# Chapter 1
# Medicine at the bedside

## Hippocrates and all that

Hippocrates has become the favoured Father for healers of all stripes. Homoeopathists find in the Hippocratic writings the roots of their doctrines. Naturopaths, chiropractors, herbalists, and osteopaths invoke him as the founder of the ideals that underlie their own approaches to health, disease, and healing. So do modern hospital consultants, many of whom would have repeated his Oath, or a version of it, when they took their medical degrees.

The reasons for this curious state of affairs can be found in history. For one thing, the historical Hippocrates is sufficiently shadowy to allow a multiplicity of interpretations to be hung from him. He

is shadowy but real. He lived on the island of Cos, off the coast of present-day Turkey, from about 460 BCE to 370 BCE. This makes him a bit older than Plato, Aristotle, and the other cosmopolitan creators of classical Greek culture, centred in Athens. His antiquity makes the survival of so many 'Hippocratic' works that much more remarkable; people save what they particularly value.

Besides where and approximately when he lived, we know only a little more. He practised medicine, took pupils for a fee, and had a son. He also achieved a fair degree of fame, since Plato mentioned him. Whether he actually wrote any of the works attributed to him is less clear. He certainly did not write them all, for they were composed over about two centuries by various unknown hands. This means that the Hippocratic Corpus, the 60 or so works and fragments that survive, contain much inconsistency and many points of view. These 'Hippocratic' writings cover many aspects of medicine and surgery, as well as diagnostics, therapeutics, and disease prevention. The Hippocratics offered advice on diet and other aspects of healthy living, and there is a particularly influential treatise on the role of the environment in health and disease. There were thus many 'Hippocratic' stances, and our 'Hippocratic medicine' is a historical construct, achieved by picking out certain themes and theories, and putting them together in a framework that was unknown during the centuries of the composition of the treatises.

Amidst this multiplicity, however, there is one strand that runs through the whole corpus, and makes Hippocrates so attractive to so many modern healers. Hippocratic medicine is holistic. The Hippocratic approach is always to the whole patient and the modern yearning for a holistic medicine finds a natural resting place there. Despite its admirable, positive characteristics, this holism was also rooted in cultural values widespread in Greek society. The ancient Greeks disliked dissection of human bodies. They performed no autopsies to determine the cause of death, and Greek doctors taught no deep anatomy to

their apprentices. There were no medical schools in the modern sense of the term. Students learned through their masters, and what they knew was surface anatomy and a shrewd sense of looking carefully at their patients for signs suggesting the likely course of the disease, that is its prognosis, and, especially, whether the patient was likely to recover or not. That there were no hospitals meant that the bedside of this chapter's title was literally the patient's, in his or her own home.

These structures of ancient Greek medicine make it the prototype of modern primary care. The Hippocratic doctor needed to know his patient thoroughly: what his social, economic, and familial circumstances were, how he lived, what he usually ate and drank, whether he had travelled or not, whether he was a slave or free, and what his tendencies to disease were. The theoretical reasons for this were embedded in the Hippocratic writings, of which more below.

If the holism attracts modern complementary healers to the Greek, there are other attributes to Hippocratic medicine that resonate within contemporary scientific medicine. The most important of these is its underlying naturalism. The medical systems of the ancient Near East – Egypt, Syria, Mesopotamia, Babylonia – combine theology and healing. The priest-physician is a common trope. Disease was widely assumed to be the result of divine displeasure, transgressions of various kinds, or magical forces. Diagnosis might involve prayer, interpreting animal entrails, or determining how the patient had transgressed. This mix of magico-religious medicine was also part of the Greek landscape during the Hippocratic period. Healing temples dedicated to the Greek god of medicine, Asclepius, were dotted all over the Greek sphere of influence, including, ironically, a famous one in Hippocrates' own backyard, Cos itself. The most substantial one was on the mainland, at Epidaurus, the extensive remains of which are still extant. These temples were in the hands of resident priests who received patients and interpreted illness on the basis of dreams that patients

reported to them. The dreams were probably affected by the presence of holy snakes, which undoubtedly disturbed sleep patterns. By sloughing its skin, the snake was an example of renewal, and a prominent part of the caduceus, symbol of the Greek god of healing (see Figure 4). Curiously, Asclepius and the caduceus, both redolent of magic and religion, have been naturalized as an emblem of modern medicine.

These healing temples were an important part of Greek medical care but the values they embodied had little impact on the Hippocratic Corpus. The treatises that form it assume that disease has a natural cause, but only once does a Hippocratic author explicitly attack supernatural explanations of disease. This occurs at the beginning of a treatise on epilepsy, called 'The Sacred Disease' in common Greek parlance. It was deemed sacred because epileptic attacks were dramatic, causing as they do a loss of consciousness, foaming at the mouth, relaxation of muscle, bladder, and sphincter control, but also included psychological symptoms which sufferers could sometimes turn to their advantage. Alexander the Great and (later) Julius Caesar were powerful epileptics in antiquity. The opening sentences of 'The Sacred Disease' have been interpreted as a clarion call for a complete naturalism within medicine. They are still compelling, written as they were more than two millennia ago:

> It is thus with regard to the disease called Sacred: it appears to me to be nowise more divine nor more sacred than other diseases, but has a natural cause from which it originates like other affections. Men regard its nature and cause as divine from ignorance and wonder, because it is not at all like to other diseases. And this notion of divinity is kept up by their inability to comprehend it, and the simplicity of the mode by which it is cured, for men are freed from it by purifications and incantations. But if it is reckoned divine because it is wonderful, instead of one there are many diseases which would be sacred.

It is significant that the stance is not irreligious ('nowise more divine nor more sacred than other diseases'), but couched within a framework that could offer an explanation within naturalist terms of the origins of this so-called sacred disease. The Hippocratic author goes on to offer such an explanation: epilepsy is caused by blockage within the brain, so that the regular expulsion of phlegm is stopped, thereby producing malfunctioning of the brain, and the dramatic symptoms of the epileptic seizure. Two further implications are worth noting.

First, this Hippocratic author located consciousness and other mental functions to the brain.

> And men ought to know that from nothing else but the brain come joys, delights, laughter and sports, and sorrows, griefs, despondency, and lamentations. And by this, in an especial manner, we acquire wisdom and knowledge, and see and hear, and know what are foul and what are fair, what are bad and what are good, what are sweet, and what unsavoury; some we discriminate by habit, and some we perceive by their utility.

The centrality of the brain is of course now a commonplace in scientific thinking, but it was not so with the Greeks. Plato followed Hippocrates in viewing the brain as the seat of psychological activity, but Plato's pupil Aristotle believed that the heart is the centre of emotion and other mental functions. After all, when we are anxious or in love, it is in the breast, or heart, not the brain, that we experience such events. The heart, not the brain, beats faster when we are most alive. Besides, Aristotle, an experienced student of embryological development, noted that the first sign of life in the developing chick embryo was the motion within the primitive heart. Almost two millennia later, Shakespeare was to recall this old debate:

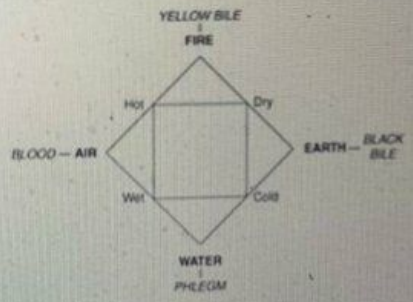
> Tell me where is fancy bred.
> Or in the heart or in the head?

Despite our language, which still attributes much to the 'heart', Hippocrates and Plato won that debate.

treatise relates to the Hippocratic cause of epilepsy: blocked phlegm. Phlegm might seem the sign of a common cold to us, but it was for the Hippocratics one of four humours, which were constitutive of health and disease, and thus at the heart of Hippocratic physiology and pathology. Although humoral doctrine was not contained in all of the Hippocratic treatises, it can be pieced together and was interpreted by the other giant of ancient Greek medicine, Galen (AD 129–c. 210), as central to medical theory. Galen gave humoral medicine such prestige that it dominated medical thinking until the 18th century.

## Humours: the complete system

The four humours were blood, yellow bile, black bile, and phlegm, and as can be seen from the schematic diagram in Figure 2, they constituted a formidable framework for understanding health and disease, and much else besides. They eventually embodied a theory of temperaments, which provided a guide to human personality and susceptibility to disease. The properties of the humours – heat, cold, dryness, moistness – offered a parallel reading of the course of diseases, and of the stages of the individual life cycle. Each of the humours was also linked to one of the four elements – air, fire, earth, water – which Greek natural philosophy posited as the constituents of all the things in the sublunary world. Below the moon, in our world, things change, grow old, and die. Above the moon, perfect circular motion was postulated as the norm, with stars made of a fifth element, the 'quintessence'.




**2. The humours: the wonderful simplicity**

**of the Hippocratic scheme is easily recognized, with the equally important qualities (heat, cold, dryness, moistness) which the humours possessed**

Taken as a whole package, Greek humoralism was the most powerful explanatory framework of health and disease available to doctors and laymen until scientific medicine began gradually to replace it during the 19th century.

