Chapter 2
Origins and Orientations of Medicine and Health: A Socio-historical Overview

Medicine is a social science
and politics is
nothing else but medicine on a large scale.
Medicine, as a social science, as the science of
human beings, has the obligation to point out problems and
to attempt their theoretical solutions:
the politician, the practical anthropologist,
must find the means for their actual solution.

–Rudolf Virchow 1949: 93.

Health is an integral notion of human civilisations. Each society conceived health differently. Notions of health are directly determined by socio-economic, cultural traits like food, family structure and many other factors. It reflects distinct and conflicting streams of ideology. The genesis of such divergent ideologies in public health can be traced back to the major philosophical debates and progress of thought over the ages and across several civilisations. As Nijhuis and Van der Maesen suggest:

> Most theoretical debates about the pros and cons of public health approaches are confined to the methodological scientific level. Philosophical foundations such as underlying ontological notions are rarely part of public health discussions, but these are always implicit and lie behind the arguments and reasoning of different viewpoints or traditions. (Nijhuis and Van der Maesen 1994: 1)

There are two streams of thought, namely, methodological holism (MH) and methodological individualism (MI), which provide scaffolds to approaches in public health. In the former (or 'collectivistically oriented social philosophy'), the focus is primarily on social constellations like age, sex, social class and race/ethnicity. Following the views of, for example, Karl Marx (1964) and Emile Durkheim (1938), 'the Gestalt… is primarily the social constellations of which individuals are part' (Nijhuis and Van der Maesen 1994: 2) The tradition is to 'go outside the body' to develop an alternative social and environmental perspective on health, where socio-economic, cultural and political factors are included in an

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analysis of diseases and death in a society. Aristotle [427–347 BCE] drew an anatomical/physiological analogy to support holism. He said:

> the state has a natural priority over the household family and over individual among us. For the whole must be prior to the part. Separate hand or foot from the whole body, and they will no longer be hand or foot except in name, as one might speak of a 'hand' or 'foot' sculptured in stone. It is clear then that the state is both natural and prior to the individual. For if an individual is not fully self-sufficient after separation, he will stand in the same relationship to the whole as the parts in the other case do. (Aristotle 1992:60–61)

In this tradition, a person was thought to be a unified whole, and illness and disease were regarded as a product of imbalances in the general harmony between the individual and the world. Since life itself was viewed in cosmological terms, spiritual dimensions were not excluded from the realm of concern for health. From primitive society to medieval times, these notions generally prevailed and constituted the holistic view of health. Although it was not exactly the same for different cultures and changed somewhat over time, it remained a reasonably accurate generalisation of a priori understanding of health and disease. This tradition in the field of public health can be traced back to the works of Rudolf Ludwig Karl Virchow ([1821–1901] 1860) and Max Joseph von Pettenkofer [1818–1901] (1883) in Germany, Francois Melier [1796–1866] and Louis René Villermé [1782–1863] in France, William Pulteney Alison [1790–1859] (1840) in Scotland and William Farr [1807–1883] ([1851] 2008) and John Snow [1813–1858] (1936) in England. They have shown a close relationship between poverty and disease and deaths, a connection that is very evident in contemporary debates on public health.

In the second and dominant tradition of research, which is methodological individualism (or 'individualistically oriented social philosophy'), the emphasis is on individuals, based on a positivist conception that by understanding an individual's behaviour, it becomes possible to understand the total. Following, for example, Vilfredo Pareto [1848–1923] (1963) and Max Weber [1864–1920] (1947), 'the total (the Gestalt) is considered to be the outcome of actions and motives of distinct individuals' (Nijhuis and Van der Maesen 1994: 2). This, of course, ignores the fact that society is an open system with structures and emergent powers and, therefore, cannot be fully understood by merely disaggregating it into its component parts. This conception is rooted in the positivist Cartesian world view where the body is conceived as a machine.

The history of medicine has been traditionally an important component of medical historiography. The study of development of ideas and orientations about health and disease, their relation to each other in time, their diffusion over space and indeed influence on historical events, has for long been the backbone of medical historiography. Historians and physicians, especially the latter, are interested in elucidating medicine's professional continuity and marshalling the aid of the past for the present theories and procedures.

In concentrating on the genesis or reception of ideas, medical history must take into consideration the climate of opinion or zeitgeist of particular historical periods. Analysis of the causes and effects of intellectual change demands consideration of the social context in which these processes take place. Viewing medical history, and

especially medical theories, against the backdrop of changing forms of disease is not a novel approach. Before discussing historiography, it is necessary to deal with its most archaic form: mythology. Mythology is considered as the antipode of history. Since nobody thinks or acts without some picture of the past, one would apt to resort to mythical interpretation where there is no history.

2.1 Medicine and Health in Mythology

According to Greek legend, the ancient Greeks referred the origins of medicine to the healing god Asklepios (called in Latin Aesculapius), who learnt his art from the centaur Cheiron and bequeathed it to the physicians, 'sons of Aesculapius'. The treatment was in the hands of a hereditary priesthood and combined the best of the methods carried on at our present-day health resorts, our hydropathics, sanatoriums and nursing homes. Fresh air, water cures, massage, gymnastics, psychotherapy and natural methods in general were chiefly relied on (Brock [1916] 1963: x). In ancient Egypt, the gods themselves were credited with authorship of sacred medical texts (Breasted 1930: 5). Indian surgeons, in support of their claim that surgery is the oldest of all branches of medicine, referred to the divine Ashvins who had reunited the head and trunk of the decapitated god, Yajna (Bhishagratna 1907: 6).

In all these myths, there may be a desire to trace the origins and orientations of health and medicine back to the gods and to a very remote old hazy past. Many consider old as sacred and what the gods have invented is above all human criticism. It is believed that man may have misused the invention and spoilt it, but, in itself, it is good and pure. In the mythological way of thinking, the entire scientific development of medicine and health discourse may appear as a fall from old and sacred priority. This is particularly the case with the orthodoxy which intends to bring to light again, old as essential truths. Theophrastus von Hohenheim, more commonly known as Paracelsus [1493–1541] the great heresiarch, reformer of medicine, chemist and naturalist, philosopher and theologian, who is admired as well as condemned for his cosmic view of man and disease, offered a defence of his own life and work with the following myth:

> Whereas God suffered the spirit of medicine to emerge in its fundamentals through Apollo, through Machaon, Podalirius and Hippocrates, and suffered the light of nature to work a darkened spirit, exceeding wonderful great works, great *Magnalia*, great *Miracula*, were performed through the Mysteries, Elixirs, Arcana and Essences of nature, and medicine were marvelously conceived in a few pious men, as was told above. Whereas, however, the Evil One with his corn cockles and his weeds suffers nothing to grow for us in an undefiled wheatfield, medicine has been darkened by the first spirit of nature and has fallen among the anti-physicians and has become so entangled with persons and sophistries, that no one has been able to advance as far in the works as Machaon and Hippocrates did. ('Seven *Defensiones*', translated by C.L. Temkin in Sigerist 1941: 10)

The myth sanctified both the profession as well as the doctrines. With the unfolding of 'reason', rational thinking acquires more and more space. French social anthropologist, a leading exponent of structuralism and ethnologist, Claude Levi

Strauss argued that mythological thought needs to be integrated in the field of scientific explanations:

> The real gap, the real separation between science and what we might as well call mythological thought for the sake of finding a convenient name, although it is not exactly that – the real separation occurred in the seventeenth and the eighteenth century. At that time, with Bacon, Descartes, Newton, and others, it was necessary for science to build itself, and it was thought that science could only exist by turning its back upon the world of the senses, the world we see, smell, taste, and perceive; the sensory was a delisive world, whereas the real world was a world of mathematical properties which could only be grasped by the intellect and which was entirely at odds with the false testimony of the sense. (Strauss 2010: 4)

