

History of Forensic Medicine & Pathology

Introduction

The purpose of this Blog on Forensic Medicine and Pathology is to introduce the fundamental concepts in these disciplines to police officers, attorneys, medical students, pathology residents and physicians. The first article will be devoted to the history of these sciences so that you will have some insight into how they evolved.

Ancient History

Judicial inquiries and postmortem examinations were required in certain deaths in Ancient Egypt. Some historians have regarded Imhotep (2650-2600 BC) as the first medicolegal expert because he was both chief justice and personal physician to pharaoh Zoser. He is believed to be the founder of Egyptian Medicine as well as the author of a medical treatise, which was remarkable for its lack of reference to magic, which was so common for the era, containing anatomical observations, ailments and cures. It is however difficult to assign any substance to Imhotep's medical abilities in light of the fact that these claims are apparently based on a papyrus written around 1700 BC, almost 1000 years after Imhotep's death. However, some historians regard him as the "God of Medicine," the inventor of the healing arts, more than that attributed to Hippocrates.

The oldest known surviving law code is the Code of Ur-Nammu, which is a reflection of Mesopotamian laws written in the Sumerian Language (2100-2050 BC). It predated the better-known code, the Code of Hammurabi by approximately three hundred years. It is considered a casuistic form of laws, i.e. if you commit this offense, then you receive this punishment. This law code actually laid the foundation for nearly all law codes up-to-today. It was quite sophisticated for it contained fines of monetary compensation for bodily harm, however, murder, robbery, adultery and rape were considered capital crimes.

The laws of Eshnumma, like the laws of UR-Nammu, are reflections of Mesopotamian laws. They were written approximately in 1930 BC. The majority of these laws involved pecuniary fines (an amount of silver) for a particular offence, however, offenses, which involved burglary, murder and rape, were penalized by death.

The Code of Hammurabi was written in approximately 1790 BC. This was written in the Akkadian language in ancient Babylon. This code reflexes the principal of 'an eye for an eye,' which was fundamental to Babylonian Law. The code is also noted for its provisions concerning improper treatment given by physicians.

The Code of the Hittites was written during the period of the Hittite Empire (1650-1100 BC). In many respects these laws were similar to the laws of Eshnumma in that they involved monetary fines for certain offenses. Like the Laws of Eshnunna, the death penalty could be avoided.

In the Phoenician battle against the Midi in the fifth century BC, Onasilaos, a Phoenician physician was noted for his treatment of wounds, which occurred during that battle. It has been reported that the Phoenicians classified wounds into seven categories, which ranged from simple to mortal.

Hellenistic Period

Hippocrates (460-377 BC), the ancient Greek physician, is regarded by most as the 'Father of Medicine.' He allegedly wrote a collection of treatises, which probably consisted of 70 works that were organized into a single work the Corpus Hippocraticum (Hippocratic Corpus); the first edition of which was published during the reign of emperor Hadrian (117-138 AD). It is believed the actual treatises were written sometime between 450 and 350 BC; Hippocrates did not write all of these treatises. The Corpus Hippocraticum is the oldest surviving medical book. One of the works contained within the Corpus is the Sacred Disease. This describes dissections of animals, the results of which permitted analogies to the human body to be drawn. In his attempt to describe the human body, Hippocratics made use of external observation only. In another work from the Corpus, On Ancient Medicine, the internal organs are described as they can be seen or palpated externally. Autopsies at this time were not permitted as the body of the deceased was regarded as sacred.

Herophilus of Chalcedon (335-280 BC) was a Greek physician who spent much of his life in Alexandria. He is regarded as the first physician to do autopsies on a regular basis, performing some of them in public; hence he is also thought of as the first anatomist. Alexandria was the exception for the era in that it permitted dissection of the deceased. Herophilus differentiated between sensory and motor nerves, identified the dura mater and pia mater and made observations of the liver, heart, pancreas, intestines, retina and ovaries. Herophilus together with Erasistratus founded the School of Anatomy of Alexandria.

Erasistratus of Chios (304-250 BC), like Herophilus, was a Greek physician and anatomist. He is known for his descriptions of the valves of the heart and determining that the heart functioned as a pump and was

not the seat of sensations as was the common belief. He is noted for the first in-depth descriptions of the cerebral and cerebellar hemispheres in the brain and differentiated between arteries and veins.

Galen of Pergamum (129-200/217 AD) was a prominent Roman physician and philosopher of Greek origin. Galen developed an interest in anatomy from his studies of the works of Herophilus and Erasistratus and performing anatomical dissections on monkeys, as human dissection was not permitted in Pergamum. His descriptions of human anatomy endured until Vesalius's printed descriptions and illustrations of human dissections in 1543. His concept that the heart was the source of the arteries, conveying life-giving arterial blood (and vital spirit) to all parts of the body remained until William Harvey established that the heart functioned as a pump giving rise to circulation of the blood in 1628. Galen produced an enormous amount of written works, amounting to at least twenty-two volumes in which he summed up more than six hundred years of Greek and Roman medicine. It was through his writings that he became regarded as the leading medical authority of antiquity whose influence extended centuries into the future.

The Greek and Roman physicians were more concerned with the principal of exact and careful clinical observation rather than the nature of disease and the effect that disease had on the body. Human dissection was not commonly practiced; hence, there was no opportunity to study the effect that diseases had on the various organs. There was one exception and that was Alexandria during the reign of the Ptolemies, however, although human dissection was done, it was for the purpose of studying anatomy and not the effect that diseases had on the various organs. During the Greek and Roman period disease was thought either to be the result of a supernatural visitation or a disturbance in the ratio of the four humors, which composed the body.

The four humors were black bile, yellow bile, phlegm, and blood. This concept was closely related to the theory of four elements: earth, fire, water and air. These two theories were believed to be inter-related: earth was in black bile, fire in yellow bile, water in phlegm, and all four elements were in blood. All diseases and disabilities were the result of an imbalance in the ratio of the humors/elements to one another in the body. This was the accepted medical philosophy of the Greeks, Romans and later Muslim and Western European medical societies for centuries.

Roman Law

The most important of the pre-Christian legal codes was the Roman law, which governed the Roman Empire for 900 years, beginning in 451 BC. The Law of the Twelve Tablets, the first Roman Code of Law, was characterized by formalism. The basis of Roman law was the concept that the exact form, not the intention, of words or actions produced legal consequences. To ignore intention may appear to be unfair to our way of thinking, but the Romans understood there are witnesses to actions and words, but not to intentions. Roman Civil Law allowed for greater flexibility in adopting new ideas or extending legal principles in the complex environment of the empire. Instead of replacing older laws the Romans would develop alternate procedures for greater fairness should the existing law not address new developments. In essence, instead of changing a law to avoid confusion, the Romans preferred to make the rigid system more flexible, if you will, more human. As an example, one could make a will, however, if he did not leave at least 25% of his property to his children, they, through a magistrate, could have the will declared invalid.