Bodily fluids and their effects are features that someone caring for a sick person notices. The skin becomes flushed when the sick person is febrile; people cough up phlegm or blood; eyes water and noses run; the urine turns dark if there is jaundice or dehydration; the skin can become clammy, sweaty, or pale; and diarrhoea or vomiting may be prominent features of illness. Greek cultural prohibitions against dissecting human bodies meant that the Hippocratics had relatively little knowledge of deep anatomy, or it was inferred from animal dissections or knowledge acquired through preparation of animals for eating. This did not seem to bother the Hippocratics very much, although Galen later tried very hard to provide anatomical knowledge, largely through dissecting animals.

Humoral medicine does not require all that much knowledge of anatomy, since the operative elements are the bodily fluids, not the solids. Each of the humours was identified with a bodily organ, however: phlegm with the brain, blood with the heart, yellow bile with the liver, and black bile with the spleen. Further, in the surgical treatises of the Hippocratic writings, these doctors also discussed the setting of fractures, reduction of dislocated joints, wound treatment, and simple operations for various specific conditions. Surgical work, then as now, requires a much more focused orientation on a particular area of the body. But Hippocratic *medicine* remained holistic and preoccupied with interpreting the changes of the humours.

Humoralism brought with it two related and enduring themes within Western medicine: balance

and moderation. The Hippocratics viewed health as the result of a sound balance of the humours. Imbalance, too much or too little of one or more of them, or an imperfect quality (often described as a corruption) of one of them produced disease. The body was sometimes regarded as a kind of oven, with cooking metaphors prominent in Hippocratic descriptions of disease. Excretions in disease – pus, sweat, expectorated phlegm, concentrated urine, vomitus, diarrhoea – were interpreted as the products of natural defence mechanisms. The body often cooked, or concocted, corrupt or excess humours, to enable the better removal of the surfeit or the peccant humours, and restore a balance.

The Hippocratics interpreted this bedside observation – of the body getting rid of humours – as evidence of what they called the *vix medicatrix naturae*, the healing power of nature. This doctrine has long been debated within medicine, and it was codified in the 19th century with the concept of 'self-limited disease'. A powerful modern medicine is able easily to accommodate it: most disease, treated or untreated, is self-limited. Treating the symptoms of a cold, for example, may make one feel better, but it never really touches the cause, which in due course the body generally deals with. Every doctor knows this, but they also know that the prescription that makes the patient feel better is often interpreted as curative. *Post hoc, ergo propter hoc*: 'after, therefore, because of': a lot of clinical medicine has always relied on this logical fallacy.

The Hippocratics were more modest, and the doctrine of the healing power of nature gave rise to two of their most important aphorisms: 'Natural forces are the healers of disease', and 'As to diseases, make a habit of two things – to help, or at least do no harm'. Therapy was thus aimed primarily at assisting the patient's body do its 'natural' work. Some of their procedures jar with modern sentiment. Bloodletting, for example, had a rational basis, since local inflammation, or the flush of fever, was easily interpreted as evidence that the body had too much

blood, and therefore needed aid in ridding itself of it. Bloodletting is one of the oldest and most persistent therapies, and the one most often held up as evidence of the crude barbarity of medicine until the modern period. It continued to be a mainstay of therapeutics until the mid-19th century, and was abandoned only gradually and reluctantly by rank and file practitioners. Patients often demanded it, and many of them reported being helped by having blood let, sometimes so much that the doctor stopped only when the patient was on the point of fainting. As another Hippocratic aphorism put it, 'For extreme diseases, extreme strictness of treatment is most efficacious', often made more pungent: 'Dangerous diseases require dangerous remedies'.

In general, however, humoral therapy was mixed, and included diet, exercise, massage, and other modalities that were aimed at the individual needs of the individual patient. It was this holistic individualism that was the core feature of their medical practice. Although Hippocratic writings contain descriptions of many diseases to which we can give modern labels, they never separated the disease from the individual sufferer. Thus, although we can find accounts of diseases we might call consumption (tuberculosis), stroke, malaria, epilepsy, hysteria, and dysentery, these are presented as events that happened to individual people. They used these experiences to come to generalizations about how to deal with these diseases, presented as aphorisms and what we would now call 'clinical pearls'. Their humoral explanatory framework always encouraged them to tailor particular treatments to unique cases.

The Hippocratics were also acutely aware that diseases often sweep through a community, affecting the old and young, rich and poor, thin and corpulent, male and female: just those attributes that at the bedside they strove to take into account when making a diagnosis and recommending a therapeutic regimen. In two particularly influential treatises, a series of books on *Epidemics*, and one entitled *Airs, Waters, Places*, the Hippocratic writers offered reflections

about these wider aspects of disease. *Airs, Waters, Places* is essentially the foundation statement of Western environmentalism, especially as it relates to health and disease. It offered advice on where to build one's house (well-drained soil, protected from chilling winds), and analysed the health of communities in terms of the environmental factors that impinged on their inhabitants. Like most medical and biological thinking until the late 19th century, it espoused what is now called (anachronistically) 'Lamarckianism'; that is, the Hippocratics believed that environmental factors could change the basic characteristics of human beings (skin colour, body shape, and so on), and that these changes could be passed on to offspring. This is an optimistic philosophy of human malleability, consonant with the general Hippocratic confidence that their therapeutic regimen had much to offer to its patients. At the same time, their writings are full of occasions when experience taught that the disease was so far advanced or serious that there was little to be done.

## Wider Hippocratic reverberations

The humours provided a theoretical framework that lasted. We still use the idea of the temperaments in casual speech ('a naturally sanguine person', 'generally melancholic'), and the hot–cold, wet–dry axes of the humours regulate how we see common acute complaints. Popular belief has it that we catch colds by going out without our hats on, or getting our feet wet. Doctors, who ought to know better, fall in with popular disease conceptions about the nature and treatment of colds, partly because that is what patients expect, partly because it saves time in the patient–doctor encounter, partly because doctors, too, are all too human. More recently, Darwinian medicine has used the Hippocratic *vix medicatrix naturae* to question the treatment of symptoms. Is it better to suppress the cough, or dry up the nasal secretions, when they are part of a naturally evolved defence?

Much of the Hippocratic legacy was actually

transmitted to the West through the writings of Galen, who dominated medical thinking for more than a millennium. Galen saw himself as extending and completing the framework of the Hippocratics. We know much more about him than any other doctor of antiquity: more words of his survive than any other ancient writer, medical or otherwise, and his works are laced with autobiographical snippets. He wrote about all aspects of medicine: diagnosis, therapy, regimen, and the philosophy of medicine. He codified the Hippocratic doctrine of the humours, but also consolidated an experimental dimension to medicine. Whereas the Hippocratics were content with careful observation, Galen went much further, offering anatomical and physiological accounts of what happened in health and disease. He was big on ego-strength and seemed to assume that his was the last word on virtually everything. He cannot be blamed that most doctors for more than a thousand years agreed with him.

Humoralism served Galen very well at the bedside, explaining disease, but he also developed a complicated physiology to explain normal bodily function, which relied on spirits (pneuma) rather than humours. Within his model, food was taken into the stomach, whence it was turned into chyle. This chyle went to the liver via the portal vein, where it was converted into blood suffused with natural pneuma. Some of this blood then was conveyed to the heart. Part of the blood from the heart went to the lungs to nourish this essential organ. Other portions of the heart's blood passed through invisible pores from the right to the left ventricle, where it mixed with vital pneuma, acquired from the lungs and ultimately through breathing air. This vital blood then went via the aorta and carotid artery to the brain, where it had its last refinement, with animal pneuma, and then via the nerves to initiate motion and sensation.

**3. Galen's 'physiological system'. Galen accounted for many basic physiological phenomena by implicating the liver, heart, and brain in the elaboration and distribution of three kinds of 'spirit', the natural, vital, and animal**

This model of human physiology became gospel for more than a millennium. So, too, did Galen's comments on anatomy, often (through no fault of his own) performed on pigs, apes, and other animals. The prohibition on human dissection was out of Galen's control, and his only mistake was not to tell his readers where he got his anatomical knowledge from. This omission encouraged later worshippers of Galen to assume that the human body must have changed since the master dissected, but eventually left him a sitting target for progressives who believed their own eyes.

More than 500 years separated Hippocrates and Galen, and there were of course many doctors and systems of treatment afoot between them. One group of doctors in Rome emphasized massage, warm or cool baths, and other therapies to relax or constrict the body's pores, their preternatural state of tension posited as the cause of disease. Other doctors adopted their own approach to diagnosis and treatment. Some of these alternative systems survived Galen's dominance, but Galen bestrode the millennium after

his death far more comprehensively than Hippocrates had done in the centuries after his followers stopped writing. These medical dimensions are worth studying for their own sake, but Greek medicine as a whole left three basic principles that formed medicine until the modern period.

The first principle, as we have already seen, was humoralism. The second was the botanical basis of most drugs. Doctors looked to the botanical kingdom for medicines to combat disease. One doctor in particular organized the ancient pharmacopoeia into a form that others found useful for centuries. Dioscorides (fl. c. 40–80) wrote a treatise on *Materia Medica* which incorporated the medical-botanical writings of earlier authors but also included much that he himself had discovered about plants and their medicinal qualities. Although he described a few animal products, plants dominated, as they did for most other doctors in antiquity and beyond. Plants could yield substances that would bring on a sweat, induce vomiting or a purge, produce sleep, or control pain. Many botanical preparations, such as opium and hellebore, had great staying power, but unlike the core theoretical content of ancient medicine, plants have definite geographical distributions, and the search for them meant that later doctors had to do their own hunting, in their local forests and hedgerows. If you have a particular plant in your area, you can supply it to others who don't, and importing and exporting drugs became an active business in later centuries. Galen incorporated much of Dioscorides' work in his own voluminous writings, and the latter's *Materia Medica* was still prized in the Renaissance.

