ADDRESS IN MEDICINE

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MEDICINE.

THE heavy responsibility of delivering the Address in Medicine on the occasion of the visit of the British Medical Association to London has been placed upon me by the Council of the Association. The opportunity of addressing so many of his colleagues as are assembled here rarely happens to a medical man. The honour attending it is very great, and nothing short of his best thought and endeavour ought to satisfy his sense of what is due to the occasion. It was under the influence of this feeling that I entered upon the difficult task of deciding what I should bring before you to-day, and it seemed to me that it was better that I should resist the temptation to take up some special subject, or a topic of local or temporary interest, and once more go back to the past and see what lessons it has for us at the present day. I propose, therefore, to consider the growth of the art and science of medicine.

THE ART AND SCIENCE OF MEDICINE.

I place the words "art" and "science" in this order advisedly, for the art of healing is one of the primary needs of social organisation, however rudimentary, and preceded by many ages the development of anything which could be called a science of medicine. So far, moreover, the art of healing has always been in advance of science, firmer in its basis and more secure in its principles, and, even when medicine as a science has realised our highest aspirations, the end and aim will be art, that is, skill in the recognition and treatment of disease. At the same time it is true that until science began to throw light on its path the art of healing struggled blindly on its way, and its advances were intermittent and slow, with long intervals in which there was stagnation and retrogression. All true progress in medicine has consisted in the application of the results of scientific investigation to the facts of observation.¹

MEDICINE BEFORE HIPPOCRATES.

At whatever period of the world's history and at whatever stage of civilisation we may contemplate the physician engaged in combating disease, there will be recognisable three distinct factors in his work—his power of identifying disease, the remedies at his command, and the ideas by which he is guided in the employment of these remedies.

The first rough and imperfect identification of the more conspicuous forms of disease was scarcely worthy of the name of

¹ In my first sketch of this address I was tempted to use that comfortable word "evolution," but I found this term appropriated on every side, and employed to connote such a variety of modes of progress that my poor effort would have been lost in the crowd. Besides, a very little reflection showed me that no such process as "progress from the general to the special," which is what is really implied by the term evolution, can be traced in the history of medicine, but that, as Mr. Balfour says: "Assuming, as we do, that knowledge exists, we can hardly do otherwise than make the further assumption that it has grown, and must yet further grow. In what manner, then, has that growth been accomplished? What are the external signs of its successive stages, the marks of its gradual evolution? One at least must strike all who have surveyed, even with a careless eye, the course of human speculation: I mean the recurring processes by which the explanations or explanatory formulae, in terms of which mankind endeavours to comprehend the universe are formed, are shattered, and then in new shape are formed again. It is not, as we sometimes represent it, by the steady addition of tier to tier that the fabric of knowledge uprises from its foundations. It is not by mere accumulation of material, nor even by a plant-like development, that our beliefs grow less inadequate to the truths which they strive to represent. Rather are we like one who is perpetually engaged in altering some ancient dwelling in order to satisfy newborn needs. The ground plan of it is being perpetually modified. We build here, we pull down there. One part is kept in repair, another part is suffered to decay; and even those portions of the structure which may in themselves appear to be quite unchanged, stand in such new relations to the rest, and are put to such different uses, that they would scarcely be recognised by their original design.

diagnosis. Anatomy, which is essential to the localisation of morbid conditions, was scarcely known; no shadow of comprehension of physiological or pathological processes entered into the conception—it was simply the attaching of a name to an assemblage of symptoms, the course of which, however, was watched with great sagacity.

How remedies were first discovered and how the properties and uses of so many of them as were handed down from remote antiquity were known is matter for amazement. Animals are credited with instincts which direct them to the consumption of certain herbs or mineral substances when their health is deranged; the instincts of the primitive man also must have applied to remedies as well as to food, and experience of their effects must have been accumulated and transmitted, embodied frequently in legend or superstition, as part of tribal knowledge.

Of the infancy of medicine properly speaking we know nothing. Individual acts of healing are related in the Old Testament, and the treatment of wounds is described by Homer; the Chinese from remote antiquity had a system of medicine, and medicine has a place in the *Vedas*; but in the works of Hippocrates, the earliest medical literature which has come down to us, we are at once introduced to the theory and practice of the art of healing at a considerably advanced stage of development. Already there were rival schools of thought and treatment, and disease was discussed with extraordinary acumen from opposite points of view both as regarded its nature and phenomena.

Bleeding was in everyday use, not by any means as a routine fashion, but with judgment; cupping also was practised. The virtues of opium were known, and purgatives of various kinds, chiefly irritating and violent, and emetics were familiar remedies; enemata and suppositories and pessaries were employed, and fomentations and poultices in great variety were applied.

HIPPOCRATES: THE SUBORDINATION OF THEORY TO
OBSERVATION.

Hippocrates, whose writings embody all our knowledge of ancient medicine, was born about 460 B.C. He was a contemporary of Socrates, Euripides, and Aristophanes, and was a worthy representative of medicine at that brilliant period of Greek literature and intellect called the age of Pericles.

It is true that his knowledge of anatomy was rudimentary, and that his physiological ideas were totally wrong, but he has left of himself the picture of a sagacious observer and wise physician. He was the inheritor of the knowledge and traditions of the school of Cos, and another source of information by which he had profited was the training establishments of athletes, where the influence of diet, gymnastics, and baths on health and vigour was carefully watched. His attitude of mind was towards the study of disease as such, rather than the differentiation of distinct diseases. Refinement in this latter direction had obviously been carried much too far by the school of Cnidos, which he criticised and opposed, where symptoms were looked upon as separate morbid entities.

His distinguishing merit, however, was that he was guided by observation and not by theory. Hippocrates could not, any more than his contemporaries or successors, or than we ourselves, escape the dominion of theory, but his theories were generalisations from observed facts, and not deductions from preconceived ideas or so-called first principles.

The doctrine with which his name is associated, that of the coction of humours and of critical days, for example, is essentially a generalisation from the natural history of certain simple diseases. In coryza or bronchial catarrh there is a watery acrid running from the nose, or scanty viscid expectoration with obvious constitutional disturbance. A change in the character of the secretion is attended with a remission in the symptoms, and after the discharge of more or less muco-purulent matter there is a return to normal conditions. Something of a like kind is observed in the urine in fever and in the stools in diarrhoea. For the accomplishment of these changes a certain time is required, which, when ascertained in each class of disease by careful observation, gives the critical day. The facts were essentially facts of the natural history of disease. The theory evolved as an explanation of the course of events and applied in the elucidation

tion of disease of which the processes were not patent on the surface, was that some one of the four humours, the due balance of which constituted health, had obtained predominance and set up disturbance, general or local; this was concocted or elaborated by the animal heat, increased for the purpose, and qualified by admixture of other humours, and so brought into a condition in which it could be expelled and got rid of.

