polemics throughout his life, and this no doubt did much to estrange him from many who would have been glad to learn from him. After he had given up his position of lecturer on physiology, when he was professor of ophthalmic medicine at University College, and subsequently when he lived in retirement at Ventnor, his pen was always busy, and usually on physiological subjects. He was a fervent disciple of Harvey, and throughout his life the circulation of the blood was his favourite study. His discovery of the germinal vesicle was published in 1835, and in 1837 this was followed by another paper on the origin of the chorion that attracted the attention and approval of the celebrated anatomist, Purkinje. His essay on the State of the Blood and Blood Vessels in Inflammation was awarded the Astley Cooper prize in 1830. His greatest discovery, that of amœboid movement in the colourless corpuscles of the blood, was made in 1845. Other papers he wrote were on the rhythmically contractile veins of the bat's wing (a discovery of which he was especially proud), on lymph hearts in the eel and frog, and on the tonic contractions of the main artery of the rabbit's ear; his publications on ophthalmic medicine were also numerous. Wharton Jones, however, never advanced with the times; he was never able to accept the doctrine of evolution; he was unable to recognise the value of his own discovery of amœboid movement, and rejected *in toto* the teachings of Waller and Cohnheim regarding the emigration of leucocytes; he distrusted and detested all the stains and modern methods of histology, and the pertinacity with which he upheld his own opinions caused him to be slighted and neglected in spite of his arduous labours. He knew his own greatness, felt bitterly and resented the non-appreciation of his contemporaries, and, retiring into his shell, became in time little short of a recluse.

Augustus Waller.

A few words concerning Waller, William Bowman, and Dr. Pavy, will complete these notes on the physiologists of the early Victorian epoch. Augustus Waller's first piece of important work (1846) was his discovery of the emigration of the leucocytes. The amplification of this discovery by Cohnheim has laid the foundation of our knowledge of inflammation. But the name of Waller is most closely associated with what we now call Wallerian degeneration. He subsequently published papers on the Cilio-spinal Region, and on Vaso-constrictor Nerves, but his claim to the grateful remembrance of mankind will always rest on the paper on Degeneration and Regeneration of Nerve, which was published in 1850.

Bowman.

William Bowman did not begin his medical studies at King's College till 1837, but there was no five years' curriculum in those days, and his principal investigations were carried out in the three years 1839-42. These included his work on the Structure of Striated Muscle, the Structure of the Alimentary Canal, and the Structure of the Kidney. Bowman's work on these subjects, like his subsequent work on the Eye, has stood the test of time, and, though mainly anatomical, yet forms the basis of physiological teaching. At the time that Bowman entered King's College, the celebrated Dr. Todd was Professor of Anatomy and Physiology there. Todd exercised great influence on all his pupils and assistants, and the physiological twist in such men as the late Sir George Johnson is largely to be traced to the early influence that Todd exerted on him. In 1839 Todd commenced the publication of the *Cyclopædia of Anatomy and Physiology*, the largest and most important work of the kind that has appeared in England, and still valuable for the number and variety of the original articles contributed by men of the highest standing. Bowman, as he had proved himself to be a first-rate microscopist, was engaged to write numerous articles; in 1843 he appeared as co-editor, though only 27 years of age at the time, and in 1856 the fourth and last volume was completed. It was the first physiological work in which histology appeared, and thus an epoch in physiology was constituted. The immense superiority of the book may be appreciated by comparing it with other treatises published about the same time by Bostock, Elliotson, and Carpenter.

When later in life he devoted himself to a special branch of his profession, he stepped naturally and easily into the position of leader and representative of ophthalmic medicine and surgery, holding the same position in this country which was occupied in Germany by his friend von Graefe, and in Holland by his still more intimate associate Donders. When, in 1851, the ophthalmoscope was invented by Helmholtz, he was one of the first to become expert in its use. Sir William Bowman died in 1891.

Dr. Pavy is happily still with us, and continues to work with no diminution of the vigour of his youth.

The Physiology of Our Own Time.

Such then were the physiologists of 1837—in England as in Germany to be counted almost on the fingers of one hand. Of the physiologists of 1897, it is not our place to speak here. They are more numerous, but they have one and all to thank these early pioneers for the groundwork they laid down. The superstructure is modern; we have endeavoured to indicate how new most of it is. The structure is far from complete, and there are indications that physiology sixty years hence will be wider and more perfect, though not perhaps so largely different, as the physiology of to-day differs from that of the thirties. For physiologists have now learnt and taken to heart the teaching of Harvey; the use of the microscope has enabled them to make their observations accurate; the persistent use of experiment has raised the science into the region of certain knowledge. The difference in the manner of its presentment we indicated when comparing the six experiments of Johannes Müller with the practical classes that may be seen any day at work in any of our great laboratories. A visit to the laboratory at University College will provide a useful object lesson of what teaching was in Sharpey's day with what it is now. There may be seen an oval table at which Sharpey sat with his class when teaching them practical histology; around the table is a sort of tramway, along which the solitary microscope travelled as it passed from master to student, and student to student. How the early physiologists would rejoice if they could see the practical histological classes of to-day, the experimental classes, the chemico-physiological classes, and the research in the laboratories. The change is matter for the most sincere congratulation, and we cannot wonder that the votaries of physiology accept with approbation du Bois-Reymond's description of it, as the "Queen of the Natural Sciences."

PATHOLOGY.

The Dawn of Scientific Medicine.

Looking back from our present standpoint on the evolution of pathology during the last sixty years, we cannot but be struck, as Virchow once said, by the fact that scientific medicine, as we know it to-day, is indeed very young. The development of scientific medicine has no doubt gone on very rapidly during this period of six decades, but we are forced to acknowledge that it is only during this period that the Hippocratic system and the method of Galen in medicine have been replaced by those of Bacon and of Paracelsus. The workers in medicine began their crusade against theory, and insisted that observation and experiment should take the place of hypothesis and tradition only so late as the sixteenth century, indeed medicine, with its humoral pathology, made little more advance from the times of the Egyptian physicians than did astronomy from the time of Ptolemy. With the advent of the sixteenth century, however, medicine came, first to be looked upon as a science, and then, along with the other sciences, went forward by leaps and bounds. The great anatomists, physiologists, and chemists of this period, by patient observation and careful deduction, built up the foundation upon which medicine rose from an art to a science, in which, however, empiricism necessarily still played a most important part.

At the end of the eighteenth century John Hunter and those working with him had probed very carefully such secrets of surgery and pathology as they were able to lay bare with the methods available before their time, and with others devised by means of their ingenuity. Morbid anatomy had been carefully studied, and the gross naked-eye lesions of disease had been most carefully observed; in fact, it may be said that it was due to the working out of this field of path-

ology that led medical men to turn to the botanists for new methods of research.

Pre-Victorian Pathology.

