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President's Address

THE CHANGING FACE OF MEDICINE

BY

Sir LIONEL WHITBY, C.V.O., M.C., M.D., F.R.C.P.

Regius Professor of Physic in the University of Cambridge

Once when Winston Churchill addressed the Royal College of Physicians on an occasion when he was guest of honour he laid emphasis on the importance of history in relation to current events, to wise policy, and to great decisions. In one of his characteristic aphorisms he said, "The more one looks back the further one can look forward." And so on this occasion, when we are within a short week of the inception of a great social experiment, when the administrative side of medicine—we hope not the practice of the art—will become the responsibility of the State, I have thought that we might look backward over the changed and changing face of medicine to see whether we can draw comfort from the past, inspiration and guidance for the future, and perhaps understand more clearly the train of the events which has led inevitably to a national medical service. I must, of necessity, set certain limitations. For, whereas time is restricted and patience exhaustible, medicine has been in existence for thousands of years and one cannot hope, nor is there need, to cover all the ups and downs of this vast period in order to establish my thesis. One could speak specifically about several aspects of change, such as the growth of knowledge, the character of practice, the fashions and fads of various generations, or the status and freedom of the profession. In the time at my disposal I shall touch on all these points, but I wish mainly to take a bird's-eye view of the state of medicine during certain periods, looked at through the eyes of men famous in the Cambridge Medical School, and then to pass on to wider fields as we come more nearly to our own times.

At the outset it must be realized that though medicine reached a high level in many early civilizations its practice shared in the retrogression which was common to all education during the Dark Ages after the fall of Rome. It is not therefore until the Renaissance period that any clear account can be found.

In the fifteenth century Linacre (1458–1524), of St. John's College, rendered great services to English medicine. He was concerned with picking up the threads of learning which had been neglected for so long. His accurate preparation of Greek texts was the first step towards putting medicine on a sound basis after the decadence and backwardness of the Dark Ages.

The Sixteenth Century

John Caius (1510–73) was likewise a great student of manuscripts and was instrumental in reviving the study of anatomy. He did more than this, however, in that he was a pioneer in the publication of observations which were original and not mere compilations of the views of other authorities. He may indeed be regarded as having written the first medical treatise in English. During his time, the sixteenth century, the surgeons had not yet risen to a dignified and trusted place; they still combined their craft with

barbering and dentistry, and when the surgeons claimed the right to give internal remedies for sciatica, syphilis, or any kind of ulcer or wound John Caius was one of the most vigorous defenders of the privileges of the physicians. It is instructive to appreciate that the "closed shop" principle is not really a new creed peculiar to the political times in which we live to-day. For many centuries the physicians held a monopoly of practice; they were jealous and stubborn of what they believed to be their rights.

Langdon-Brown (1946) has coupled William Gilbert (1540–1603) with "the dawn of experiment." Gilbert, physicist and physician, was a champion of the experimental method and an outstanding enemy of all who relied merely on the authority of ancient traditional names. He stimulated experimental science in England long before Bacon began to make his theoretical contribution to the subject. He is said to have spent as much as £5,000 of his own money on his researches. Gilbert's eminence as a physicist, shown especially in his classical work, *De Magnete*, has tended to overshadow his reputation as a physician. Yet he was President of the Royal College of Physicians and an active member of the committee of the College which was concerned with the issue of an authoritative pharmacopoeia. Gilbert realized how many of the nostrums, prescriptions, and remedies of the day were mediaeval and survivals even from the days of witchcraft; most had literally no claim to rational use. It is a pity that he did not see the final publication of the pharmacopoeia, for it can be assumed that he would not have sanctioned the inclusion of the "Emplastrum divinum" of Nicholas, which was composed of powdered lodestone made up with wax, oil, litharge, and sundry spices. This, by virtue of the lodestone, was said to draw humours and headaches from within. Gilbert's therapeutic views were based upon his clinical results. For example, for the treatment of anaemia he placed great faith in iron steeped in sharpest vinegar and afterwards dried. Gilbert's period witnessed the great renaissance of medicine in England. At this time the profession of physician was becoming slowly disentangled on the one hand from that of the clergyman and on the other from the trades of apothecary and barber.

