HANDBOOK OF FORENSIC MEDICINE

Edited by
Burkhard Madea

WILEY Blackwell

Handbook of Forensic Medicine

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WILEY Blackwell

This edition first published 2014 © 2014 by John Wiley & Sons, Ltd.

Wiley Blackwell is an imprint of John Wiley & Sons, formed by the merger of Wiley's global Scientific, Technical and Medical business with Blackwell Publishing.

Registered office: John Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Editorial offices: The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK
9600 Garsington Road, Oxford, OX4 2DQ, UK
111 River Street, Hoboken, NJ 07030-5774, USA

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Library of Congress Cataloging-in-Publication Data

Handbook of forensic medicine / edited by Burkhard Madea, Institute of Forensic Medicine, University of Bonn, Bonn, Germany.
pages cm
Includes bibliographical references and index.
ISBN 978-0-470-97999-0 (cloth: alk. paper) – ISBN 978-1-118-57060-9 (emobi) – ISBN 978-1-118-57062-3 (epub) – ISBN 978-1-118-57063-0 (epdf) – ISBN 978-1-118-57065-4 (ebook) 1. Medical jurisprudence – Handbooks, manuals, etc. I. Madea, B. (Burkhard), editor.
RA1051.H25 2013
614'.1–dc23
2013029866

A catalogue record for this book is available from the British Library.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

Cover design by Steve Thompson.

Front cover images: Scales of justice, istock © pixhook; Human cells under fluorescent microscope, istock © dra_schwartz; Test tube rack in a laboratory, istock © Pgiam; Comparative DNA analysis, istock © Zmeel Photography; "Dust bunny" under the microscope, istock © dwaugh.

Back cover photograph: © Benjamin Nauleau.

Set in 10/12 pt Minion by Toppan Best-set Premedia Limited

1 2014

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Preface

The fundamental basis of forensic medicine has to be the proper application of justice. Not only justice itself, but societies in particular benefit from well-functioning medicolegal services concerning the following:

- The detection and solving of crimes.
- The appearance of qualified expert witnesses at court.
- The prevention of crimes (such as child abuse or torture).
- The prevention of accidents (such as alcohol- or drug-related accidents or improved car engineering).

Forensic medicine is an ancient medical discipline working at the borders of medicine and law.

This is a book on forensic medicine, not just forensic pathology. It comprises all current aspects of forensic medicine commencing with the medical aspects of death, the certification of cause and manner of death and autopsy legislation, amongst others. The following chapters deal with external violence, the physical signs of abuse and the differential diagnosis of natural versus unnatural causes of death. Of special importance is a chapter focusing on toxicology since in the field of forensic medicine further matrices are now available for toxicological analyses. Further questions dealt with are the tasks of general medicolegal practice such as traffic medicine, identification, haemogenetics, medical law and forensic psychiatry.

A knowledge of all the subdisciplines of forensic medicine is required in daily routine casework since all the results obtained by different medical and scientific methods have to be integrated into one comprehensive reconstruction of events for any particular case.

During recent years there have been a number of dramatic developments in forensic medicine – both on a technical and organisational level. Great improvements have been made, especially in the fields of forensic genetics and toxicology and also in a new area – postmortem imaging – which has been developed over the last few years. This implementation of new developments into daily routine casework has considerably improved the overall validity of expert evidence. One challenge of forensic medicine for the future will be to keep up to date with other scientific improvements and to modernise the discipline.

On the organisational level, in a number of countries, improvements can be observed in the forensic medical services; in others unfortunately there has been a decline, especially in countries where forensic medical services are mainly university-based. In a time of financial austerity, other medical disciplines are much more successful than the area of forensic medicine in attracting resources.

The main tasks in forensic medicine are forensic investigation, reconstruction and expert witness reports. These areas are, of course, regulated by national legislations, differing between countries. Therefore, there are obvious geographical constraints in writing and editing a handbook on forensic medicine. On the other hand, all countries not just on one continent but throughout the world are growing economically, and a harmonisation of different scientific and medicolegal systems is inevitable in the future. An exchange of information on an international level can do nothing but good and legal medicine is no exception. Although medicolegal systems differ from country to country, in some countries postgraduate education and daily routine procedures (standard operation procedures such as medicolegal autopsy rules) have been standardised. Aspects of quality and quality control will be also addressed in this book; for example in Europe many institutes of forensic medicine are already accredited according to ISO 17025 for forensic purposes. International guidelines and internationally accepted quality standards will be of more importance in the future in an increasingly connected world.

Authors from many countries contributed to this book. I am very much in their debt for their input into this book and, of course, to the publisher for making the implementation of this book possible. I would also like to thank my secretary Mirjam Puetz for her assistance and to Professor Kernbach-Wighton who served as assistant to the editor.

Burkhard Madea
Bonn, 2014

Foreword

Born from the need for justice, legal medicine has had to adapt to a succession of scientific, technological, sociocultural and legal contexts throughout history. As a branch of science, it has been in constant evolution and, as such, has proved a source of inspiration and change for the law, stimulating improvements, amendments and legislative innovations. Specialist forensic work involves delving into mysteries of the unknown, solving the enigmas of existence and seeking answers for the large (and small) questions of life. It is also about adding to reality, about reinventing the world that we have inherited.

Legal medicine has a mission that is far from easy, a mission that has always been (and always will be) fundamental to the correct application of justice. On it depend the honour and freedom of people. Legal medicine brings us into contact with people who carry with them the traumas of a life struck by misfortune, people that sometimes have the smell of death imbued in their skin. Hearing the voices of the victims and their families, their silent screams of anguish and despair, pain and anger, we have to make a daily effort to help them and to not give up on the world. Legal medicine is a field of study riddled with doubts, uncertainties, distress and nightmares. However, associated with this, there are also moments of great fulfilment, of intense professional and personal realization – as this is an activity that indisputably helps others. All who practise it have certainly had experiences with people and situations that have profoundly enriched their lives from a human and spiritual point of view.

Although there are differences between countries regarding the content and attributions of legal and forensic medicine, it is defined by the European Council of Legal Medicine as 'the application of medical knowledge and methodology for the resolution of legal questions and problems for individuals and society. It involves the observation, documentation, collection, assessment, and scientific interpretation of medical evidence deriving from clinical and post mortem investigations required for the different fields of law, including criminal, civil, work, family, and administrative. Its core activities are Clinical Forensic Medicine and Forensic Pathology, but other areas of science and expertise including forensic toxicology, forensic psychiatry, forensic genetics, forensic anthropology may be required depending on the nature of the case.'

As legal medicine is fundamental for the correct application of justice, it can only achieve its highest level with the collaboration of highly qualified legal medical departments that pulsate with the rhythm of life and are in tune with judicial requirements. Without good legal medicine there can never be good justice. For this is the only field of knowledge can truly shed light on situations as diverse and as complex as sexual abuse, physical and psychological trauma, the influence of toxic substances, identity and kinship, death by murder, suicide and accident, etc.

The extraordinary progress which has been made over the last few years in many areas of legal medicine has yielded ever more significant results, enabling the judicial system to become faster and more efficient, and allowing it to issue decisions that are more appropriate and scientifically grounded. As a science in constant evolution, legal medicine demands permanent contact with the latest legal, scientific, technological and judicial developments, as well as promoting discussion amongst its practitioners in order to solve common problems, share experiences and knowledge, harmonize methodology and compare results. Although legal medicine has achieved a great deal over the last few decades, there is still a long way to go. The road that lies ahead will never come to an end, because it will require constant adjustments and improvements, changing yet remaining always the same. Those who travel it will have to follow its course. Books are essential for this – they are the handrail on the flight of stairs that is the ongoing professional training that each of us undergoes throughout life – offering a means for the exchange of ideas, for the acquisition and consolidation of knowledge and skills, for making contact with different perspectives and recent doctrinal, technological and scientific developments, and for understanding both the potential and the limitations of specialist activity, as well as the new challenges that are constantly appearing.

This book, edited by Professor Burkhard Madea, offers an up-to-date view of the various facets of legal medical intervention, particularly those specialist areas that have undergone the most pronounced development (such as personal injury appraisals under civil and labour law, which still arouse considerable disagreement and controversy regarding doctrine and methodology). The fruit of incessant study, an exhaustive bibliographical review and, particularly, the practical experiences of a host of legal medical teachers and professionals (most of them household names in their respective fields), it is a repository of valuable knowledge and guidance, transmitting different interpretations and points of view which stimulate reflection. Hence, it is an essential companion for qualified

specialist intervention, which always requires the careful weighing up of different interpretive possibilities and perspectives. This book will help legal medicine become more efficient and of better quality, bringing benefits to the field.

Written in clear and simple language, yet rigorous and scientifically grounded, this is the work of competent and committed academics and professionals – people who are passionate about legal medical work, about teaching, and the sharing and transmission of experiences and knowledge, who are deeply concerned with justice and the training of its practitioners. This book reveals the human, academic and professional merits of its editor, and attends to the differences in opinion that result from the wealth of human diversity and from the different perspectives that science can offer us. It is, in short, a book that deserves our attention.

It is a pleasure for me to be able to recommend this book, not only to students and practitioners of legal medicine, but to anyone who, directly or indirectly, has an interest in legal medicine issues. I am sure it will give readers great satisfaction and provide stimulating food for thought, as well as guidance for professional practice. I congratulate the editor and the different authors on this contribution to legal medicine. It is indeed a great honour to have been invited to write this foreword.

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PART I Duties of Forensic Medicine in Modern Societies

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Handbook of Forensic Medicine, First Edition. Edited by Burkhard Madea.

1 History of Forensic Medicine

Burkhard Madea

1.1 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 Schmidtmann (1905), the last editor of the famous *Handbook of Forensic Medicine* by Johann Ludwig Casper (1857), 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; furthermore, all legal essentials in health care are especially important for doctors as part of their teaching, training and research.

Apart from forensic pathology being the essential branch in the development of forensic medicine, in the last 20 years clinical forensic medicine has developed as its 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 (Box 1.1): firstly the use of medical knowledge for legal and public purposes, secondly compulsory medical testimony for the guidance of judges in special cases, and thirdly professionalisation as its own discipline.

Characteristic topics that are dealt with in forensic medicine are summarised in Box 1.2. Forensic medicine as we experience it at the beginning of the 21st century has developed since the 19th century and from much older roots. The famous criminal code of Emperor Charles V, the *Constitutio Criminalis Carolina*, promulgated in 1532, is often called a landmark of the first importance in the history of legal medicine (Fig. 1.1). R. P. Brittain (1965a) 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.

Indeed the Bamberg Criminal Code was a model for the *Constitutio Criminalis Carolina.* However, there is a deep-seated relationship between medicine and law dating back much earlier. These roots can be found in studies of nature, the violation of law and its relation to medicine (injuries, violent death, pregnancy, still birth, rape, poisoning) and the need for experts

Handbook of Forensic Medicine, First Edition. Edited by Burkhard Madea.

Box 1.1 Development of forensic medicine.

