BRITISH MEDICAL JOURNAL

LONDON SATURDAY AUGUST 8 1959

THE THREE REVOLUTIONS IN MEDICINE*

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When William Osler, Regius Professor of Medicine in the University of Oxford, gave the first of these annual lectures in 1908 he said that the invitation to him from the Master and Fellows of St. John's College manifested in the sons of the prophets the old courtesy of the fathers. That to-day they invite one whose working life has passed in a civic university founded but a few years ago shows that the old courtesy remains and is inspired by a generosity of which I am deeply conscious and appreciative.

The title of a lecture in commemoration of Thomas Linacre which includes the word revolution requires some explanation. No man was less revolutionary in spirit, and he loved the monastic peace of his study; as Fuller says, he was the restorer of learning in this country and sought to give back to medicine the uncorrupted spirit of Greece and to strip it of Arabian accretions. But, on the other hand, the Greek tradition was the child of the first major revolution in the history of medicine, and though the passage of wellnigh two thousand years had obliterated the memory of the completely different system which preceded it, Linacre in seeking to restore the Greek spirit was all unwittingly defending a revolution which had heralded a new epoch.

By precise definition an epoch is a point in time, a fixed date; in derivative use over three centuries the word has come to signify either the beginning of a new era or a period in history distinguished by the prevalence of a particular state of things or system of thought. In his studies of human history Professor Toynbee has drawn attention to something that was already widely known but worth emphasis—that epochs in the derivative sense of the term are rarely, if ever, to be defined accurately in terms of chronology. The old lives on in uneasy companionship with the new, and for many years there may be much confusion of thought, ideals, and practical activity. It is because I believe that we are ourselves passing through such a confused period that I have selected this subject for my address.

Knowledge of the past refines judgment of the present, and a man who knows something of the history of a rapidly developing subject such as medicine is more likely to distinguish the significant and enduring features of the contemporary scene than one who limits his studies to a synoptic review of that vast confusion known as current literature.

The Primitive Epoch

It is commonly assumed that theory and practice are interdependent; that what men do is determined by what they think and believe, and what they think and believe

is in turn modified by the result of what they do. That assumption is dubious, for much human activity is still conditioned by primitive instinct, untouched by conscious thought or formal creed, and even at the highest intellectual level it is probable that subconscious, imaginative intuition plays a greater part than many are inclined to admit. It is strange, too, how slowly and, as it were, diffidently practice affects theory; how reluctant men are to question authority and belief long established by time, education, or custom.

However that may be, there is little doubt that the shape of primitive medicine was determined by theories adopted in explanation of facts of nature. Man believed that phenomena like thunder, lightning, drought, or flood were controlled by powerful beings other than himself, and his conception of the nature of these beings varied. Sometimes his conception was anthropomorphic; sometimes he thought of them as animals and established an elaborate system of totems. These conceptual images, whatever their form, were the earliest gods. Some were beneficent, but to account for catastrophe primitive man believed that many were malevolent devils. In such a theoretical system sickness, obviously, was a work of malevolence, and the relief of it was sought in two ways—either by placating the ill-disposed god with sacrifice or sacrificial offering or by frightening him away from his evil work by noise, by violence, or by the assumption of grotesque and terrifying disguise by the physician or the sufferer. But, as Sir James Frazer has shown, the theory of animism does not account for all the practices of primitive medicine, for “along with the view of the world as pervaded by spiritual forces savage man has a different and probably still older conception in which we may discern a germ of the modern notion of natural law or the view of nature as a series of events occurring in an invariable order without the intervention of a personal agency.”

This conception is involved in sympathetic magic and includes two principles of thought—first, that like produces like, and, second, that things which have been in contact continue to act on each other at a distance and after the physical contact had been severed. The first principle—that like produces like—was probably suggested by the readily observed facts that children often resemble their parents and that different animal species do not interbreed; but the source of the second is more obscure. I hazard the conjecture that observations of cases of infectious disease may have promoted it. Imagine a savage stricken with dysentery or smallpox who is visited by a friend from a distance. Some days after the friendly visitor has returned to his home he is himself taken with the same symptoms of illness as appeared in the original victim, who may still,

*The Linacre Lecture delivered at St. John's College, Cambridge, on May 6, 1959.

indeed show them. To the savage with no conception of the bacterial world might it not seem that the sick men having been in contact were continuing to influence each other at a distance?

