The Anatomical-Clinical Synthesis: From Morgagni to Laennec

Guenter B. Risse

(English Version of “La synthèse entre la anatomie et la chirurgie”

_Histoire de la Pensee Medical Occidentale_


Background

Until the sixteenth century, physicians had few opportunities to develop extensive clinical knowledge and experience. Private practice was limited to the upper classes and medical consultations in hospitals remained sporadic. Autopsies were rare, requested only in cases that had forensic or public health implications. Physicians made great efforts to understand the underlying mechanisms of disease, but theoretical and practical factors hindered a systematic association between bedside phenomena and pathological changes occurring inside the body.

On the theoretical level, adherence to classical humoralism may have been an obstacle to the study of pathological anatomy. Taking its cue from a holistic conception of the body, its focus was on the fluid components, constantly shifting and being expelled during the evolution of a given ailment. In such a dynamic conception, it was believed that the organism tried to regain its previous balance with the aid of internal healing forces. In contrast, surgical affections and especially the effects of trauma, occurred within the solid components of the body. These disorders were usually organ-specific, and were frequently localized on the surface of the body. Broadly included within the tenets of humoralism, lesions were readily linked to specific clinical manifestations such as pain, infection, swelling, blood loss, and functional impairments. Thus, for an anatomical-clinical synthesis to occur, it was essential to graft the surgical perspective of a localized, structural concept of disease onto holistic and functional medical views. The search for connections and relationships in disease states required a cognitive scaffolding whereby clinical manifestations and structural bodily changes could be seen as joint expressions of a single pathological disease process.

To better understand this fusion process, one must examine the two elements whose merger was essential in fashioning such an anatomical-clinical synthesis. Historically, the “medical mentality” sustained complex, integral notions of sickness based on speculative views of the nature of life and disease. This approach led over time to the establishment of a wide and often contradictory range of doctrines. In its essence, the
medical approach can be defined as both natural and historical: physicians listened to the sick and observed symptom-sequences believed to reveal the natural progression of a particular disease. On that basis, they proceeded to make diagnoses and prognoses. Practitioners also intervened therapeutically, taking into account the symptomatology and disease progression. Viewing the human as a closed black box, both symptoms and localized lesions were effects of a struggle between disease and the individual organism. Within this traditional framework, all healing actions were considered secondary, solely aimed at mobilizing and supplementing the body’s internal healing forces.

The “surgical mentality,” in turn, historically focused more on the solid components of the body, localizing and identifying discrete lesions and striving to understand their anatomical structure. While accepting an overarching humoral pathogenesis for understanding the stages of wound healing, for example, the surgical approach remained essentially anatomical, topographical and functional. What organ was affected, where was the trouble located, and what functions were compromised? Diagnostic examinations relied on specific physical inspections and functional tests. Instead of seeking a systemic response, therapeutic interventions focused narrowly on the evacuation or extirpation of lesions, as well as the mending of bones and flesh.

While representing a convergence of medical and surgical styles of thought and action, the anatomical-clinical synthesis should also be linked to professional efforts aimed at improving clinical diagnosis and prognosis. In our own time, bedside observations are still subject to diverging interpretation, even error. To be successful, both medically and socially, clinicians must establish firm correlations between a number of events that include the patient’s medical history and clinical course, subject to postmortem pathological verification. Pathology remains the final arbiter of clinical conclusions, teaching bedside caution and skepticism. As Giovanni Battista Morgagni (1682–1771) explained in the eighteenth century, those “who have dissected or inspected many bodies have at least learned to doubt, when the others who are ignorant of anatomy and do not take the trouble to attend to it, are in no doubt at all.”

In addition to different approaches to the human body, private medical and surgical practice remained historically within the parameters negotiated between patients and physicians or surgeons. Variations throughout the centuries have reflected a wide range of professional and cultural contexts shaped in great part by choices and expectations existing on both sides of the patient-physician relationship. As rightful patrons, paying patients were historically in control of the encounter. Under these circumstances, elite

practitioners were bound by rules of social etiquette that, for example, limited physical intimacy. For physicians, professional dignity and status were centered on claims of scholarship and rationality. Verbal skills and the construction of plausible explanations defined the physician as a scholar. In sharp contrast, manual labor, including most surgical activities, carried with them a potential for social stigma.

Thus, physical examinations and the dissection of bodies, both of interest to surgeons, were governed by powerful cultural conventions. After the twelfth century, however, Christian requirements of bodily integrity were often at odds with newly formulated legal and public health requirements. Beginning with the sixteenth century, postmortem examinations were more common, but were usually carried out to ascertain the immediate causes of death without close reference to either previous clinical information or a structural perspective on disease. In the course of their numerous anatomical dissections of humans, Andreas Vesalius (1514-1564), Colombo (1516-1559), Fallopius (1523-1562), and Eustachius (1524-1574) all made observations concerning pathological organs. Vesalius, for example, was familiar with aortic aneurysms and linked their existence to a given set of clinical symptoms. These efforts, however, were never systematic because they arose in the process of carrying out public dissections of executed criminals, who coincidentally suffered from disease. More pathology was probably discovered during clandestine autopsies, but these were only sporadically reported.  

Nevertheless, Antonio Benivieni (1443-1502) of Florence attempted to correlate bedside data with observations made at the postmortem dissection table. His posthumously published work, The Hidden Cause of Disease (1507) sought to demonstrate the usefulness of this approach by studying twenty-two of his patients both clinically and pathologically. For this purpose he requested and obtained the permission of his patients’ relatives to conduct the examinations himself. Because the dissections were limited to merely opening the body instead of carefully dissecting the various organs, insufficient anatomical data coupled with fragmentary clinical information rendered such correlations simplistic and somewhat meaningless.

Another sixteenth-century precursor was Jean François Fernel (1497-1558), a graduate of the University of Paris, and professor of medicine there after 1534. By all

2 For a general overview see Esmond R. Long, A History of Pathology, revised from the original edition of 1928, New York, Dover Publications, 1965

accounts, Fernel was a much sought-after court physician who attempted to collect and summarize the extant medical knowledge transmitted from classical and Islamic sources. In his three-part *Medicina*, published in 1554, Fernel classified human diseases and explained bodily functions both in health and illness. By attempting to employ anatomical localization as the primary criterion for his nosology, Fernel succeeded in linking the disease processes to various inner organs. His text was widely read and used in contemporary medical teaching, and this novel localization of disease in the solid parts provided encouragement to others for making further postmortem observations. In fact, the second part of the work, titled “Pathologia” provided the first systematic essay on the morbid condition of numerous organs as discovered during dissection.4

Both Benivieni’s and Fernel’s publications suggest that as early as 1600, some wealthy private patients or their relatives occasionally consented to the performance of postmortem dissections. The knowledge obtained in this fashion was supplemented by the examination of bodies from deceased hospitalized patients and others surreptitiously disinterred for dissection purposes. Slowly, physicians and surgeons began using this privileged pathological learning to bolster their professional authority and standing. To this day, the understanding of material transformations taking place in the body’s innards allows practitioners to effectively oppose lay opinion and even challenge the patient’s own competence as the best interpreter of his physical condition.5

One of the first to compile pathological observations from the extant works of Sylvius, Vesalius, and Columbus was Johann Schenck von Grafenberg (1530–1598), a student at Tübingen. Eventually a city physician at Freiburg, he published nine hundred pages in seven volumes of his *Observationum medicarum, rarum, novarum*, in Basel, from 1584 to 1597. Although Schenck mainly presented observations culled from works of previous authors, he also included information from his own practice and that of his friends and relatives. As with all collections of disparate data, the value of Schenck’s work resided in its accurate citations and good indexing. Equally important were surgical works such as Ambroise Pare’s (1510–1590) *Dix livres de la chirurgie* (1564), and Wilhelm Fabry von Hilden’s (1560–1634) *De gangraena et sphacelo* (1593). These publications decisively advanced the anatomical concept of disease by describing and indicating specific lesions as causes for a number of specific symptoms and signs.