Step 1
Medical knowledge used for legal or public purposes and dependent on the level of achievement both in law and medicine in:
- Knowledge of medical plants and 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 and malpractice.

Step 3
Further professionalisation in:
- 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 replacing textbook knowledge (e.g. J. L. Casper)
- Foundation of professorships
- Foundation of own institutes
- Foundation of societies

Box 1.2 History of characteristic topics in forensic medicine. After Fischer-Homberger (1983).

Responsibility
- Age
- Gender
- Mental diseases, melancholia
- Simulation
- Disease or malice

Sexuality and reproduction
- Marriage, family
- Impotence, infertility
- Virginity
- Conception and pregnancy
- Duration of pregnancy
- Superfetation
- Abortion
- Infanticide: hydrostatic tests of the lungs
- Rape

Injuries and violent death
- 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

to assist the law or a court – thus defining the constitution of forensic medicine as a scientific discipline with the publication of monographs, subjects of special instructions and its own research (Table 1.1).

The development and existence of the speciality of forensic medicine depends essentially on two factors: a sufficiently high development of the law and a sufficiently high development of medicine. As Ackerknecht has outlined, in very highly developed civilisations with sophisticated legal regulations there is, on the one hand, no evidence that judges consult medical persons in assessing crime. On the other hand, despite the high development of a rational medical art, no document exists that provides evidence for the use of medical experts in ancient Greece.

1.2 Civilisations of the Near East and China

Forensic medicine developed in relation to law and it was often legal requirements that pushed improvements in forensic medicine forward. 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 the 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 had to strictly adhere to the knowledge of ancient books, experiments and originality were not encouraged and, 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 way 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 of this book, describes his impression as follows:


CHRISTO AVSPICE.
PLVS VLTRA.

Des aller Durchleuchtichsten
Großmächtichsten/vnüberwindlichsten Key-
ser Carols des fünfften/ vnd des heyligen Rö-
mischen Reichs Peinliche Gerichts
Ordnung.

Von Richtern/Vrtheylern/vnd Ge-
richts Personen.

Erstlich setzen: Ordnen vnnd wöllen wir/ daß
alle Peinliche Gericht mit Richtern/ Vrtheylern vnnd
Gerichtschreibern/ versehen vnd besetzt werden sollen/von
frommen/ erbarn/ verstendigen vnd erfarnen Personen/
so tugentlichst vnd best/ dieselbigen nach gelegenheyt jedes
orts gehabt vnnd zubekommen sein. Darzu auch Edle vnnd Gelehrte ge-
A braucht

Figure 1.1 *Constitutio Criminalis Carolina* (criminal code of Emperor Charles V). Reproduced from http://commons.wikimedia.org/wiki/File:De_Constitutio_criminalis_Carolina_(1577)_13.jpg (last accessed 12 June 2013).

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 recognised, 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 recognised, and poisoning is given considerable attention. The examiner is advised on the possible importance of examining the locus, and is

Table 1.1 Timetable of the history of forensic medicine.

Date	Place/person	Events
3000 BC	China	Writings about pharmacology and pharmacognosy
1700 BC	Babylon	Code Hammurabi: rights and duties of physicians including medical malpractice
220 BC	China	Bamboo texts with information on the rules and regulations for the examination of injuries
10 BC	India	Law of Manu: competence of witnesses at court
–	Egypt	Detailed laws concerning the medical profession and forensic medicial investigation; stab wounds were categorised and closed head injuries with fractures described
–	Persia	Official code for medical fees, penalties for medical malpractice, and classification of injuries; abortion was classified as a crime
–	Greece	Autopsies on human bodies were not permitted; use of physicians as expert witnesses was loose and ill defined
572 BC	Lex Aquillia	Lethality of wounds, '*novus actus intervenium*', break in causation
460–355 BC	Hippocrates of Kos	Lethality of wounds; Hippocratic oath as basis of medical ethics
449 BC	Rome	*Lex duodecimo tabulorum*: length of gestation (for the determination of legitimacy), disposal of the dead, poisoning, and punishment depending on the degree of injury
Ancient Rome	Numa Pompilius	Advocated cutting open the bodies of pregnant women after death to deliver the baby (Caesarian section)

(*Continued*)

Table 1.1 (*Continued*)

Date	Place/person	Events
138–78 BC	Lex Cornelia (Sulla)	If a physician caused the death of his patient he should be exiled or executed; prostitution and confinements supervised
100–44 BC	Gaius Julius Caesar	A 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	Complained that laws punishing incompetent or ignorant physicians were needed; also discussed drowning
AD 131–200	Galen	Dealt with gladiators and their wounds, anatomical features, differences between neonatal and adult lungs, stillbirths (rubra, gravis, densa substantia carnis pulmonum) and live births (alba, levis, rara substantia carnis pulmonum)
483–565	Justinian	'Physicians are not ordinary witnesses, but give judgement rather than testimony' (*Medici non sunt proprietestes sed maius est iudicium quam testimonium*); discussed proof of pregnancy, sterility, hermaphrodism and simulation of diseases
5th–10th centuries	*Leges barbarorum* *Lex euricianus* *Lex visigothorum* *Lex burgundionum* *Pactus legis salicae* *Pactus legis riduarie* *Edictus rothari* *Pactus legis alla manorum*	Consisted of the Goths, Visigoths and Vandals; when medical experts have to be called; 'wergeld' (blood money) had to be paid to the victim of 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 and suicide
1100	Assizes of Jerusalem Godfrey de Bouillon	In cases of alleged illness or murder three experts were sent
1140	Roger II of Sicily	Physicians required to have an examination prior to commencing their practice
	Frederic II	Public examination of physicians, strict criteria for medical practice, and versed in the teaching of Hippocrates and Galen; requirements for ordination as a doctor: at least 21 years of age, legitimately born, have studied logic for 3 years, have studied medicine for 5 years, served 1 year of apprenticeship On qualification had to swear an oath to treat the poor free and visit each of his patients twice by day and once by night as required A human body should be dissected in public once every 5 years
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
1532	Charles V	*Constitutio criminalis Carolina*; legal medicine originated as its own speciality; requirement of a medical opinion in cases of murder, wounding, poisoning, hanging, drowning, infanticide or abortion
1575	Ambroise Pare	Wrote book on medicolegal reports, death from lightning, ante- vs. postmortem injuries, and poisoning by carbon monoxide
	Codronchius	*Methodus testificandi*
	Fortunatus Fidelis	*De relationibus medicorum*
1584–1659	Paolo Zacchia	*Questiones medicolegalis*

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. (Smith 1951)

1.3 Justinian enactments

The Justinian enactments between AD 529 and 564 represent, according to Sydney Smith, the highest point of achievement in 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 '*Medici non sunt proprie testes, sed majus est judicium quam testimonium*', was not an ordinary witness, appearing for one side or for the other side, but assisted the judiciary by impartial interpretation. The Justinian Code enjoined the cooperation of medical experts in a broad field of legal problems, for instance in the determination of the existence of pregnancy, in cases involving sterility, 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 (Smith 1951).

1.4 Further developments and Italian town charters

In the 12th century physicians were already being 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 had to say what was the matter with him (the body), where he had been injured and with what instrument it seemed 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 an alleged illness (Bonte 2000).

Box 1.3 Dates of the foundation of some European universities.

- Parma 1066
- Bologna 1119
- Modena 1175
- Perugia 1200
- Paris 1211
- Padua 1222
- Naples 1224
- Sienna 1240
- Montpellier 1289
- Prague 1348
- Jena 1365
- Heidelberg 1386
- Cologne 1388
- Leipzig 1409

The Italian town charters played an important role from the 11th to 13th century. The town charters were qualified with the help of the law faculties in the newly established universities (Box 1.3). For instance, 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 of 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. (Ackerknecht 1950/51)

In Bologna, according to the town charter a medical expert must be at least 40 years of age and to have been 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, such as the faculty of medicine of the University of Montpellier in 1374. As in Italy, forensic medicine in France

and Germany 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 – god 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' (Ackerknecht 1950/51). The physicians knew the limitations of only examining a body, they were aware of their responsibility. In the 17th century in particular it was recognised that autopsies were necessary to definitely clarify the cause of death, even if no signs of external violence were visible. Gottfried Welsch (1618–1690) in the first edition of his book *Rationale Vulnerum Lethalium Judicium* (1660) was already recommending forensic autopsies, especially in cases of intoxication, and that autopsies should be performed by doctors with experience in postmortem dissection.

1.5 Forensic medicine as a book science

The period from the late 16th to 18th century was characterised by books published on forensic medicine (Box 1.4). In 1575 Ambroise Paré published a book that dealt with medicolegal reports in 'Death from wounds or impotence or loss of any member'. He discussed abortion, infanticide, death by light-

Box 1.4 Important books in the history of forensic medicine (17th–18th centuries).

Alberti, Michael: *Systema jurisprudentiae medicae . . . cum praefatione*. Foreword by Christiani Thomasii: *Halae: Orphanotropheu* 1725 (Vol. I). Fulda: Tomus alter Schneebergae, 1729.

Ambroise, Paré: *Wund Artzney oder Artzneyspiegell. Von Petro Uffenbach . . . auss der Lateinischen Edition Jacobi Guillemeau . . . in die Teutsche Sprach . . . gesetzt*. Frankfurt/M. Fischer: Rötell (Drucker), 1635.

Ammann, Paulus: *Medicina critica*. Erfurti: Ohler; Hertz (Drucker), 1670.

Ammann, Paulus: *Praxis vulnerum lethalium*. Francofurti: Gleditsch, 1690.

Bohn, Johannes: *De renunciatione vulnerum, seu vulnerum lethalium examen*. Lipsiae: Gleditsch; Fleischer (Drucker), 1689 (2nd edn, Amsterdam, 1710).

Bohn, Johannes: *De officio medici duplici, clinici nimirum ac forensis*. Lipsiae: Gleditsch, 1704.

Cardanus, Hieronymus: *De venensis libri tres*. In: *Opera omnia*, 10 vols, Vol. 7, pp. 275–355. Lugduni: Huguetan and Ravaud, 1663.

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.

Codronchius, Baptista: *Methodus testificandi*. In: *De vitiis vocis, libri duo*, pp. 148–232. Francofurti: Wechel, 1597.

Fahner, Johann Christoph: *Vollständiges System der gerichtlichen Arzneikunde. Ein Handbuch für Richter und gerichtliche Ärzte*, 2 vols. Stendal: Franzen and 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*. Translated by Paul Amman. Lipsiae: Tarnov, 1674 (1st edn, Palermo, 1602).

Frank, Johann Peter: *System einer vollständigen medicinischen Polizey*, 4 vols. Vol. 1 (2nd edn), Mannheim: Schwan, 1784 (1st edn, 1779); Vols 2–4 (1st edn), Mannheim: Schwan, 1780–1788; Vol. 5, Tübingen: Cotta, 1813; Vol. 6 (in three parts), Vienna, 1817–1819. The supplements were edited by 1827.

Haller, Albrecht von: *Vorlesungen über die gerichtliche Arzneiwissenschaft. Aus einer nachgelassenen lateinischen Handschrift übersetzt*, 2 vols. Bern: Neue typographische Gesellschaft, 1782, 1784.