It was at this time that Henry VIII was inspired or encouraged to set the profession of medicine on a sure foundation. He gave a Charter to the Royal College of Physicians and founded chairs of physic or medicine in a number of universities. Humphry Rolleston (1932) says: "The Regius Chair of Physic at Cambridge was founded in 1540, about the time of the dissolution of the monasteries, by Henry VIII, who has often been called that munificent donor of other people's property."

But despite the advance in learning both physicians and surgeons at this time laid claim to a knowledge which can only be described as pretentious, ponderous, and peremptory, so that little or nothing was done within the profession

to overcome what was still the chief impediment to progress—namely, the intimate association of medical science with astrology. Upon this outlook Gilbert's influence was salutary because of his insistence upon observation, experiment, and deduction and his scorn for reliance upon nothing more than ancient or astrological authority.

The Seventeenth and Eighteenth Centuries

Harvey's (1578–1657) great work on the application of physical principles to physiology may be regarded as a natural extension of Gilbert's experimental methods. In Cambridge the period of the early seventeenth century was marked by the appointment of Francis Glisson (1597–1677) to the regius chair. Glisson's name is familiar to every medical student who reaches the stage of the second M.B. He was a master in the art of exact clinical observation and in the accurate study of morbid anatomy. He began a phase of medicine which was to last for more than two centuries, a period of individual medicine when the physician, with no more equipment than his five senses, his experience, his instinct, and his knowledge, would deduce the diagnosis from acute and penetrating observation and would prescribe such remedies as were known or were believed to be effective. Glisson's name will be familiar to all who are interested in medical history because of his original observations on rickets, or *morbus anglicorum*, and for his classical work on the anatomy of the liver.

One can pass naturally from Glisson to the eighteenth century, the period of the gold-headed cane, which signified the rise in wealth and in the social status of the physician. In Cambridge the medical trend of the century was represented, not by the two somewhat colourless regius professors who occupied the chair during almost the whole of a hundred years, but by William Heberden (1710–1801) the protagonist of a rational system of *materia medica* and a fine example of the best traditions of clinical medicine. He likewise would not pander to mere tradition and was critical of the views of even distinguished men. For example, his opinion upon Sydenham's belief that jaundice was due to hysteria was, "No reasonable deference to this accurate observer could make anyone very much doubt that he was mistaken."

Heberden flourished during the time of the first professorships in anatomy and chemistry at Cambridge. He must have seen and scoffed at the medical cabinet of Viganì, the chemistry professor, which may still be seen at Queens' College and which contains such late seventeenth-century remedies as dragon's blood, balm of Gilead, viper, scorpion, and the claws of crabs.

The Nineteenth Century

The end of the eighteenth century was marked by a crucial epoch-making adventure in experimental medicine which was a prophetic prelude to the triumphs of the nineteenth and twentieth centuries, and which even to-day stands out as an unprecedented achievement in preventive medicine. I refer to Edward Jenner's successful cross-immunization experiments with cowpox, the application of which has almost banished from this country a disease which at one time had an appalling mortality and caused disfigurement and disability to thousands. This experiment by a general practitioner, which we now accept as a rational piece of work, was far in advance of the times and was inspired by shrewd clinical observation, by one who knew nothing of all the immunological and bacteriological knowledge which we possess to-day. When one comes to the mid-nineteenth century Jenner's vision begins to be seen in the right perspective. From then onwards there has been, with ever-increasing rapidity, a greater and greater develop-

ment of the scientific aspect of medicine until to-day we are at a stage, albeit not a final one, when no one man can hope to be highly skilled in more than one small corner of the fabric of medicine.