Hippocrates, from this subordination of theory to observation, from his careful study of the causation of disease not less than from the lofty sentiments and clear judgments contained in his writings, remains, and must ever remain, the model physician.

During the 500 years which separated Galen from Hippocrates the centre of gravity of the civilised world had shifted. Greece, shattered by conflict between its different States, had succumbed to Macedonia. Alexander had conquered Asia and then died. On the ruins of his empire Rome had gradually risen, and when Galen lived had extended her rule over Greece, Asia Minor, Egypt, and the southern littoral of the Mediterranean as well as over Gaul, Spain, and Britain. There had been time, however, for the development of a high degree of intellectual activity and literary culture under the Ptolemies in Egypt, and Alexandria had become a great centre of learning. Here marked advances were made in anatomy, dissection was practised on human bodies as well as on animals. Herophilus, between 305 and 280 B.C., left his name to the confluence of the sinuses of the dura mater; Erasistratus, a contemporary, recognised in a crude way the motor and sensory functions of the nerves; Chrysermes, 240 B.C., wrote on the pulse, as does also Heraclides, 230 B.C.

Medical writings date from Alexandria as late as 170 A.D., but the school had long lost its authority, and Rome henceforth attracts the highest medical talent. The physicians who first made a name in Rome are Greeks—Asclepiades, the friend of Cicero, and Galen himself. Celsus, however, who comes between the two, writes in Latin.

THE REIGN OF GALEN.

Galen, who was born at Pergamos A.D. 130, as is known to all of you, dominated medical thought for 1,500 years, and if it was inevitable that authority should exercise such undisputed sway for so long a period it was perhaps fortunate that it derived from Galen. He was in spirit a follower of Hippocrates, and the basis of his ideas on disease and its treatment was observation. His keen and active intellect and fertile imagination, it is true, led him to theorise on every conceivable subject; but the impression left as to his character by reading his numerous works is that of an acute observer, of remarkable ingenuity and profound judgment, and excellent common sense.

He dissected diligently and thoroughly, but mainly monkeys rather than the human subject. Taking this into consideration, his writings on anatomy were wonderfully complete and exact. They held sway till the time of Vesalius. He finds the most ingenious reasons, often far-fetched and preposterous, for the form, consistence, and relations of all the various organs.

In respect of anatomy, his knowledge was incomparably superior to that of Hippocrates. He experimented on the spinal cord and on the nerves, and knew that they subserved motion and sensation—knew even that there were motor and sensory nerves distributed to the muscles and skin respectively, discovered the part taken by the recurrent laryngeal nerve in phonation, and, although his physiology is chiefly represented by fanciful teleological explanations of the uses of the different parts and organs, he made noteworthy additions to the knowledge of functions.

Apparently Galen was the first to establish the fact that the kidneys secreted the urine, and that it was conveyed by the ureters to the bladder. At any rate, this was disputed in his time, the objection being that the urine could not be forced back through the ureters, and could not, therefore, have entered by these canals. The bladder was supposed to attract the urine. He demonstrated it by tying the ureters; and in the course of his experiment he almost stumbles on the discovery of the circulation, for he maintains that blood is carried by the renal arteries to the kidneys in order that its watery part may be filtered off. The traditional ideas as to

the origin of the veins and of the flux and reflux of the blood in them, however, blinded him to this and other evidence, and he believed that the arteries contained air, though he maintained that they also contained blood.

A frequent reproach brought against Galen is that he spoke of the interventricular septum as perforated, so as to allow the passage of air between the two ventricles, against the evidence of his senses; but an excuse can be found for him in the fact that invisible communications had always been supposed to exist between the trachea and the arteries by which air passed from one to the other. He can only have meant similar invisible perforations, the orifices of which he would think he saw in the depressions which the walls of the ventricles present.

To convey even the faintest idea of the additions which Galen made to medical knowledge would require more than all the time at my disposal for this address. He wrote more than a hundred treatises on various subjects, including six on the pulse, and, while giving extravagant descriptions and making fanciful comparisons, he pointed out distinctions and characters which have been verified by the sphygmograph.

His treatise on local affections is remarkably true to Nature, and no more impressive lesson on the value of observation, even when unaided by science and experiment, can be afforded than by realising how fresh and vivid and modern his descriptions of diseases and symptoms sound. His diagnosis, for example, between hæmatemesis and hæmoptysis and other forms and causes of blood spitting leaves little to be desired.

I cannot deny myself the pleasure of quoting a passage which illustrates his robust common sense. He is distinguishing between the different causes of ischuria:

"Suppose the patient to be a child who has previously presented symptoms of stone, watery urine charged with sandy deposits, the child continually squeezing the penis, which is flaccid or unaccountably erect; then sudden stoppage of urine takes place. It may be reasonably concluded that the stone is lodged in the neck of the bladder. Place the child on his back, the hips a good deal raised above the rest of the body; then shake him in different ways so as to make the stone fall out of the canal. After these proceedings, tell the child to try and pass his water. If the attempt is successful and the urine flows you will be satisfied that you possess the exact diagnosis of the cause, and that at the same time you have found the proper treatment. Should the retention persist, you will shake him again still more forcibly; if after this it still persists, then with the catheter you will push the stone from the neck of the bladder to reopen a passage for the urine." It might be my surgical colleague, Mr. Jonathan Hutchinson, who was speaking.

POLYPHARMACY.

Materia medica was always too multifarious, even in the earliest times, and that of Celsus and Galen was much more varied than that of Hippocrates. Theriaca, so named from containing viper's flesh, was the subject of a work by Galen. It was a complicated opiate electuary containing about 63 ingredients, among which besides poppy juice and the vipers, were pepper, rose leaves, iris, liquorice, cinnamon, nardus, cassia, crocus, frankincense, balsam gum, fennel, cardamoms. It is said to have been employed for 2,000 years. Aloes, in Galen's hands, had largely taken the place of the irritating purgatives, such as hellebore and spurge, previously employed. Dioscorides, who wrote in the first or second century, describes more than 2,000 substances, chiefly vegetable. It may be remembered, by some now present, that an attempt was made only last year to invalidate the patent for lanoline, on the strength of a process for obtaining fatty matter from wool, given by Dioscorides.

The doctrine specially associated with the name of Galen is the humoral pathology accepted by him from Hippocrates and developed. The humours are phlegm, blood, yellow bile, and black bile; and all diseases arise either from a change in the quality of these humours, or from a predominance of one or other of them, or a flux of some particular humour to a given part. But, like Hippocrates, Galen is first of all an observer and his theories, faulty as they may be, are generalisations from observations and not deductions from *a priori* assumptions as to the nature of things.