In 1822 William Cook had translated Morgagni's *De Sedibus et Causis Morborum per Anatomen Indagatis* (published in the original form in 1760, when the author had nearly attained his 80th year). The English edition, which from the list of subscribers appears to have found its way into the hands of many of the principal physicians and surgeons of London and Edinburgh, must be looked upon as the first systematic attempt to locate the effects of disease in various organs, and appears to have set men thinking of the processes of disease as apart from their mere effects. The information to be gathered at this time, owing to the meagre information that had as yet been obtained as to the structure of the various organs was, however, necessarily very scattered and sketchy. There appears, however, to have been an earlier English translation of Morgagni's works in 1769, made by Dr. Benjamin Alexander, but this, like the original, was used for little but reference, and though it was to be found in the best libraries, it was seldom in the hands of those who were teaching and studying pathology. Just at the end of the eighteenth century a countryman of our own, Matthew Baillie, following somewhat the method adopted by Morgagni, but leaving out a very great amount of detail that characterised Morgagni's work, published a work (the second edition appeared in 1797) in which the various pathological changes met with in different organs were set forth. It may be interesting to give the amount of information that Baillie had concerning inflammation of the kidney. He says: "I don't recollect to have seen the proper capsule of the kidney inflamed, and I am disposed to consider it a rare morbid appearance. When the substance of the kidney is inflamed, it frequently advances to suppuration, and perhaps there is no considerable gland in the body so liable to form abscesses as the kidneys. In some cases which I have seen, the abscesses have appeared to be of a common nature; but in the greater number of cases they have been scrofulous. The kidney I have once seen converted into a hard inflamed substance, somewhat intersected by membrane, in which the natural structure of this gland was entirely lost. The kidney was at the same time very much enlarged in its size. This alteration of structure I should call scirrhous, but it exactly resembles scirrhus in other parts of the body; it occurs very rarely in the kidneys." This gives an indication of the knowledge that had at that time been obtained by those who were most carefully searching after pathological light. We gain in these few paragraphs some idea of the enormous advance made by Richard Bright, when he gave to the medical world his classical description of Bright's disease. In France Broussais, Louis Portal, and later Cruveilhier, were doing for pathology what Matthew Baillie and those who succeeded him were doing in this country. Early in the nineteenth century Bichat published his celebrated *Anatomie Générale appliquée à la Physiologie et à la Médecine*, in which we have for the first time a differentiation of the organs of the body into what were called tissues. It may be accepted that Bichat made it possible to carry on the study of pathology to a point beyond that gained by Morgagni and the earlier morbid anatomists—in fact, basing its work upon Bichat's published method and teaching, the French school of pathology or morbid anatomy, under the masters abovementioned, made exceedingly rapid strides, and some of the earlier and previously unnoted pathological processes now came to be observed and described. In this country, although the number of workers was apparently not so great as in France, and although less progress appeared to be made, we now know that a truer conception of pathology was being gained even than in France. The influence of John Hunter and his teaching had left a strong impress on the work of his time, and on that done by his pupils immediately after his death; the work of Matthew Baillie, his nephew, still remains as a monument to the accuracy of the observations of this period. The reason for this appears to have been that Hunter and Baillie were not content with the humoral pathology of their predecessors; they made a careful study of the effects of disease, and traced the relationship between normal and pathological processes. Crude theories, however brilliant, they carefully avoided and discounted, unless they could find facts which would support them. Speaking of this period and the period immediately following, Professor Welch,[1] of Baltimore, writes: "The plain purely objective descriptions, free from the prevailing tendency towards unwarranted generalisations, have given a permanent value to this work. Sound observations continued to be made by such men as Abernethy, the Bells, Abercromby, Cooper, Howship, Munro, Addison, Gulliver, Bright, Hope, Carswell; but much as they enriched the storehouse of pathological anatomy, the fundamental principles of pathology remained the same, although commendably free from many of the speculative tendencies of the Continent."

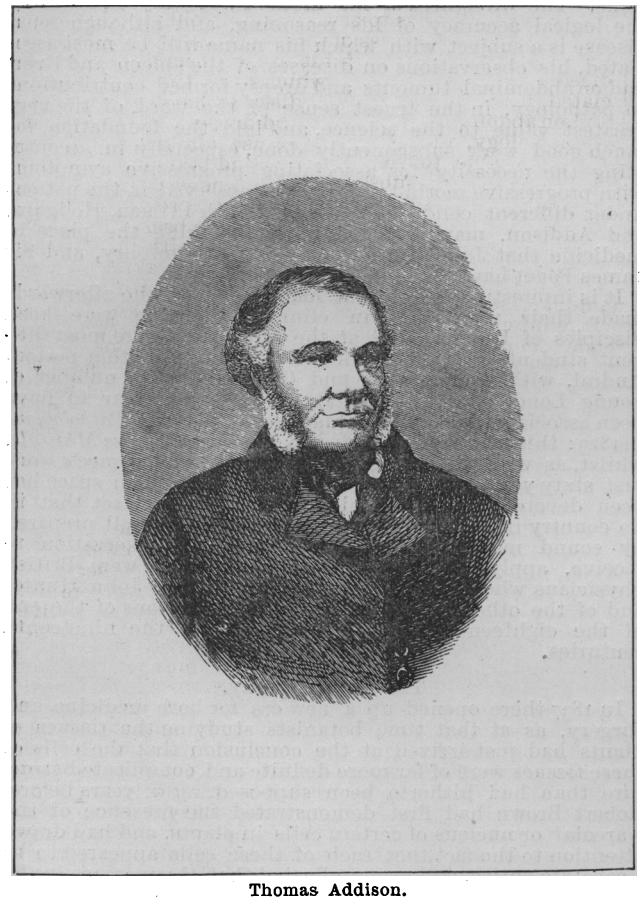
Whilst endorsing a great part of this statement, one cannot but feel that many of the men mentioned in this list did something more than merely accumulate facts. In the work of almost all of them we have suggestions of new principles, or at any rate of the application of the old principles in a new fashion. Sir Charles Bell's work on the *Nervous System*, and his observations on the method of transmission of nerve impulses and on the nature and course of the degenerative processes in nerves may truly be said to have opened up a new era in both physiology and pathology. Howship's observations on the Structure of Bone and the relation of this structure to nutrition in the normal and pathological condition also marked a great advance in our knowledge, especially of inflammatory processes, whilst Addison, by his careful observations on diseases of the suprarenal capsule, gave a definite and marked impetus to the localisation of disease, which was soon accelerated by Bright's observations on inflammatory diseases of the kidney. Carswell, in the beautiful drawings of diseased organs and parts, many of them preserved in the new pathological department in the University of Edinburgh, and others in University College, London (where he was professor of pathological anatomy about the commencement of the reign of the Queen), left a record of cases which has been a mine of wealth and a source of inspiration to more recent morbid anatomists. Concerning Hope and his work, it will be necessary to enter into somewhat greater detail in connection with the pathology of diseases of the heart. So completely has pathology become revolutionised during this period under review that it is now difficult to appreciate the fact that a little over sixty years ago Rokitansky was at the height of his fame as the head of an enormous pathological department in Vienna. After being appointed assistant in the pathologico-anatomical department of the University, he in 1834 was made professor of pathological anatomy and prosector at the General Hospital at Vienna, and medico-legal anatomist to the municipal authorities. Between the years 1843-6 he gave to the medical world his work on *General Pathological Anatomy*, in which, as he says, he attempted to pin his faith more and more upon Nature alone, and to make pathological anatomy the great work, not alone of all medical knowledge, but also of all medical treatment, whilst he attempted to bring within the domain of pathology a pathological chemistry. At the time that his work was published—1846—he writes: "Amongst these views I may here single out for exemplification the doctrine of a primitive diversity in blastemata, as the only tenable basis for a humoral pathology." Here we have ample evidence that the teachings of Schleiden and Schwann had had no influence on the thought and work of Rokitansky, who, however, places on record such an enormous number of well-observed facts that, although at the present day he is seldom or never quoted, future historians must necessarily turn to the Vienna school for a record of what had been done by German-speaking nations at this period. Up to the birth of the cell theory, Rokitansky dominated the pathological world, except so far as France and Great Britain were concerned; whilst his teachings exerted an enormous influence in stimulating the study of pathological anatomy even in this country, where, however, the cell theory was much earlier received than in Germany, although not so promptly applied.