On such hypotheses was the primitive practice of medicine based, and faith in the efficacy of images, charms, and relics derives from them. If we add to the theories of animism and sympathetic magic the belief that the stars in their courses influence the fate of individual men (as they certainly determined the routine of their agriculture) we have the explanation of the extraordinary therapeutic practices which persisted in Europe down to the eighteenth century and later, and still hold sway in large areas of the world to-day.

The Greek Epoch

In the course of centuries the primitive system of medicine I have described gained an authority so absolute and hallowed that to question it was an act of infamy deserving instant and condign punishment at the hands of its established and orthodox practitioners.

The fetters of primitive beliefs were strong, and it is part of the glory of Athens that they were broken there. Our debt to the Hippocratic physicians is threefold. First, they rejected the welter of superstition inherent in animism, astrology, and sympathetic magic, and in its place established the concept of disease due to natural causes and as a manifestation of disturbance of the normal equilibrium between an organism and its environment.

As an example take the opening words of Hippocrates on "The Sacred Disease" (epilepsy). "It is not, in my opinion, any more divine or more sacred than other diseases, but has a natural cause, and its supposed divine origin is due to men's inexperience." And later the blunt statement, "Every disease has its own nature and arises from external causes, from cold, from the sun, and from changing winds."

His followers accepted the current scientific opinion of their time that there were four elements—air, water, earth, and fire—and matched them with four humours—yellow bile, phlegm, black bile, and blood. Healthy bodies contained proportions of all these, and when either the proportions were disturbed or one of the humours was altered, disease resulted.

The next achievement of the Hippocratic school was a sound method of clinical practice based on patient observation at the bedside and objective records of the course of individual cases.

The Greek physicians were much concerned with the crises of acute disease (which to them were an indication of the separation of noxious humours from the body) and particularly with prognosis. Their insistence on the importance of forecasting the outcome of a particular illness may justly be compared with the prestige that the power of prediction confers on many scientific activities to-day.

Greater than these achievements, however, was their definition of the proper role of a physician.

When first I heard them the words of the Hippocratic Oath seemed strange, fantastic, and even a little superfluous. "The regimen I adopt shall be for the benefit of the patients according to my ability and judgment and not for their hurt or any wrong. I will give no deadly drug to any . . .," and so on. But in the older, magical system medicine was not practised exclusively in the interest of the sick. Deadly drugs

or poisons, spells, and rituals paved the path to power and satisfied the lust of private enmity. The primitive medicine man might be priest and king, but he was often murderer as well as healer. The Hippocratic Oath marked a clean break with the past; the practice of medicine was to be a way to the good life and no longer the instrument of ambition. To effect the change took time; there persisted long after the Hippocratic revolution cults of medicine which did not shrink from the invocation of evil and the administration of poison for private gain. I remind you of the advice that Cato, the Censor, gave to his son about Greek physicians in Rome, "They have sworn to kill all the barbarous with their drugs, and they call us barbarians. I forbid physicians for you."

The Oath was not superfluous at that time, and in our own sad events during the last war led to a revision of it in modern terms.

Another remarkable instance of the survival of the primitive idea of the work of a physician is to be found in a book by John Keevil entitled *Hamey the Stranger*. At the end of the sixteenth century, Hamey as a young man from the University of Leyden was appointed private physician to the Tsar of Russia, and found to his distress that his royal master expected his doctor to poison ambitious nobles of the court whom he had cause to fear. When the Tsar himself was sick he deserted his physician and consulted the local sorcerers.

So great was the contribution from Athens, and later from Alexandria, that it seems a little ungenerous at this date to comment on aspects of Greek medicine which contributed to its partial eclipse in the centuries before the Renaissance. Nevertheless, it must be admitted that Greek physicians after Hippocrates tended to adopt sweeping generalizations with insufficient criticism of the evidence for their support. Galen, for instance, held that nature did naught in vain, and that he could detect Divine intention in every human organ—presumably a return to the principles of animism which had characterized the primitive system.