Both Hippocrates and Galen rejected the doctrine of the sect of empirics, who declared that experience alone, without reasoning as to the nature or relations of observed phenomena, and without reference to causation, or to the influence of climate, season, age, sex, character of constitution, or mode of life, was the only safe guide in the treatment of disease.

Hippocrates still more emphatically rejected the pseudo-philosophical deduction of rules of treatment from the abstract qualities, hot and cold, dry and moist, acrid and sweet; and Galen in his turn rebutted the methodic doctrine of Asclepiades and Themison, which he found prevailing in Rome, according to which all diseases were referred to constriction and relaxation and treatment consisted in relaxing and astringing.

A high standard of medical literature is maintained by Oribasius, the friend of Julian, 350 to 400, by Aetius, who wrote near the end of the fifth century; Alexander, a little later in the reign of Justinian; and Paulus, who lived about 620; and improvements in practice can be traced during this period.

Alexander treated gout by purgatives, in which a kind of colchicum was a constituent. Paulus first described the aperient action of rhubarb, and extolled steel in scirrhus of the spleen.

After this there is a long gap in the history of medicine and of the liberal arts generally, but this is not to be wondered at. The Roman system of civilisation was gradually broken up, and its warring fragments were shaped by geographical and racial conditions into States out of which modern Europe has grown.

The seat of Government was shifted from Rome to Constantinople in 330. Rome was sacked in 546 and 549; later the Church established its dominion over the ruins of the ancient city.

As countries and governments were organised and delivered from the pressure of constant war, universities were founded. At Salerno there were already professors of physic in the middle of the seventh century. Charlemagne founded a college here in 802, and the Schola Salernitana was dedicated to Duke Robert of Normandy, son of William the Conqueror. The Universities of Bologna and Paris almost rival in antiquity that of Salerno. Thus in these dark ages the revival of learning and the *renaissance* of art were being prepared.

THE ARAB PHYSICIANS.

Names which have remained famous began again to appear in the ninth century. The followers of Mohamed in the course of their conquests found at Alexandria the works of Hippocrates, Galen, and other early medical writers. These they translated into Arabic, and upon them was based the medical learning for which Arabian physicians became renowned. With the Moorish conquest of Spain, and the extraordinary culture and civilisation developed by the invaders, the writings of Hippocrates, Galen, and the best Greek physicians, which had almost been lost sight of, came back to Europe with practical additions and modifications of great interest. Venesection was employed with greater moderation, and milder purgatives were substituted for hellebore and the like.

Rhazes, 852 to 932 A.D., besides reproducing the most important works of Hippocrates and Galen, gave the first account of small-pox, which, like the plague and cholera, came to us from the East, where he had seen it before the Saracens brought it into Europe in the course of their invasion. His description of this disease served for 500 years, and it is perhaps worthy of remark that he compares it to a ferment in the blood, like must. He is said to have been the first to employ chemical as distinguished from Galenic remedies.

Avicenna speaks of adherent pericardium and mediastinal abscess, and employed nutrient enemata. Albucasis appears to have been very enterprising as a surgeon. It was only at the end of the fifteenth century that, in the general revival of learning, Greek medical literature displaced the Arabian writers, and again resumed its authority.

While there is evidence that clinical medicine was seriously cultivated, such events as the visitation of the plague in 1348, which carried off one-fourth of the population of

Europe, and modified profoundly social history, or the successive epidemics of the sweating sickness, which specially affected this country from 1485 to 1529, left no mark on the history of therapeutics. Syphilis, which first became prevalent and virulent in 1494, afforded better opportunities for the trial of remedies. Guaiacum obtained a reputation as a specific for this disease, which we do not now understand; but it was seen before long that mercury, which was employed in the form of inunction, was the real remedy. John of Vigo was the first to recommend mercurial inunction, but Carpus previously employed it as secret remedy, and amassed a large fortune thereby. Fumigations were also practised. The effects were attributed to the carrying off of humour by the salivation which was produced. The introduction of mercury was an important addition to the *materia medica*.

THE RENASCENCE.

Already in the fourteenth century *post-mortem* examinations and dissections of the human body were made. The imagination was stimulated and a material impulse was given to the energies and ambitions by the discovery of America in the fifteenth century, and the invention of printing in 1462 made general intellectual culture possible. An evidence of the revival of interest in medicine was that the practice of medicine, which had drifted into the hands of monks and priests, was reclaimed. Linacre in this country took the licensing to practise out of the hands of the bishops, and founded the Royal College of Physicians in 1518.

The prodigious mental activity of the sixteenth century took in medical matters the form of eager and close study of human anatomy. Vesalius challenged the accuracy of Galen, and was haled before the Inquisition for his pains. Other names which mark this epoch and which have been left imprinted on some part of the human frame are Fabricius, Eastachius, Fallopius, Ingrassius, Columbus, Arantius, Varolius, while Servetus, Columbus, and Cæsalpinus almost penetrated the secret of the circulation. This great discovery, however, was reserved for our own Harvey, and the publication of the *De Motu Cordis* in 1628 constituted the most important epoch in the history of medical, and indeed of biological, science. But while vindicating his undoubted claims we must not forget that he owed his early knowledge of the anatomy of the heart and vessels to Fabricius, and drew his inspiration from the teaching he found at Padua. There is no need for me to dwell on the importance of the discovery of the circulation. When completed by the demonstration of the capillaries by Malpighi and by the discovery of the lacteals already made by Aselli in 1622, and of the receptaculum chyli and thoracic duct by Pecquet in 1647, and of the lymphatics by Steno somewhat later, the foundation was laid for physiology and the first step taken towards a real comprehension of disease.

THE SLOW SPREAD OF THE DOCTRINE OF THE CIRCULATION.

It was a long time, however, before the establishment of the circulation began to bear fruit. Indirectly, it is true, an end was made of various absurd discussions, as, for example, whether bleeding ought to be done on the same side as a pleurisy or on the opposite side, which was the subject of a formal enunciation by the University of Salamanca to be enforced by legal penalties, and minds were emancipated from the authority which had enslaved them for so many centuries. But the first conclusions drawn from the circulation of the blood and lymph were absurd if not mischievous; one kind of blood was supposed to be conveyed to the muscles, another to glands, and the nerves were supposed to convey nutriment to white fibrous tissues, and it will be remembered that a century after Harvey there were physicians who sat to Le Sage for the portrait of Sangrado, which he drew in *Gil Blas*, and to Molière for the character of Diafoirus.