4 Jean-Francois Fernel, *Medicina*, 3 vols, Paris, A. Wechelum, 1554

5 See the valuable summary by Lester S. King and Marjorie C. Meehan, "A history of the autopsy,” *American J. Pathology* 73 (1973) 514-544
Continuous support of anatomical studies by Italian popes and princes bore fruit during the seventeenth century. In Rome, Giovanni Riva (1627–1677), a distinguished anatomist and surgeon, as well as physician to Pope Clement IX, organized a special society and, in association with one of the local hospitals, founded a museum for the collection of pathological specimens. More important was the role of Marcello Malpighi (1628–1694), a graduate of Bologna, who taught at Pisa in 1656. Interested in comparative anatomy, Malpighi was credited with the discovery of capillaries and red corpuscles. Also influential was the first illustrated textbook of surgery, *De Recondita Abscessuum Natura* (1632), written by Marco Aurelio Severino (1580–1656), professor of anatomy at the University of Naples. This complete treatise focused on “swellings” and described and classified a great variety of tumors, along with their clinically benign or malignant nature. A later source for valuable pathological information was Giovanni M. Lancisi (1654–1720) of Rome, whose works *On Sudden Death* (1707), and *On the Motion of the Heart and on Aneurysms* (1728) laid the foundation for an understanding of heart disease and pathology.

Toward the end of the seventeenth century, information about morbid findings began to accumulate rapidly. Within the Dutch school of anatomy at Leyden, Frederick Ruysch (1638–1731) of Amsterdam, a student of Sylvius, was widely known for his research on the lymphatic system and his techniques of wax injections. Ruysch published an atlas depicting some of the specimens he had collected, which included a large aortic aneurysm, cirrhotic livers, kidney stones, as well as tumors of the rectum and stomach. At about the same time, Raymond of Vieussens (1641–1716) of Montpellier concentrated on the heart, describing a host of new pathological conditions, including valvular disease. His work *Novum vasorum corporis humani systema* was published in 1705.6

Johann J. Wepfer (1620–1695), city physician in Schaffhausen, became interested in cerebral vascular anatomy, diseases of the head and especially the phenomenon of apoplexy caused by cerebral hemorrhage. Wepfer wrote *Observationes anatomicae, ex cadaveribus eorum, quos sustulit apoplexia*, published in 1658. Another important author was Nicolas Tulp (1593–1674) of Amsterdam. As a professor of anatomy, he was concerned with tumors, polyps, and cancer; he published his illustrated *Observationes Medicae* in 1641. Thomas Bartholin (1616–1680) of Copenhagen, also a professor of anatomy, published his anatomical observations between 1673 and 1680 in a series of treatises under the title *Acta Medica Philosophica*. In this work, he combined his

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personal records of postmortem examinations at Leyden and Padua with that of other prosectors he had brought to his anatomical theater in Copenhagen. The Padua school of anatomy also influenced physicians in Britain. Alumni such as William Harvey (1580-1657) compiled “anatomical histories” of some of his private patients, although the collection was apparently destroyed during England’s Civil War. In his first letter to Jean Riolan, Harvey eloquently expressed his beliefs concerning the importance of pathological anatomy when he wrote that “the examination of one single body of one who has died of a long-standing disease is of more service to medicine that the dissection of ten hanged men.”7 Following in Harvey’s footsteps, a group of Oxford physiologists, led by Thomas Willis (1621-1675), were equally committed to an experimental and visual investigation of nature. Based on Gassendi’s corpuscular philosophy, these men attempted to explain vital functions chemically, especially using Willis’ concept of fermentation in the blood. Willis was also interested in advancing contemporary medicine. His objective was to place it “amongst the noblest of the sciences.” Willis promoted the study of normal and pathological human anatomy as essential elements for a rational medicine and he extensively employed clinico-pathological correlations.

Willis’ central concern was the nature of the human soul, and he strove to discover the connections between mind and body. He shared with his associates the notion that “ocular demonstrations” would indeed provide a “firm and stable basis” for a new and more authoritative physiology as well as a “pathologie of the brain and nervous stock,” as expressed in Willis’ Rational Therapeutics of 1675. To achieve this goal, one had to understand the interaction of drugs with the “spirits, humors, and solid parts” of the body. Such relationships demanded a better knowledge of human anatomy to ascertain the causes of symptoms as well as the possibilities for cure.

To attain his objectives, Willis relied on dissections of human bodies, including executed criminals and deceased private patients drawn from the Anglican upper classes. The former were condemned individuals released by the Crown to barber-surgeons for dissection. Since the time of Vesalius, their bodies had helped demonstrate many of the normal structures, but the absence of clinical histories precluded useful correlations between pathological findings and premortem events. As Harvey had recognized, postmortem examinations of aristocratic patients who had provided sufficient details of their ailments were much more informative. In a rare conjunction of English religious, cultural, and medical interests, many of Willis’ upper class clients allowed such dissections to take place, often requesting autopsies in their

7 The subject is treated in detail in Robert G. Frank,Jr., Harvey and the Oxford Physiologists, Berkeley, University of California Press, 1980
wills. Willis' pathological findings focused mainly on the structures of the nervous system. In one sense, these observations were more credible since they derived from the examination of noble persons instead of wretched individuals who had died in workhouses or hospitals. In the dedicatory epistle to his work on the pathology of the brain published in 1667, Willis hoped to “better solve all the phenomena of the sick” by “anatomical observations firmly stabilized.”

In sharp contrast Willis' contemporary, Thomas Sydenham (1624–1689) saw no meaningful links between the evolution of a disease and those anatomical changes inside the body which were evident only at postmortem dissection. Representative of the holistic clinical thought of his day, Sydenham considered it futile to localize a disease in any specific portion of the human body because all parts were interconnected and no meaningful boundaries could be drawn between them. In addition, many disease states such as melancholia, vertigo, and mania apparently had no specific seat in the body. In fact, even if a lesion could be found, nothing could be inferred from anatomy about the cause of a disease. According to the wisdom of the day, disease was not the product of damage accrued to a number of internal organs, but a reflection of complex bodily struggles with invisible morbific matter.

The year 1700 marked the publication of Bonet’s revised, two-volume Sepulchretum sive Anatomia Practica, ex cadaveribus morbo denatis (The Cementery, or Practical Anatomy, from Cadavers dead from Disease), first published in 1679. This monumental book contained information on nearly three thousand autopsies with Bonet’s appended comments and references. Born in Geneva, Theophile Bonet (1620–1689) obtained his doctorate from Bologna in 1643. Bonet, though greatly interested in practical medicine, had retired early from medical practice in Neuchatel in 1675, because of a hearing defect. A copious writer, he published a Medico-Practical Index (1682), among other works, in which diseases were alphabetically arranged and described in detail, together with all suggested cures recommended by other medical writers. In the revised Sepulchretum, much of the first volume’s information was repeated, but Bonet’s arrangement of the information had changed to a topographical format, proceeding

8 For these insights I am indebted to Robert Martensen and his unpublished M.A. dissertation "Thomas Willis (11621-1675) and the constitution of medical knowledge in Restauration England," University of California, San Francisco, 1991.