Mende, Ludwig Julius Caspar: *Kurze Geschichte der gerichtlichen Medizin. In: Ausführliches Handbuch der gerichtlichen Medizin*, Part 1, pp. 1–474. Leipzig: Dyk, 1819.

Metzger, Johann Daniel: *Kurzgefasstes System der gerichtlichen Arzneiwissenschaft*. Königsberg/Leipzig: Hartung, 1793.

Platner, Ernst: *Untersuchungen über einige Hauptcapitel der gerichtlichen Arzei-Wissenschaft durch beigefügt zahlreiche Gutachten der Leipziger medicinischen facultät erläutert. Aus dem Lateinischen übers*. Edited by C.E. Hedrich. Leipzig: Kupper, 1820.

Plenk, Josephus Jacobus: *Anfangsgründe der gerichtlichen Arztneywissenschaft und Wundarztneykunst. Aus dem Lat*. Translated by F. August von Wasserberg. Wien: Gräffer, 1782.

Ploucquet, Wilhelm Gottfired: *Abhandlung über die gewaltsame Todesarten, nebst einem Anhang von dem geflissentlichen Missgebähren. Als ein Beytrag zu der medicinischen Rechtsgelahrtheit*. Tübingen: Berger. No date.

Pyl, Johann Theodor (ed.): *Aufsätze und Beobachtungen aus der gerichtlichen Arzeneywissenschaft*. Collections 1–8. Berlin: Mylius, 1783–1793.

Suevus, Bernhardus: *Tractaus 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 (2nd edn, 1731).

Welsch, Gottfried: *Rationale vulnerum lethalium judiciium, in quo de vulnerum lethalium n atura, 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, iurispertis apprime necessarium, medicis perutile, caeteris non injucundum*. Ed. Tertia (3rd edn), Amstelaedami: Blaeu, 1651 (1st edn, Rome, Vol. 1, 1621; Vol. 2, 1625; Vols 3–4, 1628; Vol. 5, 1630; Vol. 6, 1634; Vol. 7, 1635).

ning, hanging, drowning, feigned diseases and the differentiation of ante- and postmortem wounds – all topics that still belong today to the field of forensic medicine. He also dealt with poisoning by carbon monoxide. An example of a report by 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 important *Methodus testificandi*, in which he dealt with wounds, poisoning and sexual matters and gave models of reports. Another magnum opus was the work by Fortunatus Fidelis of Palermo entitled *De relationibus medicorum*, which was the first great general systematic treatise on legal medicine. In this he deals firstly with matters of public health, secondly with wounds, simulated diseases and medical errors, next with virginity, impotence, pregnancy and viability of the fetus, and finally with life and death, mortality of wounds, suffocation and death by lightning and poisoning.

The greatest work in this early period was the *Quaestiones medico-legales* of Paulus Zacchias, the principal physician to Pope Innocence X and Alexander VII and an expert before the Rota Romana, the papal court of appeal (Fig. 1.2). He published his monumental work between 1621 and 1635 in Rome (Fig. 1.3), with two additional books published in Amsterdam in 1666. The books are divided into parts and these delve into specific questions dealing with: 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

Figure 1.2 Paolus Zacchia (1584–1659), called the 'Father of forensic medicine'. Courtesy of the US National Library of Medicine, History of Medicine Division.

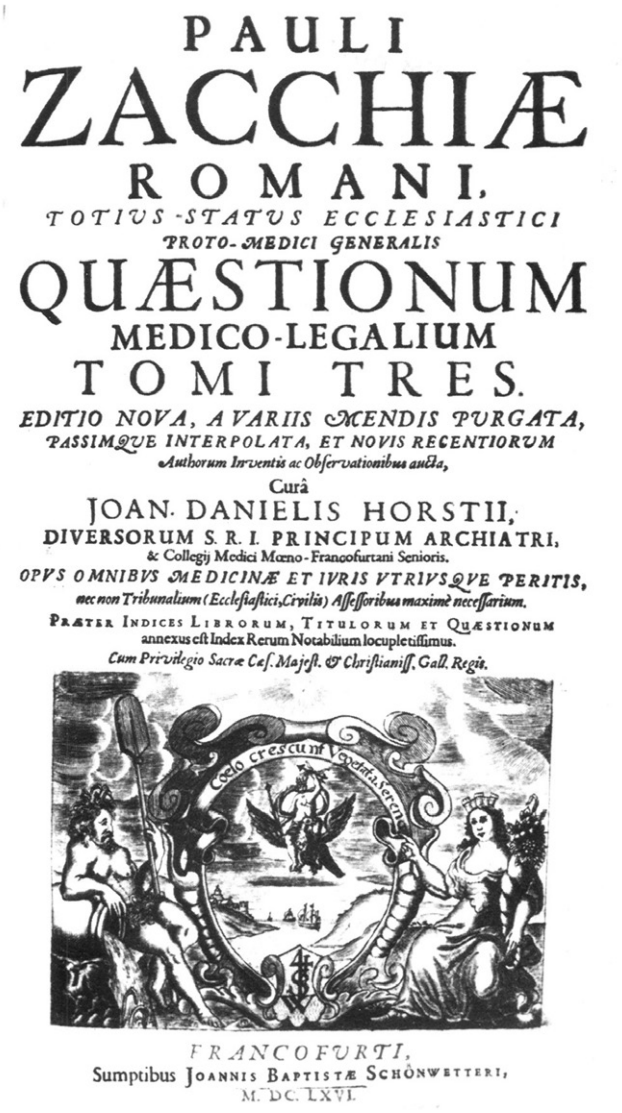

PAULI
ZACCHIÆ
ROMANI,
TOTIVS STATVS ECCLESIASTICI
PROTO-MEDICI GENERALIS
QUÆSTIONUM
MEDICO-LEGALIUM
TOMI TRES.
EDITIO NOVA, A VARIIS MENDIS PURGATA,
PASSIMQUE INTERPOLATA, ET NOVIS RECENTIORUM
Authorum Inventis ac Observationibus aucta,
Curâ
JOAN. DANIELIS HORSTII,
DIVERSORUM S. R. I. PRINCIPUM ARCHIATRI,
& Collegij Medici Mœno-Francofurtani Senioris.
OPVS OMNIBVS MEDICINÆ ET IVRIS VTRIVSQVE PERITIS,
nec non Tribunalium (Ecclesiastici, Civilis) Assessoribus maximè necessarium.
PRÆTER INDICES LIBRORUM, TITULORUM ET QUÆSTIONUM
annexus est Index Rerum Notabilium locupletissimus.
Cum Privilegio Sacræ Cæs. Majest. & Christianiss. Gall. Regis.
FRANCOFURTI,
Sumptibus JOANNIS BAPTISTÆ SCHÖNWETTERI,
M. DC. LXVI.

Figure 1.3 Title cover of Paulus Zacchias's book *Quaestiones medico-legales*.

diseases, the plague and contagion, miracles, virginity and rape, fasting, wounds, mutilation, and the salubrity of the air, water and places. Thus by the middle of the 17th century there was a well-developed literature on this subject and the subject itself was recognised as an entity.

In the 17th and early 18th centuries it was mainly professors at universities in mid Germany (at Leipzig and Halle) who contributed to the development of forensic medicine. In 1660 Welsch (at Leipzig) wrote a book on wounds, dealing with their vitality. Ten years later Ammann (also from Leipzig) produced a manuscript dealing with false beliefs in forensic medicine and in 1690 a more important contribution, his treatise on fatal wounding. In 1689, Johannes Bohn of Leipzig published his work *De renunciatione vulmerum*, which was of great importance at his time, and 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 procedures to be followed. According to 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 during the 19th century that this book knowledge was replaced by personal 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 as it became a modern science in the 19th century were located in Berlin, Vienna, Glasgow, Edinburgh and London.

1.6 Forensic medicine as an experimental science

1.6.1 France

According to Bertrand Ludes (2008), modern forensic medicine was born 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 reorganised in 1794 and professorships of forensic medicine were established in the new faculties. For instance, in 1789 Francois Emanuele Fodere (1764–1835) published his legislation enlightened by physical sciences, and treatises of forensic medicine in public health, which represented the first French publication with forensic medicine in its title. Fodere 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 in 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'.

Figure 1.4 Mathieu-Joseph Bonaventura-Orfila (1786–1853).

New horizons were opened for forensic medicine with the development of pathological anatomy and analytical toxicology, both vigorously promoted by Mathieu-Joseph Bonaventura-Orfila (1786–1853) (Fig. 1.4), one of the most influential men in the development of scientific forensic medicine in France. A born Spaniard, Orfila was physician to Louis XVIII and dean of the Paris faculty from 1830 to 1848. He published famous books such as his *Tread de Toxicology* (1813) or *Leson de Medicin Legal* (1823) and did experimental work both in toxicology and classic forensic medicine, including on putrefaction and postmortem wounds. By 1840 Orfila was able to use a test that has coined almost 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 Divergy (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 in 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

Figure 1.5 Johann Ludwig Casper (1796–1864), founder of modern forensic medicine in Prussia.

Alexandre Lacassagne (1843–1924), who hold the chair of forensic medicine in the faculty of medicine for over 30 years (1880–1913).

1.6.2 Prussia

One of the most remarkable experts in forensic medicine in the 19th century was Johann Ludwig Casper the founder of modern forensic medicine in Prussia (Fig. 1.5). 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. At the age of 24 he had already 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 a year and in 1825 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 a member of the scientific deputation for health care. In 1839 he was appointed professor and medicolegal officer for Berlin and in 1850 director of the Institute of Forensic Medicine, at that time called Unterrichtsanstalt für Staatsarzneikunde (School for State Medicine). Caspar published more than 170 papers, some at the beginning of his career on medical statistics. He published on mortality and life expectancy with regard to different countries, gender and businesses (e.g. the mean life expectancy at this time was 38.5 years in England and only 21.3 years in Russia; the mean life expectancy for theologians was 65.1 years and 50.8 years for medical doctors). In 1852 Caspar founded the quarterly *Journal of Forensic and Public Medicine* and in 1857 the first edition of his practical handbook of forensic medicine was published. His practical handbook, which was also translated into English, was revolutionary since its content was based on his own observations. 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 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 third edition of his textbook, 1860)

His practical handbook achieved eight editions, the last of them published by Schmidtmann in 1905. Caspar also published an *Atlas of Forensic Medicine*. His son-in-law was his successor as head of the Unterrichtsanstalt für Staatsarzneikunde and built in Berlin the famous Institute of Forensic Medicine at the Charité from 1884 to 1886 (Fig. 1.6). Liman had visited

