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THE DEVELOPMENT OF BRITISH ENDOCRINOLOGY*

BY

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Few, I suppose, to-day would deny that endocrinology is a branch of the biological and medical sciences, integrated as a coherent whole to form the subject of textbooks, journals, and societies, and indeed to constitute the professional vocation of a small group of workers who call themselves endocrinologists. Nevertheless it has from the beginning so permeated many other branches of science and medicine as to become an integral part of them. This it will continue to do more and more as the subject unfolds under the warm sunshine of advancing knowledge. Thus it is physicians and physiologists, biologists and biochemists, pathologists and pharmacologists who by their contributions have founded and established endocrinology so that its study and practice have now become essential not only to their own but to other specialties. Should this need, however, be neglected, not only will their own branches of science and medicine suffer, but endocrinology will wither.

British workers have played a distinguished part in the development of endocrinology both in the past and during the present generation, and to-day, with a journal, a society, and a section at the Royal Society of Medicine, endocrinology in this country would seem to flourish and prosper and to be firmly established. Will it continue so in the future? This is the theme I wish to develop.

"Internal Secretions" and "Hormones"

So far as I can discover, the earliest British contributors to endocrinology were Thomas Willis and Richard Lower, both of whom hinted at the possibility of some mechanism of internal secretions. Willis was at school in Oxford and became batteler to a canon of Christ Church and thus matriculated from "the House" in 1636 and took the degree of B.M. ten years later. He was a contemporary of Robert Boyle, John Locke, and other future Fellows of the Royal Society, which received its charter in 1662. When the monarchy was restored Willis was rewarded for his loyalty by being appointed Sedleian Professor of Natural Philosophy at Oxford. During the time he held this chair he wrote much on anatomy, describing of course, among other things, the circle of Willis, and taught a number of students who were subsequently to become famous, such as Christopher Wren. In 1666 he moved to London and built

up a lucrative practice. His reputation is difficult to assess. Was he the inventor of the nervous system, the founder of biochemistry (he tasted the urine for diabetes), the peer of Sydenham, Heberden, and Bright, or a parasite living on his pupils' ideas? † It is said that he refused a knighthood because he had been declared by the Merry Monarch to have killed more of his subjects than an invading army. Richard Lower, his pupil, who may well have inspired some of his ideas, including those concerning internal secretions, followed Willis to London in 1666 and eventually became the "most noted physician in Westminster and London" and a confidant of Nell Gwynne. He fell foul of the King, however, and his practice and reputation suffered accordingly. In 1675 he was expelled from the Royal Society, probably for not paying his subscription. Nevertheless he was one of the many physicians who attended the royal deathbed and tortured the wretched Charles, as Macaulay says, "like an Indian at a stake," while he was being "a most unconscionable time a-dying." The first contributors to British endocrinology were therefore colourful, successful, and worldly.

Though endocrinology made few advances during the next 200 years, the conception of internal secretions kept recurring, and George Gulliver, who enjoyed the curious distinction of being surgeon to "the Blues" as well as a Fellow of the Royal Society and a Foundation Fellow of the Royal College of Surgeons, was one of those who played upon this theme by postulating in 1840 that the adrenal glands elaborate a substance which they discharge into the venous blood. The term "internal secretion" was first used by Claude Bernard in a lecture at the Collège de France in 1855, but the word "hormone" was introduced half a century later by Bayliss and Starling. In 1902 they discovered secretin, and felt that its production in one part of the body and its transport to other parts on which it effected changes were not adequately described by calling it an "internal secretion." In their search for a more appropriate term the word "hormone" was suggested, and Starling used it in 1905 in his Croonian Lectures at the Royal College of Physicians. Starling had carved out a distinguished career for himself in the Physiology Department at Guy's, but as the authorities were unwilling to give him full control of the department he left in 1900 to become Jodrell Professor of Physiology at University College. He was succeeded at Guy's by M. S. Pembrey, who from the first took undisputed command of his department. Two years earlier Guy's had lost another distinguished physiologist through inadequately defining his ultimate prospects, for Gowland Hopkins had been enticed

*Based on the Presidential Address to the Section of Endocrinology of the Royal Society of Medicine, delivered on October 27, 1954.

†Sir Charles Symonds, in his recent Harveian Oration (*British Medical Journal*, 1955, 1, 119), has refuted this suggestion and has borne testimony to Willis's high repute.

to Cambridge by Michael Foster to undertake research in chemical physiology. I mention these facts because they are relevant to my theme.