9 Thomas Willis, Opera Omnia, 2 vols, Geneva, S de Tournes, 1676-80

from head to toe, with the manifestations of each disease described in the form of several examples. In each case, the author provided causal explanations, suggestions for management, and anatomical postmortem findings. In this way, Bonet intended that contemporary physicians compare and match their cases with those provided in the book. The encyclopedia was flawed, however, because Bonet relied somewhat uncritically on the opinions and observations of other practitioners, simply compiling their material without drawing any inferences.11

Pathology remained mostly a part-time activity of selected clinicians and surgeons. In light of Sydenham’s holistic ideas, why were physicians around 1700 becoming more interested in pathological anatomy? As seen in the case of Bonet, there seemed to be an obvious need to summarize and integrate the rapidly accumulating pathological data and link it to clinical manifestations through the employment of case histories. It was hoped that both strands of knowledge would improve the clinician’s diagnostic skills, improve prognosis, and aid in the therapeutic management of patients. The issue, however, was whether physicians armed with such pathological knowledge should move beyond the practical goals of verification and illustration of clinical events, to reshaping medical theory and nosology.

One could argue that the rise of pathological anatomy during the eighteenth century was intimately linked with efforts to inventory human diseases and chart their evolution, as part of a broader effort to understand the natural world. Ultimately, however, correlations between clinical events and pathological changes in the body could be deemed useful only if physicians accepted a reciprocal, causal linkage between such external manifestations and the simultaneous structural changes internally occurring in various organs. In the eighteenth century, origins of illness were conceptualized as vapors and poisons whose entry into the body triggered a systemic response; clinical and pathological manifestations were both seen as the effects of an ongoing struggle within the body. A true anatomical-clinical synthesis could not occur until such correlations were incorporated into a functional system in which practitioners interpreted clinical signs and pathological lesions within a mutually interacting physiopathology.12

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11 Theophile Bonet, Sepulchretum sive anatomia practica, ex cadaveribus morbo denatis, 2 vols, Genevæ, L. Chouet, 1679

As representative of the Italian Enlightenment, Giovanni Battista Morgagni (1682–1771) was a product of intellectual and institutional environments operating in Bologna and Padua, which for more than two centuries had fostered the study of anatomy. Self-consciously following in the footsteps of Malpighi and his student, Anton Maria Valsalva (1666–1723), Morgagni pursued the “new philosophy” while still a university student. In 1699, he joined the Academia degli Inquieti of Bologna (Academy of the Restless Ones), an extramural society promoting experimental activities in accordance with the new scientific models. Within such an academic setting, Morgagni took advantage of the blurred boundaries between medicine and surgery and the lack of stigma attached to scholarly manual work. In fact, Italian physicians with extensive anatomical knowledge frequently assumed supervisory and consultant roles in surgical cases while delegating the actual use of instruments to dexterous operators.13

Morgagni was a student of the Malpighian creed, which rejected scholastic learning, favoring observation over disputation in the discovery of hidden aspects of nature. Contemporary thought held that medicine could advance only if it adopted such an observational approach. The result would be a better understanding of the clinical course of diseases, the effects of medicines, and the seats of disease obtained from a postmortem study of deceased patients. This improved understanding was possible only if practitioners first acquired a comprehensive knowledge of normal anatomy in both man and animals through repeated dissections and experimental vivisection of certain animals. After obtaining his medical degree in 1701, Morgagni practiced in three of Bologna’s city hospitals, including the Ospedale Santa Maria della Morte, where he is said to have dissected a vast number of cadavers. In 1715, he was appointed to the first chair of anatomy at Padua—a position previously held by Vesalius, Columbus, and Fallopius—where he remained until his death in 1771.14

Morgagni’s dissatisfaction with and criticism regarding the incompleteness of Bonet’s Sepulchretum prompted him to plan his own work in 1700. He was especially dissatisfied with the defects of Bonet’s disease indices, the numerous inaccuracies, and the lack of systematic anatomical-clinical links. More importantly, Bonet’s postmortem examinations seemed to lack enough clinical information to allow significant correlations with the anatomical findings. Morgagni’s own De Sedibus et Causis


14 I have drawn valuable information from Andrew Cunningham’s unpublished paper “Morgagni: from case history to pathology,” delivered at the conference The History of Case Histories, Stuttgart, September 1991
Morborum per anatomen indagatis (The Seats and Causes of Diseases as Revealed by Anatomy), was actually written after 1740 and finally published in 1761, the fruit of almost sixty years of clinical and pathological observations. What had started as an effort to correct and update the Sepulchretum with the incorporation of materials derived from the experience of Valsalva and Morgagni himself became instead a landmark treatise of clinical medicine.

To understand the context in which Morgagni studied and wrote his book, one must take into account a number of biological and social factors that enabled contemporary physicians to study clinico-pathological correlations. Prominent among them was an expanding spectrum of disease seen in the urban environment of European cities since the Renaissance, including the high incidence of plague, tuberculosis, and other infectious diseases generally classified as “fevers.” Venereal infections, especially syphilis with its tertiary vascular complications, also occupied a prominent place in the casebooks. There seems to have been a high incidence of degenerative vascular disease affecting the coronary and cerebral arteries of upper class individuals, perhaps a product of greater longevity and affluent lifestyle.

One factor that facilitated the professional ascendancy of surgery was the increase of traumatic cases. Partially the result of expanded mercantile and artisanal activities in cities, the problem was compounded by the progressive expansion of warfare with firearms throughout the European lands. The great variety of shotgun wounds afflicting both poor and rich combatants required anatomical expertise for bullet extraction and subsequent wound care. This fact played an important role in the sustained support for the provision of corpses to the medical establishment, and the performance of anatomical dissections on the Continent.

The increased medicalization of the hospital, a charitable institution traditionally offering shelter and restoration to indigents and travellers, furnished more opportunities for dissection. By 1700, a number of such European establishments increasingly restricted admissions to the sick, hired physicians and surgeons to provide care, and allowed such professionals the use of inmates for educating students. More importantly, hospital authorities allowed more dissections of the bodies of individuals without relatives, who had died in the wards. Morgagni dissected at hospitals in Bologna and Padua and also occasionally received corpses and bodily parts from these institutions for his regular university anatomy dissections or private studies.

Primarily a treatise of clinical medicine rather than one on pathological anatomy, Morgagni’s De Sedibus was highly systematic. However, like Bonet’s work, it was arranged anatomically from head to toe, employing Bonet’s disease nomenclature. Using an epistolary format popular at that time, each section was composed in the form of a letter to an anonymous young gentleman. Responding to Bonet’s indexing
deficiencies, Morgagni provided four types of comprehensive cross references that enhanced the book’s usefulness. Based on about seven hundred personal dissections, either anatomical demonstrations or investigative postmortems, the book contained a wealth of information. Although less voluminous than Bonet’s *Sepulchretum*, Morgagni’s encyclopedic learning, critical acumen, and superior observational powers allowed him to create a much more readable and instructive book.

To achieve a meaningful synthesis between clinical and anatomical evidence, Morgagni devoted many pages to describing the history of the patient’s ailment, carefully recording age, sex, occupation, hereditary factors, seasonal incidence and previous exposure to disease. He listed his own cases as well as those of Valsalva and other trusted colleagues. The history was often followed by diagnostic procedures, which routinely involved visual inspections of the body’s surface and orifices. Morgagni’s actions were modulated by contemporary social conventions and the patient’s authority. Physical examinations such as palpation in search of abnormal structures to determine their location and size were performed. Morgagni and others may have placed an ear on the patient’s body to locate the existence of fluids in the chest and abdomen. The results of Morgagni’s autopsies were recorded in great detail. They included the precise and graphic descriptions of gross pathology familiar to everyone in our day.

To his credit, Morgagni’s observations and the inferences drawn from the bedside and dissecting table were cautious. His text reveals that he often attempted to confirm his findings and conclusions through the use of animal experiments, a traditional approach employed since Galenic times. In contrast, his pathophysiological explanations were framed within a humoral schema based on the Harveyian circulation model. In this regard, Morgagni followed in the tradition of other Italian iatromechanists such as Borelli, Santorio, and Ramazzini, who were similarly guided by hydrodynamic principles. A number of acrimonious humors and irritating particles were seen as the most common culprits causing disease, as they circulated in constricted or relaxed vessels and nerves. To legitimate such hypotheses, Morgagni cited a parade of authorities and original sources in the form of footnotes, displaying an impressive erudition while properly attributing credit to his predecessors.  