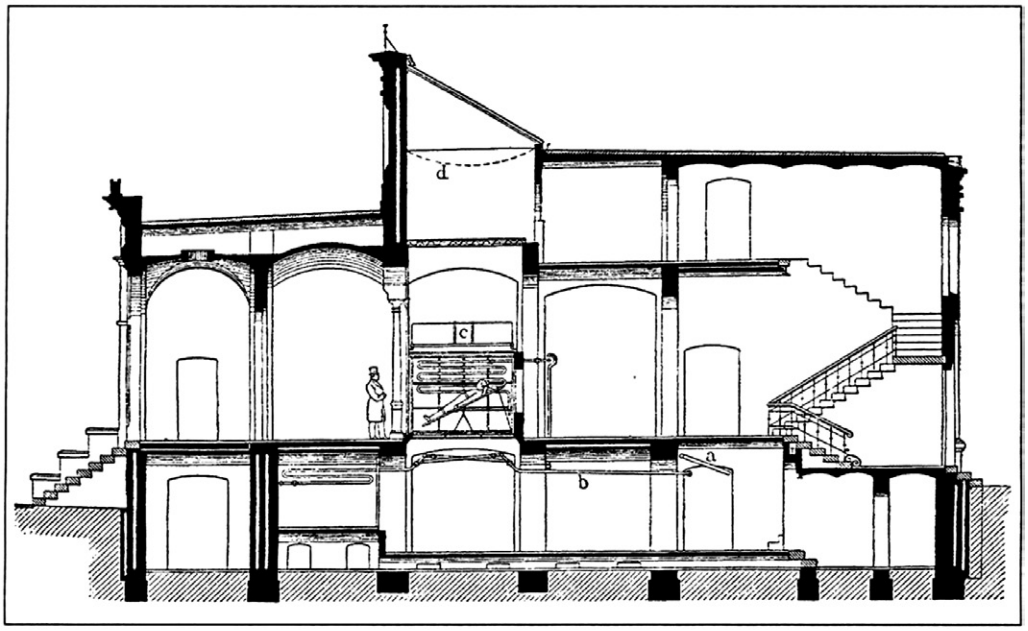


Figure 1.6 Cut-through of the Institute of Forensic Medicine at the University of Berlin (built from 1884 to 1886). The institute served also as a morgue where unidentified deceased people were exhibited for public viewing. At the first floor a man is standing in front of a glass window, behind the window bodies are exhibited in cooling cells. The Paris morgue served as a model for the construction of the morgue in Berlin.

the Paris morgue and the plans for the institute in Berlin were based on the building in Paris.

1.6.3 Austria

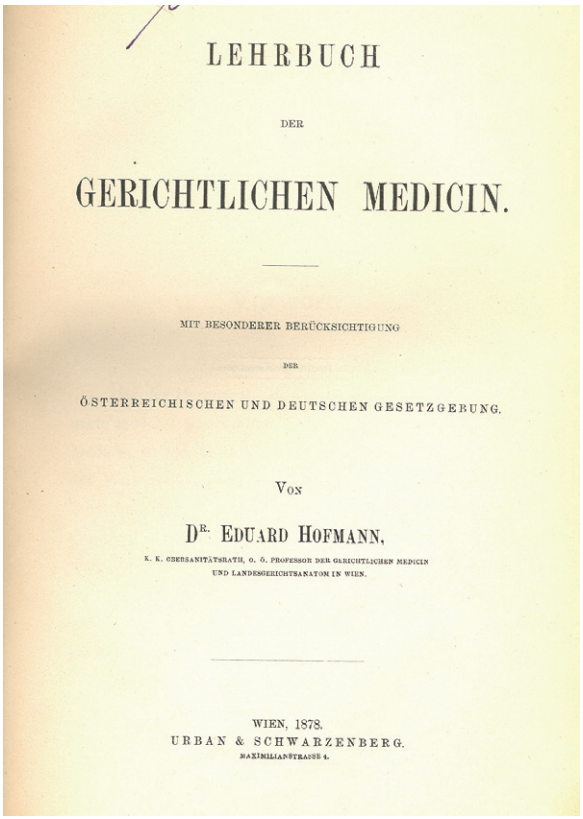
In Vienna an institute of forensic medicine had been founded by 1804 as the Institute of Forensic Pharmacology and Medical Police. The claim of a having a medical police goes back to Johann Peter Frank, who was appointed professor of surgery at the University of Vienna in 1794. His most famous book was *System einer vollständigen medizinischen 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. In 1875, Eduard von Hofmann, who was the first professor of forensic medicine at the University of Innsbruck (since 1869), moved to Vienna (Fig. 1.7). In 1878 he published his famous *Lehrbuch der Gerichtlichen Medizin* (*Textbook of Forensic Medicine*), which was translated into four languages (French, Russian, Italian and Spanish) (Fig. 1.8). The 11th edition of this textbook was published by his pupil Albin Haberda in 1922. Around this time Johann Peter Frank founded a museum of biological specimens in Vienna which can still be visited today in the so-called 'Narrenturm'. Von Hofmann moved the forensic preparations out of the Museum of Pathology and founded his own collection of forensic preparations, which now comprises more than 2000 preparations; preparations are still exhibited that appeared in his own textbook and atlas of forensic medicine.

1.6.4 United Kingdom

In the UK the development of forensic medicine lagged behind Italy, France and Germany due to differences in legal systems and practices. In contrast to English common law, the approach of Roman canon law to legal decision making encouraged the development of forensic medicine because, according to Vanezis, technical evidence by experts could be more easily incorporated as sentences were made by judges. This contrasts with 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 instruction in forensic medicine. The course subjects had been made obligatory for the medical curriculum of every medical school the year before. The rise and decline of forensic medicine in the UK is entwined with the incorporation of forensic medicine in to the medical curriculum. By 1944, the instruction in forensic medicine given to medical students was excessive. However, later, the Royal Commission on Medical Education in 1968 did not consider the subject at all. As a consequence, universities could claim with considerable justification that the provision of forensic medicine as a speciality of its own was not important, particularly when money was short and virtually no research came from those who specialised in the subject.

A decline of academic forensic medicine has not only been observed in the UK but also in Germany. Reasons for this are an inadequate financing of forensic medicine, competition for

Figure 1.7 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.


LEHRBUCH

DER

GERICHTLICHEN MEDICIN.

MIT BESONDERER BERÜCKSICHTIGUNG

DER

ÖSTERREICHISCHEN UND DEUTSCHEN GESETZGEBUNG.

VON

D^R. EDUARD HOFMANN,

K. K. OBERSANITÄTSRATH, O. Ö. PROFESSOR DER GERICHTLICHEN MEDICIN UND LANDESGERICHTSANATOM IN WIEN.

WIEN, 1878.
URBAN & SCHWARZENBERG.
MAXIMILIANSTRASSE 4.

Figure 1.8 Title cover of Eduard von Hofmann's *Textbook of Forensic Medicine*.

money between different medical disciplines and a scientific recognition that is based on impact factors and external funding.

1.7 Current problems

Forensic medicine developed as a recognisable separate scientific discipline in most European countries in the 19th century but was not considered to be a separate academic discipline. 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 that the knowledge of these sciences is only used for practical purposes (e.g. judicial questions). This approach is not only wrong but has also proved hard to dispel and has accompanied our discipline for more than a century. In England and Wales the number of professorships in forensic medicine has decreased dramatically, and in Germany several institutes of forensic medicine have closed in the last 10 years.

Forensic medicine, however, does have its own research profile and deals with questions and issues that are not found in other disciplines. These include:

- Thanatology: postmortem changes, time of death, wound age estimation, distinction between ante- and postmortem injuries and vitality of wounds.
- Traumatology as a basis of reconstruction.
- Postmortem toxicology.
- Toxicological analysis of various body fluids.
- Hair analysis.
- Driving under the influence of alcohol or drugs and impaired driving ability.
- Stain analysis.

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2 Duties of Forensic Medicine

Burkhard Madea and Gerhard Kernbach-Wighton

The traditional and comprehensive definition of legal medicine as a special medical discipline that prepares medical knowledge for the purposes of law still remains a reliable description today. Thus, legal medicine is a typical interdisciplinary subject which includes the tasks outlined in Fig. 2.1 and Box 2.1.

According to D. N. Vieira (2008), the basic mission of forensic medicine is the proper application of justice. The honour and freedom of individuals so often depend on it. Much of what justice has been in the past few centuries has passed through forensic medicine, and much of what justice ought to be will pass through it in the future.

However, although there are some common rules, there are also considerable variations between countries. Different countries do not only have different laws but also have different legal systems. For example, Europe represents a mosaic of sociocultural, economic and legal realities, and this is reflected in forensic medicine, it having always influenced a variety of operational modes, especially in terms of organisational systems, structures and functional competences (Vieira 2008).

While some countries still have a wealth of academic forensic units, in others forensic medicine is mostly carried out by so-called clinical forensic practitioners. By definition, clinical forensic medicine includes all medical (health care) fields relating to legal, judicial and police systems (Payne-James & Busuttil 2003) (Box 2.2). There is a wide range of practitioners who perform work in forensic medicine and forensic sciences:

- Forensic pathologists.
- Clinical forensic practitioners.
- Forensic nurses (e.g. in the UK).
- Forensic psychiatrists/psychologists.
- Forensic odontologists.
- Forensic scientists, especially in forensic toxicology and forensic genetics.
- Forensic anthropologists.
- Forensic archaeologists.

In special cases, consultants from other clinical disciplines are asked to work together with the forensic pathologist or clinical forensic practitioner (e.g. gynaecologists, paediatricians, emergency physicians). Separate disciplines could include forensic entomology and forensic botanical science. This system is characterised by a number of disadvantages, for instance experts from different fields may be involved in the case. For instance, a number of different experts may appear in court and the manner in which different opinions are given by them may vary, often against the interests of the victim. Secondary victimisation may occur which could be avoided by changing the way that injuries, stains or traces are secured.

While in some countries, for instance Germany, both the clinical and the pathological aspects of forensic medicine are undertaken by the same individual, in other countries this is strictly separated due to specialisation. Whereas for example a forensic pathologist in the UK or USA receives training in pathology and then specialises in forensic pathology, a specialist in forensic medicine in Germany has to study both forensic pathology and also clinical forensic medicine. Postgraduate training in forensic medicine differs from country to country,

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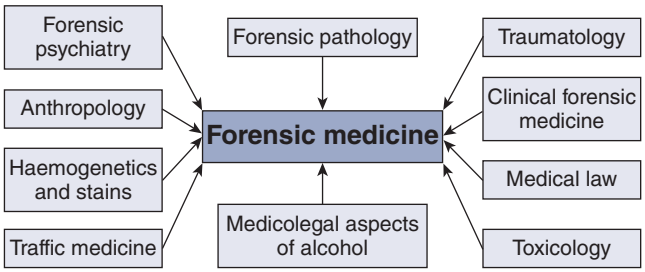

Figure 2.1 Tasks of forensic medicine. As a cross-sectional discipline, it uses the knowledge of numerous different fields of expertise.

Box 2.1 Areas of competence for specialists in forensic medicine.