Rokitansky and Pathological Pessimism.

The reason for Rokitansky's failure to keep the attention of

[1] Rudolph Virchow, Pathologist, by William Welch, M.D. *Boston Medical and Surgical Journal*, October 29th, 1891.

workers in this country was that, in spite of his attempt to trace a relation between the symptoms and signs of disease observed during life and the changes in the organs as seen on the *post-mortem* table, he accepted the advanced processes found in diseased organs after death as not only the ultimate, but also as the only changes of which cognisance was to be taken. The earlier and minor lessons leading up to these advanced changes were either not recognised, or were ignored by him as being of comparatively slight importance. The gradual development of disease in an organ, or rather the change produced by a disease, was to a large extent passed over, with the result (the effects of which might be seen even fifteen years ago in the work in the Vienna hospitals) that his pupils took an exceedingly pessimistic view of the cases that came under their care. With them an illness was merely the disturbance of function which would give way under the

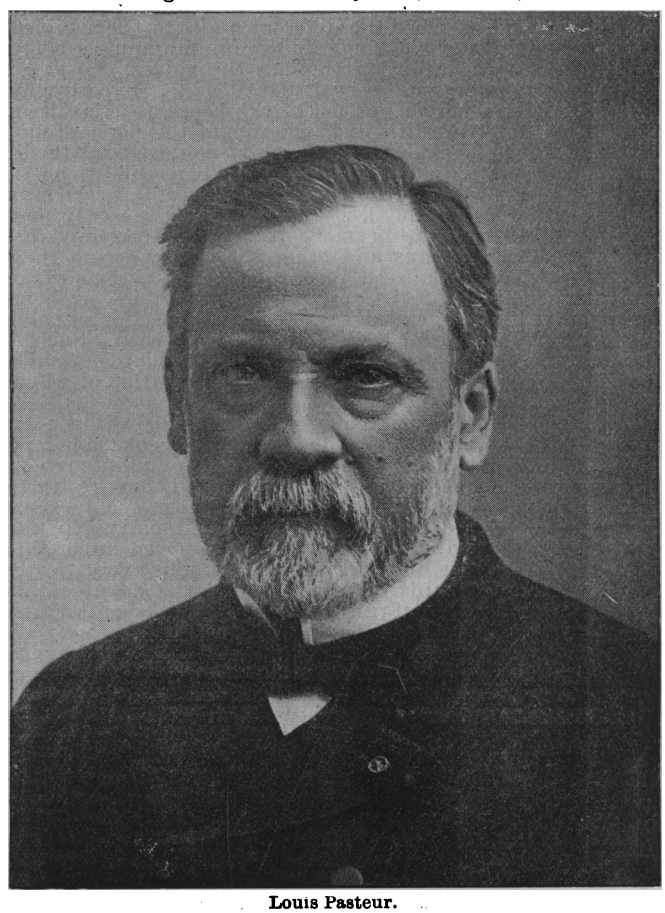


Thomas Addison.

slightest treatment, and therefore did not require to be specially treated, or the patient suffered from disease in which the organs were so profoundly altered that it was little use attempting to prescribe anything more than a series of placebos, therapeutic and general treatment being both deemed to be of little avail. To a certain extent this was probably a reaction against the system of indiscriminate drugging that characterised much of the practice of the earlier part of this century, and indirectly the practice then built up was extremely valuable from the fact that it cleared the way for more careful observations on the action of single drugs, and opened up an almost entirely new system of therapeutics and pharmacology.

LAENNEC AND AUSCULTATION.

Before this period, however, one of the greatest advances in the art and science of diagnosis had been made by Laennec, who, in his *Traité de l'Auscultation Médiate et des Maladies des Poumons et du Cœur*, by applying the physical method of percussion, which he assigns in the first place to Corvisart and then to Bayle (two great pioneers in the advance of pathology), states that he found that there were certain cases from which he could not learn anything as to the conditions within the thorax either by percussion or palpation. In 1816, after applying his ear to the region over the heart and noticing a series of very marked sounds, he conceived the idea of listening to these sounds through a roll of paper. After this the same method of conveying sound from the chest to the ear was adopted in certain cases of phthisis, with the result that *râles*, he found, could be readily heard. After a time he used a small cylinder of wood about the thickness of a quill for the same purpose, and gradually built up his method of exploration of the chest, which practically revolutionised, or formed the basis of a revolution of, the methods of diagnosis of heart and lung disease. This system, however, was of even



Louis Pasteur.

greater importance from the point of view of the practical physician as bearing on the gradual modification of structure during the advance of disease in the lifetime of the patient, for by its aid the alterations that occurred from time to time in the structure of the organ could at any rate be guessed at, with the result that as auscultation and percussion came to be more generally used the pessimistic theories introduced by the earlier morbid anatomists who viewed only the ultimate results of disease as seen on the *post-mortem* table, could be corrected by the information gained that in most cases the disease was a steadily advancing process, which, although it could not be absolutely cured, might be cut short at any rate in a certain proportion of cases. It thus also became possible to differentiate between those cases in which general symptoms only were present, often attributable to functional disorders, and those cases in which well-marked organic lesions were present. Bertin said of Laennec's system of auscultation that it was a discovery which "has in a few years more completely illuminated the diagnosis of the diseases in question

than all the other modes of experimentation had done for centuries."[2]

THE SOUNDS OF THE HEART.

With all this it was not to be expected that Laennec should interpret aright all the physical signs that he observed, and in the case of the diseases of the heart it was left to a young Edinburgh physician, John Hope, to give a comparatively full and rational explanation of the murmurs that could be heard during the heart cycle in health and in disease. Laennec certainly mistook the effects of the action of the heart, and was unable to analyse the various signs made available by his method of observation. This, however, can scarcely be wondered at when it is remembered what an enormous amount of work he had to get through during the short period between his first observation and the publication of his results. He ascribed the sounds to mere muscular contraction; Hope, on the other hand, ascribed the different *bruits* to the modified motion of fluid, and speaking of a bellows murmur as being produced by regurgitation through the valves, he says: "The murmurs attending valvular disease, hypertrophy with dilatation, nervous action of the heart, reaction from loss of blood, pericarditis and adhesion of the pericardium, also the allied phenomena of purring tremor, arterial thrill, throb, and murmur, I have attributed to modifications in the motion of the blood, and explained according to the laws of hydraulics and acoustics. In this way not only may organic diseases of the heart be readily and certainly distinguished from nervous and other affections wearing their aspect which I have offered respecting the situations where valvular sounds are to be explored and of certain corroboration derived from general symptoms, the particular valve diseased may in general be detected with precision. Such at least are the conclusions to which I have been brought by a considerable number of cases, a small proportion of which are appended in this volume."