The Greeks also held "mechanical" labour and practical arts in some contempt, and this restricted their advance because anatomical dissection and the examination of diseased bodies after death were essential to progress, and both required considerable manual dexterity and physical exertion. Their point of view seems to have been derived from the argument that, although many things in the world appeared imperfect, it was impossible to believe that the gods would have created anything less than perfection, and therefore they must conclude that sensory perception was fallible (as indeed it often is) and not to be ranked as high as the mental activity of, for instance, pure mathematics.

Greek practice, too, was limited in its application. As Dr. Donald Hunter has pointed out in his *Diseases of Occupations*, no one can read the *Regimen* prescribed by Hippocrates for a healthy life without realizing that Greek physicians were almost exclusively concerned with a privileged class: that their advice about the proper balance of food and exercise had no relevance to the mass of the people. Running on the track, wrestling after being well oiled, walks in the sun after dinner, warm baths, sleep on soft beds, and drunkenness occasionally, but not to excess, are no doubt admirable prescriptions for a man of leisure, but they were hardly applicable to the many who earned scanty bread in the sweat of their brows. We must not blame the Greeks for failure

to test their hypotheses by experiment: that idea in its full development was to be the fruit of the scientific revolution that began in the sixteenth century of our era.

The Second Major Revolution

"Since a babe was born in a manger it may be doubted whether so great a thing has happened with so little stir." In that terse sentence A. N. Whitehead assessed accurately the impact of the scientific revolution which, as its influence spread, completely changed the character of the habitual thought of men. From the point of view of medicine, 1543 (less than twenty years after Linacre's death) is the crucial date when Andreas Vesalius published his *De humani corporis fabrica* and restored accurate observation and description to a place of greater importance than that of commentaries on the writings of the Greek fathers. By strange coincidence *De revolutionibus orbium cælestium* by Copernicus was printed in the same year, but nearly a century was to pass before William Harvey published *De motu cordis* in 1628, and demonstrated for the first time that harmless experiments on men might be used successfully in the study of problems of physiological function and to test a hypothesis. The idea that accurate measurement and the experimental method of the physical sciences might be relevant to biology and medicine grew slowly. Lack of interest in it was due to several reasons. Biological problems are very complex, and particularly when they concern men.

In the more exact sciences, in chemistry and physics for example, observation, reflection, and experiment define a problem, and in a search for its solution the chemist or the physicist is completely free in the use of his material; the only limits are those imposed by the scope of his intelligence, the quality of his apparatus and assistance, and the limits of the established knowledge of his time. Modern experimental science has scored its greatest triumphs by the study of isolated systems in a controlled environment. Intuitive philosophers and artists, a decayed but deserving class, have indeed suggested that completely isolated systems are a fiction and that glimpses of reality derived from the study of them are likely to be misleading, but the hesitation of thinkers and the inspiration of artists gain little sympathy in the midst of material triumphs of the experimental method. In clinical medicine the material for study is a self-conscious human being; the isolation of a system is extremely difficult; indeed, we can never isolate the whole individual from his thoughts, his memories, his emotions, or his past, and the control of his environment will at best be partial. To these inherent difficulties must be added the inexorable claim of ethics that nothing may be done by way of experiment that could harm the subject of it; and physicians cannot often repeat experiments at will; frequently they must await the chance event of nature.

Human biology and medicine, therefore, had to wait on the progress of chemistry and physics, on the discovery of the true nature of combustion, on the invention of the microscope, and on the development of techniques in neurophysiology and psychology as well as in the physical sciences.

More important still, from the standpoint of medicine, the labour of research seemed at first to promise no dividend for the patient. Even Harvey, the supreme scientist in his approach to the study of the circulation, continued in his clinical practice, as Sir Charles Dods has pointed out, to use totally unscientific methods quite uncritically and without question. Apart from opium,

purgatives, and emetics, "none of the drugs at his disposal had any pharmacological or therapeutic activity." It is not surprising that Thomas Sydenham in this country had a large following in the seventeenth century when he pleaded for a reversion to the Hippocratic method of patient study at the bedside as the only reasonable preparation for the work of a physician.