- Investigations at the scene of death/crime[a]
- External examinations of bodies[b]
- External examinations of bodies prior to cremation[b]
- Estimation of the time since death[a]
- Identification[a]
- Forensic anthropology[b]
- Medicolegal autopsies[a]
- Clinical forensic medicine, particularly focused on the examination of injuries in living individuals[b]
- Analyses for alcohol and drugs[b]
- Forensic toxicology[a]
- Clinical toxicology[b]
- Expert opinion on the ability to drive[a]
- Expert opinion on the suitability for driving[b]
- Expert evidence on legal responsibilities[b]
- Haemogenetics:[b]
  - paternity diagnostics
  - stain analyses
- Coroners' autopsies[b]
- Expert opinions given in court[b]

[a]Services only offered by forensic medicine.
[b]Services concentrated in forensic medicine.

Box 2.2 Typical and additional roles of a forensic physician. After Howitt and Stark (1996) and Payne-James *et al.* (2011).

Typical roles

- Determine fitness to be detained in custody
- Determine fitness to be released
- Determine fitness to be charged: competence to comprehend charge
- Determine fitness to transfer
- Determine fitness to be interviewed by the police or detaining body
- Advise that an independent person is required to ensure rights for a vulnerable or mentally disordered individual
- Assess alcohol and drug intoxication and withdrawal symptoms
- Examine comprehensively a person's ability to drive a motor vehicle
- Undertake intimate body searches for drugs (e.g. anally/vaginally concealed drugs)
- Carry out precise documentation and interpretation of injuries
- Take forensic samples
- Assess and treat personnel injured whilst on duty, including needle stick injuries
- Pronounce life extinct at a scene of death and undertake a preliminary advisory role
- Undertake mental state examinations
- Examine adult complainants of serious sexual assault and the alleged perpetrators
- Examine alleged child victims of neglect, physical or sexual abuse
- Examine victims and assailants in alleged police assaults

Additional roles

- Expert opinion in courts and tribunals
- Death in custody investigation
- Provide opinion in Fatal Accident Inquiries (FAI; Scotland)
- Pressure group and independent investigators in ethical and moral issues:
  - victims of torture
  - war crimes
  - female genital mutilation (female circumcision)
- Refugee medicine (medical and forensic issues)
- Asylum seeker medicine (medical and forensic issues)

for example in Germany postgraduate specialisation in forensic medicine takes at least 5 years (60 months) according to the teaching regulations of the state medical chambers.

One common problem in many countries is that forensic medicine is often extremely underfunded. Since forensic medicine carries out work for the police, justice and public health departments, and is also engaged in medical education and research, it should be financed by all four ministries in charge (Ministry of Justice, Internal Affairs, Health Care and Science). However, often forensic subjects and forensic institutions are funded by Justice Ministries or Ministries of Science only and therefore appear to be relatively underfunded. Forensic medicine and forensic sciences therefore need to pay close attention to the great shifts of our day and age, and spare no effort to modernise themselves, to keep up-to-date and to develop, so that they can play a fundamental role in the service of justice and community and remain at the centre of academically qualified research and teaching.

In Scotland, funding of medicolegal services is provided by particular service contracts between the Crown Office (Ministry of Justice) and the appropriate university departments (of pathology) or the National Health Service (NHS). By this method, posts and administration within such departments are directly financed by the Crown Office based on contracts running for periods such as 5 years. After this period, contracts are reviewed and negotiated again. The system also applies to clinical medicolegal services. Although it can be assumed that this type of funding appears rather safe in terms of changing

external factors and conditions, it might create problems regarding the independency of forensic medical experts originating from a conflict of interest. Furthermore, departments may be transformed to sole service providers, thus losing their appropriate academic input.

University institutes of forensic medicine are responsible for the teaching of medical students within the faculty. Essential subjects of teaching are: postmortem examination, certificate of death, legal and ethical issues within the profession, signs of violence, securing and documentation of findings, contact with the inquiring authorities, and duties and rights of experts and witnesses.

Knowledge in legal medicine is indispensable for every physician since:

- Every doctor has to be able to carry out an external postmortem examination.
- Most victims of violence are treated in hospitals and private practices and every physician has to be able to recognise and record injuries and might be summoned to court.
- The physician has to know their own and the patient's position in the respective legal system including all rights and obligations.
- The doctor has to be informed about examinations that might be carried out in an institute of legal medicine in order to advise her or his patient adequately (e.g. on clinical toxicology).

Additionally, the physician has to learn how medicolegal experts evaluate statements and findings since she or he will also have to verify their validity and significance in practice (e.g. defensive manoeuvres in cases of child abuse, simulated illness, etc.).

At conventional and traditional universities, forensic medicine is not only taught in the medical faculties but also in several other faculties that are closely linked to this subject, for example faculties of law and of mathematics and natural sciences (food chemistry, pharmacy, biology, chemistry).

It is the medicolegal commitment to research and teaching, in particular, that creates an indispensable basis for proper quality in services, thereby increasing the stability of law and justice in society. Legal medicine also provides advice to jurisdiction and politics regarding case law and required amendments.

Medicolegal research deals with very specific subjects which should remain separate from other subject areas; this is essential for public and legal security. Its main tasks are: thanatology, traumatology as a basis for reconstruction of actions and movements, toxicological and molecular biological examinations of forensically relevant matrices, ballistics of wounds, epidemiology and causal research in alcohol or drug affiliated traffic accidents, establishment of limits regarding the ability to drive, and those aspects of medical law and status that originate from forensic practice.

Knowledge based on medicolegal routine and research has always been used in aspects of prevention. For example, an important increase of passive vehicle safety could be derived and developed from autopsy findings in road traffic accident victims.

There can be no doubt that justice will only be able to reach its maximum effectiveness if it can rely on a wide collaboration of modern and dynamic medicolegal and forensic services, services which need to operate at the swift pace of life and legal changes (Vieira 2008). As there are various legal systems and different types of medicolegal systems worldwide, international cooperation and harmonisation is essential. As there is no international consensus on how forensic medicine should be delivered, there is a continuing need to learn about our similarities and differences, in order to further harmonise the systems within medicolegal practice, especially medicolegal autopsy rules and laboratory procedures.

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3 Forensic Medicine and Human Rights

Hans Petter Hougen

3.1 Human rights issues

Forensic pathologists are trained in trauma description, interpretation and report writing. They are used to cases including all kinds of violence, and, therefore, it is natural that forensic expertise is used in the documentation of human rights violations.

In post World War II society, human rights are based on the United Nations (UN) Universal Declaration of Human Rights from 1948. This declaration was not ratified as a convention until 1984. The majority of UN member countries have ratified the convention, which has been integrated into their legislation, and from 1994 the UN has had a High Commissioner for Human Rights based in the Geneva office. Other conventions have also been passed during the years and are integrated in national legislations. Article 3 of the Declaration of Human Rights states that 'Everyone has the right to life, liberty and security of person'. Article 5 states that 'No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment'. These are the articles that are relevant for forensic medicine.

Forensic documentation of human rights violations started in the 1970s, primarily with the work of Amnesty International's Danish medical group. Their results were reported, and soon other organisations such as Physicians for Human Rights took up this important work. During the last four decades hundreds of publications have appeared on documentation of human rights violations, mainly torture. The interest in and importance of the forensic documentation of human rights violations have steadily grown. Thirty years ago virtually no forensic pathologist dealt with the subject, but today there is a wide acceptance of the importance of forensic documentation of human rights violations. For instance, the subject forms a natural part of international forensic conferences. The UN High Commissioner for Human Rights has relied on forensic documentation for many years, and other international organisations (such as the Organization for Security and Co-operation in Europe (OSCE) and Organization of American States (OAS)), frequently make use of forensic expertise in human rights violation cases. During the last 10 years the International Committee of the Red Cross (ICRC) has also made use of forensic expertise in their work.

The forensic human rights work today is based on different activities: exhumation and examinations of bodies in singular or mass graves (forensic archaeologists, forensic anthropologists, forensic pathologists, forensic odontologists, crime scene technicians and morgue technicians); autopsies on fresh bodies (mainly forensic pathologists and morgue technicians); examination of living torture victims (forensic pathologists and psychiatrists); studies of documents like medical records, police reports and autopsy reports (forensic pathologists); court appearances, mainly international courts like the regional human rights courts (the European, the African and the Inter-American International Crime Court, the International Crime Tribunal of former Yugoslavia (ICTY), etc.); and last but not least publication of reports, scientific articles, text books and conducting training courses.

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3.1.1 Human rights courts

The African Court of Justice and Human Rights, previously named the African Court on Human and Peoples' Rights, was founded by the African Union in 2004. The court is located in Arusha in Tanzania. The jurisdiction of the court is 15 of the African states – those countries that are member states of the Protocol of the African Charter on Human and Peoples' Rights.

The European Court of Human Rights was established in 1959 by the Council of Europe. The court is located in Strasbourg, France, and its jurisdiction is the 47 member states of the Council of Europe.

The Inter-American Court of Human Rights was founded by the OAS in 1979. The court is based in San José, Costa Rica, and together with the Inter-American Commission on Human Rights it makes up the human rights protection system of the OAS. Its jurisdiction is 21 of the South and Central American states. The United States and Canada have not ratified the convention.

There is no human rights court for the Asian or Pacific region, although the question has been raised several times over the years, most recently at an Asia–Pacific conference of lawyers.

3.1.2 Ad hoc and permanent tribunals

Ad hoc tribunals are a known system for dealing with the international prosecution of war crimes, among them genocide. The first tribunal was set up in Nurnberg in 1945 after the Holocaust during the Nazi regime.

Tokyo War Crimes Tribunal lasted from 1946 to 1948, where Japanese military and political leaders were charged with war crimes committed in Japanese occupied countries during World War II.

The ICTY was founded in 1993 in the Haag by the UN after the beginning of the Balkan wars. The tribunal is scheduled to end in 2014. Several Balkan leaders have been sentenced to long imprisonment, while the cases against the two main characters, Radovan Karadžic and Ratko Mladić, are only in their initial phase.

The International Criminal Tribunal for Rwanda is, like the ICTY, under the auspices of the UN and is situated in Arusha, Tanzania. Several of the main perpetrators in the genocide in Rwanda have been sentenced, while others still are awaiting trial in detention.

Extraordinary Chamber in the Court of Cambodia, also known as the Khmer Rouge Tribunal, is a national court established pursuant to an agreement between the Royal Government of Cambodia and the UN to charge senior members of the Khmer Rouge for serious violations of the Cambodian penal code and international humanitarian law between 1975 and 1979. The court was founded in 2003 and is situated in Phnom Penh. The end date is still not scheduled.

The International Crime Court was founded by UN in 2002 and is situated in the Haag. One hundred and twenty of the UN members have ratified the statutes of the court. It is a permanent tribunal court to prosecute individuals for genocide, crimes against humanity, war crimes and crime of aggression. The court opens investigations when it finds it necessary, for instance in the Democratic Republic of Congo, Uganda, Darfur (Sudan), etc. The court frequently publishes a list of people who have been indicted and among them are both previous and present heads of states. The first verdict was in 2012 when Thomas Lubanga from Congo was sentenced to 14 years imprisonment for forcing children to fight as soldiers.