The earliest rationalistic myth is to be found in the book *Ancient Medicine* of the Hippocrates' [460–377 BCE] collection. Hippocrates wanted to prove that none of the newfangled philosophical systems of his time could be considered as a reliable basis for medicine. He claimed:

> Medicine has long had all its means to hand, and has discovered both a principle and a method, through which the discoveries made during a long period are many and excellent, while full discovery will be made, if the inquirer be competent, conduct his researches with knowledge of the discoveries already made, and make them his starting point. (Hippocrates 1957b: 15)

George Rosen considers five critical periods: Greco Roman; Middle Age, with devastating Black Death and related plagues wiping out over 30 % of the European population; Age of Absolutism (1500–1750); Age of Enlightenment (the foundation of rationality); and Age of Industrialisation, from 1830 onwards (Rosen [1958] 1993). Any classification of history of medicine is for heuritic purposes so is the case with Rosen. So it is futile for the philosophical historigraphy of public health and medicine to follow a conventional periodisation of history as ancient, medieval and modern.

2.2 Medicine and Health in the Ancient Age

When philosophy freed itself from the swaddling clothes of mythology, medicine too became imbued with the spirit of speculation. The Hippocratic physicians speculated on the structure of the body, the functions of organs and the aetiology of diseases.

Generally speculation tends to culminate in opinions that never quite sever their bond with the individuality of the thinker. It is therefore not surprising that the first history of medicine is a collection of the opinions of physicians who lived in the era of Hippocrates. It is believed that a pupil of Aristotle, Menon, prepared this collection for Aristotle, who was accustomed to cite and analyse the opinions of his predecessors so that he might elucidate his own position by agreement or refutation. In other words, the doxographical method proves vital wherever philosophy or science tries to reach truth by the method of Platonian dialectics which proceeded by rejecting one premise after the other and finally reaches the truth (Collingwood 1957).

Throughout antiquity, and even into modern times, the dialectical method remained alive, with doxography (represents a record, not of what previous generations have already known but of what they have opined and pretended to know) as its necessary partner. The importance of doxography was greatly enhanced by the development of medical sects from the third century BC onwards. Opinions of individuals were included along with the basic tenets of the sect to which the individuals belonged. The dogmatists believed in the value of anatomical and physiological research for the understanding and proper treatment of diseases. Their opponents, the empiricists, denied the possibility of finding the obscure causes of disease and, instead, reposed their faith in experience. At the dawn of the Christian era, a third sect arose, that of the methodists. The methodists were satisfied with grouping diseases into three: *status strictus*, *status laxus* and *status mixtus*. The fight between the sects lasted far into late antiquity, and medical authors had to declare their adherence or opposition to one or the other sect. Thus, Aurelius Cornelius Celsus ([1746] 1961) in the preface to his work *De Medicina* gave a historical sketch of the development of medicine up to his own time, with an emphasis on the dogmas of the three sects and their main representatives. The aim of the work was clarification of Celsus's own attitude. Celsus took the middle path in order to probe his impartiality. Here, Celsus refers to the dogmatists and empiricists since he rejects the methodists altogether.

The skillful historical form that Celsus gave to his exposition should not cloud the fact that doxography of the sects was as little bound to historical understanding, or even exact chronology, as doxography of individual opinions. Aelius Galenus or Claudius Galenus or better known as Galen ([AD 129–c. 216] [1543] 1952) of Pergamum, a provincial city of Roman Empire on the western coast of what is now Turkey, one of the most influential men of antiquity, outlined the sects and his own relationship with them with scanty reference to dates and historical circumstances. Not very long after Galen, the opinions of the sects became largely a matter of the past. With the ascent of Galenism, medicine appeared much more unified than before. If Galen is to be blamed for the tyranny of his ideas, exercised for over 1,000 years, he might also be praised for the cosmopolitan character of scholastic medicine.

It was, first, the opposition to and, then, the destruction of the Galenic system, (together with the works of the great representatives of Arab Galenism – Haly Abbas, Avicenna, Albucasis, Averroes) which again split medicine into sects. Just as with Luther the unity of the Catholic Church was decisively broken, so with Paracelsus – the *Lutherus medicorum* – the unity of Galenism was destroyed. Thereafter, the split ran between Galenists, on the one hand, and chemists, on the other. In the sixteenth century, under the impact of new discoveries and Cartesian philosophy, Galenism succumbed altogether. In its place there arose many systems, beginning with *iatrophysics* and *iatrochemistry*. The controversial spirit of the eighteenth-century medicine was almost as strong as that permeating Galen's work. In fact, it represented a state of medicine in which thinking and practice were still dependent on philosophical differences. Thus, doxography was relevant even up to the early nineteenth century. However, with the advancing century, health/medicine approached the positive sciences. Opinions and dialectical arguments inside

medicine were replaced by scientific theories and experimental or statistical proofs. Once again, medicine appeared cosmopolitan and unified.

Historiography of medicine and disease consists not merely of the exposition of opinions and theories but also other forms of historical endeavours, notably biography and bibliography. The great *Corpus Hippocraticum* has stimulated biographical attempts since antiquity. Hippocrates, rightly or wrongly, has been acclaimed as the founder of rational medicine, a keen observer and a humane physician. His writings, consisting of about 60 works written between 430 and 330 BC, are regarded as the beginning of scientific medicine.

Pre-Socratic Greek philosophers made the first attempts to give rational explanations for man's external environment. Grosso modo Alcmaeon of Croton included environmental factors, such as water and location, in his definition of health and disease:

> Health is the equality of rights of the functions, wet–dry, cold–hot, bitter–sweet and the rest; but single rule among them causes disease; the single rule of either pair is deleterious. Disease occurs sometimes from an internal cause such as excess of heat or cold, sometimes from an external cause such as excess or deficiency of food, sometimes in a certain part, such as blood, marrow or brain; but these parts also are sometimes affected by external causes, such as certain waters or a particular site or fatigue or constraints or similar reasons. But health is the harmonious mixture of the qualities. (Alcmaeon, cited in Freeman 1948: 40–41)

The first complete statement about the influences of seasonal and environmental factors on health is found in the Hippocratic treatise on public health *Airs, Waters, Places* (a treatise on public health), which was considered a prognostic guide for a physician who came to a new locality. Hippocrates writes:

> Whoever wishes to pursue properly the science of medicine must proceed thus. First he ought to consider what effects each season of the year can produce; for the seasons are not at all alike, but differ widely both in themselves and at their changes. The next point is the hot winds and the cold, especially those that are universal, but also those that are peculiar to each particular region. He must also consider the properties of the waters; for as these differ in taste and in weight, so the property of each is far different from that of any other. Therefore, on arrival at a town with which he is unfamiliar, a physician should examine its position with respect to the winds and to the risings of the sun. For a northern, a southern, an eastern, and a western aspect has each its own individual property. He must consider with the greatest care both these things and how the natives are off for water, whether they use marshy, soft waters, or such as are hard and come from rocky heights, or brackish and harsh. The soil too, whether bare and dry or wooded and watered, hollow and hot or high and cold. (Hippocrates 1957a: 71)

Airs, Waters, Places contains a schematisation based upon certain assumptions. The premiere is the belief that the change of seasons exerts a direct influence on the human body and, therefore, the diseases. So it is important to know when these changes will occur, and this can be done by observing the constellation. By changing the quality of the humours through heat, cold, wetness and dryness, the four seasons (the Greek system contained only four seasons unlike India which has six) normally exert strong influences upon the lives of beings. Winter is predominately cold and wet, summer is hot and dry, autumn is dry and cold and spring, the ideal

season, is a moderated equilibrium of all the four qualities. Under the influence of the seasonal qualities, the humours of the human body may increase or decrease. For example, in winter there is a normal increase of phlegm in the body because of the superabundance of cold and wetness in the physical environment.