From the middle of the nineteenth century onwards many causes of disease were brilliantly revealed with the work of Pasteur, Koch, and others in the bacterial field; of Ross, Bruce, and Leishman in the realm of parasites; of Mellanby, Gowland Hopkins, and others with vitamins; of Harington, Banting, Best, Dodds, and others with internal secretions; of Ehrlich, Domagk, Fleming, Florey, and others with specific chemotherapy. In parallel there has grown up an immense accumulation of knowledge of the habits and mode of life of parasites and of the complex science of immunology which has elucidated some of the mechanisms by which the body eliminates an infection, some of the methods by which the protective powers of the body can be increased, and some of the means by which organisms and parasites exert their pathogenic action.

The co-ordination and application of all this knowledge greatly changed the face of medicine between the closing years of the nineteenth century and the opening and subsequent years of the twentieth. Not much more than fifty years ago, as I have shown, certain drugs and treatments were being used with much art, with some skill, and a certain success, but only for the alleviation of the symptoms of a disease. There was little or no knowledge of the action of the drugs, if any, on the primary cause. With the discovery of the causes of disease the way became open for rational therapy based on animal experiment, and this has yielded us the handsome therapeutical dividends which we draw to-day.

Yet there were some in the pharmacopoeial period, the period when nursing and nature were largely responsible for cure, who were by no means satisfied with the state of medical knowledge. Heberden in the eighteenth century in his *Commentaries* remarks upon the difficulty of ascertaining the powers of medicine, and laments, as did Hippocrates, the length of time necessary to establish medical truths. He says: "Very few remedies have justified promises. However, the title of 'specific' may be justly claimed for Peruvian bark for ague, quicksilver for venereal disorders, sulphur for itch, and opium for some spasms." Oliver Wendell Holmes was more outspoken in his appreciation of the limitations of medicine even as late as the mid-nineteenth century when he said: "If with two exceptions, morphia and anaesthesia, the whole *materia medica* as now used could be swept to the bottom of the sea it would be all the better for mankind and all the worse for the fishes." And there were some who had a foot in both ages and achieved a place in both.

Humphry Rolleston (1929), writing the life of my famous predecessor, Sir Clifford Allbutt, says: "During the 89 years of his life he witnessed changes in medicine which would seem never likely to be rivalled." This might be true were we not aware of how much the speed of advance has quickened since Allbutt's death in 1925. Allbutt was born before the introduction of anaesthesia; he saw the development of bacteriology and immunology, of antiseptic and aseptic surgery, of Ehrlich's pioneer work on chemotherapy, including the perfection of salvarsan; and he saw the creation of the nursing profession, astonishing progress in public health and preventive medicine, the discovery of x rays and radium and of vitamins, as well as their application to medical practice, the development of neurology, cardiology, biochemistry, endocrinology, and specialism in many spheres. At the end of Allbutt's time, changes in the face of medicine began to overshadow the individual and to substitute an ever-enlarging scientific team.

Achievements of the Past Decade

This will be apparent if we no more than glance at some of the achievements of the past ten years. Almost all are extensions of the work which Allbutt saw in its fundamental early stages. First come to mind the advances in chemotherapy, the science fathered by Ehrlich in the early years of the century, which has enabled us to control so many bacterial and parasitic diseases. It is little more than ten years since the first sulphonamide gave us a powerful influence over streptococcal, meningococcal, gonococcal, and *Bact. coli* infections. Exploitation of the sulphonamide group led to potent specific measures for the treatment of pneumonia, "the captain of the men of death," and bacillary dysentery—a disease of immense military importance when armies have to fight in tropical and sub-tropical climates.

