treatment, for in the earlier part of the nineteenth century bleeding and mercurial salivation had run riot. The main advances in treatment have almost all been comparatively recent and the outcome of laboratory investigation, such as serums, especially diphtheria antitoxin, various vaccines, particularly the prophylactic antityphoid vaccine (Almroth Wright, 1897) used in the South African war, and as "T.A.B." (typhoid and paratyphoid A and B) vaccine in the European war. Insulin (Banting, Best, and Macleod, 1922) has transformed the treatment and outlook of diabetes mellitus. The same result has followed the dietetic treatment, by liver (Minot and Murphy, 1927) and gastric mucous membrane, of pernicious anaemia; the substitution treatment, by thyroid preparations, of myxoedema and cretinism is an outstanding success of organotherapy; and the use of salvarsan preparations (1910) in syphilis is a notable example of Ehrlich's chemotherapy.

A CENTURY OF BRITISH SURGERY

BY

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Surgery in 1832 was based wholly on anatomy; surgery in 1932 has the additional support of bacteriology. In this hundred years brilliant surgery reached its zenith, waned, and finally died. Operating surgeons in 1832 were only to be found in London, Edinburgh, Glasgow, Leeds, Hull, Birmingham, Bristol, and Exeter. Except in London, Dublin, and Edinburgh surgeons combined general practice with their operating work, and there were only one or two men in each capital who would now be called pure consultants. These men made large incomes, but were correspondingly hard-worked. Distances were great; locomotion was slow and difficult. In Canada, Australasia, the Cape, and India there were no great operating surgeons. Anaesthesia had still to come, and the practice of surgery was a sore trial to all but men of iron nerve who had become inured to the scenes in the operating theatre. Abernethy frequently vomited before he entered the theatre to perform a major operation. John Flint South, surgeon to St. Thomas's Hospital, wrote in his diary before he tied the aorta: "I prayed earnestly for help last night, and constantly during the morning, and was most graciously heard." Operations, therefore, were not undertaken lightly, and they were performed as rapidly as was consistent with safety. A perfect knowledge of anatomy was essential. Every hospital surgeon had graduated through the dissecting room, and each considered it necessary to practise dissection as assiduously as Joachim used to practise his violin exercises, saying, "If I do not do them one day I know it myself, and if I do not do them for two days the public does know." It was Astley Cooper's custom, we are told,

"to rise every morning at six o'clock, even during the winter. As soon as he was dressed he went into his private dissecting room, where he worked till half-past seven or eight. Searle then dressed his hair, and by half-past eight he began to see patients, who came in large numbers, even at this early hour."

The subjects upon which Sir Astley worked were obtained by resurrectionist methods, in which, at any rate in his early days, he had taken an active part. It was this union of the dissection of uninjected bodies in the morning and dirty operations in the afternoon which enabled Lister to say he remembered the time when, after an operation, "One shiver by the patient made the surgeon suspicious; two filled him with alarm, and three was a forerunner of

death." The crimes of Burke and Hare in Edinburgh in 1828, and of Bishop and Williams in London three years later, led to the passing of the Anatomy Act in 1832, after which it was possible to obtain a supply of bodies which were less tainted, both physically and morally.

Introduction of Anaesthesia

The age of brilliant surgeons like Astley Cooper, Robert Liston, and James Syme ended with the advent of anaesthesia. The last survivor of the brilliant band of teachers and showy operators was Christopher Heath, who resigned his post of surgeon to University College in 1900. The ligation of large arteries, the removal of tumours from inaccessible places, lithotomy, and the invention of modified forms of amputation had been their delight. Their successors enlarged the sphere of surgery, and found their pleasure in operating upon the abdomen, the head, and the chest—regions which had never been invaded by their masters. They looked to cure their patients where the older surgeons hoped only to save life. By the aid of anaesthesia they could afford to work slowly, deliberately, and with a feeling of security which had been previously unknown. Spencer Wells, Victor Horsley, and Rickman J. Godlee were of this band who owed much to anaesthesia, a great deal to the principles inculcated by Lister, and something to improved nursing and hospital accommodation.

Surgical Pathology

The older surgeons continued the tradition set by John Hunter and the Hunterian school—personal dissection of the human body, and the collection, comparison, and study of pathological processes so far as could be done by naked-eye dissection, injection and the preservation of specimens. Every hospital surgeon had his own museum, the nucleus of which he bought from his predecessor and sold again on his retirement from active practice and teaching. So constant was the custom that it sometimes led to abuse, and at St. Bartholomew's Hospital there was a rule that

"No surgeon shall form a private museum, but all specimens removed in the hospital shall be the property of the governors of the institution."

The result has been the formation of a collection which is second only to that preserved by the Royal College of Surgeons of England. Benjamin Travers, surgeon to St. Thomas's Hospital, was the last exponent of the system. He tried to build a rational system of surgical pathology upon a philosophic basis. His two books, known to many generations of students as *Travers on Irritation*, were classics in their day, but the science of bacteriology swept away their entire structure. Improvements in the microscope and in the preparation of tissues for histological examination developed surgical pathology along new lines. Speculation gave place once more to experiment and observation. In 1859 Sir James Paget published the lectures on surgical pathology which he had delivered during the years 1847-52. They were inspired by the work of Rathke, Retzius, Schleiden, Schwann, and, above all, by Johannes Müller. They mark a period in English scientific surgery which is not yet ended.