Roman law is noted for its effective utilization of expert evidence in the judicial system. This was affected through the Roman practice of appointing friends of the court, to advise judges on matters requiring specialized knowledge. These friends were nonpartisan advisers who took part in the hearing of cases and in the deliberation of justice. No substantive distinction was drawn between evidence taken from a witness and the advice given by an expert. In fact, the Roman codes dealt very little with what could be called evidence of law under the Anglo-American Common Law System of today. What is important to remember about Roman law is that although it evolved from custom and statutes, the emperor was the ultimate authority and source of law, i.e., "What pleases the Emperor has the force of Law."

As Roman law and scholarly commentaries on it expanded, the need grew to codify and to regulate conflicting opinions. It was not until the 6th century AD that there was a significant change in these concepts, which occurred during the reign of Emperor Justinian I (483-565 AD), who established the Justinian Code.

Development of Civil and Criminal Law in China in the Han Dynasty (206 BCE-220 CE)

During the Han Dynasty cases of rape, physical abuse and murder were prosecuted in court. Women were permitted to file civil and criminal charges against men, despite their lower cultural status. Although a suspect could be jailed, a convicted criminal was not imprisoned. Instead those found guilty of an offense could receive a monetary fine or a period of forced hard labor. If one received the death penalty, they were

beheaded. During the early Han period a convicted criminal's punishment could be torturous mutilation; this was abolished through a series of reforms being replaced by foot whipping (bastinado).

Magistrates of counties and Administrators of commanderies acted as judges in civil lawsuits. Complex, high profile or unresolved cases were often referred to the Minister of Justice in the capital or even the emperor.

Development of Pathology and Related Sciences in the Middle (Medieval) Ages

The Middle Ages are that period of history, which extended from the fall of the Roman Empire (400-476 AD) with the sacking of Rome by the Visigoths to the fall of Constantinople 1453-1517. It is a period filled with contradistinctions in thought. As an example, in 1209 Pope Innocent III, sought the appointment of doctors to the courts for identification and description of wounds, however, he and the Fourth Lateran Council of 1215 wrote a code of behavior for physicians, the effect of which was to distant physicians from their patients. Physicians were advised to refrain from masturbation, intoxication, and extramarital intercourse (for any of these might danger the soul of the patient), and prohibited them from practicing surgery or doing autopsies since the dissection of humans for study was forbidden. Physicians spent most of their time debating, writing, and preserving ancient dogma. The actual caregivers were religious such as nuns, rabbis, and monks. Earlier the clergy had been surgeons too, but the Fourth Lateran Council prohibited priests from shedding blood. It was the barbers who did the surgery with the earliest barber-surgeons working under the supervision of priest.

Little was accomplished in discerning the pathology of diseases during the medieval ages, which is often referred to as the dark ages. In fact there were no significant contributions made in the effect that diseases had on the organs of the body from the time of Galen to the Renaissance, with the exception of the contributions made by medieval Islam and later Paracelsus and Girolamo Fracastro.

Muslim physicians were responsible for the discovery of infectious disease and the immune system, advances in pathology, and early hypotheses related to bacteriology and microbiology. The earliest ideas on contagion can be traced back to several hadiths attributed to Muhammad in the 7th century, who is said to have understood the contagious nature of leprosy, mange, and sexually transmitted disease. Muhammad's ideas concerning the contagious nature of certain diseases lead to the theory of contagious disease, which was proffered in the comprehensive works of Avicenna (the Arab Prince of Physicians) in "The Canon of Medicine," published in 1020. By then in the Muslim world the pathology of contagion was fully understood, and as a result, hospitals were created with separate wards for specific illnesses, so that people with contagious diseases could be kept away from other patients who did not have any contagious diseases. In "The Canon of Medicine," Avicenna puts forth the contagious nature of infectious diseases such as phthisis and tuberculosis, the distribution of diseases by water and soil, and fully understood the contagious nature of sexually transmitted diseases.

Ibn Zuhr (Avenzoar) (1091-1161) was one of the earliest physicians known to perform not only human anatomical dissection but also postmortem autopsies. He was the first to demonstrate that the disease scabies was caused by a parasite, a discovery, which challenged the theory of humorism supported by Hippocrates and Galen. The removal of the parasite from the patient's body did not involve purging, bleeding, or any other traditional treatments associated with the four humors. He was not the first physician to challenge the theory that the body possessed four separate "humors", whose balance were the key to health and a natural body-temperature; that distinction goes to another Islamic physician, Muhammad ibn Zakariya Razi (Rhazes) in his work "Doubts about Galen," in the 10th century.

Ibn al-Nafis, who also performed human anatomical dissections, was the first to describe the pulmonary circulation, coronary circulation, and capillary circulation, which formed the basis of the circulatory system, for which he is considered the "Father of Circulatory Physiology." The first European description of the pulmonary circulation came several centuries later, by Michael Servetus in 1553 and William Harvey in 1628.

Early in the 16th century Paracelsus, a member of the Faculty of the University of Basel, insisted that if you allowed for natural drainage, this would prevent infection of wounds, allowing nature to heal the wound. In 1546, Girolamo Fracastro proposed that epidemic diseases were caused by transferable tiny particles or "spores" that could transmit infection by direct or indirect contact or even without contact over long distances. The name for syphilis is derived from Fracastro's 1530 poem, "Syphilis or the French Disease," about a shepherd named Syphilis. His book "On Contagion," in 1546 also gave the first description for typhus.

Development of the Forensic Sciences in China during the Medieval Period

A book entitled the *His Yuan Lu* (Record of the Washing Away of Wrongs) written by Song Ci in 1247 (Song Dynasty, 960-1279) addressed methods to be utilized in the investigation of suspicious deaths. Another author, Zi Xian, however, states the book was entitled *Xi Yuan Ji Lu* (Collected Cases of Injustice Rectified through Forensic Science). In the book Song Ci writes: “A forensic medical doctor must be serious, conscientious, and highly responsible, and must also personally examine each dead body or that of a wounded person. The particulars of each case must be recorded in the doctor’s own handwriting. No one else is allowed to write his autopsy report. A coroner must not avoid performing an autopsy because he detests the stench of corpse. A coroner must refrain from sitting comfortably behind a curtain of incense that mask the stench, let his subordinates do the autopsy unsupervised, or allow a petty official to write the autopsy report, leaving all the inaccuracies unchecked and uncorrected.” In addition he also wrote: “Should there be an inaccuracy in an autopsy report, injustice would remain with the deceased as well as the living. A wrongful death sentence without justice may claim one or more additional lives, which would in turn result in feuds and revenges, prolonging the tragedy. In order to avoid any miscarriage of justice, the coroner must immediately examine the case personally.” As to whether the original text used the word ‘coroner’ is not known. It may represent a liberty taken by Professor Giles, a professor of Chinese at Cambridge University who translated the text in 1924. It is interesting to note that this text contains the first evidence of using the science of entomology in the resolution of a death due to multiple lacerations induced by a hand sickle. Song Ci’s serious attitude toward autopsies had a substantive influence on Chinese medicolegal development for centuries. Prior to Song Ci’s book there was no substantive text written in China in the Forensic Sciences. There are however, references made to what constitutes an injury. In the book *Li Ji Yuan Ling* (The Book of Rites) or (“Collection of Treatises on the Rules of Propriety and Ceremonial Usages”), which is one of four extant collections on ritual matters of the Zhou Dynasty (1045 BC-256 AD), injury of the skin is called *shan*, injury of the flesh (involving bleeding) is called *chuang*, and injury of the bones and muscle is called *zhe*.