Although Hope's complete work was published in 1831, many of his observations had already been made and described before the Royal Medical Society of Edinburgh in 1824-25, and he had already shown that Laennec's three diseases which were said to show no pathognomonic signs —aneurysm of the aorta, pericarditis, and polypi in the heart previous to death—should be removed from this category, though in his work in 1831 he added very greatly to the accuracy of his descriptions and the detail of his experiments. Before 1831 Dr. C. J. B. Williams had written his *Rational Exposition of the Physical Signs of Diseases of the Lungs*, and had placed in the hands of English readers much of Laennec's valuable work, to which he added keen criticism and copious annotations.

Hope now only did for the heart what was already being done for the lungs. He referred the heart sounds to particular phases and periods of its action, associating the first sound with the ventricular systole and the second with the ventricular diastole, showing how at the same time modifications in these sounds could be brought about during life in those hearts where after death it was found that the valves were stenosed, the incompetence being due to imperfect closure by contraction of the cusps, to the presence of a vegetation on the valve or to the rupture or displacement of a valve. He also showed how the alterations in the elasticity of the walls of the aorta might affect the sound, and thus built up as a result of examination during life of the symptoms and signs, and after death of the morbid conditions presented, a system of diagnosis which in its essential features has not been altered to the present day. By those who will read Laennec's description of the physical signs of a diseased heart some idea of the advance in medicine made possible by Hope's work may be gathered. Hope showed that a sharp line of demarcation might be drawn between diseases of the heart due to mere functional disturbance and those due to organic lesions; he showed, too, that heart disease was by no means the hopeless condition that it had been considered. He was able to differentiate between those cases that were due to changes in the heart itself and those that were due to alterations in the kidneys and in the blood vessels, and he opened up the way for Addison's observations made twenty-five years later on the relation between certain cerebral diseases and diseases of the kidney.

[2] Laennec's earliest observations were made in 1816, and a second edition of his book was published in 1826. A new edition, edited by Andral, was given out in 1837. This edition appears to be the basis of much of the teaching given on diagnosis of diseases of the chest not only in France, but also in England and Germany, up to the present day indeed, one is struck by the remarkable persistence of the terms used at that time—"Ægophonie, vésiculaire, râles, râle crepitant humide, râle muceux, tintement métallique, bronchial breathing," and similar terms.

THE WORK OF RICHARD BRIGHT.

In 1824, Richard Bright had published the first volume of his *Select Medical Reports*, but it was not until some ten or fifteen years later that the importance of his work, especially that on renal disease, came into great prominence, partly, apparently, through his own additional writings and partly through the observations of those, Christison and others, who set themselves to criticise or to corroborate his observations. The directness of his method was only equalled by the logical accuracy of his reasoning, and although renal disease is a subject with which his name will be most associated, his observations on diseases of the spleen and liver, and on abdominal tumours and dropsy formed contributions to pathology, in the truest sense of the word, of the very greatest value to the science, and laid the foundation for much good work subsequently done, especially in accentuating the necessity for associating progressive symptoms with progressive morbid processes as observed in the patient under different conditions. Bright, with Alison, Hodgkin, and Addison, may be looked upon as taking the place in medicine that John Hunter, Sir George Humphry, and Sir James Paget have taken in surgical pathology.

It is interesting to find that many of those who afterwards made their reputation in clinical medicine were keen disciples of Laennec, but at the same time were most diligent students of the pathological anatomy of that period. Andral, with whom Hope and Carswell and a number of young London and Edinburgh physicians appear to have been associated, brought out his *Précis d'Anatomie Pathologique* in 1829: this had been preceded by his work *Clinique Médicale*, whilst, as we have already seen, he edited Laennec's work just sixty years ago. This period, to which much space has been devoted, is of special interest from the fact that in no country in the world were medical men so well prepared by sound medical training and practical observation to receive, apply, and extend new theories as were British physicians who had followed the teaching of John Hunter and of the other great physicians and surgeons of the end of the eighteenth and the beginning of the nineteenth centuries.

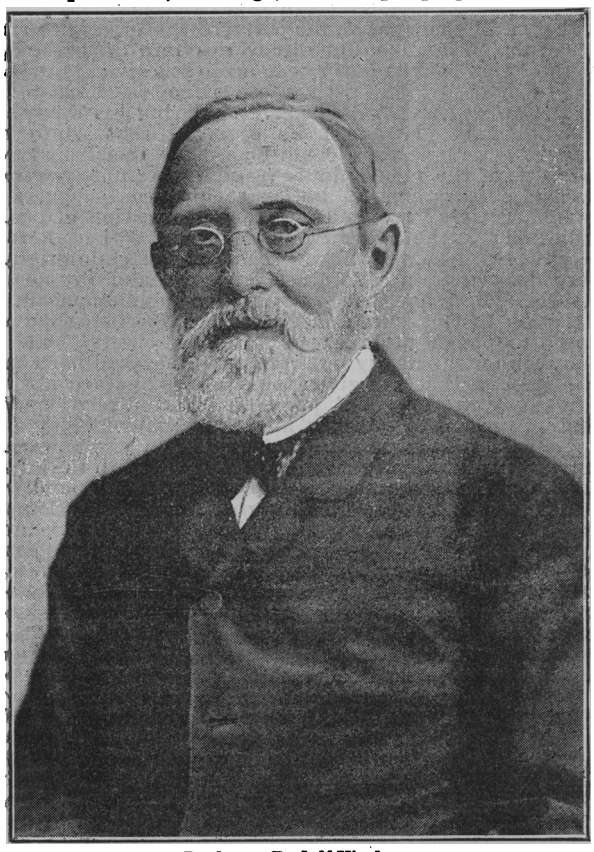
THE CELL THEORY.

In 1837 there opened up a new era for both medicine and surgery, as at that time botanists studying the tissues of plants had just arrived at the conclusion that the cells of these tissues were of far more definite and complicated structure than had hitherto been supposed. Six years before, Robert Brown had first demonstrated the presence of the "areola" or nucleus of certain cells in plants, and had drawn attention to the fact that each of these cells appeared to be a separate entity, and even indicated that the increase in the number of cells was due to a division of these cells, in which the nucleus probably took part. In 1838 Schleiden, and a year later Schwann, gave still more detailed accounts of the structure of cells, and pointed out that not only did each contain a nucleus, but also a nucleolus. In the meantime, numerous observers had found that what was true of vegetable tissue was also true of animal structures, and that these were composed of nucleated cells, of which the type was earliest observed in the ovum. In our own country Wharton Jones had demonstrated the presence of the germinal vesicle in the ovum in the animal ovary about the same time that similar observations had been made on the Continent, but Schwann's great generalisation that there is one universal principle of development for the elementary part of organisms, however different, and that this principle is the formation of cells, was first published in 1838, and it may be accepted that most of the advances that have been made in our accurate knowledge of disease and its treatment are based almost in their entirety on the observations that led up to this generalisation.

In this country Martin Barry,[3] from the years 1838-41, made most valuable contributions to our knowledge of the physiology of the cell, and stimulated to increased activity the physiologists and pathologists of that period.

THE FORMATION OF THE PATHOLOGICAL SOCIETY.