Nevertheless, despite all discouraging circumstance, the idea of a rational scientific basis for medical practice was never wholly abandoned: the development of physiology in France at the end of the eighteenth century, cellular pathology in Germany in the nineteenth, with the introduction of methods of clinical examination by percussion and auscultation, did much to increase the physician's understanding of the phenomena of disease, but they added nothing to his ability to control it. In the preparation of a review of the influence of the General Medical Council on education I came across two interesting passages in *The Times* of 1856, when negotiations for the Medical Act of 1858 were proceeding. The first, from the issue of January 25, was generous. "Of the three learned professions the medical has attained the highest character for disinterestedness. Hard things are said of the cupidity of the clergy . . . still harder things are said of the lawyers who are supposed to eat the contested oyster while the plaintiff gets one shell and the defendant the other: but there is probably no class of the community generally so free from mercenary motives as the members of the medical and surgical professions." But on April 3 a sterner note was struck. "There is so much guesswork in the [medical] profession that the president of the College of Physicians is nearly on a level with the meanest herbalist," and "The result of the longest, most varied, and most profound medical experience is so often a discussion of the worthlessness of medicine."

In his Festival of Britain Lecture in 1951 Sir Henry Dale confirmed the opinion recorded in *The Times*, when he said that in the mid-nineteenth century "medicinal treatment, in fact, was hardly ever given then with any idea that it could suppress or remove the cause of disease." It was the "duty of the physician . . . to maintain the patient's strength . . . and leave nature with as free a hand as possible. . . . We cannot . . . ignore the wide opening which a medicinal treatment with no other objective than this offered to self delusion, oracular posturing, and benevolent humbug."

In the past sixty years the picture has changed. No one now questions the value of medical treatment, and it is important to remember that most of the improvement has been derived from cultivation of basic sciences rather than development of clinical methods.

Nevertheless there has emerged a new discipline of clinical science for which we in this country are much indebted to the late Sir Thomas Lewis. It is the culmination of the second major revolution in medicine, which began with Andreas Vesalius in 1543 and was continued by William Harvey in 1620. That revolution added a scientific basis to the clinical practice and ethical position of the Hippocratic physician.

The Third Revolution

Fifty years before the therapeutic harvest of the scientific method in medicine had begun, the seeds were sown of a third revolution, which is the source of much confusion to-day.

Early in the nineteenth century Jeremy Bentham

conceived the idea that medicine had a duty to society as well as to individual patients, and that, in certain circumstances, this social duty should take precedence of personal professional responsibility; in other words, that doctors should be concerned more with the public health and less with the relief of individuals. His followers, Thomas Southwood Smith, Edwin Chadwick, and John Simon, were disturbed by epidemics in the congested towns that were a consequence of the Industrial Revolution. They believed, rightly, that if doctors were made legally responsible for the notification of cases of infectious or contagious disease to a local authority steps might be taken to limit their spread, and they made proposals to that end. To-day those proposals seem harmless enough, but they were not adopted without spirited opposition from those doctors who considered they infringed the passage in the Hippocratic Oath which required that whatsoever was seen or heard in the course of professional work should never be published abroad, and that notification might destroy mutual confidence and trust between a doctor and his patient.

As it is often believed to-day that by clinging to rules sanctioned only by long tradition doctors have been consistently hostile to changes in social policy, I take this opportunity to draw attention to some facts which deserve to be more widely known than they are.

In 1832 Charles Hastings, a kinsman of the great Governor General of India, founded the Provincial Medical and Surgical Association at a meeting of "50 respectable medical gentlemen" in the Royal Infirmary at Worcester "to promote the medical and allied sciences and to maintain the honour and interests of the medical profession." A year later the new Association sent a recommendation to the House of Commons Committee on Parochial Registers "that great benefit might be expected to accrue to medical science and consequently to the community at large if arrangements could be made for recording causes of death in the provincial registers of mortality." The Registration Act was passed in 1836. At the same time the Association was much occupied with the Poor Law Amendment Act of 1834, and in 1837 a highly critical report on it from a committee was published. In that year Charles Dickens was writing about Oliver Twist—that item of mortality who cried lustily at his birth, and would have cried the louder had he known that he was an orphan left to the tender mercies of churchwardens and overseers commissioned by the Act to make poverty as unpleasant as possible even for small children. Whether Dickens ever saw the Association's report I cannot say, but the similarity of the views expressed is remarkable.