For the historian, *De Sedibus* raises a number of methodological questions. What kind of relationship can be forged between clinical case histories and gross pathology? What were the obstacles that individuals such as Morgagni encountered in obtaining complete medical and pathological histories to attempt the correlations? Full clinical

15 For a general treatment of the subject, see Saul Jarcho, “Giovanni Battista Morgagni. His interests, ideas, and achievements,” *Bulletin of the History of Medicine* 22 (1948) 503-527
histories were frequently unintelligible and fragmentary whether obtained from patients or their relatives of any social class. The sick were sometimes too ill to provide information, friends and family unavailable. Yet, cadaveric findings could have little significance unless they were properly integrated with premortem clinical events and basic information about the patient’s age, sex, occupation, and life-style. To Morgagni, the influence of occupation on disease was quite important. Porters, farmers, weavers, prostitutes, priests, and men of learning were among the occupations noted. Weather was believed to influence the circulation mechanically, and thus became an accessory factor to be considered in the causation of disease. All such clinical facts were considered meaningful, and no attempt was made to determine relative degrees of importance among them.

Morgagni’s syntheses were limited to the contemporary range of clinical and pathological phenomena available to him for study. Perhaps fearful of contagion, Morgagni eschewed postmortem examination of infectious cases, persons who had died of tuberculosis, smallpox, and other dangerous fevers. His own speculations were, therefore, fairly limited and skewed towards non-infectious and chronic problems afflicting the well-to-do patients. He also subscribed to the traditional view that specific clinical manifestations and pathological changes were ultimately products of the same disease process. As such, they could perhaps shed light on the causes of the disease in question. Indeed, for learned physicians, knowledge of causes was an important criterion employed to separate them from empirics and quacks. As Daniel Sennert aptly expressed it during the seventeenth century, “to know scientifically is to understand things through their causes.” Although the correlation between clinical and anatomical findings was based on observation, a causal relationship between these phenomena became a desired inference. In Morgagni’s case, such inferences were made routinely, even when the causal network appeared to be complex, demanding distinctions between remote and proximal causes, predisposing and exciting ones.

Morgagni’s most sought-after finding was the “proximal” or “immediate” cause of death. A complete pathological profile from the deceased patient at the time of dissection could perhaps provide important clues. Bedside and pathological phenomena leading toward death were duly noted, but the clinical history did not always suffice in detailing the events surrounding death, or the circumstances of death itself. A thorough autopsy might reveal the cause of death, though perhaps a full dissection was necessary to ascertain it. It was important that date, place of death, and time of postmortem examination be recorded. Legal issues, as well as questions of normal postmortem

\[16\] Saul Jarcho, ed. and transl., The Clinical Consultations of Giambattista Morgagni, Boston, Francis A, Countway Library, 1984
decay and how it could influence the findings had to be considered. The question remained as to whether pathological anatomy could uncover a cause. Postmortem dissections could certainly expose conditions that provided a structural explanation of the patient’s symptoms, but could they reveal causes? This was the key question for Morgagni and others performing such dissections in the eighteenth century.  

During the course of an autopsy, it was difficult for the dissector to select a given lesion as the “seat” of the disease, not knowing what relationship a particular lesion would have to others discovered during the dissection. In a letter written to the German anatomist Meckel in 1760, Morgagni wondered whether diseased organs should be considered effects or causes of abnormal function. In his view, the study of altered structures could lead to an understanding of the underlying actions which bring about these changes, an insight further developed by pathologists nearly a century later.

Physicians in Morgagni’s era sought to make the anatomical-clinical syntheses practical to medicine. In creating a new semiology, anatomists used postmortem findings to interpret premortem symptoms and physical signs to some extent, though not exclusively. Therefore, Morgagni’s correlations may have accentuated the importance of bedside observations and thus stimulated specific searches for clinical clues that would match the uncovered pathology. In De Sedibus, Morgagni frequently recorded that he practiced palpation and auscultation on his patients in an effort to detect the presumed pathological changes taking place beneath the skin. Equally important was the notion that the autopsy would uncover clinical errors of interpretation and therefore serve as a valuable educational tool to sharpen the physician’s diagnostic and therapeutic skills.

Morgagni’s work was hailed as an important contribution to the contemporary debate concerning the clinical utility of anatomical research. However, by the time it appeared in print, De Sedibus seemed oddly antiquated. The text was structured into Bonet’s outdated, topographical arrangement that started with headaches and cerebral apoplexy instead of being organized by organ systems. As an encyclopedia of diseases, the work was somewhat incomplete, since it lacked the most common infectious disease categories. Moreover, Morgagni’s observations, especially his pathological

17 For a comparison, consult Saul Jarcho, ed. and transl., Clinical Consultations and Letters by Ippolito Francesco Albertini, Francesco Torti, and Other Physicians, Boston, Francis A. Countway Library of Medicine, 1989

findings, failed to provide a new understanding of morbid processes, nor did they inspire a novel classification of disease. Indeed, Morgagni’s work offered no new theories of pathogenesis, presenting the standard early eighteenth-century iatromechanical concepts while ignoring Haller’s new properties of irritability and sensibility.

Before proceeding, one should ask whether Morgagni’s work was a model for French post-revolutionary attempts to correlate clinical signs and symptoms with pathological lesions, as is sometimes suggested. One prominent French physician, Jean N. Corvisart (1755-1821), acknowledged that *De Sedibus* was a “splendid work, a monument of a wise and vast erudition” that failed, however, to encourage the art of clinically recognizing organic diseases. In Corvisart’s opinion, a different emphasis was needed: instead of increased focus on the seats and causes of diseases through anatomical dissections, attention had to be directed toward those clinical phenomena and diagnostic signs resulting from organic lesions.19 In the meantime, Corvisart’s own autopsies at the Charité Hôpital in Paris continued merely to illustrate the antemortem clinical findings. Even Philippe Pinel (1745-1826), who had prominently declared that “to pay attention to the autopsy is a basic goal of the hospital physician,” viewed postmortem examinations as subordinate to the findings obtained at the sick bed. Clinical medicine continued to supply the most important information for diagnosis and treatment.20

From Morgagni to Bichat

Six years after the publication of Morgagni’s magnum opus, a French court physician, Joseph Lieutaud (1703-1780) of Provence, published his two-volume *Historia Anatomica Medica* (1767). Analogous to Bonet’s *Sepulchretum*, this massive compendium contained 3,500 brief clinical cases together with their autopsy reports. The limited clinical background and anatomical information were uncritically correlated by simple placement in parallel columns. Given its scope, Lieutaud’s analysis depended on data recorded by other anatomists, and his classifications were therefore cumbersome and arbitrary. Lieutaud’s contention that postmortem dissections disclosed the structure and relation of bodily parts with their natural connections—anatomy and physiology—while exposing to the observer the internal nature of human disease merely repeated Morgagni’s ideas. In addition to being a collector of other


physicians’ experiences, Lieutaud sought to use anatomical-clinical syntheses to promote more accurate prognoses and make medical treatments safer.21

Another prominent contemporary who was conscious of the value of postmortem examinations, was Herman Boerhaave (1668-1738) of Leyden. Accepting their pedagogical role, he performed his autopsies in the presence of students in an attempt to correlate pathological findings with clinical developments. Boerhaave’s two reports, describing autopsies carried out on nobility whose baffling clinical manifestations were explained by postmortem examinations, were widely circulated. *Atrocis nec Descripti Prius Morbi Historia* (1723) concerned the case of Baron de Wassenaer who died of a ruptured esophagus, while *Atrocis Rarissimique Morbi Historia Altera* (1727) involved the Marquis de St. Alban, who perished from a previously unrecognized mediastinal tumor. Boerhaave’s successor, Hieronymus Gaub (1705-1780), was the author of a general text of pathology, the *Institutiones Pathologiae Medicinalis*, published in Leyden in 1758.22

Also in Leyden, Eduard Sandifort (1742-1814), successor and pupil of Bernard Albinus, added a great number of pathological specimens to the Leyden Museum. Sandifort also published a four-volume illustrated work *Observationes Anatomicae-Pathologicae* between 1777 and 1781, which is somewhat comparable to Morgagni’s opus. It includes an excellent description of congenital abnormalities, including the cardiac tetralogy later attributed to Fallot.