Development of Forensic Science in Europe during the Medieval Period

The Justinian Code, was the result of Emperor Justinian’s desire that existing Roman law be collected into simple and clear system of laws, or “code.” It represented the first-ever codified body of civil law (*Corpus Iuris Civilis*). Tribonian, a legal minister under Justinian, lead a group of scholars in a 14-month effort to codify existing Roman law. This resulted in the First Justinian Code, completed on April 7, 529 AD. This code was later expanded to include Justinian’s own laws, as well as two additional books on areas of law. The completed Justinian Code was accomplished in 529 and consisted of the Code (codification of existing Roman Law), Digest (a guide for judges and a summary of laws), and the Institutes (instruction to law and the Code intended for Law Students). This codification of Roman law became the foundation of law in all Civil Law Jurisdictions. The provisions of the *Corpus Iuris Civilis* also influence the Canon Law of the church since it was said that *ecclesia vivit lege canona* (the church lives under Roman Law). A fourth part, the Novels (*Novellae Constitutiones*) were added later. The *Novellae* related to administration of the state and to ecclesiastical affairs. Most were published between 529 and 534, with the last being published in 565.

Included within the Justinian Code was a provision directed toward the use of medical experts. In contradistinction to Roman law, a medical expert would not be used to advantage if he were used as an ordinary witness, appearing for one side or the other. The code stated that the function of such an expert was really to assist the judiciary through impartial interpretation and opinion, based on his knowledge.

The Visigothic Code represented the story of the Gothic Monarche in Spain. The Visigothic King Chindasuiath of Hispania put the original code forth in 642/643. Recceswinth edited the code in 654. The laws of the Visigothic Code include elements of the Catholic Church’s Canon Law. The code consisted of twelve books; book six concerned crime and torture, which included issues dealing with homicide, injuries, wounds, and mutilations, abortion, and poisoners; book eight concerned acts of violence and injuries, which included attacks, and plunder of property, injuries to animals, arson and incendiaries; book eleven concerned physicians and their patients.

The Alemannia Law Code, in comparison to other early medieval law codes, devoted substantive attention to the protection of ecclesiastical personnel and their rights. Between 724 and 730 Lantfrid revised the existing laws of the Alamans into what became known as *Lex Alamannorum Lantfridus*. This code appears to have been enacted in 730 and ultimately through successive revisions contained 50 manuscripts. It is divided into Clerical Law, Ducal Law and Popular Law. Chapter 3.1 of the Clerical Law addresses a fugitive who has sought refuge in a Church: “no fugitive seeking refuge in a church should be removed by force, or be killed within the church. Instead, the pursuers should assure the priest that the fugitive’s guilt is

forgiven.” In chapter 3.3 penalties for the violation of the asylum are set at 36 solidi to be paid to the church and an additional 40 solidi to be paid to the authorities for violation of the law. Chapter 56.1 regulates penalties for violence against unmarried women, whereas 56.2 addresses penalties for violence against married women, the penalties of which are doubled as compared to those against unmarried women.

The Bavarian Code appears to be the result of a single codification made between the years 743 and 748 involving Odilo, duke of Bavaria and Childeric III, King of the Franks. The code is evidently modeled on the Alemannian Law as well as use of the Visigothic Code. This code addresses compensation for injuries; included were penalties for negligent doctors if his patient dies.

During the Merovingian and Carolingian Dynasties, especially under Emperor Charlemagne a series of legislative or administrative acts called capitularies were enacted. They were referred to as capitularies because they consisted of a series of chapters, i.e. capitula from which capitularies is derived. Charlemagne was considered the greatest of the Carolingian monarchs being crowned by Pope Leo III in Rome in 800. The capitularies were written sometime between 768-814. There does not exist a single capitulary in its original form. Our knowledge of them comes from isolated capitularies identified in various manuscripts. In 827 Ansegisus, abbot of St. Wandrille at Fontenelle, arranged the known capitularies into four books: one of the ecclesiastical capitularies of Charlemagne, one of the ecclesiastical capitularies of Louis the Pious, one of the secular capitularies of Charlemagne, and one of the secular capitularies of Luis the Pious. Historians regard Ansegisus four books as authoritative. There were three additional books added by Benedictus Levita, which historians do not hold in regard.

The original four books contain provisions for requirements of “proof as clear as day” in cases of a serious nature, such as when a man’s life is at stake. They require the courts to seek medical advice in all cases of physical injury, infanticide, rape, bestiality, and marital issues such as annulment and divorce.

Origin of the Coroner’s System

Historically the coroner’s system was established in England in September of 1194. The first recorded use of the term ‘Coroner’s Office’ was in 925 in which King Athelstane established a ‘grant of the coroner’s office’ to St. John of Beverly. The actual word is derived from the formal establishment of the office of coroner in England by Article 20 of the “Articles of Eyre” in September of 1194 to “keep the pleas of the Crown” with the term ‘coroner’ being derived from the word ‘crown.’ At its imitation, the coroner could be directed by a judge (at the time referred to as ‘Justices in Eyre’) to perform his administrative duty through establishing an inquisition as to a death of a person; however, he also could perform these duties without being directed by a judge. Initially the coroner had the power to arrest either witnesses or suspects as well as retain material, including land of those believed to be guilty of a crime. Pragmatically the coroner’s duties were more concerned with criminal issues such as murder, suicide or when a felony gave rise to a crown plea, which required enforcement.

The phrase ‘Pleas of the Crown’ signifies a criminal offense in which the king is a party, an offense against the king, i.e. his decrees or edicts. These offenses were to be tried in the Kings Court. The word ‘Plea’ means an allegation, i.e. as an allegation by the King’s Court of an offense against the king.

A description of the coroner’s duties at the time Edward I became King in 1272 as it appears in Blackstone is as follows: “The office and power of a Coroner are also like those of a Sheriff, either judicial or ministerial, but principally judicial...And consists, first, in inquiring, when a person is slain or dies suddenly, or in prison, concerning the manner of his death. And this must be upon sight of the body; for if the body be not found, the coroner cannot sit. He must also sit at the very place where death happened, and the inquiry must be made by a jury from 4, 5, or 6 of the neighboring towns over which he is to preside. If any be found guilty by this inquest of murder or other homicide, the coroner is to commit them to prison for further trial and must certify the whole of his inquisition, together with the evidence thereon, to the Court of King’s Bench, or the next assizes.” Assizes refers to an obsolete circuit criminal court, which held periodic sessions, never being held in a fixed location, as opposed to the King’s Court. Judges on an assize court were known as ‘Justices of Assize.’