In addition to the seasons, other external factors like wind also affect the body through their qualities of hotness, coldness, wetness and dryness. The winds, furthermore, are classified to correspond with the seasons, and the inhabitants of towns which face winds of known qualities are prone to certain characteristic diseases. Towns facing the south and exposed to hot, wet winds contain residents of a flabby physique with a superabundance of phlegm; this affects their system, makes them subject to chronic diseases like fluxes, diarrheas and dysenteries and produces epilepsy, since there is likely to be too much phlegm in the brain. Towns facing the north and exposed to cold, dry winds have just the opposite kind of inhabitants. Their sinewy, spare bodies are troubled by 'costiveness' and acute diseases like pleurisy. Towns facing the rising sun are like the spring season in that the heat and cold are moderated, and the diseases in them resemble those of towns with a southern situation but less severe. Most unhealthy are towns facing the west (which resembles autumn) because of the extreme fluctuations in temperature and humidity in the morning and afternoon (ibid.: 83).

The water supply of a town is also categorised according to its source. The east, once more, is signalled as the preferable direction because their water is supposedly sweet, clear, light and healthful, in contrast to noxious, stagnant surface water that brings diseases characterised by excessive heat and dryness. Waters originating from rocks containing certain metals and minerals also possess the same hard, heating nature. Rainwater is preferable to melted ice. Urinary calculi are caused by the gradual coalescence in the bladder of solid matter, which is found as the residue of impure waters (ibid.). Based on these general ideas, the treatise lists many diseases that are caused by the aforesaid reasons. The first part concludes with the admonition that grave dangers to health accompany the solstices and the equinoxes, because they lead to seasonal changes. In the course of history, the ancient assumptions were discarded. It seems obvious that, in the Greek view, the causes of good health were both internal as well as external. Roman medicine inherited the Greek system. However, under the great physician Galen, the system became more empiricist than speculative and thereby medicinal, and the transition from a religious to a scientific orientation in the conception of health and disease began. There can be external as well as internal causes of disease:

> A disease is a disposition of the body which is such as primarily to impede one of its activities; those dispositions which precede it are not indeed diseases … So, on our account, not just anything which occurs in a body contrary to nature should immediately be labeled a disease, but rather only that which primarily harms an activity [should be called] a disease, while what precedes it <should be called> a cause of the disease, but not indeed a disease. (Galen, cited in Hankinson 2008: 230)

Galen holds that any proper analysis of physical functioning involves four distinct features: (1) the dispositions of the physical parts, (2) their proper activities, (3) the causes of the dispositions and finally (4) 'the symptoms which necessarily

follow the various alterations in bodies, whether in a natural state or not', although they do not in themselves affect the performance of the activities (Hankinson 2008: 231). Galen ([1543] 1952) tried to combine two trends: the empirical and the rationalistic. This very fact may explain why his doctrine dominated medicine for nearly 1,500 years. In his encyclopedia of the medicine of the time (22 large volumes of Kuhn appearing between 1819 and 1833), he pointed out that the foundation of medicine should be on (i) experience (*peira*) and (ii) the direct certainty of the intellect (*logos*).

Galen was later accused of being teleologically speculative. However, he practised a veiled renascent Hippocratism, of course enriched by many new remedies. In his *Methodus Medendi*, he demonstrated, with numerous practical examples, the fundamental value of the methods of elimination based on refined indication and performance. Such contributions as 'on diseases which can be cured by vivisection' or 'indications of purging' point towards his empiricism.

In spite of his theoretical veneration for Hippocrates, Galen's writings have been ignored in modern times as is indicated by the dearth of translation of his work. He was an extremely successful practising physician, which is the reason enough to reread and reinterpret him, and in parts of rural Spain, a doctor may be familiarly referred to as *un galeno*.

2.3 Medicine and Health in the Middle Ages

The Middle Ages are said to be characterised by conservatism and the following of tradition rather than by new developments. Religious and humanistic philosophical interests often prevailed over direct observation of nature, finally degenerating into speculative scholasticism. There were, of course, many outstanding practising physicians in Europe and among the Arabs till the sixteenth century. Nevertheless, for a while, medicine tried to make the theories of Galen still more precise and systematic. It was finally recast to an almost mathematical degree of apparent exactness. Thus, rationalism went to another extreme and other forms of cognition were lost. 'Scientific' medicine became petrified and remote from life and nature. This was the situation faced by Paracelsus and Ambroise Paré [1510–1590], both living in the sixteenth century. Both were eminent practitioners, fighting against the narrow-minded 'scientific' medicine of that time (Temkin 1946).

Everything that did not fit into the dogmatic system of Galen and his followers (e.g. Avicenna [979–1037], in Arabic *Ibn Sina*) ([1930] 1973) was considered 'unscientific'. On the other hand, extensive and successful therapy had developed among the 'barber surgeons' and in lay medicine that was often effective where scholarly medicine declared itself helpless. In other civilisations, the extremely rich traditions of medicine existed.

An interesting study conducted in the Middle Ages relates the miraculous cure of the king of France. He had been suffering from a malignant fever and dropsy and was declared a hopeless case by the physicians of the court. Finally, he was

abandoned to the empirics, which meant lay healers or 'quacks'. They administered an emetic and the king recovered within a few days. The textbook of the French army surgeon, Paré (1952), is full of such miraculous cures, especially the incurable arthritis. He used intricate methods of purgation and counterirritation. He was in fact, 'the first to stress on the vital question of sterilization which three centuries later, was the key note of such great events' (Pledge 1966: 27).

Paracelsus ([1894] 2002) aggressively attacked the rigid dogmatism of the universities of his time. He was convinced that an enormous amount of practical wisdom had been collected in folk medicine and by practical wound surgeons. Moreover, he had a tremendous knowledge of herbs and of alchemy. He claimed to have cured severe cases of arthritis with preparations of gold, mercury and antimony. Although his claims were based on practical successes, the hyper-rationalistic medical schools of that time did not even want to try his methods. He appreciated the medical value of cleanliness and was first to note that miners have occupational diseases. It did not seem dignified and 'scientific' to them to use such simple methods of experience. They preferred to declare that there was no cure for arthritis because these so-called empirical methods did not fit into their narrow and rigid theoretical system. Many patients were thus unnecessarily discouraged and often driven into the arms of lay healers.

Paracelsus also reported that he had learnt from empirics how to break up gallstones and renal calculi into sand with vegetable and mineral drugs and thus eliminate them. This was confirmed later by many practitioners (e.g. Hufeland) but has been ignored by modern scientific medicine, although health resorts had achieved similar cures. At the end of the Middle Ages, scientific research and forms of professional association in Europe began to develop which culminated eventually to the worldwide growth of modern medicine.

The next section deals how the Enlightenment project initiated by radical discoveries in the realm of physics, chemistry and biology, liberated philosophy from the prison of religion and accorded supremacy to the function of human reason and logic. Kepler and Galileo's observations of the solar system and the development of Newtonian physics marked the victory of mechanical and natural philosophy over Renaissance naturalism or vitalism. In terms of the human body, while Renaissance naturalism had stressed the union of spirit and matter, mechanical philosophy treated it as a homologue of a machine.