In addition to specific organ changes, John Hunter (1728-1793) of London studied general pathological reactions. Although possessing only fragmentary surgical training, Hunter was interested in anatomy, taxonomy, and general physiology. His contributions to general pathology included experimental and clinical studies of bodily responses such as “healthy” and “unhealthy” inflammation and repair, degeneration and necrosis.23 He was also interested in the treatment of gunshot wounds, suppuration, and the nature of pus, distinguishing certain general tissue types involved in such processes. Hunter was keenly aware of the importance of his studies for clinical medicine. In his view, pathology could furnish concrete objective data in contrast with the variable, subjective and complex information obtained at the bedside. Pathophysiology, for its


part, held the promise of allowing physicians and surgeons to understand the dynamic nature of such lesions.  

A nephew of John Hunter, and also primarily a London clinician, Matthew Baillie (1761–1823) wrote the first English text on pathology. His *The Morbid Anatomy of Some of the Most Important Parts of the Human Body* appeared in 1793, and was a very popular book written in the vernacular that went through several editions. Baillie justly criticized previous pathological anatomy works as unwieldy and vague. He emphasized the importance of a dynamic approach in pathology as outlined by Hunter. For Baillie there was a wide gap between pathological structure and function. Yet, only the study of altered structure could lead to a better understanding of changing functions. Regarding the promise of pathological anatomy, he wrote in 1793: “In proportion as we shall become acquainted with the changes produced in the structure of parts from disease actions, we shall be more likely to make some progress towards a knowledge of the actions themselves, although it must be very slowly.”  

To accomplish this goal, the author was quite realistic: “The subject in itself is extremely difficult because morbid actions are going on in the minute parts of an animal body excluded from observation; but still, the examination of morbid structure is one of the most probable means of throwing light upon it.”

Unlike Morgagni, Baillie hoped that his “attentive examination” of morbid structure would lead to sharper distinctions between separate disease entities. Wrote Baillie: “A second advantage arising from the more attentive examination of morbid structure is that we shall be able to distinguish between changes which may have some considerable resemblance to each other, and which have been generally confounded. This will ultimately lead to a more attentive observation of symptoms while morbid actions are taking place, and be the means of distinguishing diseases with greater accuracy.”

Baillie’s program was quite ambitious, since it suggested the primacy of pathological anatomy over clinical medicine in the reconstruction of nosology. However, the author

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26 Ibid., p. V

27 Ibid., p. V
remained content merely to describe, not analyze, correlate, or theorize. In part, further advances awaited the advent of better microscopes and much more sophisticated experimental procedures not available for several decades. In the meantime, however, Baillie concentrated on precise descriptions of the pathological changes discovered at the dissection table, though he omitted most of the clinical details, thus contributing little to link the two. Precise and logically organized, the text was meant to inform clinicians who rarely witnessed dissections and never carried them out.28

In Scotland, the social and professional milieu was responsible for a similarly restrictive view of pathological anatomy. Autopsies were not routinely performed, although the establishment of a local infirmary in Edinburgh created more opportunities for dissections. As elsewhere, hospitalized patients who died in the institution were potential subjects for postmortem examinations. Regulations common in voluntary British hospitals stipulated that in order to perform an autopsy, official permission was needed from relatives and three hospital managers. Together with a low institutional mortality rate, this mechanism to prevent “the violation of the feelings of those most nearly concerned” at the Edinburgh Infirmary was responsible for the paucity of postmortem studies during the second half of the eighteenth century. A great deal of dissection was performed by surgeons on corpses obtained from illegal grave-robbing networks.29

Such a dearth of anatomical observations failed to convince most British medical professionals that postmortem analysis was important to the practice of medicine. As elsewhere, the abnormalities were simply seen as additional effects of disease, hidden and perhaps terminal in their appearance. Lesions were believed to be as variable as most clinical manifestations but definitely of secondary value for practitioners, who were busy managing their patients. When officially authorized, dissections were usually conducted by surgical clerks, a reflection of the old tripartite professional division in British medicine, which cast the physician in the role of a gentleman who eschewed manual work. By contrast, surgeons were much more eager to perform autopsies and thus ascertain the effects of their work, checking especially for postoperative complications that might have led to the death of a patient. Professional barriers militated against an integration of the clinical and pathological information. Protocols recording the postmortem findings of medical cases remained fragmentary and


superficial. Observations which failed to conform to the prevailing physiopathology and nosology were simply excluded.\textsuperscript{30}

In 1779, Johann P. Frank (1745-1821) in his influential \textit{System einer vollständigen medicinischen Polizey} proposed “buildings for the dissection of human corpses where practical physicians had the opportunity to discover hidden faults of the body, correct the mistakes they had committed, by thereafter treating unknown diseases more knowledgeably and defeating them.” \textsuperscript{31} With his Continental contemporaries, Frank accepted in principle the idea that postmortem examinations could perform an educational service for clinicians by pointing out unexpected lesions which could lead to diagnostic revisions and new etiological considerations. In fact, autopsy findings were deemed important for the education of medical students. Working at Pavia under both Simon A. Tissot (1728-1797) and Frank, senior and junior medical students in the 1770s began performing autopsies of deceased patients originally placed under their control by the instructors. At least in theory, Frank’s program of pathological anatomy went beyond mere illustration and supplementation of the clinical evidence, implying that a knowledge of lesions could function as a pedagogical corrective and thus advance medicine.\textsuperscript{32}

In Vienna, Boerhaave’s student Gerard van Swieten (1700-1772) made a plea as early as 1741 for permission to carry out more postmortems. Another Boerhaave disciple, Anton de Haen (1704-1776) continued the tradition of \textit{anatomia practica} in his official teaching at the University of Vienna.\textsuperscript{33} In spite of his professional standing, de Haen dispensed with the surgical prosectors and carried out the dissections himself. His successor, Maximilian Stoll (1742-1787) demanded that all deceased hospital patients in Vienna be subjected to autopsies. As Frank explained in his work, probably referring both to Vienna and Pavia, “the bodies of those patients who died in the clinic have to be opened almost without exception, to discover the seat, causes or consequences of


\textsuperscript{31} Johann P. Frank, \textit{A System of Complete Medical Police; Selections}, ed. by E. Lesky, Baltimore, Johns Hopkins University Press, 1975


the fatal illness.” However, several collections of clinical cases, together with autopsy findings published by de Haen, Stoll, and Frank, reveal that pathological findings continued to play a secondary role in both diagnosis and treatment. As in other parts of Europe, such lesions were correlated with clinical findings but had no serious role in shaping clinical understanding and disease classification.34

For some members of the medical thought collective, however, pathology at the end of the eighteenth century was becoming a full-fledged partner that could supplement the available clinical information by revealing some of the hidden effects of disease. Physicians now encouraged the use of pathological anatomy as an additional guide to clinical understanding and medical management. Surgeons, on the other hand, had already integrated pathological knowledge into the theoretical and practical aspects of their craft for centuries, thereby increasing surgery’s professional standing and, to a lesser extent, improving treatments.