The third legacy – a secular approach to disease – was more elusive but just as important for all that. Both religion and magic continued to influence thinking about health and disease by doctors and laymen. They still do. But the ancient healers whose writings survived and were prized believed that disease could be understood in natural terms. This is not to say that ancient doctors were not religious: Galen had a notion of monotheism that later

commentators turned into a kind of recognition of the religious movement that was gaining ground during his lifetime – Christianity. But when Hippocrates or Galen was confronted with a sick patient, they drew on their own knowledge and skills in an attempt to bring about an act of healing at the bedside. For all this, disease still frequently was and is experienced within a religious or moral framework, seen as a result of sin, punishment, or, like Job, trial – why me?

These glosses do not negate the fact that the framework of ancient medicine was a naturalistic one. Physician and physics derive from the same Greek root, meaning 'nature', and attempting to understand the way the body functions in health and disease has ever been a spur for the curious doctor and worried patient.

# Chapter 2
# Medicine in the library

## The miracle of survival

When one stops to think about it, it is a miracle that anything written survives from antiquity. How is it that we can enjoy Homer's epic poems, Plato's and Aristotle's works, or the 20 volumes (in their incomplete modern edition) of Galen's writings? Manuscripts were laboriously copied by hand, on parchment or other mediums, were scarce and expensive commodities, and were then subjected to the ravages of time, the destruction of war, natural decay, or simple carelessness. The items that survive today are usually later copies, made centuries after the original text, prepared because someone wanted a version for himself. In general, the more prized a text was, the greater the chance of survival, simply because

there were more versions of it made. But far more words written in antiquity have perished than have come down to us. The largest library and museum in the ancient world was in Alexandria, Egypt. It housed tens of thousands of scrolls and parchments, but suffered serial destruction and continuous decay from the 2nd century and was nothing but ruins by the 7th.

Thus, we are indebted to the anonymous scribes in great households, religious establishments, and royal courts for much of what we know of the thoughts of people who lived two millennia and more ago. The writings of Hippocrates, Galen, and other doctors of antiquity provided the formal foundations of medical practice into the 18th century. Consequently, the period of appreciation, preservation, and commentaries upon their works that characterizes the millennium between the fall of Rome in 455 and the movement we call the Renaissance deserves its own place in the history of medicine. It has been called the period of 'library medicine'. In this chapter, I shall make little distinction between the Latin West and the polyglot East, which includes Byzantium, the Islamic Empire, and Jewish and Christian contributions to medical life in the areas in which Islam came to dominate. Doctors in these widely separated geographical and cultural milieus all shared one characteristic: a veneration of the medical wisdom of the Greeks, and a desire to base their own medical theories and practices on these ancient precepts. Of course, they added much along the way.

Along with this essential contribution of preserving and adding to the Greek medical heritage, this epoch, from the 5th century to the invention of the printing press, also fundamentally changed the nature of medical structures. It bequeathed to us three important things: the hospital, the hierarchical division of medical practitioners, and the university, where the elites of medicine were educated.

## Preservation, transmission, adaptation

In late antiquity Europe, medical care was mostly in the hands of individuals without access to any of the writings of the classical period. Local traditions, including informal care, magico-religious remedies, and superstitions dominated, but the prevailing world view of the Christian era encouraged individuals to wait for the end of the world, and in any case, to see disease as a part of a wider providence, and trivial compared to the potential joys of the world to come. The few literate doctors would have had access to some 4th- and 5th-century writings within the classical tradition. Caelius Aurelianus (fl. 4th or early 5th century) produced a compilation on acute and chronic diseases, based largely on the works of an earlier physician, Soranus. Caelius's work was rational, full of medical insights, and survived throughout the medieval period as a summary of diseases and their treatments. For example, he described migraine, sciatica, and a number of common diseases. His treatments were mostly gentle, suggesting massage, bed rest, heat, and passive exercise for dealing with sciatica.

A few other medical works were also around in the Latin West: some minor works of Galen, including spurious treatises attributed to him, the Hippocratic *Aphorisms*, as well as bits of other ancient authors. The centre of gravity had shifted east, however, to the Byzantine Empire, the capital of which was Constantinople, now Istanbul. A lot of ancient manuscripts had already found their way east, and physicians in the Christian East preserved, translated, and commented on them. The rise of Islam saw Byzantium decline in influence and territory, but those same lands, now within Islamic dominion, were also significant for the transmission of the ancient corpus of medicine.

Islam was a wonderfully polyglot culture, and a number of Greek manuscripts survived only in the languages of the area of Islamic conquest, especially Arabic, Persian, and Syriac. A major translation movement was underway by the late 8th century, and this continued for three centuries. The medieval Islamic medical tradition is often seen primarily as a

conduit for the preservation and transmission of ancient Greek texts, which were translated into the Middle Eastern languages, then in turn rendered back into Latin, and finally into modern European languages.

Medieval Islamic medicine was more than an interlude, however. There was also a vigorous learned medical culture which not only reformulated Greek medical ideas to its own context but also added new observations, medicaments, and procedures. Three of the great names of Islamic medicine, Rhazes (c. 865–925/32), Avicenna (980–1037), and Averroes (1126–98), span almost four centuries, and between them produced a corpus of work that assimilated Greek ideas and passed them, properly transformed, back to the West. All of them were men of wide interests. Rhazes, active in what is modern-day Iran, wrote on alchemy, music, and philosophy, but his actual medical practice was extensive, and his diagnostic acumen was much admired during his lifetime. He distinguished smallpox from measles for the first time (measles he judged the graver illness), and offered shrewd medical advice for travellers.

Like Rhazes, Avicenna (Ibn Sina) was a man with many interests outside of medicine. Aristotle was the dominant philosophical influence on him, and infused his medical writings. A precocious youth, Avicenna produced more than 250 titles in the course of an adventurous life. His *Canon of Medicine* (*Al-Qanum fi l-tibb*) has been described as the most studied medical treatise of all time, and its five Books cover the whole of medical theory, treatment, and hygiene, as well as associated surgical and pharmacological dimensions of medical practice. Like Galen, Avicenna was a clever man who did not hesitate to tell his readers about his talents, but the *Canon* brilliantly assimilates and packages Greek medical wisdom and Islamic medical experience, in a logical and well-ordered form. It was ideal as a complete medical textbook, for which it was long used in Europe, in Latin translation, and continues to be assigned to students of *unani tibb* (traditional Islamic) medicine.

Averroes (Ibn Rushd), like Avicenna well versed in Aristotelian philosophy, worked in Islamic Spain and in Morocco. His major medical work (he also published on philosophy, astronomy, and jurisprudence) was an encyclopaedic one, in the style of Avicenna's *Canon*. Variously rendered in English as 'The Book of Universals', or 'Generalities of Medicine', Averroes' textbook in seven sections covered the whole gamut of medicine, from anatomy to therapy. Its Latin translations presented a Galenic-Aristotelian synthesis to generations of doctors in late medieval Europe.

Just as the Islamic doctors had instituted a programme of translation of ancient texts into Middle Eastern languages, so the process of translating these translations back into Latin was initiated by Constantine the African (d. before 1098), and continued by many other scholars. These newly available Latin texts formed the basis of the curriculum of the earliest European medical schools, beginning with the famous one at Salerno, southern Italy, established about 1080, and adopted by medieval university medical faculties during the following centuries.

## Hospitals, universities, doctors

Depending on what counts as a 'hospital', this central institution of modernity can be traced to various beginnings. The Romans used special buildings called *Valetudinaria* (from the same root as our word for someone who is worried well, a valetudinarian) to house and care for wounded and sick soldiers. There is one known to date from about CE 9. Slightly earlier, slaves were also being housed together when they were sick, a reflection of their value. These structures were pragmatically designed to contain a number of beds and related facilities, but they were also generally related to the necessity of a particular campaign or outbreak of illness and were not conceived of as permanent institutions in the modern sense.

Our word 'hospital' comes from the same root

word as do hospitality, hostel, and hotel. In Christendom, early 'hospitals' were religious establishments, maintained by religious orders and available as places of refuge or hospitality for pilgrims, but also for the needy. Their function was not explicitly medical, although (like monasteries or nunneries) the 'hospital' might also contain an 'infirmary' (place for the sick or infirm), where those with specific medical needs could be looked after. More common and larger in the Near East (Jerusalem contained one with 200 beds by 550) than in the Latin West, they gradually began to dot the landscape of present-day Europe. Many of the famous European hospitals of the present date back to medieval times and their names testify to their religious origins: Hôtel Dieu in Paris, St Bartholomew's Hospital in London, Sta Maria Nuova in Florence.