2.4 Philosophical Roots of Modern Medicine

An enormous growth of the rationalistic approach to medicine and health consolidated in the seventeenth century, which is also called the 'century of natural sciences'. The astronomical discoveries of Nicolaus Copernicus [1473–1543], Tycho Brahe [1546–1601], Johannes Kepler ([1571–1630] [1596] 1981) and Galileo Galilei ([1564–1642] 1974) provided scaffolds to modern physics and chemistry as the dominant sciences, even for the treatment of the sick – the *iatromathematics*,

iatrophysics and *iatrochemical* medical schools of that century derive their eponymous names from these disciplines. At that time too, exactly as what happens today, the methods of natural sciences were considered as the 'vanguard of Enlightenment', progressive, exact and infallible, although they may appear rather primitive now.

Medicine was integrally involved with the development of mechanistic science. Copernicus believed that the sun not the earth is the centre of the universe. Sometime after 1514, he produced several copies of a small handwritten pamphlet (but canny enough not to put his name to it) that challenged the very fundamentals of the geocentric (earth centred) world view, which at the time was accepted by the Church as an undeniable truth. In demoting the status of earth to a mere planet in orbit around the sun, he ran the risk of being branded a heretic (Grego and Mannion 2010: 27). Grego and Mannion further argued:

> Copernicus was convinced that the Sun, not Earth, lay at the center of the Universe, and that the apparent daily rotation of the heavens is caused by Earth's rotation on its own axis. Of all celestial objects, only the Moon's orbit was centered on Earth. Copernicus went on to explain that the annual circuit of the Sun around the ecliptic is caused by Earth revolving around the Sun, and the apparent periodic retrograde motion of the planets results from the motion of Earth along an orbit inside that of the more slowly orbiting outer planets. His explanation of retrograde motion dispensed with the need to introduce epicyclic planetary motions – circular motions along circular paths, an invention of Ptolemaeus to retain the notion of the perfection of the heavens as exemplified in the circle – and is perhaps the most insightful and original of Copernicus' theoretical points. (Grego and Mannion 2010: 27–28)

Galileo supported the revolutionary heliocentric (sun centred) world view of Copernicus, in which the sun was deemed to be the centre of the solar system and only the moon revolved around earth:

> Galileo was a genius who transformed the way we look at the world and how we can discover the world through science. He insisted on performing experiments and making careful observations, using mathematics as the language of science. He showed that the careful quantitative measurement of motion could enable humankind to deduce the laws of nature. Galileo developed the telescope and microscope, experimented with pendulums and sound, wrote about the tides, developed numerous instruments such as the proportional compass and hydrostatic balance, and investigated the strength of materials. Moreover, he was highly effective at publishing his ideas throughout Europe and was tremendously brave in the face of ignorance, opposition, and criticism, especially that which was leveled at him by the Church. He was a great observer, a highly skilled instrument maker, and an ingenious inventor. Galileo saw what nobody had seen before, and in doing so overturned the traditional ideas of Aristotle and fatally wounded established dogma. (ibid.: 92–93)

Starting with Copernicus's and Galileo's earth-shaking observations of the solar system, the Aristotle's notion of geocentrism where he had proposed a 'universe with no fewer than 55 crystalline spheres, all rotating about a motion-less central earth, got a beating. All the five known planets, the Moon, the Sun, and the stars were supposed to be fastened to these spheres, and they moved around Earth in perfect circles' (ibid.: 39). The centuries-old dialectics of the 'Platonic–Pythagorean tradition and renaissance naturalism versus the mechanical or natural philosophy began to be resolved in favour of the latter' (Westfall 1977: 1–2). Renaissance naturalism

or vitalism upheld the union of spirit and matter in the world; it saw underlying essences reflected in the totality of nature. In the case of the human body, the new metaphor was the machine. Early medical scientists such as Andreas Vesalius [1514–1564] subjected the medical theory of Galen to empirical evaluation and found many errors. In his monumental work *De Humani Corporis Fabrica* ([1543] 1998), the most influential text on anatomy in its time, he provided a critical observation and precise description of human anatomy. He described minute details of human structure of the bones, muscles, veins, arteries, viscera and brain of the human body and carefully integrated its various parts. By establishing his basic principles of research and setting forth his own anatomical discoveries in the *Fabrica,* Vesalius laid the groundwork for the anatomical revolution that provided the foundation for William Harvey's transformation of physiology. William Harvey [1578–1657], the founder of modern experimental physiology, in his monumental work *The Circulation of the Blood and Other Writings* ([1628] 1963), demonstrated how the blood circulates and showed how the body is merely as a homologue of the machine, in terms of structured similarity. Harvey noted: 'From the structure of the heart, it is clear that the blood is constantly carried through the lungs into the aorta as by two clacks (valves) of a water bellows to raise water'.... 'The mechanism of circulation was less important in understanding the body than was the vitalistic idea that the heart and blood together forming a single functioning unit which is the very seat of life' (Harvey, cited in Westfall 1977: 90–91).

It is not entirely surprising that Harvey's model of the circulation of blood acted as a metaphor for the physiocratic school of economics. The founder of this school a French physician Francois Quesnay [1694–1774] modelled the economy in terms of a circulation of goods and services. The battle between the ancients and moderns was fought, and the work of Vesalius, Harvey and others established progress, at least in anatomy and physiology. Galen was blamed for having assumed the existence of pores in the septum of the heart only to satisfy his theory. But Harvey, whose theory postulated the existence of capillaries, has been lauded for his fearless logic. His physiological work has been purged of Aristotelian categories to make him appear as a modern laboratory man, a man reposing the faith on experiments.

It is nevertheless interesting to note that at this time (the time of sovereignty of Carteniasm), the concept of the health of the people, of populations as a whole, which is at the heart of public health theory and practice, was yet to be born. The nativity of modern medicine had to wait for the birth and consolidation of absolutist state, the rise of classical political economy and the expansion of the frontiers of mathematics with the birth of statistics.

The growth of medicine at the time of the Enlightenment was part of the general armageddon of science against orthodoxy and superstition. Kantian critical philosophy profoundly shaped the character and course of German medicine, just as the French Revolution, and the theoretical and practical relations of this philosophy determined the development of a distinct clinical medicine in France (Rosen 1946). Immanuel Kant's [1724–1804] critical writings began to achieve wide circulation after 1790. Physicians viewed him as an enemy of dogmatism, as one who was leading human reason back to its true vocation: self-enrichment through a genuine knowledge of

the world of experience. In Kant's epistemology, the entire world of experience was actually a product of the human mind, which, acting like a filter, screened and ordered sensations according to its own structure. His conception of this pre-existing mental grid was rather complex. Sensations from external objects were perceived by the understanding with the help of the so-called a priori concepts such as time, space and causality (Kant, cited in Risse 1972: 147). Empirical data were arranged in a spatio-temporal and causal frame of reference with the help of these a priori concepts, which had no independent existence of their own. They were merely elements that could be used as moulds in order to shape the world of experience, thereby providing the necessary forms in which knowledge could be acquired and understood (ibid.: 147).

Hence, Kant insisted that nature, considered as a complex of objects of possible experience, had to conform to a priori concepts of understanding, in order to be experienced at all. In his view, the so-called laws of nature were not objective entities with an independent existence and validity of their own, but roughly mental constructions useful in handling experience. The conclusion, therefore, was that nature constituted a unity so far as it was a system of necessary, interconnected phenomena, and natural laws were imposed by understanding on the complexity of appearances (ibid.: 147).

The second aspect of Kant's epistemology that attracted and challenged many physicians was the new concept of 'science'. For him, to deal with all of nature in a 'scientific' fashion was to make some effort towards bringing order into the multiplicity of phenomena. Only systematic unity could elevate ordinary knowledge (ibid.: 147–148).