To John Brown, Martin Barry, and Wharton Jones, we owe much of the impetus that was given to careful investigation at this period, especially in regard to fissiparous generation of cells, and later the passage of leucocytes from blood vessels in the process of inflammation, and within the next few years there seemed to be opened up a new era of pathological investigation, the first outcome of which was the formation of the Pathological Society, with C. J. B. Williams as its first President in the year 1846, with Edward Bentley and Nathaniel Ward as Secretaries, and James Copland as Treasurer. This Society, which was "instituted for the cultivation and promotion of pathology by the exhibition and description of specimens, drawings, microscopic preparations, casts



Professor Rudolf Virchow.

or models of morbid parts," was open to "physicians, surgeons, general practitioners, and persons distinguished in other departments of science connected with medicine." These regulations and the original list of honorary members, which included such men as Andral, Cruveilhier, Alison, Carswell, Julius Vogel, Stokes, Otto, Henle, and Rokitansky, show how the researches carried on by the men named were arousing the spirit of investigation at this time.

CLASSIFICATION OF TUMOURS.

The younger physiologists certainly played a most important part in studying the structure of tissues immediately after Schleiden and Schwann had published their observations on the cell and its relation to the development of the tissues, but so far as the relation of the cell to pathology is concerned, we cannot claim that any countrymen of ours took any very active share in the adaptation of the cell theory. Johannes Müller must be looked upon as the pioneer along these lines, as his work on the *Intimate Structure and the Forms of Morbid Tumours*, which appeared in 1838, or only one year after Schwann's work was published, was the first systematic attempt to give a detailed account and classification of the minute structure of tumour tissues as distinguished from the tissues normally present in the body, and to compare and to contrast the arrangement of these tissues in the two sets of structures. The influence that Johannes Müller exerted on Martin Barry, on Wharton Jones, on John Goodsir, and a number of English workers is evident from the frequency with which reference is made to his work by those investigators, but on no one does he appear to have exerted a greater influence than on Rudolph Virchow, who in 1846 and 1847 published his now well-known articles on Diseases of the Pulmonary Artery and on Acute Inflammation of the Arteries. Virchow seems to have made the composition of the blood, with the changes that take place in it under various

Professor Robert Koch.

conditions, his first great field of observation, and there can be little doubt that his investigations into the structure and action of leucocytes, which he came to look upon as type cells, and his careful study of their behaviour first led him to differentiate between the action of these cells circulating in the blood and those fixed cells that undergo proliferation in the tissues. The marvellous grasp that Virchow early acquired of the behaviour of cells under pathological conditions, aided by his careful study of the work of his teachers in normal histology, enabled him to obtain an insight into pathological processes which, as we know, extended throughout the whole domain of pathological histology. So careful and thorough was his work, in spite of the vast field it covered, that it may safely be maintained that few workers have found it necessary to revise so little of their work as has Virchow. It was not until 1854, however, that Virchow entirely repudiated the blastema theory of the origin of cells.

[3] The Cell Theory Past and Present. Inaugural Address to the Scottish Microscopical Society by Sir William Turner, Kt., President of the Society, Edinburgh, 1890

Omnis Cellula e Cellulâ.

One can well imagine that it must have been an exceedingly difficult matter for a young man to throw aside any part of a system which had so thoroughly laid hold of the sense and imagination of scientific investigators as had Schwann's great theory, and although glimpses of a critical attitude are obtained now and again in Virchow's writings, it was not until long after histologists had finally rejected the blastema theory that Virchow, going even beyond the embryologist and the histologist, applied his extension of Harvey's dictum in the words *omnis cellula e cellulâ*, the full recognition of which he obtained on the publication of his work on cellular pathology now only thirty-nine years ago. It must be remembered in this connection that he was dealing with tissues which in many respects differed very materially from the slowly growing cells of normal tissues, tissues which were undergoing rapid multiplication but early degenerative changes. Few well defined and stable cells, such as those found in the ovum and studied by histologists were at Virchow's disposal, and it was much easier from the appearances presented by pathological tissues to assume the blastemic origin of the cells, even than in the case of normal cells. It is often stated by those who do not take this into consideration that Virchow did nothing more than apply at a late date to pathology what had already been applied in histology. Such a statement conveys an entirely erroneous impression of the value of Virchow's work. In Germany especially tradition had assigned to pathological processes methods of development perfectly distinct from anything that occurs under normal conditions, and pathologists had invoked the aid of all kinds of extraordinary theories to account for abnormal conditions. They considered that disease must be the result of something entirely different from what occurs during the processes of health, and anything that could not at the first blush be reconciled with what was found under normal conditions was at once put down under some theory or other to the credit of some not understood process. It is to the great honour of Virchow that he broke through all the traditions that maintained at this time, and applied in disease the same general laws as regards cell proliferation that were acknowledged to regulate the multiplication of cells in health. Virchow's extension of the knowledge of the life-history of the cell, his application of the microscope to the examination of morbid tissues in all stages of growth and development, and his calling in of physiological and clinical observations and experiments to help in the interpretation of this life-history of the cell, mark the commencement of a new era not only of morbid histology, but of general pathology, of clinical diagnosis, and of treatment. To Virchow an anatomical lesion became the evidence of a perversion of function due to some extraneous excitement or irritation of the cells of which an organ was composed, or of which a tissue in which the growth was found originally consisted. Each cell derived from an earlier cell had under normal physiological conditions special functions to perform; during the performance of these normal functions they retained their original and more or less characteristic form and arrangement. If therefore these characteristic features were observed to be undergoing modification of any kind, it became necessary to search for minute changes, to note in what they consisted, and then to work back from such minute changes to the perversion of function which accompanied, caused, or succeeded them, and finally to study the altered conditions of growth and environment that determined these modifications both of function and of structure.

At the present day such a statement may sound trite and obvious, but to the medical man of his time Virchow's observations that normal and pathological processes were closely related and correlated was a complete revelation, and when he pointed out that in many cases it was almost impossible to determine where the one commenced and the other ended, and that the morbid changes in altered cells, tissues, and organs might be just as much the result of altered environment and modified stimulation as the cause of perverted function, a new and wonderfully hopeful future seemed to be opened up for medicine. Comparative and experimental pathology, if these things were true, might be called in to the aid of the human pathologist, for the history of a cell, whether in health or in disease, could be traced with equal certainty in an animal and in the human subject, and what would apply to the individual cells of which an organ is composed might also be made to apply to the organs themselves.

The Cell Theory the Basis of Modern Pathology.

We have in Virchow's application of the cell theory the basis of modern pathology and of modern medicine and treatment, as it must be acknowledged that without a thorough understanding of the biological, including the vital chemical, the anatomical and the physiological aspects of the reactions of cells, the germ theory of disease, especially in relation to the production of immunity, could never have been evolved; this quite apart from the fact that the study of micro-organisms in the course of its evolution has followed almost exactly the lines of the building up of the cell theory of the structure of tissues.

Diapedesis and Inflammation.