Further social and conceptual shifts were needed for the establishment of a systematic anatomical-clinical synthesis. Restricting the practitioner’s focus to the patient’s body and its localized lesions required a further degree of depersonalization of the sick. This modus operandi demanded that only signs and symptoms considered useful for clinical-pathological correlations should be elicited and collected. All other information, including the patient’s testimony, would become secondary. In consequence, history-taking was to lose its former prominence while the social, geographical and behavioral effects of illness were irrelevant. This dramatic shift can be detected in the composition of subsequent clinical cases where the voice of the patient was lost in favor of an abstract and technical medical discourse. Such profound depersonalization also led to the establishment of museums for pathological specimens, where only diseased portions of human anatomy were henceforth exhibited according to organ or tissue classifications.

Another critical conceptual change would occur when pathological abnormalities, not clinical events, began to define and actually become not just the seat, but the disease entity itself. In such a view, later expanded and defined as “organicism,” patient complaints not supported by detectable physical signs and pathological findings would simply be dismissed. Individuals complaining of illnesses without detectable lesions would, in effect, not be considered “diseased,” since they failed to exhibit any visible, “organic” condition capable of precise diagnosis and professional validation.

34 For a complete summary, see Erna Lesky, “The development of bedside teaching at the Vienna Medical School from scholastic times to special clinics,” in The History of Medical Education, ed. by Charles D. O’Malley, Berkeley, University of California Press, 1970, pp. 217-234
Based exclusively on the materialism of clinical-pathological correlations, physicians could negate their patients’ own understanding of their illnesses. The implications of this shift for patient autonomy and power were obvious.

Finally, the nineteenth-century anatomical-clinical synthesis would demand careful and systematic physical examinations of patients to elicit possible correlations. As in earlier times, normal social conventions governing physical contact between non-intimates as well as members of the opposite sex would have to be set aside, but given the scope of such touching and probing, a new set of professional rules of conduct was needed to guide the encounter. To some extent, the patient’s consent would continue to be operative, but primarily to restrict non-routine procedures. This development represented another significant shift in power away from patients to their physicians.

Bichat

The milieu created by the political and professional agendas of revolutionary France was influential in establishing the conditions in which these conceptual and social shifts could occur. Indeed, the Revolution abolished social, professional, and educational distinctions between surgery and medicine in a dramatic compromise between professional power and medical markets. The eventual result, exemplified by the work of Marie-François Xavier Bichat (1771–1802) and Rene T. Laennec (1781–1826), was a new unified body of medical and surgical knowledge in which internal diseases were also conceived in localized, anatomical terms. The new structural outlook found its expression in a renewed interest in pathological anatomy and the development of techniques of physical examination.

In June 1794, after his arrival in Paris, Bichat met the prominent surgeon, Pierre J. Desault (1738–1795), chief surgeon at the Hôtel Dieu. By that time, the medical faculties had been dissolved by the National Convention as a bastion of privilege from the Ancien Régime, and critical shortages in military health personnel were developing. Bichat was exposed to his mentor’s surgical education at the Hôtel Dieu, and he also became Desault’s favorite student, at times substituting for the master as lecturer. Bichat pursued the study of surgical subjects conducive to his projected military career, including the anatomy, physiology, and pathology of bones and joints necessary to deal with orthopedic injuries.

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In the Hôtel Dieu, autopsies had been performed routinely on all surgical patients since the seventeenth century. In fact, since the 1710s, regular courses of anatomical demonstrations and dissections were held at Parisian hospitals for the benefit of the surgical staff. In such a milieu, Bichat had the opportunity to conduct large numbers of postmortem dissections daily. He turned his attention away from whole organs, directing it instead toward their constituent parts. Not surprisingly, he soon concluded that “ignorance of organic affections, resulting from a total neglect of postmortem examination, is the cause that has misled the ancient practitioners on most diseases.” Although he did not employ a microscope, Bichat carried out numerous experiments in which tissues were subjected to desiccation, putrefaction and chemical actions.

Bichat’s background and contact with medical ideas current at the University of Montpellier decisively shaped his brief career in Paris. His belief in the existence of a vital force or élan can be traced back to the influence of Theophile de Bordeu (1722-1776), one of the university’s former teachers, Bordeu’s vitalist pathophysiology focused on the membranes of mucous and cellular or connective tissue, such as the pleura and peritoneum, and postulated a doctrine of sympathetic links between all bodily organs. For Bordeu, these tissues made up the organizing fabric through which bodily fluids freely circulated. Any changes in solid-fluid balance in such membranes would trigger inflammation, swelling, and suppuration.

Bordeu’s rather vague vitalistic notions were further elaborated by other eighteenth-century medical authors such as François Sauvages, Paul Barthez, and Jean C. Grimaud. In fact, membranes and the serous tunics covering organs in all major body cavities were widely observed and described in other parts of Europe. British authors such as Cullen, Smyth, Hunter, and Johnstone were early contributors to a pathology of tissues, which began to replace the study of whole organs. James Carmichael Smyth’s (1741-1821) Different Species of Inflammation, published in the 1790s, brought recognition to tissue pathology as an emerging subject, yet the reception of Smyth’s theories in Britain was limited. These ideas, although important, remained scattered


37 Theophile de Bordeu, Recherches sur le tissu muqueux, ou l’organe cellulaire, Paris, Didot, 1767.

38 Othmar Keel, La genealogie de l’histopathologie, Paris, Vrin, 1980
and restricted to a small elite of physicians and surgeons, without challenging contemporary medical theories and disease classifications.\textsuperscript{39}

Plans for the establishment of a new centralized École de santé in Paris were outlined in December 1794 by a committee composed of prominent French physicians. Among the goals of the revolutionary government were the unification of medicine and surgery. As one member, Antoine Fourcroy (1755-1809), declared, one must “eradicate that ancient separation between two estates that has caused so much trouble. Medicine and surgery are two branches of the same science.” In spite of this claim, however, Fourcroy’s elaborate blueprint for the organization of instruction at the new École envisioned separate courses for “pathologie interne et externe.” While placed under one academic roof, both thought collectives, medical and surgical, continued to defend the integrity of their own disciplines. Soon, François Chopart (1743-1795) and Pierre F. Percy (1754-1825) began to assemble the surgical pathology course tailored to the needs of future army surgeons. It was mostly non-theoretical and focused strictly on discrete, localized lesions. Concentrating largely on trauma, the course divided diseases topographically into diseases of the soft and hard parts.

Medicine, in turn, followed its own traditional approach of presenting diseases within their natural historical evolution and as components of a detailed clinical classification schema. This medical pathology remained holistic and subservient to bedside findings, elaborated by a deliberately vague and speculative pathogenesis based on vitalistic principles. In 1795 François Doublet (1751-1795) and Joseph F. Bourdier planned the medical pathology course, dividing it into principles of pathology, a historical review of notions of health and disease, and a clinical typology congruent with prevailing nosologies. Both the surgical and medical thought collectives continued their own separate approaches to the phenomena of disease.\textsuperscript{40}

By September 1798, a plan for curricular reforms of the École de Médecine in Paris affirmed that “the art of healing is one and indivisible and that as a consequence there is only one pathology.” Suggestions were made to integrate the two courses of pathology—“the way a trunk is followed by its branches”—into a new synthetic view of pathology.\textsuperscript{41} A year later, Bichat published a pair of memoirs on bone and joint

\textsuperscript{39} Othmar Keel, “La naissance de la problematique histologique et l'Ecole Clinique de Paris,” Gesnerus 44 (1987) 209-218

\textsuperscript{40} Russell C. Maulitz, Morbid Appearances. The Anatomy of Pathology in the Early Nineteenth Century, New York, Cambridge University Press, 1987

\textsuperscript{41} Ibid, especially chapters 3 and 4, pp.60-105
pathology that attempted to bring medicine and surgery together. The articles disclosed a new physiology and pathology of the synovial system, with Bichat pointing out the reactivity of the serous fluids in the joint space. This behavior was linked to that of fluids lubricating the walls of other bodily membranes such as the pleura, pericardium, and peritoneum.