Within the Islamic lands, hospitals also attained considerable size and importance by the 11th century. They sometimes had special divisions, such as wards for patients suffering from eye diseases, or the insane, and attracted students wishing to learn how to practise medicine. They were probably more overtly 'medical' than their Christian counterparts, but they shared the same range of philanthropic or charitable funding, and, in times of epidemic, the same function of isolation and segregation. Community leaders made use of hospitals for two diseases in particular: plague and leprosy. Often called 'lazarettos' – from Lazarus, the poor man whose sores the dogs licked in Jesus' parable in Luke's Gospel – these isolation hospitals were adapted for plague after the Black Death, from their earlier use for people diagnosed as lepers. No disease better than leprosy captures the combination of brutality and love infusing medieval Christendom. The diagnosis itself, often for conditions that modern doctors would give another name, carried with it total social ostracism and legal death, with divorce by the leper's spouse permitted. It condemned its victim to a life of isolation and begging, generally confined to a lazaretto and needing to carry the familiar leper's rattle when going outside, so that passers-by were alerted to the oncoming source of physical (and moral)

contagion. At the same time, some monks, nuns, and other religiously motivated individuals freely lived among these outcasts and devoted their lives to them.

The leprosy diagnosis was common from the 12th to the 14th centuries, in most parts of Europe, and leprosy's decline may have been catalysed by the fact that people living together in closely confined quarters were particularly vulnerable to the Black Death and the repeated plague epidemics that followed. Certainly a number of leper hospitals were turned into plague hospitals, for many of the same reasons, save that plague was an acute disease, from which some individuals recovered, and leprosy was a chronic disease and generally a life-long sentence. Plague hospitals, especially in southern Europe, were converted to other medical uses after that disease disappeared from Europe in the 17th century; in the Middle East, where plague continued, they were kept as places for quarantining travellers and others on the move when plague was near.

**4. Classical medical figures. This early-modern image, in the classical style, depicts Asclepius on the left, holding a caduceus, and Galen examining a skeleton**

Another medieval institution important for medicine was the university. The medical school at Salerno from the late 11th century was simply that: a school to train doctors. A university followed there a couple of centuries later. In the meantime, many others were founded throughout Europe, beginning with Bologna (founded c. 1180), and followed by those in Paris (1200), Oxford (1200), and Salamanca (c. 1218). By the late 15th century, there were 50 in Europe, dotting the north and south, east and west. A university has different faculties, and most of these either had from the beginning or developed medical faculties, to complement those of arts, philosophy (including what we would call science), theology, and law. Although many of the medical faculties were very small, and the number of graduates miniscule, the movement gave birth to learned medicine, and the university-educated physician. It represented the quintessence of 'library medicine', since the teaching was initially based on texts, of classical and Islamic authors, and disputation rather than practical training or experiment was the key.

One consequence of the newly graduated physician was the formalization of the occupational hierarchy within medicine that persisted until the 19th century. With an expensive and lengthy education that the universities offered came the gentlemanly status that physicians long prided themselves on. (Until a decade ago, Fellows of the Royal College of Physicians of London could not sue for the recovery of fees.) As gentlemen, manual work was beneath them. That was the job of the surgeon and apothecary, both occupational niches that already existed but were more formally fixed with the coming of the university. Surgeons and apothecaries were trained by apprenticeships, or by informally learning their craft by associating themselves with an older practitioner. It was the Hippocratic way, but it began to acquire a lower social (and, generally, economic) status when compared with physicians who could read Latin and dispute the niceties of Galen and Avicenna.

There were, to be sure, a few surgeons with university exposure, and among both surgeons and

apothecaries, individuals with learning and wealth. The boundaries were not always fixed and, in the countryside, many physicians compounded their own drugs and performed surgery. In other words, they acted as general practitioners. In urban areas, however, the divisions were retained and regulated by colleges and companies of physicians, or by the university faculty. Surgeons in urban areas often established guilds, on a par with those regulating other manual occupations, such as butchering, baking, or candlestick making. The medical regulation was patchy, but the image of the three occupational hierarchies remained part of public perception until later developments in medical knowledge also changed what doctors could do.

## The discovery of anatomy

Galen and a number of other ancient and Arabic authors had had a good deal to say on the internal structures and functions of the human body. Since then, the occasional autopsy, mostly performed when an important person died suddenly or in suspicious circumstances, had revealed more of what the body looks like when it is cut open. For all that, it was a bold step when the medical faculties gradually began to offer public demonstrations of dissected bodies in the 14th century. Frequently, a menial prosector would open the corpse (often of an executed criminal) while the professor read relevant passages from Galen or another authority. These 'anatomies', as the whole process was called, were scheduled for the winter months, when the colder weather slowed down the body's putrefaction; the order of exposing the internal parts was also dictated by the speed of decay: abdomen first, followed by the contents of the thorax, then the brain, and finally, the limbs.

**5. Galen at work. This illustration from a 1565 edition of Galen's works subtly reinforces the fact that some of Galen's knowledge of anatomy came from dissecting pigs. Although many of the classical figures appear blissfully uninterested, the composition invokes a typical public dissection in the Renaissance**

The first recorded public dissection was performed in Bologna in about 1315, by Mondino de' Liuzzi (c. 1270–1326), who also wrote the first modern book devoted to anatomy, in about 1316. It took almost a century for dissections to become relatively common, a combination of the difficulty of obtaining corpses, and the theoretical bias of most medical education. From the 15th century, however, the pace quickened, with more dissections and more works devoted to human anatomy. Renaissance artists wanted to appreciate what the human body looked like on both the outside and inside; Leonardo da Vinci's (1452–1519) anatomical drawings are some of the most famous of the period, although they had remained virtually unknown, and therefore without influence.

The greatest of the early anatomists was Andreas Vesalius (1514–64), Belgium born but professor of anatomy and surgery in Padua. His great work *De humani corporis fabrica* (1543: 'On the fabric of the human body') is the first medical book in which the illustrations are more important than the text.

What Vesalius, himself an ardent dissector rather than simply a reader of Galen, had noticed was that

the human body was not always as Galen had described it. While others had done so before, Vesalius not only said so – diffidently at first, more forcefully as he gained confidence – but he demonstrated it through the magnificent plates that accompanied his large book. The muscular walls between the right and left side of the heart, for instance, were dense, with no way for blood to pass through, as Galen's physiology required. The human liver did not have the four or five lobes that Galen assigned it (through dissecting pigs and other animals); the sternum, uterus, and many other anatomical structures were accurately described by Vesalius for the first time.


**6. In addition to the famous muscle-men, Vesalius's *Fabrica* of 1543 depicted other parts of the human body, always dramatically represented**

We divide the history of anatomy into pre-Vesalian and post-Vesalian, with Vesalius as the fulcrum. This probably exaggerates the immediate impact of Vesalius' book, for he left Padua and anatomy shortly after its publication for a lucrative job at the Spanish court. By the mid-16th century,

however, the anatomical revolution was well underway, and the desire to see for oneself, instead of taking the ancients on childlike trust, was widespread.

Anatomy was the queen of the medical sciences for some three centuries, and no branch of medical knowledge benefited more from that catalyst of social and intellectual change, the printing press. A German artisan, Johannes Gutenberg (c. 1400–68), introduced the movable type printing press into Europe in about 1439 (the Chinese already had them). The impact on all aspects of human life was enormous. Medical books were well represented in the early incunabula (books printed before 1501), although Bibles, works of theology, and editions and translations of ancient authors dominated. Books could then be mass-produced, and even ordinary doctors could own a few of them.

In addition to the texts, woodcuts and engravings allowed books to be illustrated, so not only could people read about the human body, they could see its parts displayed on the page. Vesalius' *De Fabrica* was not the first illustrated anatomy text, but it set standards for dramatic artistic representation as well as anatomical accuracy. Over the following centuries, anatomy books crystallize a deep paradox in early-modern medicine. Anatomy was an aspect of medical activity that attracted revulsion from many members of the public: dissecting was seen as morally debasing, disgusting, and cruel. It led eventually to an underground trade in the supply of bodies by illegal means, generally grave-robbing but sometimes murder. It certainly was smelly before preservation methods improved, although the sickly sweet aroma of formaldehyde made modern medical students easy to identify on the street, permeating as it does their clothes and skin.

Dissection was thus bad for medicine's public image. It was also the subject of elaborate, expensive, and beautifully produced and illustrated books, with the upper end of the market aimed at the connoisseur. For the medical student, there were small textbooks with crude illustrations and a price to match. No other

discipline within medicine so combined art and science, or knowledge and presentation. Increasingly, even would-be physicians dissected, their curiosity getting the better of their gentlemanly pretensions. Many of the great names in early-modern anatomy – Gabriele Fallopio (1532–62), Fabricius ab Acquapendente (1533–1619), Frederik Ruysch (1638–1731), William Cheselden (1688–1752), William Hunter (1718–83) – had affiliations with surgery or obstetrics, but curious physicians, such as William Harvey (1578–1657), also used their hands in their research. Harvey's great treatise announcing his discovery of the circulation of the blood (1628) is actually entitled an 'anatomical exercise' on *de Motu Cordis* (On the motion of the heart).

**7. This Victorian engraving of a woodcut by Stradanus from about 1580 shows many stages of book production, including setting type, inking it, printing the sheets, and proof-reading**

Given the nature of medical (or even surgical) practice in the period, doctors learned more anatomy than they could actually use. But the parts of the body were palpable and it was easier to agree on an

hands-down.

## The chemical, the physical, and the clinical

The liberation effected by the injunction to look for oneself touched many aspects of medicine as well as natural philosophy. The Renaissance coincided with the period that later historians have named the Scientific Revolution, which influenced medicine as well as astronomy, cosmology, physics, and other sciences. The two natural sciences that most closely impinged on medicine were chemistry and physics.