SYDENHAM.

If we take Sydenham, who wrote between 1666 and 1680, and Boerhaave (1668-1738), the best and most representative physicians of their respective times, we find that while they have fully realised the fact of the circulation of the blood it had exercised remarkably little influence on the theoretical views which they entertained with regard to disease, or on their practice.

Sydenham may be called the English Hippocrates. He was the last and best of the pure Hippocratic school, unless, indeed, we include Trousseau. He was above all a careful clinical observer. If time had permitted it would have been interesting to compare his knowledge of disease, the remedies he employed, and the theories he entertained as to the causation, nature, and treatment of disease with those of Hippocrates and Galen, on the one hand, and with those of the present day on the other. With regard to remedies the great acquisition of Sydenham's time was bark, which had been brought over from America by Jesuit missionaries about the middle of the seventeenth century. After accepting it cautiously, he employed it freely but judiciously, laying down rules which have been found useful ever since. Mercury was of course in common use, and antimony was an acquisition of which he thought highly. Epidemics he attributed to influences emanating from the earth, and he considered that different years and the various seasons impressed different characters upon the prevalent diseases, in which, in fact, he followed Hippocrates. Other diseases were due to vitiation of the blood; Nature was engaged in the expulsion of the peccant substances. It was the business of the physician to co-operate with Nature, and his art consisted in recognising the indications presented by the symptoms and the direction in which he must act in order to aid in restoring the normal equilibrium. "As for the physician," he says, "all his philosophy consists in following the history of diseases and in knowing how to employ the remedies which experience has shown to be the most efficacious for their cure, and at the same time he ought to follow a method which is founded, not on chimerical speculations, but on a common and natural way of reasoning."

Again: "They deceive themselves grossly who imagine that the principal defect of medicine is that it lacks powerful and efficacious remedies which chemistry alone can furnish. On the contrary, what is most wanting to medicine is not to know the means of fulfilling such and such an indication, but to know precisely what the indication is which has to be met. The smallest apothecary's apprentice will tell me in five minutes the drugs I must employ to vomit or purge, to sweat or cool a patient; instead of which, to learn with equal certainty when and in what case I ought to employ such and such a remedy in different diseases requires one to be extremely well versed in the practice of medicine."

Boerhaave, whose principal works date from the first years of the eighteenth century, was also a great physician, and exercised by his writings and through his enthusiastic follower and commentator, van Swieten, a powerful and lasting influence on medical thought in his day. He evidently had great experience, and was successful in practice. He had the great merit, too, of teaching at the bedside. He seems to have thought that with the discovery of the circulation and the advances in botany, chemistry, physics, mechanics, and clinical experience, medicine had in his day attained to certainty and almost perfection, but his theories were drawn largely from the assumptions and imaginations of the iatro-mechanical school.

IATRO-CHEMICAL, MATHEMATICAL, AND MECHANICAL THEORIES.

Nothing could more confirm us in our respect for the genius of Hippocrates and the good sense of Galen than to attempt to follow the fanciful extravagances which from time to time partially displaced their humoral pathology, and have been known as the iatro-chemical and iatro-mathematical or mechanical theories. Every discovery in alchemy, as early attempts at chemistry were called, and every new development of mathematical or mechanical science, was in turn seized upon as affording the clue to the causation and treatment of disease. Even the circulation of the blood and the early knowledge of structural anatomy were turned to perverse theoretical use. Just as for the methodics in the time of Galen every disease was referred to constriction or relaxation of parts, and the remedy sought in relaxants or astringents, so at one time all diseases were ascribed to acidity or alkalinity of the humours or to fermentations; or again to obstruction of pores or minute vessels and inspissation of liquids. The contraction of muscles was due to a sudden swelling of their substance set up by the nervous

juice or spirits conveyed by the nerves. Respiration was for the purpose of giving a due comminution to the blood by the movements of the lungs. Fever was explained by an acrid nervous juice, which excited the heart to more frequent and forcible action.

THE GROWTH OF A SCIENCE OF PHYSIOLOGY.

Later still the physiological discoveries of Haller, the establishment of the principle of irritability as a property of living tissues, and the employment of the term "stimulus" led to another general theory of disease—the doctrine that fever and inflammation were the result of over-stimulation, which was attended by a return to extravagant and indiscriminate bleeding. From this there was the Brownian reaction to the contra-stimulant doctrine, with equally indiscriminate, if not equally mischievous, administration of stimulants. Even the revelations of morbid anatomy and pathology were at first made the basis of a general doctrine relating to disease—the organicism of Broussais; everything was referred to gastro-intestinal inflammation, and again venesection was the universal remedy.

From this time the character of the work which I have set before myself changes. Up to the present we have only been able to register accretions of knowledge and follow interpretations more or less close to the truth which were advanced in the absence of science. We have now reached a point at which we are entitled to say that ultimately science is to be our guide. Therapeutics will be scientific in proportion as the operation of remedies is referred to physiological laws. Physiology, in turn, is scientific in proportion as vital actions and processes are referred to physical and chemical laws. What remains for us to do is to follow the rapidly converging lines by which this consummation is being approached.

Taking up our parable again at Harvey's great discovery, we find that it remained comparatively barren until it was supplemented by Lavoisier's explanation of the process of respiration, and indeed almost until a further impulse was given to thought and experiment by a diagnosis of diseases of the heart by means of physical signs.

Then an important step was made in the elucidation of the mechanism of the circulation by the discovery of the vaso-motor nerves, and the demonstration of the contraction and dilatation of the arterioles in obedience to stimulation of these nerves, by Claude Bernard.

Almost concurrently the regulatory apparatus of the heart's action through the vagus and sympathetic was identified by the brothers Weber. These discoveries were followed out in detail by a multitude of experimenters and the adjustment of the supply of blood to local demands for the purposes of nutrition, secretion, muscular action, and the response of the heart to the general requirements of the system, to excitement, emotion, exercise, are now thoroughly understood.

It is only comparatively recently that the blood pressure in the arteries and veins, and in different parts of the arterial and venous system, first measured tentatively by Stephen Hales, has been experimentally investigated by the graphic method by Ludwig and his school and made available for clinical work through the sphygmograph by Marey and his followers.

The relative share of the heart and vessels in the production of variations in the blood pressure was thus made clear, and then for the first time the complex and multitudinous indications afforded by the pulse could be understood.

At the same time that the lacteals and lymphatics were discovered, the structure of the glands was investigated by Glisson and Wharton, and the minute anatomy of the tissues generally was initiated by Malpighi, Ruysch, and Leeuwenhoek, who demonstrated the capillaries by injection and recognised the corpuscular elements of the blood by means of the first rude form of microscope.