Thus, Kant concluded that the concept of natural law and order depended on a priori synthesis which occurred in the human mind by the action of reason. Kant's reason (*vernunft*) had a formal and logical function: trying to reduce the variety and multiplicity of knowledge acquired by understanding (*verstand*) to a small number of principles (ibid.: 148). For this purpose, human reason directed the ideas and judgements of understanding towards a coherent unity. To be sure, this systematic abstraction lays in the nature of reason itself, not in the objects of our knowledge (ibid.: 148).

Reason became sovereign for the appropriate systematisation of knowledge, which culminated in the establishment of a number of apodictically certain, and necessary, a priori principles (ibid.: 148). Kant called such a system 'pure science'.

Kant's ideal of 'pure science' based on a priori principles strongly appealed to physicians. There were physicians who dreamt of a priori medicine; commented a German observer, 'these men pretend to walk on the stilts of transcendental philosophy from the limited area of medical appearances to the infinite field of a scientific and transcendental medicine' (Schelver, cited ibid.: 149).

The synthesising activity of human reason postulated by Kant could not be avoided, and therefore, more and more experiences became a necessity to ensure the success of the rational experience. Without ever realising, the ideal of a 'pure science' medicine would, in time, achieve a higher vantage point among the empirical or pseudosciences (Schmidt, cited in ibid.: 154).

Friedrich Wilhelm Joseph Schelling [1775–1854] ([1799] 2004) conceived of a supreme 'science' of medicine. In spite of criticisms and warnings issued by clinicians and philosophers, the idea of a medical 'science' based on irreducible vital principles proved an irresistible temptation to those practitioners who sought medical certainty for their ideas of aetiology and pathogenesis (Hecker, cited ibid.: 155). Therefore, Schelling's philosophical formulations became extremely popular in the early nineteenth-century Germany. They satisfied precisely the physician's yearning for an overall synthesis of natural events, making allowances for the latest chemical and electrical discoveries. Crucial, however, was the fact that such a view of the intimate structure of nature allowed a glimpse of all final origins of life and the essential conditions for its existence, both deemed indispensable prerequisites for the construction of a true 'science' of medicine.

Schelling's comprehensive effort to project into nature a series of laws merely discovered through philosophical reflection was quite different from that of his predecessor, Kant. In Schelling's view, physicians and scientists were truly capable of a far superior knowledge of nature if they were willing to grasp, through philosophical reflection, the leading ideas after which the entire natural world is fashioned. Once these fundamental principles have been apprehended, one could erect, by simple deduction, a complete set of necessary propositions into which all appearances could be harmoniously placed. First, the supreme philosophical endeavour was to recognise the framework of basic natural ideas. This was to be the genuine foundation for a future natural science and medicine (ibid.: 156). Philosophy remained the proper tool for approaching final causes.

In retrospect, the German stress on the 'science' of medicine based upon the general laws of nature and organic life was appropriate. The preoccupation with problems of aetiology and pathogenesis rather than clinical symptomatology and pathological anatomy reflected an insight worthy of recognition. The latter were merely variable effects of a process triggered by a specific cause. Unfortunately, the cognate sciences that could have furnished the required knowledge for such an endeavour – physiology, biochemistry and bacteriology – were largely undeveloped or still nonexistent at the turn of the eighteenth century. Without their support, the effort to achieve a scientific status for medicine was doomed from the onset, and extensive philosophical speculations were unable to provide a suitable alternative. Hence, German medicine lapsed into obscurity at the beginning of the nineteenth century, overshadowed by the new French medical approach that stressed bedside healing.

René Descartes [1596–1650] revolutionised the outlook of science and introduced a fundamentally new paradigm of embodiment. Attacking the Aristotelian and magical views of nature that were popular in his day, he banished all animation and teleology from the natural realm, attributing such properties to the creator, to God alone. The human body was, for him, identified with a passive nature. As such, it appeared as mere *res extensa*, manifesting no intelligence or power of self-movement. These activities were ascribed to the mind, *ves cogitans*. The essence of the self and the divine aspect of the human being was merely a machine driven by mechanical causality and susceptible to mathematical analysis, like any other component of *res extensa*.

Descartes intended his philosophy to bear medical fruit. In his book *Discourse on the Method*, he resolved to dedicate his life to the advancement of medicine (Descartes [1673] 1967: 130) and followed through in human physiology. Even in his 1641 *Philosophical Meditations* and *Principles of Philosophy*, he attempted to show the relevance of his metaphysics of mind–body interaction to such vexing medical problems as the 'phantom limb' phenomenon and the effects of peripheral nerve blockage (ibid.: 293). Though Descartes' theories of pineal gland transmission and his hydraulic model of the human body were soon abandoned, it must be said that he did contribute to medical advancement. His metaphysics of embodiment did more to permit the achievements of modern medicine than any particular scientific theory.

By purging the body of spontaneity, willfulness and occult desires, Cartesian dualism did away with all the properties that might impede a mathematical–causal analysis of physical functioning. Viewed as a mindless machine, the body could be tested experimentally and blueprinted in detailed anatomical study. Beginning his 1664 *Treatise of Man*, Descartes provided mechanistic explanations and he could imagine a model of men as a machine:

> the digestion of food, the beating of the heart and arteries, the nourishment and growth of the limbs, respiration, waking and sleeping, the reception by the external sense organs of light, sounds, smells, tastes, heat and other such qualities, the imprinting of the ideas of these qualities in the organ of the "common" sense and the imagination, the retention or stamping of these ideas in the memory, the internal movements of the appetites and passions, and finally the external movement of all the limbs … follow from the mere arrangement of the machine's organs every bit as naturally as the movements of a clock or other automaton [moving machine] follow from the arrangement of its counter-weights and wheels. (Descartes 1985: 108)

The first apparent scientific paradigm of health/medicine originated where physicians generally relied on three techniques to determine the nature of illness: what the patient said about symptoms, the physician's own behaviours of signs of illness and the patient's appearance and behaviour and, more rarely, a manual examination of the body (Reiser 1978: 1). Medicine was by no means scientific, and 'medical thought involved unverified doctrines and resulting controversies' (Shryock 1960: 52). The new science began, for the first time, to map out in detail the internal workings of the human body. The mechanistic view analysed living things as sets of mechanical parts such as cogs and pulleys driven by a heart pump. The mechanistic philosophy provided immense power to improve the human condition. Descartes argued:

> Through this philosophy we could know the power and action of fire, water, air, the stars, the heavens and all the other bodies in the environment … and we could use this knowledge … for all the purposes for which it is appropriate, and thus make ourselves, as it were, the lords and masters of nature. This is desirable not only for the invention of innumerable devices which would facilitate our enjoyment of the fruits of the earth and all the goods we find there, but also, more importantly, for the maintenance of health, which is undoubtedly the chief good and the foundation of all the other goods in this life. (Descartes [1644] 1985: 142–143)

The development of Newtonian physics had as much to contribute to this as it did to the development of all social science disciplines in general and to classical

political economy in particular. Isaac Newton [1643–1727] ([1687] 1995) provided a unified universal theory of matter based on accurate experiments and elegantly rigorous mathematics. Greenwood has beautifully captured the spirit of Newtonian science:

> The success of Newtonian science also promoted a plausible legend, that progress in science is achieved through a process of continuous theoretical unification. Thus Galileo's law of free fall and Kepler's laws of planetary motion were independently developed and restricted to terrestrial and celestial motion respectively, but were later unified by integration within Newton's gravitational theory. (Greenwood 2009: 151–152)