The chemical movement within medicine had its roots in an eccentric Swiss genius, Paracelsus (c. 1493–1541). Paracelsus was how he was known to his followers: his full name, Theophrastus Philippus Aureolus Bombastus von Hohenheim, was something of a mouthful. The story that he meant his adopted name to mean 'greater than Celsus', the Roman author who wrote an influential compendium on medicine, is probably mythical, but it embodies one of two particularly striking and influential characteristics of his chequered career. He was passionate about the fact that medicine (and science) needed to be founded again on first principles, by the moderns. He had little use for the wisdom of Hippocrates or Galen, publicly burning one of the latter's books in a defiant display during a (brief) stint as a professor in Basel. Although he probably never converted to the new Protestantism, Paracelsus was obviously influenced by the intellectual and emotional ferment that Martin Luther's movement formally inaugurated early in his life. Paracelsus repeatedly said that learning was to be found in nature, not books, although this did not stop him from penning dozens of books himself, many of which were printed in his lifetime. Perhaps he really meant that learning was to be found in *his* books, not those of his predecessors.

His second lasting contribution was his emphasis on chemistry, as a way of understanding the way the human body works, and as a source of drugs to treat

disease. He used metals such as mercury and arsenic as much as the traditional botanicals in his treatments, and his followers, the iatrochemists (literally, chemical doctors), continued in his wake. His notion of disease, as something external to the body, is sometimes rather inappropriately described as a forerunner of germ theory, but it was in fact rooted in his mystical, alchemical notions of the way nature operates. There is more to the thinking of this strange man, who provoked controversy in his lifetime and afterwards. His followers, of which there were many for well over a century, attempted to rewrite the theory and practice of medicine, in a chemical language.

Another group, the iatrophysicists, slightly later and drawing on the triumphs of astronomy and physics, saw the body as a wonderful mechanical contrivance. Whereas the iatrochemists considered digestion as a chemical process, the iatrophysicists saw it as a mechanical grinding down. These later advocates analysed muscular movement, calculating the forces generated by contraction, and sought to represent human physiology mathematically whenever possible. Their heroes were Galileo, and later Newton, men who had replaced Aristotle's view of the universe with a much more powerful model, in which matter and force were the operative things to be measured. Throughout the 18th century, Newton's notion of gravity as a force that extended throughout the universe and explained so much was a spur to doctors seeking similar principles in medicine.

The new relationship to enquiry introduced a period of great ferment within medicine (and science). Theories abounded and optimism prevailed. The approach to understanding health and disease altered dramatically, but changes in what doctors actually did in treating patients were less striking. To be sure, the chemicals introduced by Paracelsus and his followers were mostly new, and the prevalence of syphilis meant that mercury had a prominent medical presence. Syphilis had taken Europe by storm in the 1490s. Appearing first in Naples, where some of the Spanish mercenaries had been to the New World with

Columbus, the assumption that it was a new disease imported with Columbus was a natural conclusion. Historians are still debating this scenario, but the fact remains that syphilis in the late 14th and early 15th centuries behaved like a new disease, in its virulence and rapidity of spread. Because of the rash caused by syphilis, mercury, a standard treatment for skin diseases, was used, and it seemed effective in suppressing symptoms, even if it was toxic for the sufferer, producing intense salivation, loss of teeth, and other side effects. The metallic odour to the patient's breath was difficult to conceal, and although popes, artists, and doctors suffered from it, its sexual transmission was suspected early on (the genital lesions were usually the first sign), and the introduction of the bark of the guaiacum tree, from South America, soon became the favoured therapy for those who could afford it. It reinforced the notion that syphilis had come from the New World, the assumption being that God placed remedies near to the origins of diseases, to encourage us to look for them.

**8. The differing social status and medical functions of the physician and surgeon are shown in this engraving from 1646. In these two scenes, the formally dressed physician on the left hands a medicine to a sick man in bed; on the right, he supervises the more roughly attired surgeon who is amputating a man's leg**

Despite these new diseases and new remedies,

Hippocrates would not have been surprised at most medical ministration to sufferers. Bloodletting, emetics (to invoke vomiting), cathartics (to induce purging), and the gamut of remedies associated with humoralism continued as the mainstay of doctors. Indeed, as Galen's star waned, that of Hippocrates still shone brightly. Among clinicians of the 17th century, Thomas Sydenham (1624–89) still commands respect. Called the 'English Hippocrates', he sought to return medicine to the empirical art that he identified with the Father of medicine. Medicine, he wrote, should concern itself with careful clinical descriptions of disease (he left graphic accounts of gout, hysteria, and smallpox, among other illnesses). With the security of correctly diagnosing a disease, remedies could be empirically sought. He was instrumental in advocating another New World remedy, quinine (variously called Peruvian bark, or Jesuit's bark, reflecting its origin), in the treatment of intermittent fevers.

Sydenham's experience with Peruvian bark fundamentally changed his whole concept of disease. Although he was still comfortable with Hippocratic humours, quinine seemed completely to stamp out intermittent fevers, root and branch. It seemed to be a *specific*, dramatically effective against this one disorder in all patients. It encouraged him to believe that diseases could be classified, like botanists classify plants, and that the variation of a disease and its symptoms in individuals was adventitious, like the differences in individual violets or other flowers. As he famously wrote:

> Nature, in the production of disease, is uniform and consistent, so much so, that for the same disease in different persons the symptoms are for the most part the same; and the selfsame phenomena that you would observe in the sickness of a Socrates you would observe in the sickness of a simpleton.

Sydenham's reflection can be seen as a kind of turning point in clinical thinking. It encouraged doctors in the generations that followed to classify diseases; more significantly, it began the modern

# Chapter 3
# Medicine in the hospital

## Vive la France

The phrase 'hospital medicine' has acquired a specific meaning for medical historians. Hospitals emerged in the early medieval period, and 'medicine', in the sense of medical practice, has an even longer history. Nevertheless, 'hospital medicine' is a convenient shorthand for the values that flourished within the medical community in France, and especially Paris, between the revolutions of 1789 and 1848. This period constitutes an epoch, during which Paris became the Mecca of the medical world. It was centred squarely within the Parisian hospitals and the tools and attitudes that dominated medical education and practice there resonated throughout the Western world.

This French period has sometimes been described as a 'medical revolution', appropriate since it grew out of a political revolution. Historians who have minutely unpacked the educational structures, medical procedures, and doctor–patient relationships have uncovered sufficient precedent to argue for evolution rather than revolution within medicine, but the fact remains that doctors in the 1840s had acquired a new confidence, when compared to their predecessors a couple of generations before, and much of this can be ascribed to the influence of Paris.

Like many revolutions, the Parisian medical one began small, and could have hardly been predicted during the turbulent days of the Terror. As the political and military forces of the Revolution gained power, the institutions of medicine – physicians, surgeons, hospitals, the old academies and faculties – were swept away, along with the other detritus of the *Ancien Régime*. For a couple of heady years in the early 1790s, it seemed best for everyone to be his or her own doctor, and revolutionary leaders promised that

universal health would inevitably follow the abolition of privilege and corruption associated with the old hierarchies and inequalities.

The optimism did not last long. Disease did not disappear, and the Revolutionary government soon discovered that its soldiers and sailors demanded medical care when they were sick or wounded. The army needed its doctors, and, more particularly, doctors trained in both medicine and surgery. The old dichotomy was inefficient in the midst of campaigns and battles, and in 1794, three medical schools were reopened, primarily to produce men to serve the military needs of the new republic.

Fortunately, the key man on the commission appointed by the Revolutionary Assembly to consider the medical requirements of the new era was a doctor and chemist sympathetic to the aims of the Revolution. Antoine Fourcroy (1755–1809) had made his name as a chemist, and served as professor of chemistry in the new Parisian school he helped create. Politically astute and genuinely well-meaning, he masterminded the blueprint for the schools in Paris, Strasbourg, and Montpellier. The report he largely produced recognized the military needs of the contemporary political situation and stressed three aspects of the new medical education. First, it ought to be intensely practical from the first day of the student's training. In his ringing words, the student ought to 'read little, see much, do much'. No theory and much practice were the orders of the day. Second, the new medical education was to be based squarely within the hospital, where the opportunities for experience were much greater and more intense than in the lecture theatre or practice outside the hospital. Finally, the new medical graduate should be trained in both medicine and surgery. In effect, this meant the importation of surgical thinking into medicine proper. Whereas physicians had traditionally been concerned with the whole body, with humours, spirits, or other generalist conceptions of disease, surgeons had always been confronted with the local: with abscesses, broken bones, specific abnormalities requiring definitive intervention at a particular site. With the rise of the

French medical schools, the *lesion* acquired medical significance. A lesion is a pathological change, induced by disease. It could thus be seen, either with or without a microscope. Physicians learned to think surgically, and the solid parts of the body came into their own within medicine.

**10. The massive edifice of the Hôtel Dieu Hospital, Paris, in the early 19th century, scene of so much medical innovation. The two figures on the left seem to be bearing a coffin, and the cart in front of the entrance may well be preparing to take away bodies for burial**

French hospital medicine came to be based on three pillars, none entirely new, but which together constituted a new way of looking at disease. The three pillars were physical diagnosis, pathologico-clinical correlation, and the use of large numbers of cases to elucidate diagnostic categories and to evaluate therapy.