In certain circumstances the coroner could arrest the sheriff. After the twelfth century he no longer had the responsibility for collection of revenues in the name of the King. Little changed in the coroner’s system until the middle of the nineteenth century, however, as time moved forward his function become more concerned with those actions, which lead to death.

Development of Forensic Science during the Renaissance in Europe

There was a rebirth of the medicolegal science in the 13th through the 16th centuries, which corresponded to the Italian Renaissance, due to scholarly research. The Italian Renaissance represented the bridge between Medieval and Early Modern Europe. Rules concerning the appointment of medical consultants to

the courts were formulated in Bologna, which were later adopted in other cities in Italy. As an example, Hugo de Lucca was the city surgeon of Bologna in 1214. In 1249, Hugo took an oath as a medicolegal expert. Medical reports during this era were utilized to determine the cause of death. Medicolegal autopsies were first performed in Europe in Bologna in 1302. Some historians assert that our knowledge of anatomic dissection has its origins in the publicly ordered medicolegal autopsies of homicide and suicide victims and or executed criminals in Italy. For many years, executed criminals were the chief source of anatomical material for medical schools throughout Europe.

Development of Forensic Science in Europe in the Early Modern Period

The beginning of this period is really not clear but it is generally accepted to be in the late 15th century or early 16th century. Most historians agree this period ended with the birth of the Industrial Revolution, which began in Britain in about 1750, whereas others use the beginning of the French Revolution in 1789.

In 1530, Emperor Charles V, ruler of the Holy Roman Empire, issued 'The Carolina' (Constitutio Criminalis Carolina), which was an edict, doing so at the request of various states in his empire, to reform abuses that had occurred in the administration of justice. This is regarded as the first body of German Criminal Law and is sometimes referred to as the 'Halsgerichtsordnung.' Under the 'Carolina' actions such as murder, manslaughter, robbery, arson, homosexuality and witchcraft were defined as severe crimes. One of the edicts stated, "That which will cause damage with somebody by magic spell, will be punished by death, and the punishment will be by fire." This edict ultimately laid the foundation for the mass witch trials held between 1580 and 1680. It also served as the basis for the use of torture to obtain a confession. 'The Carolina' also made provisions for medical expert testimony being required by judges for guidance in cases involving murder, wounding, poisoning, hanging, drowning, infanticide, and abortion as well other circumstances involving injury. This criminal code was used in Switzerland in the 16th century; however, it was removed in 1799 by a new Swiss Penal Code only to be reintroduced by decree on June 28, 1803. It was only in 1849 that 'The Carolina' was removed permanently from the Swiss Penal Code.

The first scholarly works in Forensic Medicine appeared at the end of the 16th century. The first was written by Giovanni Filippo Ingrassias (1510-1589), a Sicilian physician, called "Constitutiones of Capitula Necro Uirisdictiones Negii Promedicatus Officii," in 1564. French surgeon, Ambroise Paré (1510-1590) wrote a treatise on fatal wounds, entitled "De rapports et des maijens d'embaumer Les corps mortis," published in Paris in 1575. Ambroise Paré is considered one of the fathers of surgery.

Fortunato Fidele, an Italian Physician published a textbook in Forensic Medicine entitled "De Relationes Medicorum" in 1602. Paloa Zachia, a papal physician, published "Questiones Medicina-Legales." This text was published in installments between 1621 and 1634; it covered the medically related issues, which came before the Sacra Rota Romana. This court was regarded as the most sophisticated of its era. Zasschias' text became the standard in legal medicine not only in its time but also for centuries afterward. It was because of this work Paulo Zacchias (1584-1659) is considered "The Father of Legal Medicine." The works of Fidelis (1551-1630) and Zacchias were considered the most important text in legal medicine of their era.

The first course at a University Center in Forensic Medicine was taught at the University of Leipzig in 1642. Andrew Duncan, Professor in Physiology at the University of Edinburgh, began giving lectures in legal medicine and public health in 1789.

Development of Pathology in the Early Modern Period

Some historians claim that anatomic pathology began in Europe in the 16th and 17th centuries through the published works of the anatomists Antonio Benivieni (1443-1502) in 1507 and of Bonetus in 1679. Benivieni is regarded as one of the founders of pathological anatomy due to his utilization of anatomic dissection to determine cause of death. Bonetus published, "Sepulchretum sire Anatomia Practica," in 1679. This work represented a collection of autopsies along with commentaries on each case.

In 1543, Andreas Vesalius, a Belgian anatomist, published two texts, the first of which is regarded as the first scientific text on anatomy, "The Humani Corporis Fabrica, libri septem" and the "De Humani Corporis Fabrica Epitome," which was a work specifically for his students.

Another physician of this era who made a substantive contribution to the evolution of anatomy and was regarded as a skillful surgeon was Antonio Valsalva (1666-1723). Valsalva both studied and taught science, surgery, anatomy, physiology, and psychiatry. He named the Eustachian tube and described the aortic sinuses of Valsalva. His name is associated with the Valsalva antrum of the ear and the Valsalva maneuver, which is a test for circulatory function. He studied under Marcello Malpighi, who is regarded as the founder of microscopic anatomy. One of his students was Giovanni Morgagni.

Giovanni Battista Morgagni (1682-1771) was a Professor of Anatomy at the University of Padua for 56 years (1715-1771). What is regarded as his greatest professional achievement was accomplished in 1761

when he published the three volume compendium of autopsies, “De Sedibus et Causis Morborum per Anatomem Indagatis,” (On the Sites and Causes of Disease). This work was in part based on the works of Benivievi and Bonetus. In this work Morgagni drew a systematic correlation between the clinical presentation of the patient and the resulting pathological changes. In this compendium he identifies the pathology of a number of diseases, including hepatic cirrhosis, cerebral gumma, cardiac valvular lesions, renal tuberculosis, pneumonic solidification of the lungs, and syphilitic lesions (aneurysms) of the brain. Through the observations he made in some 700 autopsies, Morgagni established that ischemic infarction of one cerebral hemisphere was responsible for paralysis on the opposite side of the body. This was the first work of its kind to be published in Europe. It was this compendium that established pathological anatomy as a distinct scientific discipline and Morgagni being credited with the distinction of the “Father of Modern Anatomic Pathology.”

In the North American Continent the first records of autopsies being performed were those accomplished by one of the surgeons for the French Explorer Samuel de Champlain in 1603.

The first medicolegal application of an autopsy occurred in Maryland on March 21, 1665.

The first systematic teacher of anatomy, surgery, and obstetrics in Colonial America was Dr. William Shippen (1736-1808). He gave the first series of lectures in anatomy in 1762. He became the one of the first professors (of anatomy, surgery, and midwifery) of America’s first medical school, The College of Philadelphia, now the University of Pennsylvania, which he cofounded with Dr. John Morgan in 1765.