During the past decade Fleming's (1929) discovery of penicillin was perfected by co-ordinated team-work, thereby making available for everyday use an agent which comes very close to Ehrlich's dream of a non-toxic active anti-bacterial agent, one of the most powerful remedies against the commonly mortal staphylococcal infections, a substance which greatly reduced the mortality and morbidity from wound sepsis during war, and a material which succeeds with considerable frequency in bacterial endocarditis—a disease which hitherto has defied all methods of control quite apart from cure. Following this a vast amount of organized research into the antibacterial properties possessed by other moulds and micro-organisms has led to the introduction of streptomycin, which is a definite step forward in the treatment of acute forms of tuberculosis. And among the important successes in chemotherapy have been the advances made in the prophylaxis and treatment of protozoal disease.

In the Far-Eastern campaigns, where casualties from disease were at one time ten times as numerous as those caused by lethal weapons, the medical services can be considered to have been the most important branch of the general staff. With the world quinine supplies largely in enemy hands the work of our chemists in producing and perfecting the antimalarial drugs—mepacrine, pamaquin, and, later, paludrine—can be said virtually to have won the Burma campaign. The shade of Ehrlich must have rejoiced at these successes, for chemotherapy may be said to have been born on the day on which Ehrlich's mind connected two simple facts—that methylene blue stained the malaria parasite and that methylene blue was harmless to the human body. Ehrlich tried methylene blue for the treatment of malaria but obtained only a hint of success. Nevertheless the chemical structure of mepacrine is more closely related to methylene blue than to quinine. Thanks to chemotherapy and efficient methods of immunization many of the major horrors of war were largely controlled. In the 1939–45 war the incidence of typhoid and typhus was commendably low, tetanus was rare, and the wards were no longer filled with the stink and corruption of gangrene and sepsis. Indeed, somatic recovery, no longer retarded by chronic infection, sometimes outpaced psychological repair.

The Atomic Age

We live in an epoch-making age, the atomic age, and perhaps at the cross-roads of civilization. Nuclear physics, exploited for destructive purposes with incredible rapidity under the stimulus of war, promises immense possibilities for the advancement of medicine—what Chadwick (1947) has called a "safe" development of atomic energy because the materials which are required can be made in an apparatus incapable of being used for destructive purposes. With

quite small apparatus the transmutation of elements is a commonplace, and radioactive isotopes of almost any element can be obtained. These isotopes, used as so-called tracers, offer a field for the study of body processes, body metabolism, and organ function which will take many years to exhaust, whilst the therapeutic applications by reason of the profound biochemical changes which rays bring about in body cells may eventually reveal the chemical nature of the differences between the metabolism of normal and malignant cells.

This work links up with another horror of war which may prove a blessing in times of peace. No one would have dreamed that when the chemists invented mustard gas, one of the most devastating methods for causing disablement and death, a new chapter was being opened in the fight against malignant disease. But threshold doses of the variant, nitrogen mustard, appear to have a specific effect on cell nuclei, especially on dividing cells, in a manner comparable to the effect of irradiation. This fundamental fact is of far more importance than the therapeutic results, which have so far proved disappointing, in malignant disease or leukaemia and Hodgkin's disease. The hint of beneficial action is of tremendous import, for literally hundreds of variants await synthesis and evaluation, and it may well be that the delicate chemical changes which differentiate normal and malignant growths may be controlled not by the crude and powerful effects of penetrating rays but by a simple chemical.

The vitally important work of Dodds on stilboestrol, which has such a profound influence on prostatic cancer, is a significant pointer to the future. I can do no more than mention even a small section of other advances; for example, the vast increase in knowledge about blood and blood transfusion, the fractionation of plasma, the complexities of the Rh factor, the further understanding of haemopoiesis with the discovery and study of folic acid, the comprehension of the fundamental pathology of haemolytic disease of the newborn, and so on. All of these, in one single field of medicine each and severally demand the employment of an expert or of a team of experts. Transfusion alone, once an everyday commonplace arranged by a carefree house-surgeon, can no longer be embarked upon without the expert performance of many precautionary tests.