The invention of the microscope opened another avenue to knowledge, and every improvement in this instrument and in the preparation of structures for examination has been followed by a further penetration into the secrets of organisation and a better comprehension of function. Staining, for example, has not only facilitated the identification of different structures in their minutest ramifications and most intricate combinations, but has made it possible to distinguish between active protoplasm, in whatever form it may

be found, and the material formed by it, and has revealed essential differences between cells otherwise apparently alike in all respects.

Schwann and Schleiden laid the foundation of histological science by the discovery of cells as the structural unit, and when the knowledge of minute anatomy had reached a certain point the results were systematised by Bichat, who by his general anatomy prepared the way for the cellular pathology of Virchow.

Side by side with advancing knowledge of structure has come increasing comprehension of function. Physiology from first to last is based on experiment. It was by experiment that Galen proved that the kidneys secreted and the bladder retained the urine, and learnt the motor and sensory functions of nerves, and that Bell, again, nearly 1700 years later, discovered that the posterior nerve roots were sensory and the anterior roots motor. It was, of course, by experiment that the circulation of the blood was established. The advances made by Haller (1708-77), again, in the elucidation of vital action were based on experiment. It was not, however, till the example was set by Majendie that experiment was systematically employed in the investigation of all the functions. He was followed by Claude Bernard, to whom we owe our knowledge of the vasomotor apparatus and its influence on secretion and nutrition, and with whose name is associated the glycogenic function of the liver, which has been rudely questioned if not overthrown by Pavy; by Ludwig, who elucidated the dynamics of the circulation; by Marshall Hall and Brown-Séquard, who led the way in the experimental investigation of the functions of the various parts of the nervous system which has now reached such a wonderful stage of development.

Next to the discovery of the circulation, and almost rivalling it in importance, was the enunciation and proof of the theory of respiration. Priestley had shortly before discovered oxygen, and combustion was just beginning to be understood, when the demonstration by Lavoisier, in 1783, that carbonic acid was exhaled and oxygen absorbed by the lungs, and the comparison of the operations which resulted in this interchange of gases with the process of combustion was not merely an increase or development of previous knowledge; it was a revelation and a revolution. Until then the lungs were supposed to be simply the great and primary instrument for giving a due comminution to the blood. For the first time chemistry was brought into relation with vital operations. The original ideas, it is true, were imperfect and in some respects erroneous; but the conception of respiration as comparable with combustion was the germ of all our present knowledge of oxidation as the source of the various forms of energy developed in the system.

The full development of these ideas, however, was only possible when the doctrine of the correlation of forces and the conservation of energy was established, and it is an interesting fact that it was originally suggested by the search for an explanation of the constancy of the temperature of the body in different climates and under varying conditions.

As the microscope has revealed the intimate structure of the tissues and the mode in which they are first developed and then maintained, so chemistry has followed step by step, interpreting the connection between structure and function. The molecular changes which constitute the science of chemistry, indeed, underlie and determine the structural changes revealed by the microscope. Chemistry it is which brings us closest to the ultimate facts of life, and gives us the deepest insight into vital operations. Every vital action is a chemical action, whether the as yet to us mysterious process by which are built up the complex chemical molecules out of which the tissues are constructed or the partially understood catabolic operations by which energy is liberated.

Profound importance attaches, therefore, to the progress of organic chemistry, and those who have prosecuted its study, from Berzelius and Liebig, who led the way by analysing the excretions and secretions and by separating and classifying the organic constituents of the various structures down to the workers of the present day, who by processes of inconceivable delicacy and refinement isolate the toxins and antitoxins which play so important a part in disease, have ministered to the progress of medicine. Chemistry must

ultimately form the link between physiology, pathology, and therapeutics.

THE BEGINNINGS OF A SCIENCE OF PATHOLOGY.

So far we have been chiefly concerned in following the growth of knowledge relating to healthy structures and normal functions. Facts relating to the effects produced by disease on the different organs could be collected, and the symptoms attending the progress of disease and revealing its nature could be recorded, independently of any comprehension of the processes by which morbid changes were effected. Such accumulation of facts and such observation of symptoms were indeed necessary before study and experimental investigation of morbid processes could be undertaken.

Morgagni (1682-1771) may be called the founder of pathological anatomy. He was the first to describe on a large scale minutely and systematically the appearances found in *post-mortem* examinations and to connect them with the symptoms observed during life.

John Hunter, who had perhaps a deeper insight into pathological processes, may be placed side by side with him; Andral and Cruveilhier later produced magnificent treatises and atlases, and since their time an enormous accumulation of facts by pathological societies has taken place, and innumerable works on pathology have systematised the results and marked the progress made. The intent study of the changes produced by disease could not but imply a desire to understand the processes by which they were brought about. Chief among the men who have thrown new light on morbid changes and given an impulse to the study of the science of pathology must be placed the names of Virchow and Paget. With Virchow's *Cellular Pathology* published in 1856 a new conception of pathological changes was introduced. They were seen to be perversions of cell nutrition and cell activities, and diseases of the various organs were studied not as such, but as due to morbid changes in the cell elements of the different structures entering into their composition.

Inflammation, the most common and important of these processes, has naturally been the battle ground of rival theories. For a long time it was regarded as a purely vascular phenomenon, and all the changes in and around an inflamed area were studied from the point of view of contraction and dilatation of the capillaries and of acceleration or retardation of the current of blood through them. Then exudation of liquor sanguinis into the interstices of the tissues and proliferation of the tissue elements were looked upon as the essential feature of the inflammatory process, and later still came Cohnheim's discovery of the migration of leucocytes. It would almost seem that every detail of the changes which take place in the course of a local inflammation is now known. With the progress of this knowledge ideas as to the nature and character of the process have completely changed. Formerly it was looked upon as destructive only; now it is recognised as primarily, at any rate, defensive—a mustering of leucocytes to oppose the invading bacillus, or a preliminary to repair of damage by the removal of structures too deeply injured to be fit for further service.

While so much is definitely known of the behaviour of vessels, and blood corpuscles, and leucocytes, and tissue elements during inflammation, chemistry has not yet said the last word on the changes in the blood and structures. It is in virtue of some antecedent chemical and consequent physical change in the capillaries and tissues that the leucocytes are arrested and made to traverse the capillary wall, and it is not as an act of volition, but in virtue of some chemical affinity that the phagocyte englobes and disintegrates the bacillus.

The microscope has played the same important part in pathology as in physiology. The structure of all the forms of tumour has been minutely studied, and their relations with normal tissue and with each other ascertained. Degenerations of all kinds in glands, muscles, and nerve centres have been followed from the initial departure from normal conditions to complete disintegration, and the influences under which they have taken place have been investigated.