Just as Virchow was on the portal of his great career, 1846, one of the most important discoveries from the pathologist's point of view that had ever been made was given to the world by Augustus Waller, with whose name is associated the Wallerian degeneration of nerves. During his study of the blood and blood vessels he observed that white blood corpuscles under certain conditions made their way through the walls of the more minute vessels. So impressed was he by this observation and its far-reaching consequences that he immediately associated it with the formation of pus, and indicated that the cells in inflamed parts, which afterwards became purulent, were in no sense of blastemic origin, but were derived from cells already to be found in the blood vessels. More than twenty years later Cohnheim again drew attention to this question. So little importance had up to that time been attached to Waller's observations that Cohnheim was actually unaware that they had been made. The impetus that was given to pathology by the controversy concerning the origin of pus cells and the relation of the healing process to different kinds of cells contributed very largely to the advances in pathology from 1867 onward, the period during which experiments, designed with the object of determining the nature of changes in and around blood vessels, were carried on with the greatest activity; Cohnheim and his school maintaining that the cells found in suppuration and in regenerating parts were derived entirely from the blood vessels and were merely escaped leucocytes, whilst Virchow and his followers maintained with equal determination and ingenuity that these cells were the result of proliferation of the fixed connective tissues. Although this point has not yet been absolutely settled, most observers have now come to the conclusion expressed by Sir Roger de Coverley that "there is much to be said on both sides." Whatever may be the standpoint of any pathologist of the present day, he must acknowledge that Waller's observations on diapedesis and Virchow's work on phlebitis and thrombosis formed the groundwork of experimental pathology from which so much concerning inflammation and the healing of wounds has since been gained.

Addison and the Suprarenal Bodies.

Addison maintained that, although pathology is a branch of medicine which must necessarily be founded on physiology, physiology in many cases may derive information from pathological investigations such as can be obtained in no other way, and that the physiology of disease is as truly a branch of the whole subject as normal physiology itself; and forty-two years ago he pointed out that there may arise questions "regarding the true character of a structure or organ to which occasionally the pathologist may be able to return a more satisfactory and decisive reply than the physiologist, these two branches of medical knowledge being thus found mutually to advance and illustrate each other." In 1855 he wrote: "There are still, however, certain organs of the body, the actual functions and influence of which have hitherto entirely eluded the researches and bid defiance to the united efforts of both physiologists and pathologists. Of these, not the least remarkable are the suprarenal capsules, the atrabiliary capsules of Casper Bartho-

linus; and it is as a first and feeble step towards inquiry into the functions and influence of these organs, suggested by pathology, that I now put forth the following pages." His observations on the suprarenal capsules and the conditions in the skin and mucous membranes and in the nervous system associated with disease of these organs were entirely new and formed the basis of the whole of our present knowledge of the part that these glands play in our economy.

"BELATED RUDIMENTS" AND TUMOUR FORMATION.

Cohnheim, following up Müller's work, devoted himself for a time to the study of the structure of tumours, and his theory of "belated rudiments," did much to stimulate the interest of pathologists in the history of these growths, but it is to Waldeyer that we owe the sharp line of demarcation that was drawn between the epithelial and the connective tissue groups of tumours. Thirty years ago, he showed how epithelial tissues, apparently under certain forms of stimulation, broke beyond their normal limits and passed down into the underlying connective tissue spaces, following the course of the lymphatics and gradually invading tissues further and further away from the seat of origin of the epithelial proliferation and prolongation. He also showed how under certain conditions, new connective tissue might be formed along the lines of the invading epithelium but indicated that this was a secondary rather than a primary process, the connective tissue new formation being distinct from that found in sarcomata in which the new growth of imperfectly developed tissue is the main factor in the tumour.

"CANCER BODIES."

As yet we have not got much beyond the point at which Waldeyer and his pupils left the subject, but within the last seven or eight years a new impetus has been given to the study of the nature of the irritation that causes the proliferation by Russell's observations on "cancer bodies." Many workers, both in this country and abroad, have taken the matter up again, but as yet adequate proof of the exact nature of cancer bodies has not been brought forward.

THE INFECTIVITY OF TUBERCULOSIS.

In 1865 and 1866 Villemin brought forward experimental proof of the infective nature of tuberculosis, observations that were confirmed by Hérard and Corneil in 1867, Lebert, Wyss, Klebs, Burdon Sanderson, Wilson Fox, Cohnheim, and other observers in 1868, though there still remained considerable doubt in the minds of certain of these observers and of those who criticised their experiments as to the exact value of their observations. In 1877 Salomonsen, working with Cohnheim, was the first to observe the actual development of inoculated tubercle in the anterior chamber of the eye, and to remove all doubt as to the connection between the implantation of a minute fragment of tuberculous material and the subsequent development of tubercle nodules along lines radiating from the inoculated substance. Of the subsequent history of tubercle and the publication of the discovery of the tubercle bacillus by Koch five years later, so much has been recently written that it is scarcely necessary to do more than mention them.

LOCALISATION OF DISEASE IN THE CEREBRAL CENTRES.

It is only during the last twenty years that the localisation of disease in the cerebral centres has been at all generally received as a method to be utilised by the practitioner of medicine. No doubt Ferrier, Gowers, Buzzard, and other workers in this country, Charcot and his pupils in France, and Meynert, Hitzig, Fritsch, and others had been working on such localisation for some time, whilst Heubner and Duret had carefully noted the relation of lesions of the cerebral circulation to symptoms during life and the localisation of the disease after death. Duret's work was published, much of it, in 1872-3, and Heubner's was carried on contemporaneously, whilst Ferrier gave a systematic account of his investigations in his work on the functions of the brain, published in 1876, Charcot's lectures on localisation of cerebral and spinal diseases appearing in printed form in 1882. When we bear this in mind, the development of brain surgery, which even now appears to us to belong almost to ancient history, is simply marvellous, and British research may congratulate itself that to Macewen and Horsley has fallen so much of the credit of following up the work in which Ferrier played so important an initiative part.

THE ORIGIN OF INFECTIOUS DISEASES.

Up to the present our attention has been occupied almost entirely with that phase of pathology and pathological anatomy concerned in the observation of actual changes in tissues and the relation of these changes to modification in function in organs and tissues—the pathology, in fact, of John Hunter, of Morgagni, of Laennec, of Rokitansky, of Virchow, of Cohnheim, of Litten, and of all the accurate observers who did so much to lay the foundation not only of our pathological anatomy, but of what has, up to the present, been called general pathology. Within the last twenty years, however, an extension of the area of the field of investigation for the pathologist and an intension as regards the exact meaning of pathological changes have been made with the result that the pathology of the present day has come to deal more and more with subtle etiological causes, and with such questions as prevention and immunity, to an extent that had, up to thirty years ago, never been dreamt of by Edward Jenner, his contemporaries, and his successors even in their most sanguine moods.

It is easy to understand that before 1837, and even for a part of the sixty years that have gone between then and now, the origin and course of severe epidemics of disease should have been enshrouded in great doubt and obscurity. Although the theory of specific infection had already been promulgated, and although Jenner's specific protection had given proof of the nature of certain of the processes involved in these diseases, many still remained who looked upon infectious diseases as often arising *de novo*, and they looked upon the origin and evolution of an epidemic much as those who believed in spontaneous generation looked upon the origin of life. In fact, as already stated, the two processes were so intimately associated in the minds of many, that what was thought to apply in the case of one was used as an argument in favour of the accuracy of the theory in the other.

THE GERM THEORY.