Development of the Coroner’s System in America

The early settlers brought with them the coroner’s system as it existed in England in the early part of the 17th century. Originally the coroner’s were political appointees, the majority of which had no medical training, thus the determination of cause of death was based primarily on personal opinion. The first coroner’s inquest in this country was in the colony of New Plymouth, New England in 1635. In 1637, the Governor of Maryland appointed Thomas Baldrige of St. Mary’s to be sheriff and coroner. Up until this point in time the coroner’s inquires into death of a person was administrative, i.e., collecting information, talking to witnesses, and external examination of the body. Reference to an autopsy is not made until 1647; the General Court of Massachusetts Bay did this in regard to performing autopsies for the purpose of teaching medical students.

Development of Forensic Medicine in Russia (Eurasia) in the Modern Period

The first lectures in Forensic Medicine were given at Moscow Imperial University (University of Moscow) in 1755 Initially these lectures were incidental until a systematic course in forensic medicine was established in 1804.

Forensic medicine education in Russia was somewhat unique as was true of medical education in general in that it had a substantive moral and ethical component. The corner stone of ethical teaching in Russia was deontological. Deontological ethics holds that acts are inherently good or evil, regardless of the consequences of the acts. The foundation of deontological ethics is that we have a responsibility to do the things that are inherently good. In contradistinction, consequentialist or teleological ethics holds that the rightness of an action is determined by its consequences.

One of Russia’s early outstanding contributors to the forensic sciences was Johann Georg Noel Dragendorff (1836-1898), a German born pharmacist who was highly regarded in pharmacology. He was offered the chair in Pharmacy and Directorship of the Pharmaceutical Institute of the University of Dorpat (now Tartu University). Dragendorff contributed greatly to our knowledge of poisons. He is also known for having a reagent named after him, which consisted of a mixture of bismuth and potassium iodides in dilute sulfuric acid. It is used to determine the presence of alkaloids.

Development of Forensic Medicine in Europe in the Modern Period

Samuel Farr published the first known book on legal medicine in English in 1788. In 1789, Professor Andrew Duncan of the University of Edinburgh gave the first lectures in an English speaking University on legal medicine. He was appointed to the first Regius chair in Forensic Medicine at the University of Edinburgh in 1807.

The most prominent early name in forensic medicine was that of Alfred Swaine Taylor who was appointed as the first Professor of Medical Jurisprudence at Guy’s Hospital Medical School in 1834. He was the author of “Principles and Practice of Medical Jurisprudence,” which was published in 1865. This textbook was considered the standard of its time and remained so for years through continued revisions.

In 1857, a chair of Medical Logic and Medical Jurisprudence was established at the University of Aberdeen, Scotland. Francis Ogston, who had been lecturing on Medical Jurisprudence since 1839, was appointed to the chair. He was the author of “Lectures on Medical Jurisprudence” published in 1878.

France established the first department of forensic medicine and the first chair of Legal Medicine at the University of Paris in 1794. The University of Lyon was one of the first academic institutions to recognize forensic medicine as a subject. Professor Lacassagne (1823-1924) was the first to recognize the correlation between markings on a bullet and the rifling inside the barrel of the weapon from which it was fired. The world's first forensic science laboratory, the Institute de Medicine Legale de Paris, was established in 1863. Dr. Edward Locard, who is regarded as the first true forensic scientist, established the Lyon Police Laboratory in 1912.

Dr. Henry Faulds published the first paper in Nature in 1880 on the use of fingerprints for identification. Like Dr. Faulds, Dr. Locard recognized that fingerprinting was the best means for identification, using it successfully in a case in 1910. Dr. Locard was the first to define the rules for the application of Galton Points. Identification by fingerprints relies on pattern matching followed by the detection of certain ridge characteristics referred to as Galton Points. He however, is best known for establishing "The Locard Exchange Principal," which holds that every contact leaves a trace. His principal is the foundation of all trace evidence.

In 1902, Professor Rudolphe Archibald Reiss established a department of forensic science at the University of Lausanne in Switzerland.

The next giant in forensic medicine in England was Dr. Bernard Spilsbury, who became the Home Office Pathologist for Scotland Yard in 1908. It was he who convinced Scotland Yard detectives of the importance of having a forensic specialist in medicine at murder scenes. Dr. Spilsbury was the leading physician in Forensic Medicine in England until his death in 1947. He was followed by Professor Keith Simpson of Guy's Hospital and Professor Francis Camps at the London University Hospital who published, along with W. B. Purchase, "Practical Forensic Medicine," in 1957.

Development of Forensic Medicine in America in the Modern Period

Paul Revere accomplished the first application of forensic dentistry in this country in the identification of the body of Dr. Joseph Warren. Dr. Warren (1741-1775) was a doctor and soldier, served as chief executive of the revolutionary Massachusetts government and one of the leaders in American Patriot organizations in Boston during the American Revolutionary War. He died during the Battle of Breed's Hill (Battle of Bunker Hill) on June 17, 1775. The British Burial Detail buried him in a grave with another slain patriot. Several months later, Paul Revere went to the battle site to find Dr. Warren's body so that he could give him a proper burial. He identified his body through examination of the wooden false teeth he had made for Dr. Warren.

Dr. Benjamin Rush (1745-1813) was one of the leading physicians of the time and is regarded as the "Father of American Psychiatry." He is considered to have given the first substantive lectures in legal medicine in this country; which were given at the University of Philadelphia. These sixteen introductory lectures were published under the title "On the Study of Medical Jurisprudence" in 1810. Dr. Rush was also one of the signers of the Declaration of Independence in 1777. Dr. Rush is noted for publishing an article in 1792 opposing capital punishment. He was also the founder of Dickinson College in Carlisle Pennsylvania.

The first recognized textbook in forensic medicine in this country was by Theodor Beck (1791-1855) who published "Elements of Medical Jurisprudence" in 1823. This was considered the seminal text in American Legal Medicine for the first half of the 19th century. Isaac Ray published "A Treatise on Medical Jurisprudence of Insanity," in 1838. In 1855 Francis Wharton, an attorney, and Dr. Moreton Stille, a physician co-authored a text, "A Treatise on Medical Jurisprudence." In 1860, Dr. John J. Elwell, physician and attorney, published "A Medico-Legal Treatise on Malpractice, Medical Evidence, and Insanity Comprising the Elements of Medical Jurisprudence," which discussed many aspects of malpractice. In 1867, Dr. John Odronauz, who was also a physician and attorney, published "Jurisprudence of Medicine." Randolph Witthaus and Tracy Becker published "Medical Jurisprudence, Forensic Medicine and Toxicology," in 1894.

Dr. James Stringham was appointed Professor of Medical Jurisprudence at Columbia College of Physicians and Surgeons in 1813. He had studied medicine at the University of Edinburgh, graduating in 1799. In 1815, Dr. Walter Channing was appointed to the first chair in Midwifery and Medical Jurisprudence at Harvard University. Dr. Frank Draper, Professor of Legal Medicine at Harvard University and Boston's first Medical Examiner, published a textbook in legal medicine in 1905. Dr. Draper was followed, as Medical Examiner for Boston, by Dr. George Magrath, who taught Legal Medicine and Pathology at Harvard University and Dr. Timothy Leary, who taught at Tufts Medical School.