With many modifications, these have remained fundamental to medicine, as has the centrality of the hospital.

## Physical diagnosis: the new intimacy

An encounter with a doctor has its own etiquette and intimacy. He or she can ask the patient to undress, can touch and feel in ways generally reserved for spouses or partners, and can cause discomfort. For the

past two centuries or so, most patients have accepted this relationship with doctors, on the assumption that this dependency is for their own good. The relationship became routinized in the Parisian hospitals in the early 19th century, as a consequence of the physical examination that doctors developed in the newly opened hospital medical schools.

This is not to suggest that doctors, always male until the late 19th century, had never examined naked patients before. The vaginal speculum, for instance, was developed in Roman times, and operations for bladder stones or anal fistulae, the treatment of genital lesions, or deliveries of babies by male practitioners had occurred with some regularity in earlier centuries. Nevertheless, most medical encounters did not involve much physical contact with the doctor, other than his feeling the pulse and looking at the tongue. Bodily excretions such as the urine and faeces might also figure in medical diagnoses, but the doctor sometimes examined these without ever seeing his patient.

The doctor–patient encounter shifted in the Parisian hospitals of the early 19th century. Hospital patients were mostly the poor and uneducated, and therefore powerless to have much say in the way they were treated. Further, the new medical ideology encouraged doctors to look for objective signs of disease, rather than simply rely on the patient's account of his or her symptoms. A symptom, such as pain or tiredness, is private to the individual; signs, such as muscle wasting or an abscess, are more public matters, and the leaders of French hospital medicine wanted to base their practice on the objectivity of signs and lesions.

Physical diagnosis was central to this endeavour. The four cardinal dimensions of physical diagnoses, still taught to medical students, are inspection, palpation, percussion, and auscultation. In various forms, all had been used occasionally by doctors since the Hippocratics. The French hospital doctors put them together, made them routine and systematic, and forever changed doctor–patient relationships.

Inspection is the most basic: look at the patient.

'Stick out your tongue' has been a familiar medical command for ages. Furred tongues were deemed to be the key to fevers and other acute disorders. Yellow eyeballs pointed to jaundice, and flushed faces also indicated fevers or the end stages of a 'hectic' (a late stage of consumption, or tuberculosis), or the plethora of gout. A green tint to a pale face made the doctor think of chlorosis, a disease of young girls which mysteriously disappeared in the early 20th century, about the same time as hysteria, and possibly for the same reasons. For the most part, however, inspection was confined to the 'public' parts of our bodies: the face, hands, and other parts exposed without breech of convention. When a doctor looked elsewhere, there had to be a good reason, and surgeons were more likely to have a reason than physicians.

The French made inspection systematic, part of a general assessment of a patient's health. They did the same thing for palpation, an even more intimate manoeuvre, since it involves touching. A tender spot, lump, or enlarged organ can sometimes be observed, but it can more often be felt. The Hippocratics knew that intermittent fevers often produced an enlarged spleen, occasionally so prominent that it could be seen, but more often it could be detected by palpation. Within the gentlemanly culture of physicians in the early-modern period, however, probing the patient's body with one's hands smacked of manual labour. Palpation was thus another aspect of diagnosis imported back into medicine by the French injunction to integrate medicine and surgery. By locating disease processes within the organs, and emphasizing the importance of the lesion, French medical students were taught to use their hands as part of their diagnostic tools.

Percussion (tapping the chest or abdomen) was the third part of routine physical examination. Despite isolated comments in earlier case histories, the Viennese physician Leopold Auenbrugger (1722–1809) was within his rights when he called his 1761 treatise on the technique *Inventum novum* (New Discovery). The son of an innkeeper, the young Auenbrugger

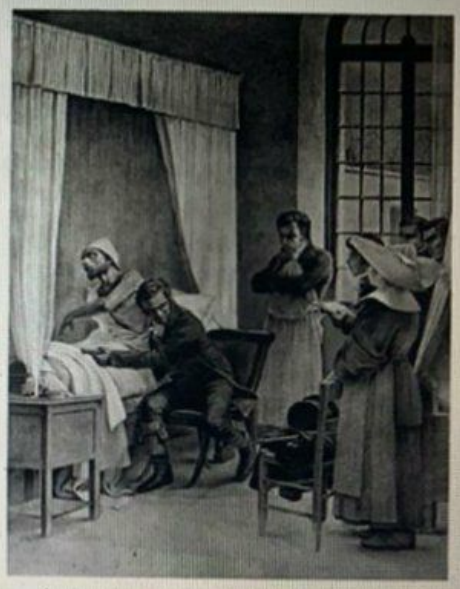
reputedly learned the value of percussion when, sent by his father to the cellar to discover how much wine and beer were left in the casks, he discovered the technique while tapping on the sides. At the point of the fluid level, the sound changed. This meant he did not have to take off the covers and peer, with the aid of a candle, into the barrels. As a practising physician, he adopted the procedure, to help determine when the heart, liver, or any other organ was enlarged, or when accumulations of fluids in the chest or abdomen meant that normally resonant body cavities were changed through disease.

Auenbrugger's modest little volume is an excellent example of the fact that classics are made, not born. It was barely noticed after publication, and only a handful of references to it in the following four decades have been recovered by historians. Doctors of the 18th century were simply not attuned to worrying too much about the solid parts of the body to aid their diagnoses. All this changed with the coming of the French way of teaching and learning medicine.

Auenbrugger's Latin treatise was rediscovered by Jean-Nicolas Corvisart (1755–1821), Napoleon's private physician and professor of medicine in the Paris school. Corvisart was well attuned to the new organ-based orientation of early 19th-century French medicine, and particularly interested in diseases of the heart. He recognized the value of percussion in cases of heart enlargement, collections of fluid around the heart, and other cardiac diseases. He began teaching percussion to his students and translated Auenbrugger's treatise in 1808 into French, adding extensive notes that quadrupled its length. His notes made it very clear how important this new technique could be in assisting the doctor in diagnoses. Two years earlier, his treatise on heart diseases had been published, largely through notes taken by one of his pupils. The case histories in this innovative volume make sober reading: Corvisart pessimistically concluded that organic diseases of the heart could rarely be effectively treated with the therapies available to him. It could be diagnosed, however, and one gets a spectrum of the patients in the Parisian

a simple stethoscope (his word), a hollow wooden tube, with two fittings at the end, a bell and a diaphragm, the better to reproduce sounds of different pitches (he was a skilled musician).

His encounter with his female patient occurred in 1816, at the Necker Hospital, in Paris. Laennec's three years between 1816 and 1819 constitute one of the most creative periods for any individual in the whole history of medicine. By the time he published his treatise on mediate auscultation in the latter year, he was an accomplished stethoscopist. He created much of the vocabulary that doctors still use to describe breath sounds and argued cogently that he could diagnose many diseases of the heart and lungs by the specific auditory patterns revealed by his stethoscope. He was especially interested in the auscultory signs of phthisis, or consumption, the leading killer of Laennec's era. His wards were filled with its victims, and the disease eventually claimed him as another one.



**11. The late 19th-century reconstruction of Laennec demonstrating his stethoscope captures a bedside scene in a ward at the Necker Hospital. The patient is passive and**

hospitals from these histories: working-class men and women with grave disease, forced to seek the sanctuary of the hospital as a last resort. Mortality rates in the Paris hospitals were very high, and hospitals then were sometimes seen as 'gateways to death'.

To Corvisart's popularization of percussion was added the fourth, and most innovative, diagnostic tool: mediate auscultation. Doctors had sometimes listened to sounds coming from within their patients' bodies. Wheezing can be heard by other people, and not simply the individual having difficulty breathing; some heart murmurs are so loud that they can also be audible to others; an over-active intestine makes prominent noises. Sounds like these provide clues to what is going on inside a person's body, and they had been noted by doctors for hundreds of years. Occasionally, doctors had noted that they had put their ears directly on the patient's chest or abdomen, the better to hear. This is *immediate* auscultation, listening directly with the ear. *Mediate* auscultation involved something between the patient's body and the doctor's ear. This was the stethoscope, the invention of R. T. H. Laennec (1781–1826), one of the most complex and gifted of the French clinicians.

Laennec's career well illustrates the importance of external considerations in who's in and who's out. As a Catholic and Royalist, his career languished during the secular atmosphere that permeated the Republic and Napoleonic epochs. A hospital appointment and, eventually, a chair came only after the fall of Napoleon and the restoration of the monarchy. He had already imbibed the ideals of the French school, and contributed much as a journalist, editor, and practising doctor. His original stethoscope was no more than a tightly rolled notebook, constructed because he wanted to listen to the chest sounds of a plump young woman, and decorum meant that he could not place his ear directly on her chest. He was delighted to discover that the sound was transmitted even more clearly than it would have been had he employed immediate auscultation. He quickly devised

**extremely cachectic, suggestive of phthisis**

Laennec's 1819 treatise consisted of two parts, one on the art of using the stethoscope, the other on the pathological anatomy of the organs of the thorax. He was a true disciple of the French school, versed not only in the nuances of diagnosis, but also routinely following his deceased patients from their bedside to the morgue, where he conducted the autopsy and compared the findings he had diagnosed in life with the lesions that were in the dead body.