3.1.3 Exhumations and autopsies

Mass killings have unfortunately been – and still are – the reality in several parts of the world. Often, the bodies are dumped in graves, single graves or mass graves, and often the graves are disguised. It is important to locate the graves, open them, exhume and examine the bodies (Fig. 3.1). There are several reasons why this should be done. First of all the relatives need to know what has happened to their next of kin. The identification and verification of the cause of death is also important as evidence in criminal and human rights courts, and finally documentation of the atrocities are important for the prevention of new human rights abuses.

The first challenge is often to locate a grave. Unmarked graves have been found both inside cities, in open land and in forests, even in remote mountain areas. To find the location of

Figure 3.1 Exhumation of a single grave, the Philippines.

a grave often needs assistance from botanists, geologists, archeologists and advanced technology like satellite photos and earth radar, which have been helpful in several cases.

Once the grave is identified it has to be opened carefully, so that evidence is not destroyed. Many mass graves have been opened with shovels and even excavators, with the inevitable result of broken and co-mingled bones. Forensic archaeologists and forensic anthropologists play the key role in this part of the work, ensuring that the excavation is done thoroughly and is documented in the right way. Thereafter, the bodies are transported to a suitable place where they can be examined thoroughly by the pathologist to establish the cause of death, and by the anthropologist and forensic odontologist to establish the identity (if possible). Crime scene technicians register all the personal belongings and document with photographs at all stages of the process, and the morgue technician assists the pathologist. This teamwork has proven very efficient on many occasions in all continents of the world.

Fingerprint experts may also play an important role in the identification process if the bodies are sufficiently preserved, and if reliable comparison fingerprints are available. Forensic geneticist assistance may also be required to establish the DNA type of the deceased. The forensic anthropologist can reveal gender, age, height, ethnicity and bone trauma. The pathologist can document and interpret bone and soft tissue trauma and other pathology, if soft tissue is present, and establish the cause of death. The forensic odontologist can examine the denture and make a comparison with antemortem data, if they exist, and in that way identify the deceased. The forensic geneticist can compare the DNA of the deceased with possible live family members or with DNA from the deceased's toothbrush, shaving gear, etc.

Case example

In 1999, North Atlantic Treaty Organization (NATO) forces threw the Serbian army out of Kosovo. The UN initiated forensic work immediately after NATO had taken over, and several international teams worked in the country doing exhumations and autopsies, primarily to document the causes of deaths of thousands of people who had been killed by the Serbs, but also to identify the deceased bodies – lying on the ground, in wells and in rivers, buried in the countryside or in cemeteries, or lying more or less incinerated in burned houses. Forensic teams were either working as stationary teams in tents converted into primitive autopsy facilities, or were working as mobile teams doing open air autopsies (Fig. 3.2). The work continued in 2000 but then all the autopsies were performed at a central facility, a previous factory, that was transformed into an autopsy facility during the winter 1999–2000 (Fig. 3.3). International teams consisted of experts from more than 30 different countries, and in the year 2000 and thereafter the work was carried out according to the guidelines of the Minnesota Protocol.

Figure 3.2 Open air autopsy on a hot summer day, Kosovo.

Figure 3.3 Autopsy teams, Kosovo.

In several cases forensic genetics also plays an important role in the documentation of human rights abuses. Examples are in Argentina and Chile where many people disappeared during the military regimes in the 1970s and early 1980s. On many occasions, newborn children were taken from detained women and adopted by families of the regimes. The true identities of these children have later been revealed through DNA analyses.

The identification of victims from mass graves in Latin America, the Balkans and other regions have later been made later using DNA techniques. The International Commission on Missing Persons (ICMP) maintains a DNA laboratory in Sarajevo, Bosnia, that processes samples of mortal remains on a large scale. In addition, the Sarajevo laboratory maintains an active programme of technical development and new methods of validation.

Interpol has developed an international person identification form, the DVI (disaster victim identification) form, where both antemortem and postmortem information can be registered. The antemortem forms are yellow and the postmortem are pink; apart from that the forms are the same. They are divided into a general part (clothing, personal documents, jewelry, etc.), a pathology part (scars, tattoos, etc. plus external and internal traumatology and pathology) and an odontology part. All information can be processed electronically with software especially developed for the purpose, if needed in incidents with several unidentified bodies.

3.1.4 Forensic observers and inspectors

International forensic observers may also be required for autopsies in high profile cases, where the death is, or is suspected to be, due to human rights violations. Forensic observers may be present at an autopsy to ensure impartiality and to check the correct procedures are carried out; they are often present as representatives at the request of international organisations such as OAS, OSCE, etc. The situation of the local forensic pathologist can be difficult, as most forensic pathologists are government employees, and in cases of human rights violations the suspected perpetrators may be representatives of the authorities. The presence of an international observer can therefore be of great help for the local pathologist. Unfortunately, local pathologists can be under severe pressure and therefore reluctant to sign reports opposing the authorities' view on a case. A sad example is what happened in an African country some years ago, where a well-known pathologist, who on several occasions witnessed against the authorities, died in a car accident that was never investigated thoroughly. A suspicion of foul play was evident.

Case example

The Colombian Revolutionary Armed Forces, FARC, had kidnapped 12 local politicians from the city of Cali and kept them hostage for 5 years. Suddenly it was announced that they were dead and buried by the guerrillas in FARC-occupied territory. FARC said that they were killed by the military, and the army announced that they were killed by FARC. The public demanded that the bodies should be handed over to the families for burial, but FARC would not let the authorities enter their occupied area to exhume the bodies. After long negotiations, the ICRC, together with the Swiss, Spanish and French embassies, managed to get permission from FARC to go in and exhume the bodies. The bodies were buried in a remote jungle area, and the graves were difficult to locate. After several days of intense search and digging the bodies were finally found and transported to the city of Cali (Fig. 3.4). At the Institute of Forensic Medicine all the bodies were autopsied under the strict supervision of an impartial, international expert committee consisting of forensic pathologists, odontologists and anthropologists from Argentina, Canada, Denmark and Portugal. The committee was formed by OAS. All the bodies were identified. They had all died of multiple gunshot wounds, but it was impossible to determine whether they had been shot by FARC or the army. No irregularities were detected in the way the bodies were autopsied or identified.

Figure 3.4 Body bags with killed hostages, Colombia.

On some occasions international experts on inspection missions have been harassed by the local authorities, especially when they have represented non-governmental organisations (NGOs), for instance Amnesty International.

3.1.5 Autopsy protocols

Forensic autopsies and preparations of autopsy reports should preferably be done according to the Minnesota Protocol. This

Case example

A human rights activist was killed in 1996 in his house in Nairobi, Kenya by unknown intruders. Amnesty International was contacted by the NGO for whom the deceased had been working. The autopsy was scheduled for the next day, and Amnesty International was able to find a forensic pathologist who left for Nairobi a few hours later. The next morning the forensic pathologist was taken to the city morgue, where the autopsy was to be performed. The morgue supervisor had been informed by the police that activists would come with a foreign forensic pathologist, and he tried to prevent his presence at the autopsy. The doctor doing the autopsy arrived and was informed about the foreign expert and had no objections to his presence; but midway through the autopsy the morgue supervisor came with the police and together they virtually threw the foreign export out of the morgue. After some arguing, however, he managed to get in again. After the autopsy, which showed that the cause of death was blunt force to the head caused by a heavy blunt object, the foreign pathologist was interviewed by a newspaper and the next morning there was a front page article with a photo, where the pathologist told that he had been harassed. The host organisation did all they could to hide the pathologist, and his embassy had to take several precautions to get him safely out of the country.

A few years prior to this incident, a doctor representing Physicians for Human Rights was detained for several days after he had been present at an autopsy where foul play was suspected.

protocol forms part of the 'Manual on the Effective Prevention and Investigation of Extra-legal, Arbitrary and Summary Executions'. The manual was adopted by the UN in 1990 and contains legal, forensic pathology and forensic anthropology chapters. Unfortunately this manual is not as well known among forensic pathologists as it is in the international courts.

3.1.6 Clinical forensic examinations

As forensic pathologists in many countries of the world are also trained in clinical forensic medicine, the examination of living victims of human rights abuses, i.e. torture victims, should whenever possible be performed by them. In countries where clinical examinations are not part of forensic pathology work, specially trained clinicians should perform the examination of these persons. However, forensic pathologists and most clinicians are not specialists in psychiatry, and since torture victims almost invariably have mental sequelae, a psychiatric evaluation should be included if possible as a natural part of the examination. Torture is described in more detail later in this chapter.

Torture victim examinations can either be done during fact-finding missions performed by NGOs, like Amnesty International and Physicians for Human Rights, or by international organisations such as the UN (the High Commissioner of Human Rights' Special Rapporteur on Torture), or examinations can be performed by local forensic doctors. Local forensic doctors in countries where torture takes place may be at risk if they examine torture victims, and therefore often need protection or assistance from, for instance, the UN or other international organisations. However, there are unfortunately several accounts of doctors who have done this important work at personal risk and have suffered the ultimate consequences. Situations like this can be avoided if the examination is performed by, for example, the Special Rapporteur on Torture, as he or she and their team always visit a country with an official invitation from the government. Luckily, however, several doctors have done – and still do – important torture documentation in less democratic countries without suffering major harassment from the authorities.

Case example

The political climate in the West African country Togo became unstable early in the 21st century. Human rights had deteriorated considerably, and due to the poor human rights conditions, the European Union (EU) put a large economic support to the country on hold. The government promised to improve the human rights conditions, and the Special Rapporteur was invited to visit the country. In 2008 the rapporteur at that time, Professor Manfred Nowak, and his team, also including a forensic pathologist, visited the country and paid many non-announced inspection visits to police stations, detention centres, prisons and military camps. Several violations of human rights conditions, both judicial and medical, were detected, but no case of torture was found. It was obvious that the human rights situation had improved, even though it was far from perfect. Later on, the EU reinstalled economic support to the country.

Fact-finding missions may also be used to document large-scale forced population displacement and forced labour. An example is a series of investigations performed in the border area of Thailand and Burma. The dictatorship in Burma often forced locals to work as slaves on road building and other public projects and as carriers for the army. At the same time they often force entire village populations to abandon their land and move to more remote areas. As soon as the inhabitants are forced out of their houses, the village is mined to hinder them from returning home. Such mining unfortunately results in many land mine victims (Fig. 3.5) and the result of the slavery is severe suffering and often death (Fig. 3.6).

Hundreds of thousands of people live as refugees in the Western world and many of these people are torture victims. Groups of doctors, such as Physicians for Human Rights in the USA and the Amnesty International Medical Group in Denmark, have for many years examined torture victims who have fled from their country of origin. This work is important not only for the torture victim (documented torture may improve the possibilities of obtaining asylum), but also for documentation of the atrocities, using publication to induce pressure on both local and international authorities.

Examination of victims immediately after the torture has taken place is usually difficult, as many authorities keep the victims until bruises, excoriations, etc. have disappeared. However, local trained doctors have over the years documented a substantial amount of information on recent torture victims. Recent torture cases have also been examined during different international fact-finding missions. Medical groups in the Western countries mostly examine victims with sequelae to the torture.