History of British Endocrinology

The history of endocrinology consists of accounts of the achievements of men who did not call themselves endocrinologists, but were physicians, therapists, chemists, pharmacologists, pathologists, and experimental physiologists.

Physicians

From the physicians I choose Addison and Gull, for the circumstances leading up to the descriptions of Addison's disease and myxoedema are characteristic of the atmosphere of the second half of the last century when men had nothing but their eyes, their ears, their finger-tips, and their clinical sense to rely upon. Thomas Addison had spent all his life studying disease at the bedside and in the post-mortem room before he published, at the age of 62, his celebrated monograph in 1855. He was a distinguished dermatologist, and it was under his direction that Joseph Towne modelled in wax the superb collection of specimens of skin disorders which are still to be seen in the Gordon Museum at Guy's Hospital. He had long been intrigued by the morbid state characterized by "anaemia, general languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change of colour in the skin, occurring in connexion with a diseased condition of the suprarenal capsules." Six years previously he had communicated a paper concerning "a remarkable form of anaemia" occurring in patients the whole surface of whose bodies "bears some resemblance to a bad wax figure." Addison wrote sparingly, and it must have taken considerable persuasion on the part of Samuel Wilks, his junior colleague, to get him to produce the finely worded and beautifully illustrated monograph which is to-day such a highly treasured gem among the exhibits of British endocrinology. Unfortunately Addison was to derive little pleasure or satisfaction from it. It is true that Trousseau, during the next year, hailed the monograph and christened the condition Addison's disease. It is also true that, after reading Addison's monograph, Brown-Séquard, later to become physician to the National Hospital for Nervous Diseases, Queen Square, an F.R.C.P. and F.R.S., founded experimental endocrinology by removing the adrenals from a curious assortment of animals and by deducing from the consequently high mortality rate that these glands were essential to life. Nevertheless the medical fraternity at Edinburgh, where Addison had obtained his M.D., would not acknowledge the disease, and two or three papers read before the Medico-Chirurgical Society were not accepted for publication in its *Transactions*. Addison was deeply hurt by this, as he had not long before been president of the society. In 1860 he retired from public life and his beloved Guy's, and shortly afterwards committed suicide.

How different was the background of Gull's disease! In 1850, at a meeting of the Medico-Chirurgical Society, with Addison in the chair, Thomas Curling, a surgeon at the London Hospital, reported two cases of sporadic cretinism with absence of the thyroid gland. No one paid much attention, and it was 21 years before a further five cases of sporadic cretinism were reported to the same society by Hilton Fagge, of Guy's Hospital, ironically with Curling himself in the chair. Fagge recalled Curling's cases and the fact that the thyroid was absent, giving credit to his senior colleague and late teacher, Dr. Gull, for having acquainted him with the principal features of the condition. One of Fagge's patients was obviously suffering from juvenile myxoedema, and this led him "to speculate as to what characters would be present, should the disease (if that be possible) arise still later in the course of adult life." Two years later, in 1873, Sir William Gull read a paper to the same society "On a cretinoid state supervening in adult life in women." In it he described five cases, referred to Fagge's paper, and

expressed the belief that these cases were examples of the condition which Fagge had predicted. Gull's paper was brief, and would probably have attracted little attention but for the forcefulness of his character and the fact that he was at this time the most famous physician in the country. Two years previously he had been called in by Sir William Jenner to attend the Prince of Wales, who was suffering from typhoid fever. Seeing that the Queen had lost her beloved husband from the same complaint, it is understandable that when the Prince recovered Gull received not only the heartfelt thanks and gratitude of the nation and the Queen but also a baronetcy. Gull resigned from Guy's at the age of 50 to attend to his busy practice, and died in 1890 following the third of a series of cerebral haemorrhages. On recovering from the first he is said to have remarked, "One arrow has missed its mark, but there are more in the quiver." He left £344,000.

It was, however, William Ord, of St. Thomas's Hospital, who in 1877 gave a full and classic account of the condition and called it "myxoedema." During the next five or six years studies were being made on the Continent of the results of total extirpation of goitrous thyroid glands, and Sir Felix Semon, the laryngologist, on reading Kocher's paper on "cachexia strumipriva," recognized in the description the classic picture of myxoedema, and drew the attention of the Clinical Society of London to the matter. Though Semon's idea that cachexia strumipriva, myxoedema, and cretinism were all due to the same cause was at first ridiculed, eventually the Clinical Society set up the Myxoedema Committee in 1883, with Ord as chairman and Sir Victor Horsley as one of the members. Semon was obviously more familiar with the Continental literature than most of his colleagues, for he was in fact German, and when he came to this country in 1875 he spoke hardly a word of English.