Development of Pathology in Europe in the Modern Period

Matthew Baillie published the first textbook of pathologic anatomy in England in 1793. During this same time period, Bichat, a French physician, developed the concept of histology in contradistinction to

gross morphology or organology. It was Bichat who proposed that diseases affected specific tissues of the body rather than specific organs.

Morgagni's, Baillie's, and Bichat's contributions gave rise to a school of combined clinicians and pathologists during the first half of the 19th century. At the time it was the clinician, who observed the affect of diseases on his patient's that performed the autopsies; pathology was considered an adjunct to clinical medicine and not a separate scientific discipline. Many of the diseases we refer to by a name arising from a person are from this period. In France there were Corvisart, Laennee, Louis, and Cruveilhier; and in Britain, Carswell, Hodgkin, Bright, Addison, Cheyne, Stokes, Adams, Corrigan, and Graves.

For the first time pathology was recognized as a distinct scientific discipline when Jean Lobstein (1777-1835) was appointed the Professorship of Pathology at the University of Strassburg in 1819. Dr. Lobstein was a German born, French Pathologist who is noted for several contributions in pathological anatomy among which was Osteogenesis Imperfecta Type I, which is also known as Lobstein's disease. In 1833 he coined the term "arteriosclerosis." In 1831, Robert Carswell (1793-1857), was made chair of Pathology at the University College of London. Jean Cruveilhier (1791-1873) became chair of Anatomy at the University of Paris in 1825. In 1836 he became the first to occupy the chair of Pathological Anatomy at the University of Paris. He was primarily known for his work on the nervous system. Carswell and Cruveilhier were the first to describe the clinical presentation of multiple sclerosis, but did not identify it as a separate disease entity. It was the French neurologist Jean-Martin Charcot who recognized multiple sclerosis as a distinct disease in 1868.

In addition to being a neurologist Jean-Martin Charcot (1825-1893) was also a Professor of Anatomical Pathology. He is regarded as "the founder of modern neurology." He was the first to describe degeneration of a joint due to loss of proprioception, which is referred to as Charcot joint. He along with Pierre Marie (his resident) and Howard Henry Tooth of England described Charcot-Marie-Tooth disease (peroneal muscular atrophy).

Baron Carl von Rokitansky (1804-1878) was recognized as one of the most outstanding pathologist of his era. He earned his doctorate of medicine in 1828 at the University of Vienna. He is credited with establishing the structural basis of disease. He developed a method of doing autopsies, which is based on the in situ examination of the viscera, which is referred to as the Rokitansky technique; for a time this technique along with Virchow's method were the two primary techniques for doing autopsies. Rokitansky is believed to have performed 30,000 autopsies and to have supervised 70,000 autopsies in his lifetime. Rokitansky was also a philosopher who is credited with raising issues of ethics in medicine. He firmly believed that one of the fundamental principals of the practice of medicine was the preservation and practice of compassion. He was also noted as a liberal politician who helped shape Austrian high liberalism. He stressed the need for reform in university education as well as the need for substantial improvement in the health sciences.

In approximately 1590, two Dutch spectacle makers, Zaccharis Janseen and his father Hans, developed the first compound microscope (a microscope that uses two or more lenses). Galileo improved both the microscope and telescope by adding a focusing devise. Anthony Leeuwenhoek (1632-1723) further improved the lenses used in microscopes through grinding and polishing, thus producing rounder lenses with greater magnification. He developed an interest in science, which with his new microscope was able to see for the first time bacteria, yeast, blood cells and minute life forms in a drop of water. Due to his great contributions, many discoveries and research papers, he has been called the "Father of Microscopy."

Although the microscope had been in existence in the 17th century, pathologist did not use it to study diseases until the middle of the 19th century when Theodor Schwann, who was inspired by the German botanist Matthias Schleiden, under the guidance of Johannes Müller, utilized the microscope to look for cells in animal tissue. It was Schleiden who discovered the importance of the relationship between cells and their nuclei and the life of the plant. In 1839, Schwann published the results of his studies, which represented a real breakthrough, of the cellular theory in biology. However, Schwann must share the credit of the evolution of the cellular theory with other scientist including the Czech physiologist and histologist, Johannes Evangelista Purkinje, who in 1837 described structures in animal tissues that he likened to the cells found in plants.

Another of Johannes Müller's students was Rudolf Virchow (1821-1902), who is referred to as the "Father of Pathology," and also founded the field of Social Medicine. Unlike Bichet, Virchow saw the importance of the microscope in bringing pathological research to the cellular layer. This ultimately led him to develop his basic concepts of cellular pathology which culminated in his six volume "Textbook of Special Pathology and Therapy." In 1856 he became chair of Pathological Anatomy at the University of Berlin. In 1858 he published one of the most consequential books of the modern era of medicine, "Cellular Pathology

as Based Upon Physiological and Pathological Histology.” For the first time in medicine a relationship was drawn between the morphology of cell and its relationship to cellular function in health and disease. This text had a profound influence on the development of medicine. It was Virchow who realized that all cells are derived from other cells. Virchow went on to expand this concept to malignant cells arising from what once were normal cells. The medical disciplines of cellular pathology and comparative pathology (comparison of diseases common to humans and animals) are a direct continuation of Virchow’s work.

Virchow discovered virtually simultaneously with Charles Troisier, that an enlarged supra-clavicular lymph node was one of the earliest signs of gastrointestinal malignancy, usually of the stomach, and sometimes lung malignancy. A supra-clavicular lymph node so involved is referred to as Virchow’s node as well as Troisier’s sign. Virchow also discovered the mechanism of pulmonary thromboembolism. One of the things he is most well known for is the development of a method of doing autopsies, the Virchow method or technique, which is one of the main techniques used today, especially among forensic pathologist.

Virchow’s influence on the evolution of cellular pathology continued through his students: Cohnheim’s concepts of experimental pathology, Klebs concepts on the bacterial causes of disease and Hopper-Seyler concepts in biochemistry.

Evolution of Autopsy Techniques

In addition to Rokitansky and Virchow techniques for doing autopsies there are two other methods of doing autopsies, Letulle’s and Ghon’s.

Letulle originally described the method of removing organs in mass (En Masse Dissection). It has the important advantage of leaving all organs and systems attached, which allows the relationship between the organs to be adequately assessed. This method is regarded as the best of the four methods for observing pathological and anatomical relationships between the various organs. Letulle’s method is usually followed for evisceration of organs in prenatal autopsies.

The Virchow Method is one of evisceration by removal of individual organs followed by dissection of each organ. This is the method utilized by most forensic pathologists. It is a relatively efficient and quick method. However, it has the disadvantage of destroying the anatomical relationships between the various organs.

The en bloc method of evisceration represents a combination of the Virchow and Letulle’s methods. This is the method that is probably utilized by most hospital pathologist. Ghon developed this method; it is relatively quick and preserves most of the important inter-organ relationships. There are a total of three blocks: the neck, cardiothoracic and abdominopelvic. This method lends itself well to modifications to fit the case you are doing.