Specialization

As with medicine so with surgery. It is barely a century since the boon of anaesthesia was introduced. It is not much more than half a century since the surgeon operated in his own special gown, a black gown, stinking with the dried abominations of previous operations. Now, with the bogy of sepsis largely controlled, even under the terrible conditions of war, the potentialities of surgery, the field of execution, and the requirements in special technical knowledge and apparatus have become so large that no one man can hope to practise efficiently in more than a limited field. With the more extensive and hazardous operations assistance is necessary from a highly trained team supported by subsidiary teams with complex apparatus merely for such things as the anaesthetic. Gone are the days of the individual general surgeon. Almost all surgeons are specialists in a limited field.

So also with diagnostic measures. An individual clinical opinion is nowadays rarely sufficient, for it can be checked against a host of scientific procedures, including radiography, pathological and biochemical tests, electrical determinations involving the heart and brain, and so on. Similar methods are also required in continuous series for the control of many forms of treatment and for estimating prognosis and progress.

The Economic Factor

All of what I have said has to be reviewed in relation to the patient's economic status and his mental outlook. There are none who can doubt that, with the advance of science, and the high degree of specialization, so that a man must now have not one but many doctors, and because of the volume of ancillary examinations which are necessary, or deemed necessary, the cost of an illness is beyond the purse of the average person. This factor—the economic one—has been potent in hastening the inevitability of a State medical service. A few facts and figures will serve to establish the point.

With an illness no more serious than a pyrexia of unknown origin which in due course might cure itself the cost of establishing the diagnosis, of determining whether the cause is amenable to modern chemotherapeutic methods of treatment, or of establishing that the fever is not due to something which is a public menace may amount to as much as £50. A single patient with pulmonary tuberculosis for whom a thoracoplasty operation is required may call for the expenditure of more than £1,000 from the time of admission to hospital to the time of discharge some months later. And all will be familiar with the primary cost of penicillin or streptomycin treatment, amounting at the outset to hundreds of pounds for a single case. Yet, in the interests of humanity, such treatment cannot be withheld on economic grounds. It would be a travesty of justice were such treatment to be available to only the few rich people whom successive Chancellors of the Exchequer have permitted to survive in this country.

As to the other point, the patient's outlook: an enormous expansion of the Press during the past 50 years has made the public aware of notable advances in medicine, sometimes long before they have matured sufficiently even to be tried on the human subject. I will not say that the information by the lay press is always accurate, in that accuracy tends to take second place to news value. I find myself sometimes surprised by my ignorance of the latest advances in medicine which a lay friend will expound from knowledge based upon an article which he has skimmed in a popular weekly journal or the lay press or heard on the wireless. Sometimes premature publications of this kind do untold harm and bring bitter disappointment to patient or relatives as well as anxiety and worry to the doctor. Witness the broadcast appeals for streptomycin before the material was either available or had been evaluated. Because a medical discovery is news the public are made aware of modern advances in diagnosis and treatment and therefore demand them—sometimes under a threat of legal action. On this aspect of medicine some cryptic, very true, and extremely salutary comments have been made by Ffrangcon Roberts (1948).

It has been my purpose so far to point out how changes in medicine itself have tended to increase the cost of medical treatment so that most people can no longer afford to be ill.

State Intervention

The intervention of the State has, of course, been hastened by the occurrence of three wars within the first half of the present century. The consequent social and economic upheaval is so obvious that there is little need for comment, save to emphasize that the dramatic events of the past 50 years have forced the State to interfere not only with measures to protect the public health but also in personal services to the individual. With each successive war the intrusion of the State has become more and more prominent.