Therapists

Treatment, other than empirical quackery, was practically non-existent in those days, and in endocrinology the first to succeed in carrying out a rational form of therapy was George Murray, of Manchester. Here is Sir Walter Langdon-Brown's description of what happened, as recounted to him by Murray himself. At the time of the setting up of the Myxoedema Committee there was a tendency to regard myxoedema as a failure of excretion, hence the patient's bloated appearance. Murray, however, after consulting Horsley, with whom he had worked at University College Hospital, suggested it was due to loss of an active internal secretion; and in 1891 he demonstrated a case of the disease to the Newcastle and Northumberland Medical Society and announced that he proposed to treat it by means of an extract of thyroid gland. A senior member of the society said that it would be just as sensible to treat a case of locomotor ataxy with an emulsion of the spinal cord. Murray arranged with a slaughterhouse to be allowed to dissect out sheep's thyroid glands, of which he proposed to make an extract. The Newcastle Medical School refused to give him facilities for this, but Armstrong College provided him with a room in which to prepare his extracts. Towards the end of that year he triumphantly demonstrated the same patient, now an active and sprightly woman of 46 as the result of injections of his extracts, to the same society. The patient lived to be 74, by which time she had received the equivalent of 870 sheep's thyroids.

Murray was, of course, lucky, for a crude extract of sheep's thyroid glands is as good a therapeutic agent for thyroid deficiency as any other. The therapists of the present generation usually have to rely upon the physiologist or the chemist to supply them with their active principle. Thus Lawrence, the pioneer and leading exponent of the treatment of diabetes in this country, had to wait for Banting and Best to introduce insulin before his own life could be saved and he could alleviate the sufferings of so many diabetics during the past 30 years. It was necessary for Reichstein to synthesize deoxycorticosterone acetate before

Leonard Simpson could apply it to the treatment of Addison's disease; and until Dodds had made stilboestrol available oestrogen therapy was virtually ineffective.

Chemists

Chemists, indeed, have played a particularly distinguished part in the history of British endocrinology, as the following examples will show.

On Christmas Day, 1914, a pure, crystalline, and physiologically active protein was isolated from the thyroid gland by the American chemist E. C. Kendall, who, believing that the essential component was oxyindole, christened it "thyroxindole," which was later shortened to "thyroxin." (The terminal *e* was added to conform to the British system of nomenclature of this class of compound.) In 1926 Harington showed that the active principle was a derivative of tyrosine, indeed a condensation product of 3:5-diiodo-tyrosine, and not of indole, and in 1927 Harington and Barger synthesized thyroxine. It is peculiarly fitting, therefore, that it was in Sir Charles Harington's laboratory that Dr. Rosalind Pitt-Rivers conducted the studies which led to the realization that triiodothyronine is in fact the true hormone of the thyroid gland. By 1929 and 1930 pure crystalline oestrogens were being extracted from the urine of pregnant mares, and G. F. Marrian succeeded in obtaining oestriol from human pregnancy urine. In the same year Marrian isolated pregnanediol, the inert urinary metabolite of progesterone, subsequently to be isolated in pure crystalline form five years later. The elucidation, in 1932 and 1933, of the structure of the *cyclopentenophenanthrene* ring system cleared the decks for an intensive chemical study of the steroids, including the sex hormones, in which an important part was played by J. W. Cook and his collaborators, who were largely responsible for determining the structure of the natural oestrogens. Struck by the existence of no fewer than five natural oestrogenic substances, Dodds and his colleagues began to wonder how specific was the molecular structure for oestrogenic activity, and they soon found a compound, 1-keto-1:2:3:4-tetrahydrophenanthrene, which did not contain the *cyclopentenophenanthrene* skeleton but which was weakly oestrogenic. They subsequently established the fact that the phenanthrene structure was not essential for oestrogenic activity, and they eventually tested the potency of the very simple compound anol (*p*-hydroxypropenyl benzene) and found it to be highly active. However, when attempts were made to repeat the work, some batches of anol were found to possess only very slight activity, and it was obvious that the activity in the first batch must have been due to a contaminant. The work was continued in collaboration with Sir Robert Robinson, and it was shown that the active compound was in reality 4:4'-dihydroxy- α - β -diethylstilbene. The introduction of this cheap and highly potent oral compound completely revolutionized oestrogen therapy.