Antisepsis and Bacteriology

The year 1864 may be looked upon as the *annus mirabilis* of modern surgery, for in that year Lister began the campaign which conquered septic disease. Working always by experiment he hardly comprehended at first the principles he was trying to discover. Little was known of ferments, less of micro-organisms. The path gradu-

ally straightened; bacteriology developed, and the work of Robert Koch in Germany, of Burdon-Sanderson, Emmanuel Klein, Shattock, and Andrewes in this country shed light upon the life and actions of what had been called "germs." Lister's work too often fell upon deaf ears, for it did not at first appeal to the majority of his contemporaries. He was in the end amply rewarded, for he lived to see surgery revolutionized and his practice approved and adopted throughout the world. Working side by side with Lister were surgeons who obtained remarkable results by more simple methods—men like Thomas Keith and Lawson Tait, who had learnt the secret so jealously guarded by the old veterinary surgeon who was implored to disclose the cause of the wonderful success which had always attended his operations. With his last breath he gasped: "I allus boils my instruments."

Surgical Education

Sir Benjamin Brodie did much to advance surgery when he secured, in 1843, a Charter for the Royal College of Surgeons of England, instituting a new class of Members known as Fellows. A well-read and highly cultivated man himself, he said:

"The object of this institution is to ensure the introduction into the profession of a certain number of young men who may be qualified to maintain its scientific character and will be fully equal to its higher duties as hospital surgeons, teachers, and improvers of physiological, pathological, and surgical science afterwards. With this view they are required to undergo a preliminary examination in classics and mathematics; while their professional education having been continued for a longer period of time they are expected to show that they have a more perfect acquaintance with those sciences which are the foundation of medical and surgical knowledge than can be expected of the great majority of those who are candidates for practice. If this system be properly and honestly carried out I apprehend the result will be that the Fellowship of the College of Surgeons will be the most honourable distinction that is offered to the junior members of the medical profession."

The forecast has been more than justified. The diploma is so highly prized that examiners are now sent to Canada and Australasia to conduct the preliminary examinations in anatomy and physiology, and thus save candidates the expense of a double journey to England. Brodie did equally good work for the profession at large when in 1858, and as the first president of the General Medical Council, he carried out without friction the changes associated with the abolition of apprenticeship and the recognition of English, Scottish, and Irish medical qualifications as being on an equal footing for admission to the *Register*.

Specialism

Nothing is more remarkable in the history of the surgery of the last hundred years than the specialties which have arisen and multiplied. In 1832, and for many years afterwards, a surgeon on the staff of a general hospital felt himself competent to undertake the treatment of every patient requiring manipulative skill. Ophthalmic surgery was no exception, although men like J. Cunningham Saunders, the practical founder of the Eye Hospital at Moorfields in 1804, had done much to raise its status and release it from the hands of the quacks and charlatans who had long held it in bondage. The invention of the ophthalmoscope by Donders in 1851 opened up new paths. Some of the younger assistant surgeons at the general hospitals took advantage of the opportunity and began to specialize—Sir William Bowman first, then George Critchett and Henry Power. The work of Dieffenbach and Stromeyer upon club-foot and other deformities bore

good fruit in England by leading William John Little to place orthopaedics on a sound basis. Joseph Toynbee began to specialize in the treatment of diseases of the ear about 1840, and in the same decade a succession of well-educated and far-seeing practitioners raised dentistry from a very subordinate position to the place it now occupies as a branch of surgery. The invention of the laryngoscope by Signor Garcia in 1856 made it possible for Morell Mackenzie and others to open up an entirely new branch of surgery by their operations upon the larynx. The old midwifery of the "man-wives" took on a new lease of life, and the work of Spencer Wells, Lawson Tait, Knowsley Thornton, and Alban Doran developed gynaecology as distinct from obstetrics. The process of specialization continues. Ophthalmic surgery is shared by those who operate upon the eye and those who, with a mathematical bent, undertake the correction of errors of refraction. Those who treat diseases of the ear are now often distinct from those who practise in connexion with the nose. General surgery itself is becoming subdivided as a result of the discovery of x rays and the use of radium. Rectal surgery is also becoming a branch apart, and so we come round to where we were six hundred years ago, when, in 1350, John Arderne gave himself out to be, and was in fact, a very successful proctologist.

But if surgery has become more specialized its practice has also become more general. The village doctor undertook no operative surgery before the introduction of anaesthetics, except such as was immediately necessary in consequence of local accidents and injuries. He bled, amputated, set fractures, reduced dislocations, and opened abscesses, but for anything more serious he sent to the nearest large town for help. The surgeon came to the patient; transport was slow; and the local infirmaries and hospitals received patients only under certain arbitrary conditions. An increasing population and the improved status and education of medical men has led to the opening of local hospitals in many of the smaller towns and villages under the name of "cottage hospitals." The first was founded in 1859, and from small beginnings they have now become of considerable size, where much operative surgery is undertaken by the local practitioners under excellent conditions, both of housing and nursing.

War Surgery

The war of 1914-18 revolutionized military and naval surgery as completely as civil surgery had been changed by the adoption of antiseptic methods. The lessons learnt in the Crimean and Boer wars were taken to heart, and under an enlightened and active medical staff the wounded received better and quicker attention than had happened in any previous campaign. On all former occasions the medical arrangements had been severely criticized, but during these years they received unstinted praise.

Nursing

A new tradition in nursing began in England with Florence Nightingale. It started in 1833, when Theodor Fliedner opened a small hospital at Kaiserswerth and developed a system of deaconess nurses. The Anglican Church established an order of Sisters of Mercy in 1848 and the Sisterhood of All Saints in 1851. A training school was founded at St. Thomas's Hospital after the Crimean war in May, 1860. Every general hospital soon had its own school of nursing. A College of Nursing was established in 1916, and in 1925 State examination and State registration came into force. The nursing, like the medical, profession is already showing signs of specialization, and to the surgical nurses the surgeon and surgery owe much.