Inspection, palpation, percussion, auscultation: these four steps in systematic medical examination were not adopted instantaneously and universally. More than a decade separates Corvisart's translation of Auenbrugger (1806) and Laennec's treatise on his stethoscope (1819). Laennec taught stethoscopy to a number of French and foreign students, and the value of his diagnostic instrument was recognized by a group of influential physicians. His English translator affirmed that private patients would not willingly submit to the intimacy of a stethoscopic examination, but it would be useful in 'captive' populations, that is, poor people in hospitals and military personnel. In fact, the power that doctors acquired in hospitals only gradually permeated outwards. He who pays the piper has ever called the tune, and paying patients had to be convinced that doctor knows best. A complete medical history and examination of the kind that French hospital doctors initiated is still a rare event outside of hospitals and diagnostic clinics. Nevertheless, the ideal elaborated by French clinicians in the Paris medical school still resonates and ought to be part of the mindset that doctors bring to the bedside.

## To the morgue: clinico-pathological correlation

The Paris medical school was reopened with its reformed curriculum in 1794. Arguably, it was rooted earlier, in 1761. Auenbrugger's description of percussion appeared that year; so did Giovanni Battista Morgagni's *De sedibus et causis morborum* (On the Seats and Causes of Diseases), a work that

underpinned the French pathological approach, just as Auenbrugger's little book contributed to its clinical one.

Morgagni's massive treatise was more an encyclopaedia than a textbook, organized in the traditional way of head-to-foot presentation. It offered case histories and autopsies of some 700 patients, many of them his own. Beginning with diseases of the head and working his way through the human body, Morgagni focused on the pathological changes that occur in the organs in disease. His case histories relied on the patient's own account of their illness, in ways that would have been familiar to the Hippocratics, and they also share the concern with close attention to detail. In addition, Morgagni brought that same case to the autopsy room, and his descriptions of morbid changes went well beyond the ancients, who of course performed no post-mortem examinations. Morgagni's work contains a number of original observations, but it was its method that reverberated. It was translated into most European languages and stimulated the use of the autopsy to learn about disease before the French school routinized it.

Morgagni (1682–1771) taught both anatomy and medicine at the University of Padua for more than 50 years. Many of the patients whose cases he included in *De sedibus* came from his extensive private practice, and although Morgagni's series of autopsies was impressive, it was soon dwarfed by the Paris school, whose clinicians practically lived in the hospitals and could accumulate in a couple of years as many post-mortem records as Morgagni collected during his long life. Hospitals offered concentrations of diseased humanity and the French exploited the conditions to the hilt.

If physical diagnoses helped the doctor find the lesion, the autopsy enabled him to interpret his earlier diagnoses and modify or reinforce them. Clinico-pathological correlation was thus a two-way street, with the repeated bedside observations giving the opportunity of following the patient's illness during his or her life, and these records being discussed in the

light of the final observations on the corpse. The clinician was his own pathologist, caring for his patients in death as in life. Thus, Corvisart, Laennec, and the other leaders of the French school were equally at home at the bedside and the morgue.

They were driven by the search for the lesion, those pathological changes produced by disease. The philosopher Francis Bacon (1561–1626) called these changes 'the footsteps of disease', and the image is apposite, of some personified 'disease' walking through the organs of our bodies, leaving behind traces of its visit. Identifying these traces was the point of the post-mortem examination.

Post-mortems were conducted by French clinicians in the same spirit as the physical examination: to objectify the phenomena of disease, and thereby replace the speculations of 2,000 years with the hard, palpable, visible, weighable, material consequences of pathology. 'Open a few corpses', Xavier Bichat (1771–1802) had exclaimed, and the airy theories of the ancients would disappear. He himself opened more than just a few in his short life (he was 31 when he died), displaying nevertheless the perfect trajectory for what Paris medicine was all about. He had served in the military, and was a surgeon turned physician, thereby living that integration of the localist thinking of surgery with the more philosophical, thoughtful perspective of the physician. His death was widely mourned, and he quickly became a hero of the new medical ways of thinking.

He is remembered today mostly as the 'father of histology', since he recognized that pathological processes are common in the same kinds of tissue wherever they occur. Thus the serous membranes that line the heart, brain, thorax, and abdomen react in similar ways to disease processes. Working with the naked eye and a simple hand lens, he identified 21 such types of tissue, such as osseous, nervous, fibrous, or mucous. He also considered veins and arteries as special 'tissues'. Bichat was more intrigued by process than many of the French clinicians who were inspired by him, and brought a more theoretical perspective to

his work than the flat-footed empiricism that characterized much of French hospital medicine. But he lived and died in the hospital, dividing his time between the bedside and dead room, and he inspired others both by his ideas and his energy, the latter extinguished too soon.

The hospitals of Paris (there were far more beds there than in the whole of Great Britain) offered an unparalleled opportunity to observe desperately sick people, drawn from the needy classes and required to offer their bodies, in life and in death, to the service of clinical medicine, in return for whatever care was on offer. The French combination of physical diagnoses and clinico-pathological correlation constituted a new approach to disease, and embodied new power structures within the hospital. It gradually produced a new organization (nosology) of disease, grounded in the organs, and elevating the solid parts of the body to pole position. It was arguably the Hippocratic approach writ large, but based in the hospital and situating disease in the organs rather than the humours.

**12. Alfred Velpeau (1795–1867) was professor of clinical surgery in the Paris Medical Faculty, but he also made contributions to surgical anatomy, embryology, physiology, and diseases of the breast. This sombre etching poignantly commemorates the uses of the dead for the living**

Organ pathology became the dominant theme. Monographs on the diseases of the heart, lungs, kidneys, brain and nervous system, stomach and intestines, liver, skin, and reproductive organs became the way French clinicians made names for themselves. Corvisart's monograph on diseases of the heart and Laennec's on diseases of the lungs were linked to their diagnostic innovations. Others – Alibert on the skin, Rayer on the kidneys, Andral on the blood, Ricord on the reproductive organs – extended the approach to other parts of the body.

Of all diseases, phthisis was undoubtedly the most written about, and most commonly encountered among the patients (and their doctors) in the French hospitals. It was the leading cause of death throughout Europe in the early 19th century. 'Phthisis' (consumption) was described by the Hippocratics as a dangerous wasting disease with fever, chronic cough, and other pulmonary symptoms, and there is good palaeopathological evidence that tuberculosis has been common in human societies for millennia. Phthisis became ubiquitous from the late 18th century, and there is reason to suppose that most cases of 'phthisis' would today be diagnosed as tuberculosis. The latter disease category received its modern definition only when Robert Koch identified the bacterium, the tubercle bacillus, as the causative agent of tuberculosis in 1882. Nevertheless, Laennec and his colleagues defined 'phthisis' pathologically, and their descriptions of both the clinical symptoms and the post-mortem findings confirm the assumption that phthisis and tuberculosis are for the most part two names for the same disease.

Laennec claimed to be able to diagnose phthisis with his stethoscope, arguing for 'pathognomonic' (i.e. unique to that condition) sounds in the upper chest in patients with the affliction. He argued on both clinical and post-mortem grounds that the tiny lesion called the 'tubercle' (literally, a small swelling) was the hallmark of a single disease, no matter where the lesion was found. He thus unified a number of different diagnoses, such as scrofula, tuberculous

meningitis, or tubercles of the intestine. He likened the development of larger granular lesions from the initial tubercles to the ripening of fruit. His grouping diseases of many organs containing tubercles into a single entity was vindicated by Koch's work on the bacillus, but within the pathological tradition, it took a leap of the imagination and was counter-intuitive given the organ-based paradigm within which he worked. As for the cause of phthisis, Laennec suspected that it would never be known for certain, although his own causative framework veered towards the psychosomatic. Strong passions were often associated with the disease, and he quietly assigned them causative significance.

Laennec's brilliant diagnostic work underscores both the strengths and weaknesses of the clinico-pathological approach: by concentrating on the end-stage of disease, the lesions, French clinicians were often left short on both the processes by which the lesions were formed, and the aetiology (cause) of the changes. More positively, by looking closely at the correlations between clinical signs and pathological changes, they were able to differentiate many diseases that have remained in the medical vocabulary, even after germ theory and other later developments offered different sets of diagnostic criteria.

One good example was the separation of typhus and typhoid fevers. The two words are similar and their clinical presentations could be close enough that it is sometimes difficult in the older medical literature to sort out one from the other, or from alternative conditions that might be diagnosed today. They were two varieties of fever, a disease in its own right in earlier times. In the 18th-century disease classifications, 'fever' was the disease, broken up into various kinds with adjectives such as intermittent, continued, typhus, typhoid, low, nervous, putrid, hectic. 'Typhoid fever' still sounds acceptable to us, and 'yellow fever' is the full name we use for the disease caused by a virus. These names linger even after 19th-century doctors gradually came to define 'fever' as a sign of disease (elevated body temperature, measured by a thermometer), rather than a disease

itself.

The differentiation of typhus and typhoid was effected more or less independently by several doctors, each under the spell of the French way of doing medicine, but working in Britain and the United States as well as France. In France, Pierre Louis (1787–1872) established pathological criteria for typhoid in 1829. His career epitomizes the French era. Young enough to train in the 'new' medicine, he spent a few years in Russia before returning to Paris in 1820, convinced that he did not know enough about disease. He gave up private practice and attached himself to the Charité hospital, carrying out more than 2,000 autopsies over a six-year period and keeping elaborate records of both clinical and pathological findings. These became the basis of his subsequent monographs on phthisis and enteric fever (typhoid). Louis identified the swollen lymph nodes (Peyer's patches) in the membrane of the large intestine, arguing that they are pathognomonic for enteric fever. William Jenner (1815–98) in London, W. W. Gerhard (1809–72) in Philadelphia, and several others completed the differentiation of the two diseases.