Torture victims should always be examined according to the Istanbul Protocol. This document is the result of work done by an international expert group and was adopted by the UN in 1999. The manual is widely available and is used all over the world thanks to years of promotion work, including training courses, performed by several NGOs.

3.1.7 Forensic evaluation based on documents

The need for forensic evaluation in human rights violation cases may arise several years after the person or persons in question are dead, and exhumation and further investigation of the body may be impossible for various reasons (e.g. cremation). However, as forensic pathologists are used to preparing reports based not only on autopsy findings but also including information from medical records and police reports, evaluations can be performed based on documents. This evaluation may of course not be of the same quality as if one had been present at the autopsy, but it can be valuable in court cases, particularly if photographs of the crime scene, exhumation, autopsy, etc. exist.

Experienced human rights forensic pathologists are frequently approached by different human rights organisations,

Figure 3.5 Land mine victim, Burma. He was smuggled out of the country and the photo was taken at a hospital in Thailand.

Figure 3.6 Forced labour, Burma. Villagers are forced to carry heavy weights of cargo over long distances. The painting was made by a survivor.

families of victims or their lawyers, and sometimes also by authorities, to evaluate a case. In these cases, as in all other forensic work, impartiality is of the utmost importance and one should always be careful not to overinterpret findings and statements. It is also important to be aware of the possibility of inaccuracy in the original autopsy report due to circumstances under which the local pathologists work. Again, most forensic pathologists are government employees and in many countries this is unfortunately often incompatible with total impartiality. Case reviews have on several occasions played an important role in the outcome of human rights violation cases.

Case examples

A Danish and a Portuguese forensic pathologist reviewed a case from Egypt, where a young man was beaten to death by police officers. The officers were finally sentenced to 4 years' imprisonment. The report from the foreign forensic pathologists played an important role in the outcome of the case. The death of the young man due to police brutality played an important role in the start of the Egyptian revolution in the beginning of 2011.

In a case at the Inter-American Court of Human Rights in the second half of 2011, the State of Ecuador was accused of negligence and violation of human rights. In 1992 a man was caught by the police during a robbery. He fired at the police, they answered the fire and the man was wounded. The police took him to a hospital where he was observed for some hours and then discharged. The police brought him back to the detention centre but his situation deteriorated rapidly. He was re-hospitalised and was kept for several days only treated with intravenous glucose water. He became febrile and unconscious, and was then transferred to a hospital in a larger city, where he was operated on and the surgeons found a perforated intestine and severe peritonitis. The man died a few days after the surgical intervention. The family complained of neglect and human rights abuse from the doctors and the hospital management and filed a case against them. The case went through the national court system and finally ended in the Inter-American Court of Human Rights in 2011. The court asked two internationally known forensic experts to review the case. At this time there was no body to examine, so the experts were left with documents only. Based on the hospital records, police reports and some witness information the experts made a report that clearly stated that it was a case of severe medical neglect. The Court found the State of Ecuador guilty and sentenced the state to pay a considerable economic compensation to the family, together with an obligation to publish the verdict throughout the country, and to change and strengthen the rules regarding treatment in public hospitals.

3.1.8 Expert witnesses in international courts

In contrast to other medical specialists, forensic pathologists are used to appearing in court as expert witnesses. This forms an important part of the forensic pathologist's work as he or she here has the possibility of further explaining and underlining the facts of the report in a language understood by non-medical professionals. The different international courts vary in their use of forensic expertise in human rights violation cases, for instance the ICTY only occasionally has used forensic expertise, while forensic experts have often acted as expert witnesses in cases brought before the Inter-American Court of Human Rights. The special crime court in Cambodia dealing with cases against former Khmer Rouge leaders has only recently considered the idea of consulting forensic expertise. It is also thought-provoking that many human rights lawyers are unfamiliar with the capabilities and usefulness of forensic expertise in the court room.

Case example

In 1991 two young brothers, 14 and 17 years old, were approached by the police in the city of Callao, Peru. The police suspected that they were planning a theft. The boys were taken outside the city in a police car, where they were beaten up and shot through the hands, and finally shot in the head. The family was worried when the boys did not come home for supper and they searched for the boys everywhere, but with no result. Finally, the family received information that the boys could be dead, lying in the morgue. The family went to the morgue and identified the boys. The boys were autopsied, and the cause of death was stated as gunshot wounds to the head. The family took a few photos of the dead boys lying in their coffins prior to the funeral. The family sued the authorities and finally, after several years, the responsible policemen were sentenced to several years in prison. However, the family wanted compensation, and the case went all the way to the Inter-American Court of Human Rights. Their lawyer, an international human rights defense lawyer, who was working primarily pro bono, asked two Spanish forensic pathologists to review the case. They made a report that was included in the case file. When the case came up in the Inter-American Court in 2003 the lawyer asked two other doctors, one with many years' experience in anti-torture work, and the other, an experienced forensic pathologist, to act as expert witnesses in the court. They travelled to San José and witnessed for the court on the torture aspects and forensic pathology interpretations of the injuries based on the documents of the case and the amateur photos. The state of Peru was found guilty and was sentenced to pay a considerable economic compensation, to publish the verdict and to name a public school after the boys.

3.1.9 Training and research

Training is a cornerstone in forensic human rights. Physicians for Human Rights, the International Rehabilitation Council for Torture Victims (IRCT), the Norwegian Medical Association, and others have web-based training programmes. Summer schools, PhD courses, seminars and conferences are arranged by several universities and NGOs. Tuition is on several levels – from grassroots to the highest postgraduate academic level. One training programme that has recently finished in Turkey comprised the teaching of more than 4000 doctors, practicing lawyers and judges in the understanding and application of the Istanbul Protocol. This vast training programme was planned and carried out by the IRCT and the Human Rights Foundation of Turkey. Every year the IRCT arranges Istanbul Protocol training courses in collaboration with their local representatives in different parts of the world, and the Argentine Forensic Anthropology Team (Equipo Argentino de Antropología Forense; EAAF) arranges combined forensic anthropology/forensic pathology/forensic genetics courses in collaboration with local human rights organisations in both Africa and Asia. Written manuals and other teaching materials are produced by several different organisations and are easily accessible via the internet. The IRCT publishes a free Medline indexed scientific journal, *Torture*, which publishes a variety of human rights

related (mainly forensic) articles. There are many activities arranged, but the need for knowledge is immense. Unfortunately, the documentation of human rights violations is still far from complete.

3.1.10 International expert network

Relatively few forensic specialists work with human rights violation cases, and the majority do it part time as their main occupation is elsewhere, for instance in universities or state forensic institutions. The work is international and the experts collaborate or represent different organisations; the need for an international expert network has been felt by many of us for years. In 2009 such a network was formed by IRCT and the University of Copenhagen. Since then the network has been activated on several occasions and has shown to be effective and rapid. The network has, for instance, already published an operational manual for forensic examination methods by medical teams, has made a statement against hooding that led to the practice now being condemned in Britain and has also intervened effectively in specific human rights abuse cases.

3.2 Torture

The UN definition of torture is stated in Article 1 of the Convention Against Torture and other Cruelties, Inhuman or Degrading Treatment or Punishment from 1948. Torture was already mentioned in the Human Rights Declaration from 1948 (Article 5) but with no clear definition. Under the UN Convention Against Torture of 1984, torture involves intentional infliction of pain, by a public official, to obtain information. The full definition of torture is:

> Any act by which severe pain or suffering, whether physical or mental, is intentionally inflicted on a person for such purposes as obtaining from him or a third person information or a confession, punishing him for an act he or a third person has committed or is suspected of having committed, or intimidating or coercing him or a third person, or for any reason based on discrimination of any kind, when such pain or suffering is inflicted by or at the instigation of or with the consent or acquiescence of a public official or other person acting in an official capacity.

This definition excludes 'pain or suffering arising only from, inherent in or incidental to lawful sanctions', which seems designed to permit the death penalty.

The Convention Against Torture has been ratified by most of the UN member countries. To monitor the prevention of torture and other cruel, inhuman or degrading treatment or punishment, the UN has established the Committee Against Torture (CAT). CAT consists of 10 independent experts elected by the member states. All member states are obliged to submit regular reports to CAT on how the rights are being implemented. States must report initially 1 year after acceding to the Convention and then every 4 years. CAT examines each report and addresses its concerns and recommendations to the member state(s) in the form of 'concluding observations'.

In addition to the reporting procedure, the Convention establishes three other mechanisms through which CAT performs its monitoring functions: (i) CAT may also, under certain circumstances, consider individual complaints or communications from individuals claiming that their rights under the Convention have been violated; (ii) undertake inquiries; and (iii) consider inter-state complaints.

According to the Convention torture is absolutely prohibited under all circumstances, both in war and in peacetime. Unfortunately, many of the countries who already have integrated the Convention in their national legislation fail to meet these requirements. Even though physical punishment (e.g. whipping) is not included in the torture definition, this act is inconsistent with Article 5 of the UN Declaration of Human Rights. However, several of the UN member countries still practice physical punishment and the death penalty.

The Geneva Conventions and their Additional Protocols are at the core of international humanitarian law, the body of international law that regulates the conduct of armed conflict and seeks to limit its effects. They specifically protect people who are not taking part in the hostilities (civilians, health workers, aid workers) and those who are no longer participating in the hostilities, such as the wounded, the sick, shipwrecked soldiers and prisoners of war. The conventions date back to 1864 when the first was adopted by 12 nations based on an initiative by Henri Dunant, the founder of the ICRC. New protocols were added after international diplomacy conferences during the years on the initiatives of the ICRC and the Swiss government. In 1949 the modern version was signed after yet another international conference in Geneva and the conventions were adopted by the UN. Later additional protocols have been included which deal with:

- The protection of persons deprived of liberty, especially in non-international armed conflicts.
- Mechanisms of control for the respect of international humanitarian law and reparations to victims of violations.
- The protection of internally displaced persons.
- The protection of the natural environment.

The Council of Europe is an international organisation promoting cooperation between all countries in Europe in the areas of legal standards in human rights, democratic development, the rule of law and cultural corporation. It was founded in 1949, and has 47 member states with some 800 million citizens. In 1987, the European Convention for the Prevention of Torture and Inhuman or Degrading Treatment or Punishment was adopted by member states of the Council of Europe. It was subsequently amended by two protocols that entered into force in 2002.

The European Committee for the Prevention of Torture and Inhuman or Degrading Treatment or Punishment or, more shortly, the Committee for the Prevention of Torture (CPT), is the anti-torture committee of the Council of Europe. The CPT visits places of detention in the member states. The visits are unannounced and are carried out by small teams of CPT members, who usually call in additional experts, like forensic doctors. After each visit a report about the findings and recommendations are drawn up and sent to the respective governments. After 20 years of experience this European model was adapted and generalised by the UN through the Optional Protocol under the Convention Against Torture (OPCAT) in 2006. So far 60 UN member countries have ratified the protocol, and a further 22 countries have signed but not yet ratified it. OPCAT, which entered into force in June 2006, has created the Subcommittee on Prevention of Torture (SPT). The SPT has a mandate to visit places where persons are deprived of their liberty in the membership countries. Under the Optional Protocol, membership countries should establish independent national preventive mechanisms for the prevention of torture at the domestic level.