Careful observations and precise mathematical elaborations, together, led to an all-embracing generalisation, extending from the smallest particle of matter to the largest corporeal aggregate. He presented a universe of particles in motion, acted upon by forces about which there might be some dispute, to be sure, but which are amenable to mathematical treatment. This universe comprised of people who were considered machines and where a sick person was compared to an ill-made clock. Empiricists like Francis Bacon [1561–1621] ([1620] 1994), Thomas Hobbes [1588–1679] ([1651] 1968) and René Descartes ([1644] 1985) provided the philosophical and ideological groundwork for such a model of a human being. Descartes concluded that the human body worked like a machine, a machine that performs all the physiological functions of a man:

> I should like you to consider, … all functions … to this machine-such as the digestion of food, the beating of the heart and arteries, the nourishment and growth of the limbs, respiration, waking and sleeping, the reception by the external sense organs of light, sounds, smells, tastes, heat and other such qualities, the imprinting of the ideas of these qualities in the organ of the 'common' sense and the imagination, the retention or stamping of these ideas in the memory, the internal movements of all the limbs (movements which are so appropriate not only to the actions of objects presented to the senses, but also to the passions and the impressions found in the memory, that they imitate perfectly the movements of a real man). I should like you to consider that these functions follow from the mere arrangement of the machine's organs every bit on naturally as the movements of clock or other automation follow from the arrangement of its counter-weights and wheels. (Descartes [1644] 1985: 108)

Descartes argued not only that the human body worked like a machine but also that the mind and body of a given individual could be separated into two substances – one 'corporeal' or material and the other 'incorporeal' or immaterial (ibid.). With this conception, 'health' came to be seen as the perfect working order of the human organism, an automaton (a self-propelling machine), whose treatment required the repair of damaged parts and the restitution of the different functions (Rossdale 1965: 83). Moreover, the methodologies of pathology and diagnostics that developed from this view (and continue to dominate the practice of medicine today) considered the cause of illness to be both as a species and individual. Treatment, therefore, was pursued on an individual bio-chemosurgical basis, relegating the recognition and implications of social causes of illness to secondary importance, though even this secondary recognition must be viewed as an 'ad hoc modifications' (Kuhn 1962: 78).

2.5 Models of Scientific Medicine

For Nicholas Jewson, scientific medicine has to pass through three specific modes (which he sees as corresponding to three successive modes of production of medical knowledge), namely, 'bedside medicine', 'hospital medicine' and 'laboratory medicine' (Jewson 1976: 225). As Lesley Doyal notes, 'these stages provide a useful means by which to understand both the development of medical thought and practice and also its relationship to broader social and economic changes' (Doyal 1981: 30).

'Bedside medicine', which dominated Western Europe from the Middle Ages until the late eighteenth century, was *polycentric* and *polymorphous* (Jewson 1976: 227 emphasis added). It was available to a minority of the population such as the wealthy and worked on a patronage system with patients choosing particular doctors whom they believed could help them the most (Jewson 1974: 369). Until then, the 'new science' (i.e. science after the Renaissance) had little impact on medical practice, and the patron–doctor relationship was a very important determinant of the content of medical treatment. The patient's choice or, in Jewson's terminology, the 'sick man' was the centre of medical concern, the patient being treated as a whole.

By the beginning of the nineteenth century, becoming a colonial power and having access to cheap raw materials, with a combination of new mechanised technologies, geographical factors and market forces, the Industrial Revolution was a major socio-economic event in Britain. The Industrial Revolution replaced the feudal mode of production by the capitalist mode of production. The Industrial Revolution 'marks the most fundamental transformation of human life in the history of the world recorded in written documents' (Hobsbawm 1969: 13). Adam Smith in his seminal work (1776), *The Wealth of Nations*, referred to Britain's advantages:

> England, on account of the natural fertility of the soil, of the great extent of the sea-coast in proportion to that of the whole country, and of the many navigable rivers which run through it and afford the conveniency of water carriage to some of the most island parts of it, is perhaps as well fitted by nature as any large country in Europe to be the seat of foreign commerce, of manufactures for distant sale, and all the improvements which these can occasion. (Smith [1776] 1999: 517)

It brought the fundamental transformations in industrial production, other economic activities and the way people lived. In other words, industrialisation meant a shift from overwhelmingly agrarian activities to industrial activities with the concomitant process of unorganised urbanisation which had a deleterious effect on human health. Unplanned urbanisation led to unhealthy cities and the consequence was the establishment of big hospitals for catering to the health needs of the working population. 'Hospital medicine' came into existence and dramatic changes occurred in medical practices. Client-centred therapy was losing its dominance, and doctors and even midwives were becoming more organised and professional (Doyal 1981: 31). It was a loss of the self in a complex social system where professionalism and individualism were on the rise. 'Hospital medicine' shifted during this period to diagnosis and classification, and the Aristotelian flavour which had characterised the theoretical base of hierarchical, patient-centred therapy was sidelined.

This professionalisation led to the process of objectification in which the individual patient or lay person was rendered largely 'invisible and obliged to be passive in the face of expert advice' (Bury 1998: 8). Ivan Illich has furthered the dynamics of this process:

> If 'sickness' and 'health' were to lay claim to public resources, then these concepts had to be made operational. Ailments had to be turned into objective diseases. Species had to be clinically defined and verified so those officials could fit them into wards, records, budgets and museums. The object of medical treatment as defined by a new, though submerged, political ideology, acquired the status of an entity that existed quite separately from both doctors and patient. (Illich 1976: 111)

The four great innovations of hospital medicine were structural nosology, localised pathology, physical examination and statistical analysis (Jewson 1976: 229). With these innovations the emphasis shifted away from a belief in the classical Greek model of health as a harmony among the body's processes, or the Galenian concept of disease as a disturbance of the total system, to what is called 'localised pathology'. Karl Figlio has captured the contradiction beautifully:

> The nosological point of view, adopted by the hospital and transformed by the technological approach to the living organism, has also limited the variety of communication between the doctor and the patient. The patient's reporting of symptoms has become increasingly less significant and his need to find an acceptable set of symptoms has become increasingly important. But in the objective, physical, reified language of modern medicine, acceptable symptoms must be either physical or trivial. Medical language lost the ability to communicate the symbolic meaning of disease, just as medical techniques focused down upon the physical lesion and lost the capacity to recognize it. (Figlio 1977: 285)

This was the period of development of new instruments and sophistication in descriptive anatomy and pathology accompanied by the use of statistical analyses. Socio-economic and environmental factors were obviously ignored in this mechanical approach. With the birth of the bacteriology pioneered by French chemist Louis Pasteur [1822–1895] and German pathologist Robert Herman Koch [1843–1910] often regarded as fathers of bacteriology, demonstrating that specific diseases could be caused by the invasion of specific microorganisms, there arose what Rene Dubos has named the 'doctrine of specific aetiology' (Dubos 1959: 106). Pasteur in his classic experiments, in which nutrient broth was placed in swan-necked flasks from which dust but not air was excluded, clearly demonstrated that putrefaction relied on the presence of microorganisms. Albert Delaunay lauded Pasteur's contribution:

> There are three main reasons why Louis Pasteur is a great figure of humanity. The first has to do with his scientific work. Pasteur has renewed entire chapters of physics and chemistry; maybe more than anyone else, he has revealed the importance of the microbial world, either as an equilibrium factor at the surface of the globe or in terms of its responsibility for animal and human disease. Secondly, one owes to his genius techniques that have transformed entire industries and the development of important vaccines. Finally, in contemplating Pasteur's life, one can only be struck by its moral quality. (Delaunay, cited in Sinding 1999: 73)

By the 1860s, Pasteur's theories about the roles of microorganisms were further extended when he investigated a disease of silkworms that was severely affecting the French silk industry and revealed that bacteria were responsible.