In 1839 the Association spent £700, which it could ill afford, to encourage an investigation of "cowpox and vaccination," and an Act was passed in 1840 to provide vaccination for those who asked for it. Vaccination was not made compulsory in the United Kingdom until 1853, forty-six years after it was first established in Bavaria.

I have already referred to the controversy about the notification of infectious diseases: this was bitter and protracted, but there is no doubt that the patient work of the Association (which in 1852 became the B.M.A.) eventually made agreement possible about the Acts of 1889 and 1899.

The list of adventures in what is now called social medicine which were sponsored by the Association is a

long one, and I can mention only a few. The school medical service, for instance, was foreshadowed in a committee report of 1888, and the virtual elimination of ophthalmia neonatorum came from a similar source in the early years of this century. The medical campaign against secret remedies began at the Annual Meeting of the Association in 1906. A nefarious vested interest had been created from human distress and credulity. Lists of unfortunate people, the victims of various diseases, were compiled and sold to enterprising scoundrels, who then circulated advertisements of their useless wares to the sufferers. Abortifacients were advertised in the press, and some newspapers charged exceptionally high rates for the notices as the traffic in them was so profitable. A prosecution in 1889 drew attention to a particularly vile aspect of the business. A firm engaged in it sent letters purporting to come from "a public official" to thousands of women who had bought their drugs. These unfortunates were threatened with proceedings for "the fearful crime of abortion" unless they paid two guineas to avert them. It is not surprising that the jury, in returning a verdict of guilty, added a rider that it was a vile plot made possible by the advertisements.

But of all the activities of doctors in the past one hundred and twenty years the one that would have interested Linacre most is the reform of medical education.

In retrospect it seems strange that he was so little stirred by the writings of his friend Sir Thomas More, who was not only Speaker of the House of Commons and Lord Chancellor but also a Commissioner of Sewers and of Plague Control. More, truly, was the Chadwick of the sixteenth century. In the *Utopia*, published in 1516, he makes a complete blueprint for public health legislation of the future; a city well built, with gardens and open spaces, a public water supply and drainage, cleansed streets, public abattoirs without the walls, hospitals of the sort we call general, and special institutions for the isolation of infectious disease. He even discusses the problem of eugenic human mating and the supply of maternity nurses. To all this Linacre seemed oblivious when in 1518 he founded the College of Physicians to regulate the practice of physic in London and for seven miles around.

Four years later the powers of the College were extended to cover the whole of England, and only graduates of Oxford and Cambridge and those who obtained the Lambeth degree from the Archbishop of Canterbury could practise as physicians without its licence. Nearly a hundred years earlier, in 1421, the Universities of Oxford and Cambridge had supported a measure to exclude from practice everyone who had not obtained the degree of bachelor of medicine, but it is doubtful whether it ever achieved the force of law, and certainly it had no significant effect. The first English law on the subject was in the Act of 1511, which seems to have been replaced by the Charter granted by Henry VIII to the College of Physicians in 1522.

In founding the College, Linacre was no doubt influenced by his experience during the seven years he passed in Italy, where the regulation of medical practice in Europe had developed and he had seen its advantages. The Harveian Librarian of the Royal College of Physicians (Sir Charles Dodds), to whom I am indebted for the information, has pointed out that the first known

legal enactment for the regulation of medical practice in Europe was promulgated in 1140 by Roger II, King of Sicily. It required those wishing to practise to be examined by "our officials and judges." Two hundred years later the examination was transferred to the Masters of Salerno. There were many Arabs at the court of that remarkable Norman, Roger II, and it is conceivable that his measures to control medical practice were a reflection of Eastern customs. It is possible, therefore, that by founding a College to regulate the practice of physic Linacre may all unwittingly have introduced one of those Arabian accretions to which he was in general opposed.