It is well known that the examination of recruits for the Boer War revealed such an appalling state of national fitness that it was deemed necessary to set up a Royal Commission to devise means for improving the quality of the man-power of the nation, which all the signs of the times showed would be required for a further European struggle. As a result a school medical service was begun in 1907, to be followed quickly by maternity and child welfare services and soon by Lloyd George's National Health Insurance Scheme. The Ministry of Health was born out of the turmoil of the 1914–18 war, whilst with the last struggle it was necessary to make provision for an Emergency Medical Service, upon which experience some of the proposed State service is to be founded. If, then, we are forced to conclude that some form of State service has come to be inevitable because of a social and financial revolution of whose implications we are as yet only dimly and fearfully aware, can we draw from history any comforting prognosis with regard to its probable success or can we take stock of our achievements at the end of an epoch and find satisfaction therein?

We should realize once again that there is nothing new under the sun, that some form of State control of the profession is no new venture. We live in A.D. 1948, yet at about 1948 B.C.—significant date—King Hammurabi, of Babylon, issued an edict whereby the conduct of medical practice in his kingdom was governed by a code which was published in every market-place. This code defined the conditions under which doctors might practise; it stipulated and limited their rewards for successful work and imposed savage penalties for unsuccessful results. It is some comfort to us to know that if an operation is fatal in these days the National Health Service Act will not prescribe that the hands of the surgeon be cut off.

Egyptian medicine was governed by the code of the Ebers Papyrus; whilst the books of Leviticus and Deuteronomy describe a fine example of public health regulations under central control. Indeed, in public health measures we have no great reason to be overproud of our accomplishments when we realize that Roman medicine had so evolved from the teachings of Hippocrates and the Greek school that the city of Rome had a sanitary service which was in some ways in advance of our own. For example, the city had a water supply allowing 300 gallons per head of the population, whilst even our best-equipped cities cannot give more than 35.

The Problems of Medicine

In all aspects of medicine we need to be humble. We can be proud of what has been accomplished so far, so long as it does not blind us to the fact that most progress has occurred in relation to acute diseases. Despite great advances in the control of bacterial diseases, and however great such advances may be in the future, medical science must always go forward. It is a remarkable fact that no sooner is the cure or control of one disease accomplished than new problems appear to arise forthwith. At one time it seemed that gonorrhoea could be almost controlled with the sulphonamides, but nowadays it is recognized that a large proportion of cases, many more than hitherto, are sulphonamide-resistant. Is this an example of the aphorism "Make haste to use a new remedy before it is too late," or is it that bacteria are really capable of rapid adaptation? The latter is probably the truth. In due course penicillin-resistant staphylococci may become common, whereupon the whole search must begin again. Likewise with streptomycin, to which resistance appears to be quickly established. Roberts (1948) has aptly said: "Our most dazzling successes have concerned those noxious agencies which differ biologically from or are extraneous to

human life—rather than those which resemble or are inherent to it." The chronic diseases and the degenerative processes which cripple and disable in the latter phases of life, and the uncontrollable activity of the malignant cell, are as yet not comprehended, much less controlled.

The problems of medicine are indeed almost unfathomable, and these very facts are part of the fascination of medical life. In effect, we know relatively little, and one sometimes wonders whether the public would put such trust in us if they properly realized our limitations. We have not yet begun to fathom the secret of vitality—that property which gives even to the smallest and simplest cell the power to accomplish, in a brief moment, chemical reactions which years of labour in a laboratory cannot reproduce. Think of the bacteria, in which, as Mudd (1948) has said, "the structure so far revealed, even with the electron microscope, is so much simpler than the remarkable synthetic capacities of micro-organisms would seem to require. The bacterial cell, when furnished with nothing more than water, salts, glucose, and simple sources of carbon, and nitrogen, can synthesize proteins, complex carbohydrates, lipids, ribose, nucleic acid, growth accessories, and enzymes, all organized in a characteristic and reproducible protoplasmic system. The bacterial cell can reproduce itself and divide within half an hour at body temperature. These feats of chemical synthesis and organization, which cannot be duplicated by the finest chemical laboratories, are accomplished within a cell a few microns in length and less than a micron in diameter. The plain facts would be fantastic were they not so familiar."