In 1876, Koch published a major work on the life cycle of the anthrax bacillus, demonstrating that the disease was caused by the active spread of the bacterium, which could lie dormant for many years, thus appearing at intermittent intervals, an aspect of the disease that had baffled many investigators. In 1882, Koch isolated the tuberculosis-causing bacillus and developed a culture medium in which the microorganisms could be grown in vitro. This was an important technical and theoretical contribution, and 'Koch's announcement came to represent the scientific modernization of biomedical culture in the late nineteenth century' (Haddard 1999: 120). Koch expressed on the discovery:

> Upon the regularity with which tubercle bacilli can be found, it seems curious that nobody has seen them previously. This, however, can be explained by the exceeding smallness of these structures and their usually small numbers … for this simple reason their existence escapes even the most attentive observer without their peculiar reaction to staining. (Koch, cited in Gradmann 2001: 7)

Koch suggested four experimental criteria that should be satisfied to prove the causative relationship between a microorganism and a disease. The microorganism had to be isolated from infected animals, cultivated and identified in the laboratory and then reinjected into healthy animals which subsequently became ill. These three stages, with the additional proviso that the same microorganism was further isolated from the host animal, became codified as Koch's postulates. Koch and his associates subsequently discovered the causative bacteria of many diseases, and thus diagnosis, treatment and prevention became increasingly possible by understanding, and controlling, the inductive microorganisms.

Germ theory guided the development of both medicine and health in the twentieth century as interventions targeted the microorganisms producing disease with newly discovered 'magic bullets' of immunisation and antibiotics. With focus on 'germs', the socio-economic context of exposure to the microorganisms was often lost (Tesh 1988: 34–40). Germ theory's placement of blame for most sickness and disease on the individual served to exculpate society from responsibility. Discoveries came thick and fast, and scientists were soon announcing bacterial causal factors for nonbacterial diseases such as yellow fever, malaria and, in veterinary medicine, hog cholera. The 'immediate' cause – the germ – became the sole factor of the disease causation. More distal causes – of predisposition, physical and social – were ignored. It effectively diminished the role of social and economic factors in disease causation and has remained the hallmark of the dominant mode of epidemiological practice hitherto. This is so ironical that hospitals are now considered the epitome of 'depersonalising' and 'objectifying institutions', but basically the development of hospitals originally formed an important part of the attempt to democratise medicine, 'a new kind of medical space … attuned to the revolutionary dream of 'medicine in liberty' (Osborne 1994: 38).

Laboratory medicine, observed as the final victory of the mechanistic world view, established itself in the middle decades of the nineteenth century, within the German university system, after the discovery of germ theory. As Howard Marget Spiro observed, 'laboratory medicine turns the physician into a scientist studying

the cell and its subcellular DNA structure and processes, rather than looking and listening to the patient' (Spiro 1986: 5). Figlio furthered the arguments:

> The hospital settings became a kind of topological space in which the conceptual nosologies were spatially arrayed. Neither the consciousness of the patient nor of the physician could be immune to an institutional organisation set up for the classification and comparison of disease rather than for the simple provision of a building in which the doctor and his patient could meet. Before this time, no such opportunities were available, and it was more difficult to imagine a disease as a discrete entity. There was no framework in which the person could be conceived of in abstraction from that person. (Figlio 1977: 281)

At the same time, doctors became more active interventionists in physiological processes, rather than being passive observers. Medicine was on the way to gaining full recognition as a science. As Doyal notes:

> In the latter half of the nineteenth century, both histology and physiology were developing extremely rapidly, and the individual cell came increasingly to be seen as the central focus for understanding ill health… Cell theory and controlled clinical trials did not immediately provide any new therapy, but they did form the basis for twentieth century developments in clinical medicine. (Doyal 1981: 33)

This biological reductionism, instrumentalism, elementalism or positivism widened the gap between the doctor and the patient. It has been observed that this version of the natural world was a victory of the industrial bourgeoisie, which established the positivist conception of science and of medicine (Navarro 1986: 167). Medicine was characterised by what Jewson calls a shift from a 'person-oriented' to an 'object-oriented' cosmology (Jewson 1976: 232). In this view of health and disease, 'it is always individuals who become sick, rather than social, economic or environmental factors which cause them to be so' (Doyal 1981: 35). Similarly Evan Stark captured individuation process:

> Disease is understood as a failure in and of the individual, an isolatable 'thing' that attacks the physical machine more or less arbitrarily from 'outside' preventing it from fulfilling its essential 'responsibilities'. Both bourgeois epidemiology and 'medical ecology' … consider 'society' only as a relatively passive medium through which 'germs' pass en route to the individual. (Stark 1977: v)

There are serious problems with this approach, which still dominates contemporary medicine. The physician deals with an individual patient (already a socially determined being) (Waitzkin and Stoeckle 1976). The patient is not an abstract being but of a certain age, sex, race and class and has to pass through a specific historical process from childhood to adulthood (Reich 1970, 1972). This medical view individuates the patient, whereas disease or injury from which the patient is suffering is collective experience in a particular historical conjuncture. And this is what the contradiction of this view is. These latter circumstances are as much a part of the cause and therefore should be taken into account in treatment. There is no gainsaying the fact that medical facts are also social, historical facts. Thus the essence of scientific medicine's treatment of disease discourages a proper understanding of disease by excluding from consideration the patient's passage through a set of historical processes. As Marx W. Wartofsky puts it, 'Human ontology cannot

be reduced to asocial or ahistorical biology without doing violence to the very specificity of human biological structure and function itself' (Wartofsky, cited in Berlinger and Salmon 1980: 137). As David Armstrong summarises this view of modern political anatomy:

> The modern body of the patient, which has become the unquestioned object of clinical practice, has no social existence prior to those same clinical techniques being exercised upon it. It is as if the medical gaze, in which is encompassed all the techniques, language and assumptions of modern medicine, establishes by its authority and penetration an observable and analyzable space in which is crystallized that apparently solid figure- which has now become as familiar- the discrete human body. (Armstrong 1983: 2)

By abstracting diseases from its social framework and reducing it to the biological sphere, social conditions were ignored. Scientific medicine became consistent with and, indeed, legitimised capitalist development by integrating a model of healing, which gets reflected in the social structure. N. Cooper et al. have captured the pick of biomedical model:

> Healthy people became manifestations of healthy cellular activity; ill people become manifestations of dysfunctional cellular (i.e. bacteriological) activity. The patient becomes a 'problem' to be solved, and the solution to that problem lies in adopting a scientific, mechanistic approach that precludes any considerations of social, psychological or behavioural influences. (Cooper et al. 1996: 7)

In doing so, scientific medicine obscures the relationship between disease and the nature and form of social development. Medicine transforms a large-scale social problem into a problem in the motivation of individuals, for which marketable commodities, including therapy programmes, surgery and drugs, are seen as the typical solutions (Eyer and Sterling 1977: 1). Today, heart disease, cancer and automobile accidents are posited as the medical problems. They are conceived of as necessary consequences of economic growth and industrialism. Disagreeing with this interpretation, Navarro commented:

> The two main characteristics of this crisis of the western system of medicine, i.e. its growth and its ineffectiveness, result not from professional manipulation, but rather from the *needs created by the process of capital accumulation* on the one hand and the *demand expressed by the working population* on the other. Moreover, these needs and demands, being generated by Capital and Labour, are inherently in conflict and thus are translated into the *daily practice of the class struggle.* (Navarro 1978: 184, emphasis in original)