Despite the efforts of Linacre's College and of many other "licensing bodies" which in the course of time acquired the right to confer professional titles, the state of medical education in this country at the dawn of the nineteenth century was deplorable, and the conflicting interests of various authorities hindered reform. In 1813 a Bill introduced to the House of Commons to put down empirical practice or quackery failed to gain support, and in 1834 a parliamentary committee appointed to inquire into the state of the medical profession revealed a situation which was truly shocking. Their report would probably have shared the humble obscurity which in England is the common fate of such labours, had not the doctors themselves, in the shape of the Provincial Medical Association, given unremittent support to their recommendations until the General Medical Council was established in 1858. One of the many Bills presented to the House of Commons was actually drafted by George Hastings, the son of the founder of the Association and a Member of Parliament, in 1852.

My purpose in this summary and incomplete review of old forgotten far-off things is to show that in the nineteenth century doctors, far from opposing change, were leaders in liberal reform. I doubt if they were inspired by political principles: to me it seems more probable that their reactions were instinctively those of ordinary decent men whose work brought them in close contact with the misery of the poor and unprivileged.

How, then, has it come about that ever since Mr. Lloyd George introduced the National Insurance Bill in 1911 the doctors have appeared to the public to be consistently hostile to measures of social reform?

In the first place it should be made clear that a dispassionate review of events in the past fifty years shows that there has been no dispute about matters of fundamental importance. Doctors have accepted readily enough most of the implications of a Welfare State.

As early as 1905 they published a report on contract practice, and recognized that in many places it was necessary. Six years later they issued another on "The Organization of Medical Attendance on the Provident or Insurance System," and acknowledged that public opinion demanded "that adequate medical attendance shall be placed within the reach of all members of the community." Soon afterwards Mr. Lloyd George introduced his National Insurance Bill. Trouble ensued because in its original form the Bill entrusted day-by-day administration to the same approved societies which had organized much of the contract practice that had proved unsatisfactory in the past, and because no income limit was fixed for those who wished to join the insurance scheme. There were also difficulties about remuneration. Amendments in the Bill which in the light of subsequent

events must be considered reasonable failed to satisfy a number of doctors, and for a few years considerable ill feeling persisted, but gradually the insurance system won general support. Its defects were that no provision had been made for hospital treatment, and that the families and dependants of insured persons were excluded from benefit.

The Ministry of Health was established in 1919, and a consultative committee headed by Lord Dawson made proposals for "the future provision of medical and allied services" in the following year. In 1930 the British Medical Association issued a "Report on a General Medical Service for the Nation," and during the war its Planning Commission took the matter further. The recommendations of this Commission were largely adopted by Lord Beveridge in his final report, which shaped the National Health Service as we know it to-day. Controversy was most acute about the abolition of the right to buy and sell practices, the fear that a whole-time salaried service might be instituted, and the regulations for discipline and for the better distribution of doctors among the population.

Through the whole of this perplexing period doctors have been in a very curious and difficult position. Their work and their intimate knowledge of the condition of the people had convinced most of them that medical reform was both desirable and inevitable, and their reports indeed admitted it. The best of them however, are anxious lest reform should take such a shape that they will forfeit their independence and that the ideals of medicine will be lost. Some, it is true seem to be concerned principally about remuneration, but during the past two years I have had an unusual opportunity to observe them, and I am confident that most doctors are more disturbed about the fate of their profession and the nature of their work than they are about their pay. No one who has any knowledge of what happened to German medical practice under the tyranny of Hitler would wish social medicine to become an instrument of policy and no more.

Some reconciliation there must be: the mere cost of the National Health Service shows that. Social policy must influence practice, but it must never dominate it and exclude that intimate relationship between a doctor and his patients which is essential to all good clinical work.

Summary

What I have attempted in this lecture is a sketch of the three major revolutions of thought which have influenced the shape of medicine in its evolution from the primitive system. The third revolution is now in progress: it involves the precise relation of medical practice to society, and it is the task of this generation to find the solution of the problems that it raises. As the years pass some of the defects of the present National Health Service have become apparent: the division of responsibility between three types of authority; the virtual exclusion of the general practitioner from all hope of promotion to the rank of consultant in the hospital service; the difficulties in changing from one place of practice or one type of work to another, are obvious defects, and there are others. Despite all the failings and the controversy, however, it is doubtful whether any political measure has ever brought so much relief and help to those who needed it as the Act which came into operation in July, 1948.