At all periods clinical observation has been in advance of physiology and pathology, presenting problems for solution, suggesting and stimulating inquiry, and waiting to turn to therapeutic uses every addition to knowledge.

Perhaps the first clinical discovery which brought physiology to bear directly on practical medicine was the introduction of physical diagnosis by means of percussion and auscultation, the former by Avenbrugger (1761) and Corvisart (1818), the latter by Laennec (1819). This not only brought the diseases of the chest within the ken of the physician, but opened out a new and wide field for observation. The effects of interference with the circulation by the various forms of valvular and structural disease of the heart could now be followed; the operation of back pressure through the lungs and systemic veins was traced, and the dependence of such symptoms as dropsy upon heart disease became manifest. A most powerful impetus was thus given to experimental research. Both physiological and pathological affections of the different valves were indeed natural experiments on the hydraulics of the circulation.

Jenner's great discovery of vaccination, unparalleled as to the direct benefit conferred by it upon the human race, was essentially a fact of clinical observation. When, however, its significance was grasped by the genius of Pasteur it became the starting point of bacteriological pathology, which gives the most far-reaching insight into the causation of disease, and constitutes the most important of all the links yet made out between science and therapeutics.

The employment of the thermometer in clinical work constituted another important epoch. We should now think clinical work impossible without it, but there must be many here who, like myself, completed their studies without ever using it, and who remember its introduction by Wunderlich. The thermometer had, indeed, been employed by Coombs, but, either because medical science was not sufficiently advanced so that the profession was not ready for it, or because it was not applied extensively enough, it had not taken hold.

It is not too much to say that the clinical thermometer has revolutionised clinical observation and practical therapeutics. Before its introduction and systematised employment there could be no adequate study of pyrexia, its significance, its causation, or its effects, whether as an incident of inflammation or as the essential feature of fever, or as the fatal factor in hyperpyrexia. Till then the problem of the constant temperature of the body was not before the physiologist, and the researches as to the production and dissipation and regulation of animal heat, fruitful in so many directions, had not even been suggested. Still less had abnormally high temperatures been dealt with as such therapeutically.

Another physiological discovery of far-reaching importance to which clinical observation has led up has been the definite determination of the fact that the ductless glands and probably other glands supply to the blood some material which plays an important part in the nutrition of the tissues, stimulating or modifying the cell activities.

Few histories are more interesting than that of the successive steps by which extract of the thyroid gland was ascertained to cure myxœdema, beginning with the observation that cretinism was associated with goitre, and that the essential feature of this affection, myxœdema, could be induced by extirpation of the thyroid. Upon this, experiment showed that the cause was not the accumulation in the blood of some substance which ought to have been withdrawn from it by the gland, but the absence of some material which the gland supplied.

Older than this, and even more important, was the discovery of the part played by micro-organisms in certain diseases. Here again clinical observation and reasoning had anticipated Pasteur. The communication of disease from person to person, the incubation period which intervened between the exposure to contagion and the development of symptoms, the successive stages which these symptoms followed and the reproduction in the individual of the poison, had given rise to the zymotic theory, according to which the history and course of these diseases were comparable to fermentation following the addition of yeast to a saccharine solution.

Experimental demonstration, however, is now demanded, and the place of theory in medicine is only to suggest and to guide investigation. It was not, therefore, until Pasteur—by the successive steps of his work on the various fermentations on pébrine—the silk-worm disease—on malignant pustule and

splenic fever—had demonstrated the powers of micro-organisms, and Lister, by that infinite capacity for taking pains, which, when combined with true insight, constitutes genius, had made the totally unexpected and unforeseen extension of the germ theory to surgical affections; until Koch again, in 1882, had identified and made visible the *corpus delicti* of phthisis in the tubercle bacillus—that the microbic origin of these diseases was fully admitted and the sweeping character of this new department of knowledge was recognised.

We may even claim for clinical observation that vaccination was a standing illustration of the attenuation of a virus, and that it anticipated and pointed the way to the processes by which Pasteur has attained such sensational results in hydrophobia and by which we hope and believe that other diseases, such as scarlatina and the fevers generally will be robbed of their terrors.

The bounds of the zymotic theory, properly speaking, have however been overpassed, and indeed swept away, and diseases such as tuberculosis are found to be caused by micro-organisms which appeared to have no analogy with those originally grouped under the name; but science has pushed the analogy between disease and fermentation still further. Just as alcohol is the potent product of the torula, so it has been ascertained that the products of bacteria are the agents which give rise to the constitutional disturbance of disease, and these products have been separated and identified. Not only so, but just as alcohol, when it has reached a certain proportion, arrests further multiplication of the torula, so do the products of bacteria bring their action to an end, and advantage is taken of this in the antitoxin treatment of diphtheria, which has recently evoked the admiration and challenged the gratitude of mankind.

THE EXCELLENCIES AND DEFECTS OF MODERN THERAPEUTICS.

We have still to ask, What is the bearing of all these advances of knowledge on therapeutics, which, after all, is the object of our lives?

Until the last few years it has not been easy to answer this question by instances of any very extensive applications of physiology to the treatment of disease, and morbid anatomy was at one time a stumbling block in the way of therapeutic effort. The pathologist, pointing to an excavated lung or cirrhotic liver, would ask the physician what he could expect to do with drugs against such conditions. But that stage has passed away, and I will not mock your intelligence by other illustrations beyond those just given of therapeutic applications of physiological and pathological knowledge, or by arguing that all knowledge of normal processes aids in the comprehension of morbid processes, and that we are in a better position to combat disease when we thoroughly understand its causation and initiation, and follow mentally its development, course, and tendencies.

Given the faculty of observation, the insight which penetrates the meaning of the phenomena, the analytical and synthetical powers by which a diagnosis is constructed, the ready adaptation of means to a well-defined end, and the firmness of character required to deal with the frailties of human nature, and the best physiologist will make the best pathologist and the best pathologist the best physician.

As regards the remedies at our command, they are only too numerous. Recourse to a great variety of drugs is fatal to exact knowledge of their effects and to precision in their use, but new ones are added every day for the benefit chiefly of those who do not know how to employ the old ones. There have, however, been recent acquisitions of extreme value, heavily discounted, unfortunately, in the case of some by the mischief done through their indiscriminate use: the antiseptic group, the chloral sulphonal group, the salicylates and salicine, the phenacetins and antipyrin class, coca and cocaine. What makes some of these, moreover, far more important and interesting is the fact that their physiological action has been inferred from their chemical constitution.