During the first half of the 19th century, pathological anatomy was the queen of the medical sciences. It provided doctors with palpable evidence of the consequences of disease, which led to a streamlining of the elaborate nosologies of earlier times. It would not have been possible without the vast collections of patients in hospitals, allowing doctors to make clinical and pathological observations on so much 'material', as they often disparagingly called it. The numbers game constituted the third pillar, called by Louis, its most systematic practitioner, the *méthode numérique* (numerical method). He applied it to help gather his pictures of diagnostic categories, but also to evaluate therapy.

## Learning to count

Like so much else in the Parisian hospitals, dealing with large numbers of patients was not entirely

become familiar. New approaches to understanding disease, the greater use of experiment rather than mere observation, and diminishing returns on what could be discovered by yet one more autopsy, rendered the miracle of French clinical medicine something more pedestrian. During its heyday, however, thousands of students had come to Paris from all over the Western world. They returned to Britain, Germany, Austria, Italy, the United States, and the Netherlands, where some of them founded medical schools and hospitals. By the early 19th century, a medical school without an attached hospital was second rate. When the new University of London (now University College London) began its medical school in the late 1820s, the first thing to do was to establish a hospital. The pattern was repeated throughout Europe, even in small German towns where clinical instruction was often by demonstration, not by doing.

In mid-century America, a number of proprietary schools prospered without a hospital or laboratory, offering medical degrees in return for a few months' tuition fees. Although returning students from Paris and graduates from the established East Coast medical schools, such as the University of Pennsylvania, despaired of what this did to the profession, American values protected entrepreneurialism. Only in the later decades of the century was the pattern broken. The Johns Hopkins University, established as a research-orientated university in 1876, introduced the German model of higher education to America. Despite a generous initial endowment by Johns Hopkins, a Quaker railway magnate, the medical school took almost two decades to be realized, so extensive were the requirements. The hospital opened in 1893, with the energetic faculty introducing a combination of German research and French emphasis on practical training. The professor of medicine, William Osler (1849–1919), was the most famous of the 'Big Four' – the initial senior medical faculty. He still commands adulation from doctors, as a scientifically attuned but humane clinician, book collector, historian, essayist, and teacher. The assimilation of German science infused the Hopkins approach to disease, but French

innovations permanently left teaching hospitals with two regular events: the daily ward round, in which a senior clinician, followed by junior doctors, medical students, and a nurse, would see and discuss each patient at his or her bedside; and grand rounds, in which interesting 'cases' would be presented by a member of the junior staff and analysed by someone from the senior hierarchy, in front of a large gathering of students and doctors at all levels of experience. Often, after the presentation of the patient's history and clinical course, and the discussion of the differential diagnosis, the autopsy findings would be revealed by a pathologist, and the whole life and death of the patient put together in a seamless whole.

In the large teaching hospitals, the medical and surgical specialties, such as paediatrics, cardiology, neurology, obstetrics, orthopaedic surgery, or otolaryngology (diseases of the ear, nose, and throat), would each have their own chief, a number of dedicated beds, and regular rounds, both ward and grand. One speciality long under-represented in most general hospitals was psychiatry, even if psychiatry has been called 'half of medicine', so common are psychiatric disorders. Instead, those suffering from serious psychiatric illness – earlier called madness or lunacy – had their own kind of institutional setting. The institutional provision for the mad developed independently from the scattered provision of ordinary hospitals in the early-modern period. Madhouses, as they were brutally called, were usually small establishments, for profit, and as often as not run by a non-medical person. Unlike general hospitals, they were mostly for the well-to-do, so embarrassing was the behaviour of a seriously eccentric or hallucination-prone relative. The most famous psychiatric institution in Britain gave its name to the language: Bedlam, a short form of its full name, Bethlehem, or St Mary Bethlehem. 'Tom-o-Bedlam' became a stock fictional character, used by Shakespeare in King Lear, and symptomatic of the isolation that psychiatric patients have always felt.

Bedlam was unusual among psychiatric

institutions, funded by endowments and with governors overseeing its operations. Most madhouses were small private affairs whose records have long since disappeared from view. But they entered public consciousness, since madness was the most feared disorder of earlier centuries (dementia often occupies that place now, even more than cancer for many people). Madhouses, not usually dignified by the name 'hospital', occupied the opposite end of the scale from ordinary hospitals. Diagnosis relied on what the neighbours or family reported, or observations about the patient's behaviour. Doctors who looked for lesions, the basis of Paris medicine, were usually disappointed. The brains of lunatics rarely pointed to some specific reason why the patient displayed symptoms. Madness was mental, not physical, even if that posed difficulties for a culture which assumed that the distinctly human characteristics of reason, moral responsibility, and the capacity to know right from wrong were the consequences of our immortal, God-given souls. Loss of reason meant loss of humanity.

These philosophical and theological niceties were negotiated in various ways, but as doctors became increasingly involved in the 'trade in lunacy', the disease model became more attractive. After all, disease is what doctors deal with. Fittingly, one of the father-figures of Parisian medicine is often called the founder of modern psychiatry. Philippe Pinel (1745–1826) made his name before the Revolution, as the author of a successful nosology of all diseases (he coined the word 'neurosis') and a medical practitioner. He also wrote a little treatise on the importance of hospitals for clinical instruction. During the Revolution, he was given the post of physician to the Bicêtre (male), and then the Salpêtrière (female), each a large *Hôpital Général* which housed a variety of inmates. These included prostitutes, vagabonds, petty criminals, orphans, the aged, decrepit, and demented, as well as other individuals deemed a danger to the wider public or unable to fend for themselves in society at large. The Revolution turned these institutions into hospitals for psychiatric patients, and during his tenure at the Salpêtrière, Pinel gradually

instituted a programme of 'moral therapy', slowly releasing confined women and treating them with firm humanity. In England, a Quaker family, the Tukes, founded the York Retreat. It was based on similar therapeutic principles of moral therapy, which were also employed at roughly the same time in Italy, by Vincenzio Chiarugi (1759–1820).

The nuances of moral therapy have been much debated by historians, but there is little doubt that this form of treatment brought the lunatic into the public gaze, and helped create a psychiatric specialty within medicine. During the middle third of the 19th century, psychiatric associations were established in most European countries and the United States, and they successfully campaigned for the establishment of networks of psychiatric hospitals (generally called 'asylums'). The traditional treatment of psychiatric disorders with ordinary medicaments –bloodletting, emetics, cathartics – was replaced by 'moral' means, and the actual form of the buildings was held to aid in the healing process. From the 1830s, non-restraint became the rallying cry, as doctors argued that the well-designed and well-run psychiatric institution had no need to use physical restraint with its patients.

Although the asylums were built in the name of humanity and treatment, they hardly justified the early optimism, by which early diagnoses and the expert use of moral and other therapies were predicted to produce cures. Instead, the asylums grew larger and silted up with incurable patients; they became, in the words of one contemporary commentator, mere 'museums of madness'. The special nature of these institutions reinforced the distance between psychiatry and ordinary medicine and surgery, a breach that still exists, despite modern knowledge of the brain and how it functions.

In the late 19th century, the German psychiatrist Emil Kraepelin (1856–1926) attempted to bring medicine and psychiatry closer together, through a psychiatric clinic within an academic setting. Kraepelin, an almost exact contemporary of the founder of psychoanalysis, Sigmund Freud

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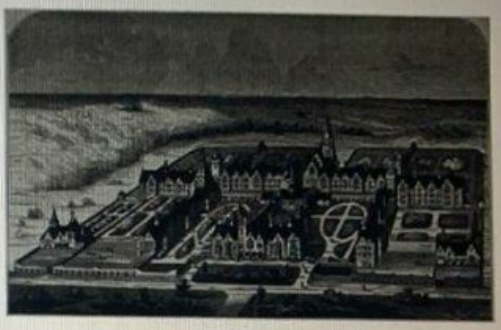
(1856–1939), developed the broad classification of psychiatric disorders that formed the basis of modern psychiatric nosology. He differentiated the major psychoses from the neuroses, and provided a fundamental characterization of what is now called schizophrenia. Kraepelin called it dementia praecox, the dementia of younger people, and his efforts helped to create academic psychiatry.

The gap between medicine and psychiatry still exists, but the trajectory of the discipline from asylum to clinic highlights the faith that Western societies have put in hospitals as healing institutions, as well as the increasing medicalization of many aspects of living, from sadness to criminality, from rebellious behaviour to attention deficit disorder syndrome. Putting a name on something is in itself comforting, and Kraepelin sought to impose a diagnostic order on mental disturbances just as the French clinicians had earlier used physical diagnosis to understand the diseases of our bodies.



**13. The movement to establish psychiatric hospitals in the early 19th century initially was an optimistic one; as these asylums became larger and silted up with chronic cases, the optimism evaporated. This plan of the lunatic asylum at Brentwood in Essex, England, graphically demonstrates how these institutions became little worlds of their own, isolated and self-contained**