As he attempted an intellectual convergence of medical and surgical mentalities, Bichat stressed that organs were not simple but complex entities, their component tissues distributed into a number of anatomical categories, such as the cellular, arterial, venous, muscular, mucous, serous, synovial and glandular types. His ideas were consonant with sensualist views held by a number of contemporary French scientists and physicians characterized as “ideologues,” including Destutt de Tracy, Jean Georges Cabanis and Philippe Pinel. Transcending the static surgical approach, however, Bichat was interested in establishing the relationship between altered tissues and functions. According to his scheme, tissue lesions determined the appearance of clinical symptoms, a radical reversal that placed pathological anatomy in a dominant position with regard to clinical medicine.42

The publication of Desault’s two-volume Oeuvres in 1799, with a section on diseases of the chest, allowed Bichat to further emphasize his functionalist point of view. This collection, for example, contained observations about the symptoms and signs of pericardial effusion, a then frequently misdiagnosed ailment of broad interest to both physicians and surgeons that ended fatally in cardiac tamponade. In this dramatic example, Bichat argued that a better understanding of both the anatomical seat of disease and its pathogenesis could be life-saving to the patient because paracentesis could be attempted.

Bichat’s Traité des membranes en général et diverses membranes en particulier appeared in 1800. The book claimed to represent a new science of anatomy and pathology based on a simple classification of various bodily linings, their distribution in various organs, and their particular susceptibility to disease. In his experience, these membranes produced protective fluids or serosities in exact balance. Bichat postulated a tripartite classification of membranes. Mucous membranes of the gastrointestinal tract and the urogenital system functioned as protective barriers against foreign bodies and produced mucus; Serous membranes differed from the mucous membranes in structure, function, and reaction. They were constantly moist, and they isolated different organs to facilitate movement. When subjected to irritations and

inflammations, these membranes produced a number of adhesions. Finally, simple fibrous membranes took the form of dense, collagenous tissue, part of the periosteum, the sclera of the eye, fibrous capsules, and the muscular aponeuroses. These structures were formed by tough, resistant, and non-contracting fibers.43

Bichat’s next publication was *Recherches physiologiques sur la vie et la mort*, which also appeared in 1800. Written in barely five months, this work contained a number of his new ideas on physiology and pathology based on vitalism. As a result of his dissections and experiments, Bichat was especially intrigued by the vital qualities of the heart and its postmortem stimulation with electricity. He developed the concept that diseases were manifestations of life that could be traced back to properties inherent in human tissues. He borrowed such ideas from previous medical authors such as Francis Glisson, Albrecht von Haller, and Robert Whytt, who had discussed the existence of vital properties such as sensibility and irritability. According to Bichat, health resulted from the proper maintenance of tissue vitality, while both disease and death could be attributed to a breakdown of such vital principles. “Life is but an ensemble of vital properties which resist physical properties, or it is an ensemble of functions that resist death,” he wrote.44

In spite of his pathbreaking publications, Bichat failed to win a teaching post at the medical school, and continued as *médecin expectant* at the Hôtel Dieu. During a course taught from September 1801 to May 1802, he expounded on his new membrane theory by locating the seats of disease in all of his twenty-one subtypes of solid tissue. Given the sensitivity of these tissues, external or internal insults could trigger characteristic pathological responses in the form of swellings, inflammatory exudates, and formation of adhesions linking various bodily systems. As his autopsy reports demonstrate, Bichat’s dissections at the Hôtel Dieu involved numerous patients who were victims of so-called dropsical diseases, including anasarca, pleurisy, pericarditis, and peritonitis. Although his premature death precluded further studies, Bichat’s tissue theory was quickly assimilated in the pathological works of Gabriel Andral, Gaspard L. Bayle, Theophile Laennec, Jean Cruveilhier and Pierre Piorry.45


In 1803, Bichat’s unfinished five-volume *Traité d’anatomie descriptive* appeared posthumously, completed by colleagues. In its introduction, Bichat summarized his fundamental approach: “Dissect in anatomy, experiment in physiology; follow the disease and make a postmortem examination in medicine; this is the three-fold path without which there can be no anatomist, no physiologist, no physician.” In less than two years, he had established novel syntheses in both physiology and pathological anatomy. What made Bichat’s approach unique was his willingness to surpass the study of particular local lesions, the traditional surgical approach. Instead, he transcended anatomical boundaries by searching for pathological actions at a distance by employing the medical doctrines of sensibility and irritability. This holistic view allowed Bichat to recognize linkages responsible for the pathological diversity he encountered at the autopsy table. Such abnormal configurations, Bichat hoped, would be detectable clinically before death. Bichat’s greatest legacy consisted in combining the surgical and medical approaches, which not only informed pathological anatomy, but created a new pathophysiology that could guide clinical medicine. His publications established the essential basis for a more systematic program of anatomical-clinical synthesis.  

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Laennec

After arriving in Paris in April 1801, Theophile Laennec (1781–1826) registered at the École de Médecine and started to follow Corvisart’s *clinique interne* course at the Charité Hôpital. He also took a private anatomy course from the surgeon Guillaume Dupuytren (1777–1835), already *chef de travaux anatomiques* at the École pratique de dissection linked to the medical school. This program was followed by the *tour de main*, a round of dissections and anatomy courses that formed the somewhat unstructured but necessary foundation for further course work. A year later, while still a student, Laennec published, in Corvisart’s *Journal*, an article on peritoneal inflammation based on his clinical experiences at Corvisart’s ward in the Charité. This work was followed by another polemical report in 1803 dealing with other bodily membranes, including the pleura. Laennec’s use of anatomy to promote hypothetical pathophysiological views rankled his former teacher Dupuytren, who responded in the same journal, setting off an important debate about the nature and goals of pathological anatomy in Napoleonic France.

The contrasting visions pitted the official “external” pathology, still dominated by surgeons such as Dupuytren and his disciple Jean Cruveilhier (1791–1874), against the traditional “internal” pathology supported by Pinel and the new physiopathology expounded by Bichat. In 1803, Dupuytren had founded the *Société anatomique*, an

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organization devoted to the promotion of anatomical research. Composed in part of members drawn from the École practique, the society’s purpose was to review human anatomy in detail as a prelude to the study of pathological anatomy. Employing a strictly utilitarian approach, Dupuytren’s emphasis was on localized pathology, since extirpative surgery required an intimate knowledge of circumscribed anatomical relationships. Such a practical approach obviously fulfilled the pedagogical needs of future surgeons taught at the École practique. In short, this external pathology represented the traditional surgical thought collective.