In 1836, however, came Spelanzani's observations, that in order to obtain absolute freedom from germs capable of development in animal or vegetable infusions, all that was necessary, after once killing these germs by boiling, was to prevent their access along with the air from without. Just sixty years ago, Donne, for the first time, definitely associated micro-organisms with the products of disease. Cagniard-Latour, and Schwann announced that the yeast cells, so fully described by Leeuwenhoek, were the exciting cause of fermentation; and Bassi described minute spores which he found on and within bodies of silkworms affected with a miasmatic disease well known to silkworm breeders—the same spores which Pasteur afterwards proved to be the cause of this disease. Early in the Forties, Henle, Swaine, Brittaine and Budd examined the excretions from cases of cholera, skin diseases, and other similar diseases, with the object of determining whether it was possible to find specific organisms which might be definitely put down as the cause of any one of these diseases; but it was not until 1849 and 1850 that Pollender and Davaine and Rayer detected anthrax bacilli in the blood and splenic pulp of cattle that had succumbed to splenic fever. Pollender described them as short rods, which could be differentiated from fragments of broken-down vessels or coagulated fibrin; and he mentioned that it was not impossible, as Henle had suggested, that these organisms were, in some way or other, etiologically connected with the outbreak of anthrax.

TOXINS AND ANTITOXINS.

From this time onwards Pasteur, Davaine, Lister, Burdon Sanderson, Tyndall, Greenfield, Klein, Koch, Rosenbach, Roux, and all the younger generation of workers have continued to add to our knowledge of bacteria, of their relation to the production of specific infective disease, of the methods of studying the organisms outside the body and experimentally in animals, of the effects of the actions and reactions between micro-organisms and the tissues and fluids of the body, of the

modification of the micro-organisms and of the modifications of the cells, of the production of immunity, of the manufacture and storing up in the fluids of antitoxins, of the value of antitoxins in certain specific diseases, and of the value of bacteriological diagnosis and of serum therapeutics and serum diagnosis. All these are of such recent origin, and are matters of such familiar knowledge, that there seems to be a danger that we may forget that they are most of them of such recent growth that a period of ten years would cover almost the most ancient of them. We now speak so glibly of toxins, of antitoxins, of natural immunity, of acquired immunity, of bacteriological diagnosis, and of serum diagnosis, that we are apt to forget that after all many of these methods until a year or two ago were absolutely on their trial, and that even at the present day we have scarcely got beyond the application of some of the principles involved in them to a few of the more typical infective diseases. We have therefore the prospect that as great advances may be made during the next twenty years as any that have been made in the past couple of decades. After all there has merely been a focussing of the work of the earlier pathologists and physiologists—or shall we say of biologists?—that was done from 1835 to 1865, in regard to disease both surgical and medical, and it must never be forgotten that it was in this latter year that Lister commenced that long series of published investigations, which in the succeeding ten years revolutionised surgery in as marked a degree as Pasteur's and Koch's investigations on anthrax and the succeeding investigations on the various specific infective diseases have revolutionised our knowledge of the etiology, pathology, and treatment of disease generally and of epidemic diseases especially.

Methods of Direct Examinations.

As an outcome of the introduction of exact methods of observation into the study of disease, and therefore as a direct outcome of the requirements for more exact pathological methods, we may take as examples the advances that have been made by the application of optical apparatus and instruments to the examination of organs and parts which are not readily accessible to direct examination. The tubular speculum for the examination of the various orifices of the body was only the first of these. After the ordinary tubular speculum and dilating speculum, the latter of which was applied to the examination of the ear, Gruber of Vienna, according to Wilde, writing to the *Dublin Journal of Medical Science*, in 1844, was the first to use a conical tube as an otoscope. In 1850, Cooper Forster, writing to the *Lancet*, described an addition to this conical tube of $\frac{3}{8}$ to $\frac{1}{2}$ an inch silver tubing, so that a better view of the tympanic membrane might be obtained. In the same year, Toynbee claimed for Avery the priority of having added an oval tube to Gruber's conical speculum. There can be no doubt that such advances as have been made in the treatment of ear disease, especially of the outer and middle ear, must date from the introduction of this modified speculum. The next piece of apparatus that contributed very greatly to the advance of medicine, especially in relation to disease of the brain and of the optic nerve was the ophthalmoscope, first described by Helmholtz in his *Beschreibung eines Augenspiegels*, published in 1851. Apparently the first record of the use of the ophthalmoscope that we have in this country is that published by the late Sir Spencer Wells in the *Medical Times* of September 10th, 1853. As short a time ago as 1856, as pointed out by Clifford Allbutt, descending neuritis was not even dreamt of, whilst the relation of the cerebral and intraocular circulation with the valuable diagnostic outcome thereof, had not been made out until Dr. John Ogle, about the end of the Fifties, pointed out that the fundus oculi, as revealed through the ophthalmoscope, was the index face of the cerebral mechanism in a very large proportion of cases. Hulke's Jacksonian Prize Essay of 1859, published in 1861, under the title of *A Practical Treatise on the Use of the Ophthalmoscope*, was the first systematic attempt to place before English students the use and value of ophthalmoscopic investigation, whilst Clifford Allbutt, by contributing his work *On the Use of the Ophthalmoscope in Diseases of the Nervous System and of the Kidneys*, also in certain other general disorders, published in 1871, and W. R. Gowers, through his manual and atlas of medical ophthalmoscopy, gave a real stimulus to the adaptation of the ophthalmoscope to general medical work in this country.

The discovery of the laryngoscope and the vast improvements in the diagnosis and treatment of discovery of the upper air passages that have followed it are described elsewhere. (See p. 1557.)

One other instance of the application of apparatus devised for physiological investigation to the study of disease may, however, with propriety, be quoted. In 1733 the Rev. Stephen Hales introduced into the femoral artery of a horse a glass tube having one-sixth of an inch bore and a length of 9 feet, in order that he might observe the height to which the blood would rise in this tube, and the nature of the alterations in the height as indicating the blood pressure during different periods of the cycle of the heart's action. In 1828 M. Poiseuille introduced a similar tube, but bent in such a manner that the variation in pressure might be indicated by the rise and fall of a column of mercury. In both these series of experiments it was necessary to open the artery, and it was not until 1835 that any attempt was made to record arterial pressure by means of an instrument which should receive the impulse from the wall of an artery. This was done by Herisson in 1835, who used a glass tube, one end of which was closed by an elastic membrane placed on an exposed but unopened artery. Three years later Scott Alison, in order to get a column that could be observed more readily than mercury, and which would not compress the artery so much as the weight of a column of mercury of the height it was necessary to use, made use of spirit of wine, and applied the tube closed at one end with membrane not only to the arteries, but also to the heart, in order to determine the nature and extent of the impulse, especially of the apex beat. Then in 1855 Vierordt described his sphygmograph which consisted of a button, and a lever which was adjusted to the pulse tension by means of a cup, in which small weights were placed. In 1878 Marey improved on this instrument, and devised his now well known sphygmograph with its recording lever, its button regulated by a screw, and the clockwork apparatus for moving the card on which the record is taken, an apparatus that was simplified by Dudgeon in 1882 to such an extent that it could be carried about and used by every practitioner. There can be no doubt that the sphygmograph has played a most important part in the study of the history of disease, especially during the last ten or fifteen years, and the work that Hope commenced when he compared his observations during life with the conditions that were found on the *post-mortem* table and his arguments as to the gradual development of pathological lesions, laid the foundation for a pathology of the heart and vascular system which has led to the adoption of a much more hopeful treatment of these conditions, associated, however, with a much keener appreciation of the danger arising out of the neglect of the earlier indication of pathological conditions that has materially reduced the mortality from these diseases.