The World Medical Association (WMA) has a set of international guidelines for physicians concerning torture and other cruel, inhuman or degrading treatment or punishment in relation to detention and imprisonment – the Tokyo Declaration. It was adopted in 1975. According to the declaration, torture is defined as:

> The deliberate, systematic, or wanton infliction of physical or mental suffering by one or more persons acting alone or on the orders of any authority to force another person to yield information, to make a confession, or for any other reason.

The eight paragraphs of the Tokyo Declaration are listed below, and six of the paragraphs deal directly or indirectly with torture.

1. The physician shall not countenance, condone or participate in the practice of torture or other forms of cruel, inhuman or degrading procedures, whatever the offense of which the victim of such procedures is suspected, accused or guilty, and whatever the victim's beliefs or motives, and in all situations, including armed conflict and civil strife.
2. The physician shall not provide any premises, instruments, substances or knowledge to facilitate the practice of torture or other forms of cruel, inhuman or degrading treatment or to diminish the ability of the victim to resist such treatment.
3. When providing medical assistance to detainees or prisoners who are, or who could later be, under interrogation, physicians should be particularly careful to ensure the confidentiality of all personal medical information. A breach of the Geneva Conventions shall in any case be reported by the physician to relevant authorities.
4. The physician shall not use nor allow to be used, as far as he or she can, medical knowledge or skills, or health information specific to individuals, to facilitate or otherwise aid any interrogation, legal or illegal, of those individuals.
5. The physician shall not be present during any procedure during which torture or any other forms of cruel, inhuman or degrading treatment is used or threatened.
6. A physician must have complete clinical independence in deciding upon the care of a person for whom he or she is medically responsible. The physician's fundamental role is to alleviate the distress of his or her fellow human beings, and no motive, whether personal, collective or political, shall prevail against this higher purpose.
7. Where a prisoner refuses nourishment and is considered by the physician as capable of forming an unimpaired and rational judgment concerning the consequences of such a voluntary refusal of nourishment, he or she shall not be fed artificially. The decision as to the capacity of the prisoner to form such a judgment should be confirmed by at least one other independent physician. The consequences of the refusal of nourishment shall be explained by the physician to the prisoner.
8. The World Medical Association will support, and should encourage the international community, the National Medical Associations and fellow physicians to support, the physician and his or her family in the face of threats or reprisals resulting from a refusal to condone the use of torture or other forms of cruel, inhuman or degrading treatment.

The definition of torture in the Tokyo Declaration is much wider than the UN definition. It is not restricted to government officials or people acting on behalf of the authorities, and in contrast to the UN definition it does not exclude physical punishment. One has to take into account that the Tokyo Declaration is written by doctors, for doctors, and only the highest ethical standards can be accepted for doctors. The UN declaration is a legal document binding states and is incorporated into the legislation.

Prior to the UN Declaration of Human Rights in 1948 there were no international rules in this field, but prohibition of torture was incorporated into national legislation in many Western countries at the end of the 18th and the beginning of the 19th centuries. Torture is well-known from history and has been used openly by authorities to provoke confessions and information, and/or as part of punishment.

The Christian Church played an active role in torture for about 600 years from the 13th to the 19th century. The most widely known are the Spanish and Portuguese Inquisitions. Not only the Catholic Church but also the different Protestant churches frequently applied torture, usually in collaboration with the secular authorities. Witch hunting followed by summary legal proceedings – including torture-provoked confessions and ending with burning in public of the 'guilty' while still alive – was not uncommon in Europe for several centuries.

Torture disappeared at least officially in the Western world during the 18th and 19th centuries, but reappeared during the totalitarian regimes in Russia and Germany in the 20th century. Today, torture is prohibited in the Western world and is rare, although not completely absent. In many other parts of the world torture is unfortunately part of the interrogation procedures used by the police and other authorities. The yearly reports by Amnesty International clearly document this sad fact. In almost all countries where torture takes place it is not officially admitted by the authorities as they have incorporated both the UN Declaration of Human Rights and conventions against torture in their legislation. It seems as though the most important 'reason' for torture today is not to obtain information or to punish, but to break down the mind and personality of persons who represent opposition and therefore are a threat to non-democratic regimes.

3.2.1 Torture methods

Many different torture methods have been reported, both physical and psychological. Psychological torture methods will just be briefly discussed as forensic pathology is focused on signs of physical torture.

Blunt force injuries

Many reports show that blunt force injury, like beating and kicking, is a part of almost all torture sessions (Table 3.1). Many torture victims have reported that blunt force injury has been used as the 'introduction' to the real torture sessions with more sophisticated methods, while other torture sessions only include blunt violence. Blunt violence is mostly applied on the body, but also often against the arms, legs, head and face. The violence is often kicking with boots or hitting with fists, especially in the face. Different forms of instruments are also often used. A police truncheon is an effective weapon, which can cause severe damage. Instead of truncheons, which can be of different lengths and can be handled with one or two hands, the police in some countries also use long sticks like lathis in Nepal and India. The effects of this torture include bruising and swelling, and fractures of the arms, fingers, ribs and skull. Fractures of the facial bones and teeth are also not infrequent. Blunt violence to the head can cause intracranial hemorrhages. Kicking and stamping on the body can lead to lacerations of internal organs, pneumothorax and fatal hemorrhage.

A special kind of blunt force torture is falanga, also called falaka or bastinado, which is beating of the foot soles with truncheons, sticks, metal wires or other elongated instruments. The victim is usually lying down, either prone or supine, during the torture session. Falanga is not only painful to the feet, but the pain often spreads to the rest of the body and the head. The feet swell and if the beating has been intense and prolonged, the skin of the foot sole may burst. Not infrequently the torture victim is forced to jump up and down on bare feet or walk on uneven surfaces, stones, etc. after the falanga torture, which is extremely painful. This torture method has been used in the Middle East for centuries, but has also spread to both Europe (Greece, in the junta regime in the 1960s and Spain in the Franco period) and Asia (India, Nepal) and even to Central and South America, although reports of falanga are scarce from that part of the world.

Whipping has been an integrated part of torture and punishment for thousands of years. It is well described from most of the civilisations in Asia, Africa and Europe. In Europe it was used by both the Greeks and the Romans and later by both the Inquisition and secular authorities. Whipping was also a frequently used punishment for slaves in America. Today, whipping is still accepted as punishment in several Middle East countries, and also in some Asian and African countries (Fig. 3.7). Either a whip or a cane is used for the whipping sessions. The victim is usually tied to a pole and is then whipped on the naked back. Whipping is a torture method that may be combined with the application of salt, pepper and chilli in the wounds afterwards. Whipping causes intense pain, and prolonged and fierce whipping may cause death. The wounds often become infected and may lead to death.

Table 3.1 Torture methods reported by 235 torture victims from 35 different countries. Percentages exceed 100, as almost all victims had been tortured in many ways.

Torture method	Reported use
Blunt trauma (beatings, including falanga, kicking, whipping)	99%
Positional torture (suspension, streaking of limbs, forced positioning)	53%
Burns (with cigarettes, heated instruments, hot or caustic liquids)	34%
Electrical torture	24%
Penetrating injuries (stab and gunshot wounds)	21%
Asphyxiation	18%
Sexual violence	18%
Crush injuries (crushing fingers or heavy rollers to injure thighs or back)	17%
Chemical exposure (salt, chilli pepper, gasoline in wounds or body orifices)	11%
Poor detention condtions (cold, hot, solitary confinement, forced nudity)	9%
Sensory deprivation (sound, light, sense of time, sleep restriction)	8%

Figure 3.7 Whipping, Togo. The victim was accused of the theft of two chickens and was whipped to provoke a confession.

Near-drowning

A torture method that was frequently used in Latin America under the military regimes in the 1960s, 1970s and 1980s was the submarino (submarine). There were two versions of this torture, the wet and the dry. The wet submarino, also called 'la bañera', is where water is used. The water is often polluted with urine, faeces or vomit and the victim's head held under water until nearly reaching the point of drowning. This is usually repeated several times. The other form is the dry submarino, where a plastic bag is placed over the head and held firmly to the neck, so no air can enter. The plastic bag is then kept over the victim's head until the point of choking, then torn off and often replaced again several times. Both wet and dry submarino techniques were also commonly used under the Franco regime in Spain and the methods have also been reported from other parts of the world.

Waterboarding is a form of torture in which water is poured over the face of an immobilised captive, thus causing the individual to experience the sensation of drowning. Waterboarding, like submarino, can cause extreme pain, damage to the lungs, brain damage from oxygen deprivation, other physical injuries including broken bones due to struggling against restraints, lasting psychological damage and death. The term waterboard torture appeared in press reports as early as 1976 from Cambodia. Although a variety of specific techniques are used in waterboarding, the victim's face is usually covered with cloth or some other thin material, and the subject is immobilised on his/her back. Water is then poured onto the face over the breathing passages, causing an almost immediate gag reflex and creating the sensation of drowning.

In 2007 it was reported that the Central Intelligence Agency (CIA) was using waterboarding on extrajudicial prisoners and that the Department of Justice had authorised the procedure, even though the United States government hanged Japanese soldiers for waterboarding US prisoners of war in World War II. The CIA confirms using waterboarding on three Al-Qaeda suspects in 2002 and 2003. During the presidency of George W. Bush, US government officials at various times said they did not believe waterboarding to be a form of torture.

Electrical torture

This torture method has been, and unfortunately still is, widespread. Electrodes are usually placed on sensitive parts of the body, like the genitalia, anus, nipples, tongue and lips. Several torture victims have reported that equipment with variable amperes has been used. Electric cattle prods have also been used on many occasions as torture instruments. In a more recent and infamous case the crown prince of Abu Dhabi tortured a previous business associate by inserting an electric cattle prod in the victim's anus.

A variety of electric shock devices or weapons are available on the market, such as taser guns, electric shock batons or stun belts. Several police forces use these devices and they are unfortunately also frequently used as torture instruments. CAT reports that taser use can be a form of torture due to the acute pain caused and warns about the possiblity of death in some cases. The use of stun belts has been condemned by Amnesty International as torture, not only for the physical pain the device causes, but also for their heightened abuse potential. Electric shock causes immediate pain, but can also cause cardiac arrest due to universal depolarisation.

'Telefono'

'Telefono' is the Spanish word for telephone and the technique consists of simultaneous slapping both ears. This results in acute, severe ear and headache and usually tympanic rupture. The method was frequently used in Latin America, Greece and Spain during the military regimes.

Burning

Burning, especially with cigarettes, is a widespread torture method usually applied in combination with other torture methods. Apart from the pain, the burns can get infected, and large burns may be lethal.

Finger torture

Fingers are often subjected to torture. One method is to place, for instance, a pencil between the fingers and press them together. This is very painful as the sensitive periost of the phalanges is affected. The nails can also be the target of torture by pressing a sharp object up under the nail or pulling the nail