In the androgen field Leonard Simpson, Alison Macbeth, and de Fremery had reported abnormal quantities of male hormone in the urine of certain cases of virilism from 1933 onwards, but the chief credit for developing a reliable and accurate method of estimating urinary neutral 17-ketosteroids belongs to Callow. It is of some interest to note how this came about. In 1936 Professor A. W. M. Ellis (now Sir Arthur Ellis), of the London Hospital, appeared before the Hormones Committee of the Medical Research Council and pressed strongly for the establishment, under the Council's auspices, of an endocrine laboratory institute in which hormone assays and estimations could be carried out to assist clinicians in the diagnosis and treatment of endocrine disorders. The Committee considered the proposal and decided that a useful start could be made by trying to find a method of determining the urinary metabolites of the androgens produced by the gonads and adrenal cortex. The task was placed in the capable hands of Dr. R. K. Callow, and his staff was augmented by an additional biochemist, whom he subsequently married. Callow and

his colleagues modified the Zimmermann colorimetric method for determination of urinary androgens and put it on a secure basis.

The most recent chemical achievement of which British endocrinologists may be proud is the discovery by S. A. Simpson, J. F. Tait, and H. M. Grundy of the very potent adrenocortical hormone, aldosterone.

Pharmacologists

Pharmacologists have also made valuable contributions to British endocrinology. Dr. George Oliver, a physician who practised in Harrogate during the summer months, had gained the impression that patients suffering from low blood pressure would derive benefit from injections of an extract of the adrenal gland. Trying this out on his son, he thought he detected a contraction of the radial artery. In considerable excitement he rushed up to London to tell his friend Professor Schäfer (Starling's predecessor in the Chair of Physiology at University College) about it. Schäfer was actually conducting an experiment which involved measuring the blood pressure of an anaesthetized dog, and, polite though incredulous, he injected some of the extract into the animal and was astonished to see the mercury almost shoot out of the top of the manometer. The date was 1894, and in the following year Benjamin Moore, working in Schäfer's laboratory, correlated this pressor substance with the adrenomedullary chromagen. Later adrenaline was isolated and its relationship with the sympathetic nervous system remarked upon. A little later still Sir Henry Dale pointed out that noradrenaline reproduced the actions of the sympathetic impulses with even greater fidelity. In 1906 W. E. Dixon obtained from a heart which had been subjected to vagus stimulation an extract which inhibited frog's heart muscle. This substance, subsequently known as acetylcholine, was discovered by accident in ergot of rye by Dale and identified by Dale and Ewins in 1914; it was found to be released at parasympathetic nerve-endings by Dale and Dudley in 1929 when, as Sir Henry has modestly put it, they "were looking for something else."

Pathologists

Pathology, perhaps, has contributed surprisingly little to British endocrinology. Nevertheless there are three exceptions. The first is the detailed description of the histology of the thyroid gland by Wilkinson King in 1836. He described the colloid and showed that it passed into the lymphatics and so into the great veins, adding that "whilst the nourishment of a part is indispensable to its existence, the influence which it exerts upon the circulating fluid may be more or less needful for the healthy subsistence of the entire animal"—a prophetic forecast of the principle of internal secretions. King succeeded Thomas Hodgkin as curator of the museum at Guy's at the age of 28, and his literary output was very considerable; but, as Wilks said, "though young he had an aged worn look and a chronic cough," and he died of pulmonary tuberculosis at the early age of 38. The second exception is the description by A. C. Crooke in 1935 of hyaline changes in the basophil cells of the pituitary in cases of Cushing's syndrome, and the third the observation by H. L. Sheehan that the majority of cases of panhypopituitarism are due to post-partum necrosis of the gland and present clinically as cases of secondary myxoedema and not, as described by Simmonds, as pituitary cachexia.