With this sobering thought in mind, and with the realization that the nationalization of our profession must inevitably increase restrictions on individualism which advances in science have themselves initiated, let us hope that there will always be elbow-room for a man to work out his own ideas, to be outspoken in criticism and in debate, and to be free from unnecessary restrictions, regulations, and regimentation.

Let us hope also that men may still be inspired to undertake work for the love of it. For most if not all of the great advances in science, as well as the finest work in every branch of the medical profession, have been accomplished by men whose work has been their life, by men who have never given a thought to a 40-hour week, and by many who have been undaunted by, indeed oblivious of, poverty, makeshift equipment, or cramped quarters. Modern team-work provided, organized, and financed by the State can do much to exploit and perfect a fundamental discovery. Witness the speed with which money and co-ordinated work brought penicillin from being an interesting laboratory phenomenon into the realm of everyday therapeutics.

But by looking back into history I hope I have made it abundantly clear that individualism has done so much in the past that were it to be extinguished either by the State, by easy living, by regulated hours or indeed regulations of any kind, or by too much insistence upon plans and planning, then the future changes in the face of medicine will never reach the same heights of achievement as in the past.

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MEDICINE AND THE PUBLIC HEALTH

BY

Sir ARTHUR S. MacNALT, K.C.B.
 M.D., F.R.C.P., F.R.C.S.

Formerly Chief Medical Officer of the Ministry of Health

"Looking too into that larger world from the more compact experience of our own specialty, we can vividly see, in relation to many of its chief evils, that the Profession of Statesmanship, like the Profession of Medicine, must be intent on methods of Prevention no less than on possibilities of Cure, and must derive its preventive methods from a genuine science of Causes."—SIR JOHN SIMON.

The establishment of the National Health Service is the culmination of a hundred years of endeavour for the public weal. It is a historic moment, the end of an epoch, the beginning of a fresh advance towards the maintenance of health and the conquest of disease and social evil. It is appropriate, therefore, to reflect upon this marriage of true minds, the union of preventive with curative medicine, and to inquire how it has been effected in the course of time.

Eighteenth-century Pioneers

Public health is an edifice at which many have laboured. Statesmen, administrators, philanthropists, engineers, chemists, physicists, biologists, and others have wrought in its building. But the design and planning of the structure and its secure foundations are due to the medical profession of Great Britain, who must ever take a legitimate pride in its success.

The science of preventive medicine emerged from the practice of clinical medicine in the eighteenth century. Pioneers like Mead, Huxham, Heberden, Fothergill, Willis, and Withering observed the clinical features of epidemic disease, the influences of external environment, the paths of contagion and infection, and the effects of climate and season. Three men—Smellie, William Hunter, and Charles White—reduced the high rate of mortality in childbirth. Jenner practised vaccination. Lettsom and Cadogan paid attention to infant welfare. Aikin, Percival, and Ferriar formed with others a Voluntary Board of Health which called attention to the prevention of the mortality, disease, and crippling seen in persons employed in the new industries.

Establishment of State Medicine

In the early years of the nineteenth century the increased and sudden urbanization of the people brought about by the Industrial Revolution created most serious sanitary problems. Not only did the conditions in the factories promote degradation, crippling, and disease, but the home conditions of the workers were even worse. Dirt and disease, malnutrition, and sometimes starvation prevailed, and these horrible conditions were aggravated by the increasing density of the population. Infectious diseases rioted uncontrolled to a large extent throughout England, and the economic loss to the nation caused by ill-health must have been considerable. A great and humane physician, Thomas Southwood Smith, directed public attention to these evils from 1838 onwards. His reports, together with those of Dr. Neil Arnott and Dr. James Phillips Kay, to the Poor Law Commission showed how much could be done to combat prevalent disease and made the Commission the stepping-stone to public health reform.

These three eminent medical practitioners—Southwood Smith, Arnott, and Kay—are the medical architects of State medicine. It was Southwood Smith who first