The in situ method developed by Rokinansky, although popular at one time, is rarely used today. This method involves dissecting the organs in situ with little actual evisceration. It is useful if speed is of importance and the pathologist already has an idea of what he or she expects to see. In terms of the information obtained from doing an autopsy, this method provides the least amount. It is however, useful when doing autopsies on patients with highly contagious diseases especially since the organs are not removed from the body with the exception of the samples taken from each organ for microscopic examination. In the past it was this method that was used because it was not uncommon to do autopsies in the home, etc. rather than a hospital.

Development of Pathology in America

Pathology as practiced in America in the 19th century was strongly influenced by Virchow and the German School of Pathology. The first text of note was published by John C. Warren (1776-1856) in 1822 entitled “Comparative View of the Sensorial and Nervous System in Men and Animals.” William Beaumont (1785-1853) published “Experiments and Observations on the Gastric Juice and the Physiology of Digestion,” in 1833. William E. Horner (1793-1879) published “A treatise on Pathological Anatomy,” in 1829, which was the first such work produced in the United States. Benjamin Silliman (1779-1864) published “Elements of Chemistry,” in two-volumes in 1830 and 1831. In 1832, Robley Dunglison (1798-1869) published a two-volume work, “Human Physiology,” with the eighth edition appeared in 1856.

Samuel Gross (1815-1884) was an academic trauma surgeon who graduated from Jefferson Medical College in 1828. His best-known work is the two-volume textbook, “System of Surgery” published in 1859. He was referred to as “The Nestor of American Surgery” (an elderly and wise practitioner of surgery), by surgeon biographer Isaac Minis Hays. He was a prolific writer of texts in pathology, surgery, and history; he made numerous contributions as an educator, a surgical researcher, and as a pioneer in surgery. practioner.

Benjamin Silliman, Jr. (1816-1885) published "First Principles of Chemistry," in 1847; T. Sterry Hunt (1826-1892) did the section on organic chemistry. John William Draper (1811-1882) probably did the first microphotographic work, producing photographs of slides through a microscope. There were published in 1856 in a text entitled, "Human Physiology, Statical and Dynamical; or, The Conditions and Course of the Life of Man." John Call Dalton (1825-1889) published "A Treatise on Human Physiology," in 1859; the seventh edition was published in 1882. He published a second noteworthy text, "Experimentation on Animals, as a means of knowledge in Physiology, Pathology, and Practical Medicine."

In 1870 microscopes became available to medical students.

John Shaw Billings (1838-1918) established Index Medicus, a classified index to current medical literature in the world. Henry Newell Martin (1848-1896) published the textbook, "The Human Body," in 1881.

In 1884, William Henry Welch was appointed Professor of Pathology at John Hopkins University School of Medicine. Dr. Welch had an enormous influence on the development of American Pathology and Medicine. Dr. Welch was noted not only in pathology but also bacteriology. Perhaps his most noted accomplishment was the discovery of the bacillus causing gas gangrene, which bears his name, *Clostridium welchii*, first reported in 1892. He wrote numerous papers on pathology and bacteriology. One of his outstanding papers was "General Pathology of Fever." In 1885 Francis Delafield (1841-1915) and Theophil Mitchell Prudden (1849-1924) published "A Handbook on Pathological Anatomy and Physiology." This was originally published by Delafield in 1872 as, "A Handbook of Postmortem Examinations and Morbid Anatomy," a seventh edition appeared in 1904. Prudden also published, "A manual of Normal Histology," in 1881.

William Hallock Park (1863-1929) discovered the role of healthy humans in the transmission of diphtheria in 1893. In 1900, Dr. Park discovered the role of transmission of healthy humans in the transmission of typhoid fever.

In 1892, William Councilman was appointed the Shattuck Professor of Pathological Anatomy at Harvard. In 1890, together with Frank Mallory and Richard Pearce, he published a monograph on diphtheria. He also published several important papers on cerebral meningitis and chronic nephritis with Mallory and John Homer Wright.

Frank Burr Mallory was an assistant pathologist at Boston City Hospital in 1891 under William Councilman. He became Professor of Pathology at Harvard Medical School from 1928 to 1932. He was responsible for the standardization of tissue staining. He studied the function of histiocytes, confirmed that the whooping cough bacillus was the causative agent, worked on the classification of tumors, especially meningiomas, and cirrhosis of the liver.

Dr. W. Ophuls, Pathologist at Cooper Medical College, San Francisco, Cal., published the results from one thousand autopsies in the Archives of Internal Medicine, February 1912. In this article he established there was no justification for considering interstitial nephritis as a primary condition over that induced by arteriosclerosis of the kidney.

Aldred Warthin became a professor as well as Director of Pathology at the University of Michigan in 1903. He wrote "Practical Pathology," in 1896 with a second edition in 1922. He did research on tuberculosis of the placenta, lymph nodes, mustard gas poisoning, lipemia, the aging process, and especially syphilis. In 1920 Warthin and Starry introduced a silver stain as a method for demonstrating spirochetes in tissue.

Development of the Coroner's and Medical Examiner's Systems in America

In 1860, the State of Maryland enacted the "Code of Public General Laws," which authorized the coroner or his jury to require the attendance of a physician in cases of violent death. The act did not specify what type of physician; the coroner appointed the physician who attended. In 1868, the Maryland Legislature authorized the governor to appoint a physician as sole coroner in the city of Baltimore. It was not until 1890 that pathologist who performed autopsies for the coroner were referred to as 'medical examiners.'

In light of the controversies surrounding the Coroner's System in Massachusetts, the Coroner's System was replaced with a Medical Examiner's System in 1877. The jurisdiction of the Massachusetts Medical Examiner was limited to "dead bodies of such persons only as are supposed to have come to their death by violence." However, the early Massachusetts Law did not allow the medical examiner to perform autopsies without the authority of the district attorney. It was not until 1945 that the Massachusetts Law was amended to make performance of autopsies discretionary with the medical examiner.

In 1918, Dr. Charles Norris was appointed the first Chief Medical Examiner for the City of New York. He was given the authority to determine whether the office would take jurisdiction in a death thereby establishing the functional criteria for a competent medical examiner's office. Due to the authority given to the Chief Medical Examiner, some regard the New York City Medical Examiner's Office as the first true 'Medical Examiner's Office.' Dr. Norris made significant contributions to forensic medicine research and service development. This office served as one of the main cornerstones for the development of forensic science in the United States.

The founder of the American Science of Toxicology, Dr. Alexander Gettler, established the toxicology laboratory at the New York City's Medical Examiner's Office under the direction of Dr. Norris.

Dr. Thomas Gonzalez succeeded Dr. Norris as Chief Medical Examiner on Sept. 18, 1935. He was assisted by Dr. Helpern, Dr. Vance and Dr. Dominick DiMaio all of who were noted forensic pathologists. Dr. Milton Helpern, who became recognized as one of the most outstanding Forensic Pathologists of the twentieth century, followed Dr. Gonzalez. In 1937, Dr. Helpern, along with Dr. Gonzalez and Dr. Vance published "Legal Medicine and Toxicology," which was considered the most important American text in forensic medicine during the first half of the 20th century. The second edition was published in 1954. Dr. Helpern was one of the founders of the National Association of Medical Examiners in 1966.