Experimental Physiologists

Last I come to a group of endocrinologists whom I find difficult to classify, and I think perhaps I can best describe them as experimental physiologists. Actually they may be surgeons, like Astley Cooper and Victor Horsley, performing thyroidectomy on puppies or monkeys; or they may be anatomists, like Zuckerman, whose contributions and those of his school have always been careful, painstaking, and prolific, and yet have ranged over a surprising variety of subjects from the menstrual cycle and the functions of the prostate to the interactions of the hypothalamus and the

pituitary; or neurophysiologists, like G. W. Harris, whose studies of the hypothalamus and the pituitary have been outstanding. They may be engaged on agricultural research, like S. J. Folley, whose studies at Reading have laid the foundations of modern lactational physiology. They may be biochemists, like F. G. Young, whose fascinating studies of the role of the pituitary in carbohydrate metabolism have identified the diabetogenic hormone with the growth hormone. Or they may be truly experimental physiologists, such as the late F. H. A. Marshall and his disciple, A. S. Parkes, whose work on the physiology of reproduction virtually created this branch of endocrinology and has certainly maintained its standard unsurpassed throughout the world.

The object of this historical review has been to point out that the contributions of the British school were noteworthy and important and have gained for British endocrinology a high reputation. The following account suggests that that reputation has been maintained during the last quarter of a century.

The "Journal of Endocrinology"

By the late 1930's it was becoming obvious to a few workers actively engaged in various fields of endocrine research that there was a growing need for a journal in which their results could be published. A small group of ten therefore decided to launch a British journal devoted to the publication of original work in endocrinology. Each of these ten individuals having guaranteed a certain sum of money, the *Journal of Endocrinology* eventually came into being. Sir Henry Dale acted as chairman of the committee which conceived, devised, and launched the project, but, at his own request, he was not appointed chairman of the council of management. Dr. A. S. Parkes was accordingly elected to this post, and Professor F. G. Young became the secretary. With Sir Charles Dodds as editor, the first number of the journal was published in June, 1939. It could hardly have appeared at a less propitious moment. Before the next number was printed the second world war had broken out. Many of the journal's subscriptions came from overseas and therefore promptly ceased at the outbreak of hostilities. Had it not been for the subventions granted from time to time by the Royal Society the journal would assuredly have succumbed. Indeed, at one stage during the war the treasurer was obliged, in order to keep the journal afloat, to call upon the guarantors to pay up half the money they had guaranteed. However, it seems to have been endowed with a miraculous buoyancy, and to-day it is a flourishing concern which publishes four or more numbers a year under the editorship of Professor Zuckerman.

The Society for Endocrinology

Once the war was over, one or two members of the council of management felt the need for periodic symposia on endocrine subjects and suggested that a society should be formed to deal with the organization of such gatherings. The council recognized the rapid expansion that was taking place in endocrinology and the desirability of founding a society membership of which should be open to the many workers now actively engaged in the study of this subject. They felt that this society should take over management of the journal, which should become its official publication. The treasurer, however, insisted that the society should repay the guarantors the money they had individually disbursed to keep the journal alive during the days of its financial difficulties. This money having in due course been repaid, the Society for Endocrinology was founded and held its first meeting at Guy's Hospital in July, 1946, when Sir Charles Harington delivered the inaugural address. Dr. Parkes became chairman of the committee of the society and Dr. S. J. Folley the honorary secretary. The society's first symposium was held in December, 1946. Dr. Folley became chairman of the committee in 1951, and with the two present secretaries, Professor C. H. Gray and Professor N. F. MacLagan, has led the society forward to become the

flourishing and respected body that it now is, upholding the highest traditions of academic endocrinology, and enjoying a reputation certainly equal to that of any society of endocrinology throughout the world.

The Section of Endocrinology of the Royal Society of Medicine

In the meantime the clinicians were not inactive. Towards the end of 1944 Dr. Raymond Greene was exploring the possibilities of establishing a Section of Endocrinology of the Royal Society of Medicine and was not finding his task easy. There were some who disapproved of carving another slice off the body medical, and there were others who felt that the creation of a Section of Endocrinology might deprive existing sections of many subjects that they themselves would like to discuss. There were still others who felt that clinical endocrinology was not yet based on a scientific foundation, that most clinical endocrinologists were quacks, and that a Section of Endocrinology would become a sounding-board for their "hot air." On the other hand, Dr. Greene had one or two loyal supporters, particularly Mr. L. R. Broster, who was able to plead the case before the Council of the Royal Society of Medicine. Thus it is almost entirely due to these two enthusiastic pioneers that this section came into existence on January 26, 1946, exactly six months before the Society for Endocrinology held its inaugural meeting. The first president of the section was Sir Walter Langdon-Brown, the two vice-presidents were Mr. Broster and Dr. Gardiner-Hill, and the senior secretary was Dr. Raymond Greene. Indeed, the new section emerged as such a smart equipage that a certain wit christened it "the Section of West-Endocrinology." Sir Walter Langdon-Brown was unfortunately prevented by illness from making a personal appearance before the section, and his presidential address was read for him by Dr. Raymond Greene. On the death of Sir Walter, Mr. Broster became president.