A fact which brings practical therapeutics into near relation with physiology and pathology is that the active principles of all drugs are isolated, their chemical composition is ascertained, and their physiological action investigated. Pharmacology, in effect, has become a branch of experimental physiology, and the immediate effect of remedies is known

with a completeness and accuracy heretofore undreamt of. All this is working towards a more intelligent employment of drugs, and leads towards the goal of all the efforts to bring therapeutics within the circle of the sciences. This goal is that we should know not only the effects of remedies, but how these effects are produced. This is in the last resort a question of chemistry. As I have said before, all vital actions are attended with molecular or chemical changes; are, from one point of view, chemical actions, and come under the laws of the correlation of force and conservation of energy; so, therefore, are the physiological and therapeutical action of drugs, and obviously the key to the latter is to be found in the chemistry of vital processes. Therapeutics, to become scientific, is only waiting for answers to the questions which she puts to chemistry. Why are sodium salts so much more abundant than potassium salts in the blood, and why are the former almost confined to the liquor sanguinis, and the latter to the corpuscles? We must assume that albuminoid proteids have an affinity for sodium, and the globulins for potassium. With the answer to this is bound up the secret of the necessity of sodium, potassium, and calcium salts to anabolic and catabolic operations, in which they take no traceable part, and of the presence of iron in the blood corpuscles.

Why, again, in the case of substances apparently so similar as potassium and sodium salts will the former, if injected into a vein, even in small quantity, paralyse the heart and destroy life, while we see pints of normal saline solution thrown into the circulation with none but good results? How does prussic acid—the simplest in composition and constitution of all organic substances—prove fatal with such fearful promptitude by its presence in infinitesimal proportion in the blood? How again does morphine suspend the activity of the nerve centres? Chemists must admit that the poisonous effects of prussic acid and morphine can only be due to some molecular change in these substances; they know that if the deadly cyanogen is so tied up that its component atoms cannot fly apart it is innocuous, and that a very slight change in the chemical constitution of the morphine molecule entirely alters its effect; it is an almost irresistible inference from the doctrine of conservation of energy that the change in the molecule, say of the morphine, must be equal and opposite to the molecular change in the nerve cells which it arrests. It seems to me, therefore, that we have in the chemical constitution of the morphine molecule a clue to the character of the chemical change by which nerve action takes place and to the quantivalence of nerve energy.

What then is our position to-day in respect of the three points which we have been following—the recognition of disease, the knowledge of remedies, and the ideas which govern the employment of remedies in the treatment of disease?

The basis of therapeutics is diagnosis, the grasp of the actual condition underlying the symptoms or phenomena, and the greater our command of powerful remedies and the more precise our knowledge of their effects and of the mode in which these effects are produced, the more important does accuracy in diagnosis become.

A diagnosis, to be real, implies not only the recognition of the disease which may be present and an accurate appreciation of the morbid changes which may have taken place in various organs. It embraces a knowledge of the nature and intensity of the pathological processes which have been and are in operation, and of the causes which set them going, and also of the results to which they tend. A further element, moreover, enters into the consideration; an estimate, by the aspect of the patient, by the pulse and temperature, and by other subjective and objective indications, of the impression made on the system, and of the resistance which it is capable of to the lethal tendencies of the disease.

Year by year we see improvement in this respect; not only that hospital physicians and teachers endeavour to carry diagnosis to a greater pitch of accuracy and a higher point of refinement than ever before, but that the entire body of medical men are trained by improved education and systematic clinical teaching to appreciate and to practice careful diagnosis in their daily work.

Diagnosis, we may say, has reached an extraordinary degree

of advancement. There are, no doubt, still new fields to conquer, but in the recognition of diseases, local and general, there is not much which seriously concerns the human race which remains to be done. The same degree of knowledge, however, does not extend to morbid processes. Our comprehension of the significance and essential character of inflammation is by no means complete and satisfactory. The part which fever plays and the place which it holds among the phenomena of disease is far from being fully understood. It cannot have been intended by Nature for the destruction of the subject, and we can see distinctly that in some cases it forms part of the defensive operations; possibly, indeed, its general tendency is defensive, by promoting the production of phagocytes, or possibly a certain elevation of the temperature may be fatal to maleficent organisms which have taken possession of the blood or tissues. We are not certain, indeed, whether in pyrexia the heat-producing oxidation in the structures receives its stimulus from, or takes place at the bidding of, the nervous centres, or, on the other hand, is due to enfeeblement of the restraint which they normally exercise over it, or whether it defies control by the thermotaxic nervous centres.

But here I must stop. I have said enough to show that the much-despised therapeutics, like clinical observation, suggests and stimulates scientific investigation, and I must now take up the last point; the views which guide the medical man at the present day in the employment of remedies.

PERSONAL EXPERIENCE AND PERSONAL PREJUDICE.

Of course our individual guide is mainly personal experience and observation of their effects. But the human mind is so constituted that it demands reasons, and even our experience finds expression in theory. There is, however, no theory which is supposed to apply to pathological processes and therapeutical in general, like the humoral doctrine of Hippocrates and Galen, the various iatro-chemical and mechanical theories, the animism of Stahl; the stimulant, contra-stimulant, or organicist ways of accounting for everything—no theory of universal application. Yes! Homeopathy still, like a belated ghost, haunts the dawn of scientific medicine, and men are still found who wear its doctrines as a cloak for ignorance, or flaunt them as an attraction for the more foolish and credulous of the old ladies of both sexes.

But while our minds are not dominated by any *a priori* conception of a vital principle governing all vital operations, we must not flatter ourselves that we cannot be carried away by fashions in treatment. In our own day, under the influence of Todd, alcohol was largely accepted as the universal panacea, and for nearly a generation mercury was almost banished from the materia medica on theoretical grounds. The last twenty or thirty years have afforded us increased opportunities for the study of syphilitic diseases of the nervous system and of hereditary syphilis because of the abandonment of mercury in the treatment of the primary disease. And if we have no comprehensive theory of disease or treatment we have our small working hypotheses. To one man gout explains everything, and the more hazy or inadequate his idea of what gout is the more satisfactory the explanation. Gout, moreover, is accepted by the public as accounting for everything. The permutations and combinations of which uric acid is capable, and its ingenuity in giving rise to the most varied forms of disease, are truly wonderful.

To another man the clue to treatment is acidity, or bile, or disease of the liver.

Names have still a great influence, and the lesson which Galen constantly enforced, that we must treat not the disease but the patient, is as necessary in our day as in his. It does not follow that because we call a pain rheumatic, the remedy is salicylate of soda.

At one time the action of quinine was supposed to be explained by calling it an antiperiodic, and any tendency to periodicity in the recurrence of symptoms of whatever kind, or at whatever intervals, was considered to be an indication for its exhibition.