A Medical Examiner's Office was established in Newark, New Jersey, by Dr. Harrison Martland, who had worked in the New York City's Medical Examiner's Office. Dr. Martland served as the pathologist for Newark City Hospital and as the Essex County Medical Examiner. He became Professor of Forensic Medicine at New York University in 1933. Dr. Martland was noted for his outstanding research into radium's lethal qualities, which was published in the Journal of the American Medical Association. In 1929, Dr. Martland coined the term "punch drunk," to describe the brain injuries of prizefighters. Several decades later, Dr. Richard Lindenberg, Forensic Neuropathologist for the State of Maryland's Medical Examiner's Office, expanded this concept. Dr. Martland was regarded by his peers as one of the greatest minds in legal medicine.

Dr. Alan Moritz was appointed to the George Burgess McGrath Chair of Legal Medicine at Harvard University in 1937. Dr. Moritz was the first to teach Forensic Pathology as a subspecialty in this country. Dr. Moritz established a residency-training program in Forensic Pathology. He published the "Pathology of Trauma," in 1942. Dr. Moritz went on to become Professor of Pathology and Director of the Institute of Pathology of the School of Medicine at Western Reserve University in Cleveland, Ohio.

The first Statewide Medical Examiner's System was established in Maryland in 1939. In the establishment of Maryland's Statewide Medical Examiner's System the legislature directed that the appointment of the Chief Medical Examiner be accomplished by a commission consisting of the professors of pathology of two medical schools, the executive officer of the State and Baltimore City Health Departments and the superintendent of the State Police. Thus, the appointment of the Chief Medical Examiner was removed from the political process. The commission also appointed the toxicologist, other staff members and the deputy medical examiners in the other counties.

The American Academy of Forensic Science was founded in 1948.

The American Board of Pathology commenced board certification in Forensic Pathology in 1959.

The first Western State to institute a statewide system of medicolegal investigation was Utah. It appointed an outstanding forensic pathologist in the name of Dr. James T. Weston, as its first Chief Medical Examiner. While serving as Utah's Chief Medical Examiner, he aided the State of New Mexico in designing; in what Dr. Weston felt, was an ideal medical examiner's system. This culminated in the coroner's system being replaced by a medical examiner's system on July 1, 1973. Dr. Weston became the State of New Mexico's first Chief Medical Investigator (medical examiner). Dr. Weston's system was somewhat unique in that the Medical Examiner's Office was established at the University of New Mexico. This in effect allowed the ME's Office to utilize the resources of the medical school as well as provide training for medical students, residents, and other medical professionals. Being part of the university, the personnel of the ME's Office, had ready access to medical and non-medical consultants.

The first Medical Examiner's Office in Texas was established on May 6, 1955, for Baxer County (San Antonio); its first Chief Medical Examiner was Dr. Robert Hausman. One of the most outstanding Medical Examiners for Baxer County, and one of the leading forensic pathologists in the country, was Dr. Vincent J. M. DiMaio. Dr. DiMaio is the author and co-author of four books and over 75 articles.

The first class of certified Forensic Pathologists were all outstanding anatomic pathologists; Lester Adelson, Joseph Davis, William Eckert, Russell Fisher, Milton Helpern, Geoffrey Mann, Alan Moritz and Charles Petty comprised this class. Lester Adelson wrote "The Pathology of Homicide;" Russell Fisher,

who trained under Alan Moritz for two years, co-authored "Medical Legal Investigation of Death with Werner Spitz, and was the State of Maryland's second Chief Medical Examiner; Charles Petty was one of the authors of "Modern Legal Medicine Psychiatry and Forensic Science," Director of the Southwestern Institute of Forensic Science at Dallas, Chief Medical Examiner of Dallas County, Director of the Dallas County Criminal Investigation Laboratory, Professor of Pathology and Forensic Sciences at the University of Texas Southwestern Medical School of Dallas, and former President of the American Academy of Forensic Science; William Eckert wrote "Introduction to Forensic Science," and served as a consultant in the assassination of Robert Kennedy and the legendary slayings of Jack the Ripper; Dr. Joseph Davis served as the Chief Medical Examiner for Miami-Dade County from 1957 to 1996. During his tenure, Dr. Davis was recognized as one of the countries leading Forensic Pathologist.

In September of 1960 the American College of Legal Medicine was formed. In 1973, this organization published its first scholarly journal, the Journal of Legal Medicine. In 1988, it published the first edition of its textbook, Legal Medicine.

The Coroner's and Medical Examiner's Systems in the United States today

In the United States there are three medical legal systems utilized, the Coroner's and Medical Examiner's Systems and Mixed System.

In the Coroner's System, the coroner is usually an elected county official, who serve typically four years per term, although there are some jurisdictions in which the term is for six years. Their primary function today is to determine cause and manner of death. The cause of death is fundamentally the physiologic process that led to death. The manner of death is the mechanism (homicide, accident, suicide, natural, and undetermined, i.e. unknown mechanism) that gave rise to the physiologic process that led to death. The coroner typically is aided in this process by a forensic death investigator. As a finder of fact, the coroner has quasi-judicial powers such as the power of subpoena, and in some jurisdictions the power to hold inquest, however, unlike the coroner's in Great Britain, they are not judicial officers, instead are considered to be executive branch officials. In England and Wales, the coroner's system is under the control of the Ministry of Justice, which is headed by the Lord Chancellor and Secretary of State for Justice. The level of experience required of a coroner is varied with only four states (Ohio, Kansas, Louisiana and North Dakota) requiring the coroner be a physician. Coroners with rare exception, have the autopsies performed either by forensic pathologist or hospital pathologist. In some jurisdictions, such as Monterey County, California, the legal duties of the coroner have been merged with the Sheriff's Office, which then delegates the medical responsibilities of the coroner to forensic pathologist with the expected supporting professional staff.

Medical Examiners are typically appointed and rarely other than a physician. The area of jurisdiction of the medical examiner may be a county, city, district or statewide. Most jurisdictions require the medical examiner be a forensic pathologist or at least a pathologist. There are only two states, Minnesota and Wisconsin, which do not require the medical examiner to be a physician. As forensic science has evolved in the United States there has been a trend toward jurisdictions, whether they be a county, city or state to adopt the medical examiner's system. At this time, approximately 50% of the population is served by the medical examiner's system.

Some states have a mixed system with the large metropolitan areas served by the medical examiner's system, while the rural counties are served by the coroner's system.

Future of Forensic Science

As history has shown, the forensic sciences and pathology have made substantive contributions to society throughout the centuries. We have been, and will continue to be, servants to the continued evolution of the forensic sciences and pathology in our quest to give society the very best that these disciplines have to offer. We must continue to strive for the highest standards in the practice of forensic pathology and in the application of the various subspecialties of forensic science in the resolution of cause and manner of death. This same principle must be applied to our participation in the clinical forensic medicine. It is only through striving to attain these goals that we can best serve society for whom we are forever their servant.