In view of the universal use of the clinical thermometer at the present day, and of the value of thermometric readings in determining alterations in the processes of metabolism, diagnostic conditions affecting the heat centres, and the condition of the heat-regulating centres themselves, those who study the history of pathology and its relation to medicine must be struck by the fact that it was not until about 1850 that the clinical thermometer came into anything like general use. For some years previously, however, thermometric investigations had been carried out in special diseases and under special conditions, whilst earlier still John Hunter had made his important temperature observations. About 1851-2, Traube, Von Baaerensprung, and especially Wunderlich, systematised what had already been gathered concerning the use of the thermometer in various febrile and cerebral conditions; and it is specially to these observers that we owe the recognition of the value of thermometry as indicating pathological changes which had, up to that time, escaped observation. The study of fevers from this period onwards became a very different matter from what it had hitherto been; and the observations concerning the relation of alterations in temperature regulation to morbid anatomical lesions and pathological processes became characterised by a definiteness and accuracy that had hitherto been entirely

wanting, with the result that many diseased conditions which had been grouped under a single heading were differentiated into distinct processes, and the ground was cleared for much of the work that has recently been done in determining the exact nature of the specific infective processes with which these diseases are known to be associated.

THE RISE OF SCIENTIFIC MEDICINE.

The microscope and the test tube have come to be as important in their way as the ophthalmoscope, the sphygmograph and the thermometer. Every branch of science has been called in to the aid of the pathologist and the clinician, and the outlook for the study and treatment of disease has never been so bright as at the end of this period of sixty years, at the commencement of which the first steps along the present paths had only just been made. At the same time we must not forget that it is by those who took these earlier steps that our present day pathology has been rendered possible, and that the glory shed on medicine and surgery by the successful treatment and alleviation of disease and the protection against disease, was in part at any rate earned by the pioneers of the end of the 18th century and the beginning of the 19th century.

As has already been said just, as the science of astronomy made no advance from the time of Ptolemy down to Tycho Brahé and his successors, so little advance was made in the study of medicine except in regard to pharmacology and the treatment of symptoms of disease from the time of Aristotle down to Paracelsus and John Hunter. That medicine has become a science rather than an art we have evidence in its sudden awakening along with the renaissance in science, and it may fairly be claimed for pathology as a branch of biology, that it has during the last sixty years shared with anatomy, physiology, and chemistry the honour of raising medicine from a mere empirical art to a science based on accurate observation and patient research.

THERAPEUTICS.

WHILE it is fairly easy to estimate the amount of progress which occurs in medicine from year to year, it is no light task to look back to the position of medicine sixty years ago, and to endeavour to give an account of the state of therapeutic knowledge at that time, and to compare it with the practice of the present day.

DRUGS IN 1837.

If one were to judge by the drugs in use when the Queen ascended the throne, fallacious impressions might be formed. The medical journals of that time teem with articles and with lectures on materia medica and therapeutics, in which occur the names of drugs which are still in common use; it might therefore, at a first glance, be hastily assumed that a fair estimate of progress might be made by mere tabulation of those remedies now in use which were wholly unknown at the commencement of Her Majesty's reign. From such tabulation, however, although we should of necessity to a great extent realise the progress, we should still derive a very incomplete idea of the amount of good work which has been compassed during the last sixty years. To be more accurate, it is necessary, even with the drugs which were then employed, to consider the mode of their employment, and to compare it with that at present in vogue. In this way it will be found that many explanatory theories of action have died out, in obedience to progress in other branches of medical science, and that they have been replaced in some instances by other theories, which may be doomed to pass away in the future, while in other cases theory has been replaced by knowledge of the mode of action, and this has led to more precise employment of remedies for diseases and conditions for which they are more suitable.

EXAMPLES OF EARLY VICTORIAN TREATMENT.

Medicine at the beginning of the reign was guided mainly by observation, which to a very large extent was purely clinical; and, although this led to the accumulation of a vast store of information, the facts were frequently confused and often misinterpreted owing to the limitations of knowledge by an imperfect pathology. Thus, a case of pneumonia is recorded as having been treated with spirits of turpentine, when bleeding and calomel were of no avail in arresting the disease and the pulse had risen to 140; the dose of spirits of turpentine was sufficient to cause "frequent watery discharges from the bowels," and the patient complained "very much of pain from strangury;" and yet, as the respiration was 34 and free, on the ninth day from the initial rigors, the medical man "surprised to find an extraordinary improvement," attributed the result to the turpentine, and published the case for the instruction and guidance of his professional brethren.

In considering all the facts presented to us in this case it is impossible to doubt that the surprise was really due to the usual fall of temperature with the crisis of the case. On the other hand, the apparent strangeness of the mode of employment of some drugs ceases to be peculiar if due regard is paid to the general condition of medicine at that time. For example, a paper of about the same date is headed "On the Pre-eminence of Tobacco in Strangulated Hernia.' General muscular relaxation was, before the introduction of anæsthetics, obtained by the use of emetics and nauseants. Tobacco was frequently employed as an enema; but in the case detailed in the paper referred to "there was no syringe nor means of administering an enema, nor was there any fire in the house by which a tobacco cataplasm could be quickly made," so the patient "was furnished with a cigar and desired to make vehement efforts to pass the smoke into his stomach. He soon became sick and puked, his whole frame relaxed, and covered with a cold sweat. The bowel was now very easily reduced, and the free use of volatile spirits both internally and externally soon restored him." Here, undoubtedly, the treatment was justified by the result, and perhaps on an emergency even in the present day, in the absence of an anæsthetic, the same plan might be followed.

CASE REPORTING.

An interesting feature in the medical literature of the early part of the reign is the apparent frankness with which details are given. Frequently the name of the patient appears in full, together with the age and occupation, but sometimes an air of mystery prevails, and the patient becomes "a well-known lady," or the practitioner is "called to the country to see a lady of wealth and importance;" and this secures attention and allows the narration of the benefits to be derived from the use of the essential oil of valerian as a remedy in nervous and hysterical affections.

EARLY VICTORIAN THERAPEUTIC LITERATURE.

It is an interesting fact that during the first year of the reign Pereira's lectures on "Materia Medica, or Pharmacology, and General Therapeutics" were in course of publication in the *London Medical Gazette*, while "Lectures on Materia Medica and Therapeutics," by Dr. George G. Sigmond, were appearing in the *Lancet*. Only five years before, the first edition of Dr. Anthony Todd Thomson's *Elements of Materia Medica and Therapeutics* had been published, and a third edition appeared in 1843. Yet a few years earlier Woodville's *Medical Botany*, containing systematic and general descriptions, with plates, of all the medicinal plants, was published in two substantial volumes, the plates being remarkable for their accuracy and in many cases for the beauty of the drawing. These publications indicate that in the beginning of the century a considerable amount of attention was being paid to the drugs then in use. It is interesting to compare the scope of some of these books, as they show the extent of therapeutic skill at that time, and still more, the relative importance then attached to the different branches of the subject.

Woodville's *Medical Botany* was valuable chiefly for the illustrations; the descriptions of indigenous plants were complete, but the amount of information relating to the action of the plants was far from being satisfactory. Woodville set out, according to his title page, with the intent to supply "circumstantial detail of their medicinal effects and of the diseases in which they have been most successfully employed," but when this "detail" is examined, it is found to consist largely of generalities culled from various sources, and in some cases of very doubtful authenticity.

Dr. Thomson's volume was more ambitious in its scope, or