The internal vision of pathology, in turn, was associated with traditional medical agendas that harked back to Morgagni’s and Baillie’s ideas. The physician-pathologist dissected a number of cadavers, identified morbid appearances in certain organs of the deceased, and thus supplemented the contemporary clinical knowledge of diseases by including pathological findings. Moreover, lesions were often correlated with age, sex, and the seasons to establish “anatomical constitutions” consonant with medical and epidemic ones. Finally, when possible, pathological anatomy furnished physiologists and clinicians with glimpses of reciprocal influences between the diseases and organ systems. This traditional, auxiliary role to the clinic continued to dominate the Paris faculty and found expression in the teachings of Philippe Pinel and the courses of internal pathology at the École practique. The problem with this approach was vividly illustrated by Pinel’s teachings. After becoming chief physician at the Salpêtrière in 1794, he presided over the two hundred-bed infirmary of the hospice, usually using only one thirty-bed ward to make detailed observations. Working within a traditional framework, Pinel had trouble fitting the protean manifestations of disease displayed by his patients before and after death into his 1798 nosology.47

In Bichat’s vision, also propounded by Gaspar Bayle (1774-1816), pathological anatomy was no longer a junior, but a full-fledged, if not dominant partner of clinical medicine. Laennec’s outlook, in contrast to Pinel’s, relied on morbid appearances to understand clinical events. He sought to construct a holistic, anatomically oriented pathogenesis and nosology that provided physicians with a new road map to interpret the clinical manifestations of disease. Bichatian pathology was taught only in several private courses; however, other outlets were the memoirs presented at meetings of

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medical societies, and contributions to the *Journal de médecine, chirurgie, pharmacie*, edited by Corvisart and Alexis Boyer.48

In 1804, after his graduation, Laennec presented a broad programmatic statement on pathological anatomy to the *Société de l’École de Médecine*, the research arm of the medical faculty. In his view, Morgagni’s successors had refined and extended knowledge of pathological anatomy without really “coordinating its materials through systematic linkages.” In Laennec’s opinion, the initial impetus for such correlations had been made by Bichat in his *Treatise on Membranes*, by pointing out the patterns of membranous lesions and their functional significance. Dupuytren, who studied similar structures and planned to publish his own treatise of pathological anatomy, angrily disputed such functional claims. Further exchanges between both authors, published in Corvisart’s *Journal*, illuminated the distinctions between styles of investigation and conceptual formulations concerning the role of pathological anatomy.

For financial reasons, Laennec went into private practice after 1804, failing to publish the projected *Treatise of Pathological Anatomy*. A partial manuscript of this work, however, reveals Laennec’s own program of studies based on experiences obtained while teaching pathology in Corvisart’s circle. Not surprisingly, it was firmly rooted in Bichat’s pathological theory. For Laennec, there was a different way of mapping out the body and interpreting its morbid appearances which differed from the traditional descriptive approach employed by anatomists. For the latter, the exposition of organic lesions followed the actual order of dissection, with diseases therefore classed according to their seats, not their nature. The alternative strategy championed by Bichat, Bayle, and now Laennec was both anatomical and clinical, and would force a total reorganization of contemporary nosology.49

At its first meeting of the academic year 1808–1809, the *Société Anatomique* invited Laennec to deliver a welcoming address, in which he again revealed that his view of pathological anatomy went beyond the traditional boundaries established by the École pratique. In Laennec’s opinion, the new discipline had to provide facts applicable to clinical medicine. “Without [pathology] diagnosis is always either impossible or prone to uncertainty,” he declared. There were also opportunities to amalgamate the surgical and medical approaches at the level of explaining disease processes and construct a


new pathogenesis. Medicine needed to become more anatomical and surgery more medical. The clinically determined semiology and nosology represented by Pinel and others had to be transcended.50

As more post-mortem findings were increasingly correlated with the clinical phenomena observed during life, physicians sought means of detecting internal lesions and abnormalities in the living patient. In 1806, Corvisart announced the reintroduction of Leopold Auenbrugger’s method of percussion in his own work Essay on Diseases of the Heart. Two years later, in 1808, he published a French translation of the Austrian physician’s Inventum Novum, thereby providing a critical impetus for the integration of pathological anatomy and physical diagnosis. The anatomical-clinical synthesis envisioned by Bichat and Laennec had found an additional proponent. Careful description of postmortem findings and their linkage to antemortem physical signs and patients’ symptoms made Corvisart’s publication an illustration of how such a method could be successful.51

In 1812, Laennec wrote an article on pathological anatomy for the Dictionnaire des Sciences Médicales, repeating his previous ideas.52 A companion article, penned by Gaspard L. Bayle, further expounded on the utility of the new pathology for clinicians and its full integration with internal medicine. Often, the patient’s symptomatology was misleading, with similar symptoms resulting from different causes, while disparate symptoms could evolve from similar underlying diseases. At the same time, vital lesions inferred by clinicians were sometimes not ascertainable after death, while postmortem lesions were detected in the absence of clinical manifestations. Instead of solely relying on the clinical manifestations of disease, pathological anatomy could become the touchstone for diagnosis. Bayle therefore proposed a process of mutual or “reciprocal rectification” suggesting that clinicians move back and forth between antemortem bedside examinations and postmortem autopsy findings to arrive at a precise diagnosis. Among the caveats expressed by Bayle was that the anatomical lesion would not always reveal the origin of the disease. At dissection, moreover, final disease causes usually


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remained obscure and even immediate ones were often impossible to determine, especially the nature of terminal events.53

After assuming charge of the clinique interne at the Hôpital de la Charité in April 1815, and accepting another post at the Necker Hospital the following year, Laennec used his new wooden “cylinder” as a tool to investigate varied clinical conditions and establish antemortem findings to be confirmed at autopsy. The goal of establishing anatomical clinical correlations was demonstrated by Laennec’s casebooks and autopsy records, which contain numerous cases of peritonitis, pleuritis, and pericarditis. More importantly, both physicians and surgeons could now join forces in novel and complementary ways. For example, the diagnostician could localize the pathology in vivo and the surgeon could perform procedures, such as a thoracentesis, to alleviate the symptoms.

Laennec’s De l‘auscultation médiate, published in 1819, illustrated his ideas of how to achieve this anatomical-clinical synthesis. The work not only presented the techniques of physical diagnosis as important adjuncts of the new pathological anatomy, but established the legitimacy of an approach that had melded the medical and surgical mentalities. In the introduction to his famous work, Laennec summarized historical development by acknowledging that “morbid anatomy, since the commencement of the present century, throughout Europe, and more especially in Paris, has been productive of many improvements and discoveries.” Indeed, Laennec sought to emphasize the superiority of what he called the “anatomical” instead of the clinical or “symptomatical” description of diseases.54

While Laennec’s elevation of pathological anatomy to a dominant position in relation to clinical medicine has been perceived as nothing less than an “epistemological break,” many of the issues raised in the process of establishing clinical-pathological correlations remained unresolved. Among the most difficult was the question of etiology: could pathological anatomy, through its study of lesions, determine the true causes of a disease? Indeed, some of Laennec’s colleagues defined the lesion itself as causal, questioning whether or not morbid appearances actually determined physiopathological processes. While conscious of the limitations inherent in


the anatomical approach, Laennec nevertheless tried to establish criteria by which practitioners could equate lesions, functions, and causes. His opposition to any dogmatic formulations prompted him to reject a strict organicism while continuing to promote the importance of a dynamic view regarding pathological phenomena.\textsuperscript{55}

The attainment of a systematic synthesis between the anatomical and clinical aspects of disease during the early nineteenth century owed much to the particular intellectual, political and institutional contexts of post revolutionary France. The vast Parisian hospital system, with its institutional cross-infections and persistent high mortality, made substantial numbers of inmates available for clinical and postmortem observations. A widespread, negative view of poor patients molded a new physician-patient relationship in which the sick were depersonalized and lost their autonomy. Faced with a bewildering array of patient complaints and symptoms, French physicians gradually turned from unreliable patient histories to pathological findings obtained under more controlled circumstances at the autopsy table. In a complete turnabout, pathology came to rule clinical medicine, narrowing its scope to those complaints which could be correlated to internal lesions. The human body ceased to be a mysterious black box, being reduced to a collection of organ systems and tissues. In the end, the collective effort of an ever-expanding army of practitioners and students in hospitals and dissection labs provided the foundation for an anatomical-clinical synthesis which continues to be the hallmark and bane of modern medicine.\textsuperscript{56}

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