It is inevitable that our imagination should be impressed by the revelation of the wonderful part which micro-organisms have been found to play in the genesis of disease, and that our thoughts should turn towards antisepsis in our treat-

ment. So far the greatest success has been in dealing with microbes outside the system, as in antiseptic surgery and preventive medicine, and further triumphs are to be hoped for in this direction, as, for example, in the prevention of tuberculosis. We have as yet little evidence of the power of antiseptics to follow and destroy the microbes when they have once got possession of the system. Quinine, however, kills the malarial plasmodium, and we have now the antitoxic serum. Apparently, too, one virus may be antagonistic to another, and an attack of small-pox has often seemed to cure phthisis. We must continue our efforts to apply antiseptic principles, but it is most important that we should not allow ourselves either to imagine that we have obtained effects which have not been realised, or to attribute results to antiseptics which may have come from other causes. It is not yet clear that any considerable impression has been made on the mortality from phthisis by guaiacol or creasote; and was not sulphuretted hydrogen, injected into the rectum, to deliver us from this scourge?

It was inevitable, again, that we should be greatly struck by the remarkable power of lowering the temperature possessed by the antipyretic class of drugs. We seem to have within our reach the means of dealing with our most formidable enemy, and it is a great triumph to be able to point out to friends the effect of our remedy on the temperature chart, especially when it has been accompanied by relief of headache and other symptoms. Here it is very important that we should maintain an attitude of cool observation, and not conclude that in bringing down the temperature we have necessarily exerted a favourable influence on the course of the disease. We may have been bringing down also the patient, and it is not so certain that Nature does not know her business when she sets up febrile reaction. I feel myself justified in re-echoing the warning given by Dr. Douglas Powell on this point.

But it is time that I should bring this long and disconnected address to a close, and in thanking you for the patient attention with which you have listened to it I congratulate you and myself that we live at a time when the art of medicine has made such progress, when science in its application to medicine has brought such marvellous and such beneficent aid to therapeutics, and when our beloved profession stands so high in the estimation of the world.

ADDRESS IN SURGERY

BY

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At the Annual Meeting of the British Medical Association at London, July-August, 1895.

THE LATE MR. DURHAM.

MR. PRESIDENT AND GENTLEMEN,—My first words must of necessity be an attempt to express the deep regret which you and I alike feel at the sad event which has been the cause of my coming before you. We had all looked forward with high anticipation to the pleasure of listening to an address on surgery from Arthur Durham. The hand of death has snatched him from us, and put a stern veto on our hopes. It is not too much to say that the whole profession deplores Mr. Durham's too early death as a heavy loss to surgical science, whilst to many of us it brings in addition deep sorrow for a much-loved friend.

The peculiar circumstances under which, at the desire of my friends and at very short notice, I have undertaken to give this address will, perhaps, plead my excuse if I avoid all attempt to bring before you anything original: I purpose rather to offer you a brief retrospective glance at the surgery of past, interspersed with a few comments as to what may be hoped for in the future.

SURGERY IN 1750.

In the year 1750 there was published in London by one of Mr. Durham's many distinguished predecessors, A *Critical Inquiry into the Present State of Surgery*. Samuel

Sharp was not only surgeon to Guy's Hospital, he was Fellow of the Royal Society and a man of acute and original mind. He wrote good English, he saw for himself, and he travelled, not merely for self-gratification, but in search of professional knowledge. His work was to some extent the result of a visit to Paris, and he displays familiarity with the practice of all the Continental surgeons of his day. His *Critical Inquiry* was received with so much favour that it was translated into French, German, and Spanish. I may, therefore, fairly take this book as representing the opinions of the day, and as affording to us fair criteria as to the topics which most interested the surgical world in the middle of the last century.

"DREADFUL IN THE DOING, OR MELANCHOLY IN THE EVENT."

Mr. Sharp thought well of his times and his compeers. In his preface he writes, "Perhaps there never was a period of time in which any art was more cultivated than surgery has been for these last thirty years." This, we may remember, was written when Pott was in his prime and Hunter a young man. It may perhaps not be without instruction for us if I glance for a few minutes at the topics which mainly claimed Mr. Sharp's interest. To begin with he dismissed luxations and fractures with the statement that all eminent surgeons were agreed as to the method of treating them. With an almost similar remark he put aside "tumours, wounds, abscesses, and ulcers," asserting that their treatment is "fundamentally the same in every country of Europe." His optimistic belief that finality had been attained in these large departments is to be regretted, for it much restricted the scope of his interesting *Inquiry*. His thirteen short chapters concern hernia, lithotomy, amputations, concussion of the brain, tumours of the gall bladder, extirpation of the tonsils, hydrocele, and a few other matters. A small 8vo of less than 300 pages, and in large type, suffices for what he has to say. Let me repeat that what he does say he says well, but how little there is of it, and how restricted are his topics! What a contrast is presented with the almost limitless multiplicity of the subjects which in the present day claim the attention of his successors! Mr. Sharp's chapter on the extirpation of the tonsils contains a strong recommendation of this simple measure. He remarks "there is not an operation in surgery that in my opinion ought to give an operator so much encouragement. It is neither dreadful in the doing nor melancholy in the event." From this remark we may infer much as to his general experience respecting the major operations of his day. He wrote before the days of laparotomy for intestinal obstruction, and when he gloomily hinted at procedures which were either "dreadful in the doing or melancholy in the event," his thoughts probably went no further than excisions of tumours, amputations, and cutting for stone.

SURGERY IN ENGLAND A CENTURY AGO.

Somewhat more than half a century later another important work appeared on the same lines, but far more thorough in character than that of Mr. Sharp. M. Roux, the distinguished surgeon of La Charité, spent a month in London engaged in the diligent investigation of English surgery. On his return to Paris he published the results of his observations. He had seen Lawrence, Brodie, and Bell operate; of the two former he speaks as young men. With Cooper, then in his prime, he had held controversy as to the possibility of bony union in fractures of the neck of the femur, and had promised to send him a specimen which should remove all doubt. Between the dates of Sharp's *Critical Inquiry* and Roux's *Relation d'un Voyage* the whole of John Hunter's career had passed. The "Father of Scientific Surgery" had now been twenty years in his grave, and the great work of his life, that triumph of genius and industry, his Museum, was already well housed under the guardianship of the College of Surgeons. Roux visited this Museum, and he notes over and over again the extraordinary love which English surgeons had for anatomical preparations.

I do not purpose now to occupy your time by any analysis of M. Roux's book, but I put it forward as a very valuable recapitulation of the surgical knowledge of the day as regards its two most important schools, Paris and London.