The major concern of scientific medicine, consequently, is to render the body more functional in its struggle to adapt to the potentially antagonistic forces of nature. In contrast to the World Health Organization's (WHO) definition given in the preamble of its charter health is a state of complete physical, social and mental well-being and not merely the absence of disease or infirmity. In the later sense, health tends to be defined in unrealistic and static state of perfect well-being in functional terms, as the absence of disease. Defining health and illness in a functional way is an important example of how a capitalist value system defines people as primarily producers and consumers. It is concerned with their 'fitness' in an

instrumental sense, rather than with their hopes, fears, anxieties, pain or suffering (Doyal 1981: 34–35). In the therapeutic relationship, the task of the patient is to understand the signs and symbols of the problems as the physician reads them and thus to accept the medical definition of both the problem and the solution. Michael Taussig calls this process:

> the creation of a 'phantom objectivity' with regard to disease, a process of 'denying the human relations embodied in symptoms, signs and therapy', a process by which 'we not only mystify social relations, but we also reproduce a political ideology in the guise of a science of apparently "real things" – biological and physical thing hood.' (Taussig, cited in Crawford 1980: 373)

Further:

> Medical practice is a singularly important way of maintaining the denial as to the social facticity of facts. Things thereby take on a life of their own, sundered from the social nexus that really gives them life, and remain locked in their own self-constitution. (ibid.: 373)

From the many factors that contribute to diseases – social, environmental, physical and psychological – modern medicine tends to isolate a single physical factor and label it the 'cause'. Rene Dubos explains that Pasteur and Koch's conceptualisation of germ theory created experimental conditions that were sufficient to bring the host and parasite together to produce disease and thus minimised the influence of other factors (Dubos 1959: 106). The focus on the doctrine of specific aetiology and germ theory facilitated the transformation of health into a commodity saleable in the market, which is the essence of capitalist mode of production, i.e. commodification. With this commodity fetishism, health problems become problems of the body, which require consumption of some form of technological treatment, rather than a reflection of social relations. Vicente Navarro describes this '*need for consumption*, consumption that reflects a dependency of the individual as something that can be bought, either a pill, a drug, a prescription, a car, or the pre-packaged moon' (Navarro 1975: 358, emphasis in original). Adele E. Clarke, Janet K. Shim, et al. have captured the transformation of medicine succinctly:

> … the nature of medicalization itself began to change as technoscientific innovations and associated new social forms began to transform biomedicine from the inside out. Conceptually, biomedicalization is predicated on what we see as larger shifts-in-progress from the problems of modernity to the problems of late modernity or postmodernity. Within the framework of the industrial revolution, we became accustomed to "big science" and "big technology"- projects such as the Tennessee Valley Authority, the atom bomb, and electrification and transportation grids. In the current technoscientific revolution, "big science" and "big technology" can sit on your desk, reside in a pillbox, or inside your body. That is, the shift to biomedicalization is a shift from enhanced control over external nature (i.e., the world around us) to the harnessing and transformation of internal nature (i.e., biological processes of human and nonhuman life forms), often transforming "life itself." (Clarke et al. 2003: 164)

It is important to mention at this juncture that medicine and health were becoming increasingly mechanised and commodified with consolidation of 'new science'.

The Aristotelian paradigm with its belief in the organic unity of living things had captivated medieval society. There were inexorable links between Aristotelian physics and the organisation of feudal society, and, therefore, the downfall of feudal society was a sine qua non for the replacement of the Aristotelian view of the physical world by the Newtonian one. Aristotle's theory of the universe aimed to characterise and explain processes as they naturally occurred. It was a contemplative theory aiming to understand the world as it behaves when not interfered with. It did not aim to reorder the natural order of things. The core of Aristotle's physical theory was that the earth is stationary at the centre of a spherical finite universe, with the sun, planets and stars orbiting around it in a hierarchy of orbits. The physical universe of Aristotle is a hierarchical one. Everything is in its natural place or moves towards its natural place according to the natural order of things. And this, the generally accepted view of the universe in feudal societies of medieval Europe, was gradually replaced by the rising bourgeoisie order which needed to free it from the impediments that feudal society put in its way and emancipate it through economic advancement. In other words, it was a geocentric world view. The shift from geocentric to heleocentric world view gave scientific support to the emerging bourgeoisie order in the sense that instead of *nobility* it is the *bourgeoisie* and instead of *hierarchical inequality* it is *equality* which is advanced as the natural order of things. The science of physics, founded by pioneers such as Galileo, Kepler and Newton, provided the rational basis for the new system. 'Mechanistic medicine', which was part of this new system, made possible those aspects of medicine that have been genuinely successful either in prevention or cure of disease or in providing symptomatic relief. The tragedy, of course, was that while Descartian principles assumed that an account of knowledge and the methods appropriate for its acquisition could be deduced in a general way from the nature of individual humans, the same was also applied at the level of populations in the now dominant mode of public health.

The adoption of a mechanistic paradigm limits the nature and boundaries of what is conceived as the medical task. The basic presumption was that all diseases are caused by physiological disorder. Where there is truly no physiological problem, there is no disease; the ideal goal of reductionistic medicine would be diagnostics accomplished by a biochemical–biophysical survey of the patient's body. Ideally, psychological problems would be captured by this technique. It is part of the assumption of reductionistic medicine that, at the very least, mental states have clinically useful physical correlates (Zucker, cited in Foss 1989: 170). Thus scientific medicine ultimately became curative, individualistic and interventionist, objectifying patients and denying their status as social beings (Doyal 1981: 30).

But the story of health and medicine is not so unidimentional; there emerged in the nineteenth century an alternative approach to health, i.e. epidemiology, where the population perspective became a focal point of health discourse. And 'the task of medicine is to promote health, to prevent disease, to treat the sick when prevention is broken down and to rehabilitate the people after they have been cured. These are highly social functions and we must look at medicine as basically a social science' (Sigerist 1943: 241).

2.6 Concluding Comments

The progression of public health through ancient, medieval and modern times reflects two distinct and conflicting streams of ideology. The genesis of such divergent ideologies can be traced back to the major philosophical debates and progress of thought over the ages and across several civilisations. Through the ancient and medieval times, religion played a dominant role in the conception of life and nature. Since every social, cultural and natural phenomenon was associated with some supra-natural creator of the universe, the description of the individual, his/her interaction with his/her surroundings and his/her internal nature was imprisoned within the metaphor of religion.

With the development of mechanistic sciences, medicine too became imbued with the spirit of mechanicalism and reductionism. The Industrial Revolution in the beginning of the nineteenth century marked a paradigm shift in medical practice with the emergence of 'hospital medicine'. Mass urbanisation and the unhealthy squalor of workers' habitats gave rise to the need for an organised health service system in the form of hospitals where objective treatment was meted out to the patients, irrespective of who they were or where they came from. The emphasis was on the development of more and more sophisticated tools of anatomy and pathology. The historical progression of public health in modern times witnessed the overriding influence of methodological individualism. The work of Descartes, Hobbes, Bacon and many others marked a paradigm shift in philosophy, with the necessary fallouts in the natural and social sciences. Thus, while evidence of a holistic approach to health is observed in the writings of people like Hippocrates, the developments subsequent to the establishment of the Cartesian paradigm contained strong elements of individualism. Medicine or health travelled progressively through the phases of bedside, hospital and laboratory medicine, each phase displaying more positivist, individualistic, mechanistic and reductionist components than the previous one.

The next chapter commences with a discussion on the origins of modern epidemiology, which is considered as the basic science of public health. The inherent vision of public health discourse was to keep the population or the collective at the centre while investigating the aetiology of disease as well as formulating health policies. The developments within the field of epidemiology and its gradual transition from a population-based study to an individual- and laboratory-based study, therefore, deserve detailed exposition.

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