The section flourished from the start, and its meetings were attended by large gatherings which filled the Barnes Hall. Almost immediately all resistance, resentment, and opposition disappeared. The section has always been on the most cordial terms with the Society for Endocrinology, and during the year 1948-9 Dr. Parkes was president of the Section of Endocrinology and chairman of the committee of the Society for Endocrinology. From time to time the section and the society have held combined symposia, and the council of the one and the committee of the other have on occasions met together—for instance, when they asked the Medical Research Council to consider providing facilities for certain laboratory investigations, such as urinary hormone assays, to clinical departments which were unable to have these carried out in their own hospitals. As the result of this approach the Medical Research Council set up a Clinical Endocrinology Committee, which has, among other things, published a standard method of determining urinary 17-ketosteroids. It has also made arrangements to distribute certain steroid reference standards otherwise difficult to obtain. In 1952 the section and the society set up a committee under the chairmanship of Mr. Broster to consider how best to encourage progress in endocrinological research in this country in the future.

The Addison Lecture

As the result of a benefaction to the medical school by one of its old students, Guy's Hospital established an annual lecture to commemorate the part played by Thomas Addison in the foundation of modern endocrinology. The inaugural Addison Lecture was delivered by Sir Charles Dodds in 1946. It has been the custom to select the lecturers alternately from this country and from overseas, and the subsequent lecturers have been Professor E. B. Astwood, of Boston; Sir Henry Dale; Professor G. W. Corner, of Baltimore; Professor F. G. Young, of Cambridge; Professor T. Reichstein, of Basle; Professor S. Zuckerman, of Birmingham; and Professor Lawson Wilkins, of Baltimore. Among

those who have taken the chair at these lectures have been Sir Charles Harington and Dr. E. D. (now Lord) Adrian.

Whither Endocrinology ?

At the present time clinical endocrinology has not acquired the status of a specialty to the same extent as has neurology or orthopaedic surgery or psychiatry or paediatrics ; the number holding appointments on hospital staffs as endocrinologists can be counted on the fingers of one hand. But, with due respect to the other three, it is fair, I think, to say that this small handful cannot claim the credit for the high record in which British endocrinology is held. As I have already pointed out, there are anatomists, experimental physiologists, biochemists, clinical pathologists, pharmacologists, therapists, physicians, surgeons, and even professors of social medicine, who by their research work, their writing, their teaching, their inspiration, and their flair for organizing have raised its standard and made its great reputation.

How can this be maintained ? How are future scientists to be trained in, and future doctors to be taught, endocrinology ? Above all, what inducements exist at the moment, or are likely to arise in the near future, to attract recruits into endocrinology ? Is there to be an Institute of Endocrinology established for postgraduate training ? I think not. To be comprehensive, its laboratories, its wards, its clinics, and its specialist departments for the study of diabetes and other metabolic disorders, thyroid disease, paediatrics, neuro-endocrinology, gynaecological and obstetric endocrinology, let alone the more abstruse biological and biochemical research, would spread and sprawl to such an extent that if grafted on to a certain famous postgraduate hospital they would land up in the neighbouring gaol. Furthermore, one could not hope to concentrate the present generation of established endocrinologists in such an institute. Most of them are comfortably ensconced in the departments they have already built up for themselves through their own enterprise and the good will and personal interest of their colleagues. In fact such centralization would be a retrograde step. Regionalization is the modern policy of medical planning.

Is there to be a special course in endocrinology for premedical students, a diploma in endocrinology, a College of Endocrinologists ? Again, I think not, for endocrinology is not a pigeonhole specialty, but rather a cross-section of the biological sciences and of medicine, surgery, and gynaecology. We who are specially interested in endocrinology do not want to confine it to ourselves ; we want to spread our gospel. We want to collaborate, not to insulate ; to co-operate, not to isolate.

Nevertheless we are firmly convinced that endocrinology is an established, respectable, orthodox, and rapidly expanding biological and clinical science. We would do much to prevent it from being stifled, swallowed up, derided, or ignored. So what must we do ? Those of us who hold appointments in undergraduate teaching hospitals must select from our collection a few only of our most classic cases of common endocrine disorders and demonstrate them to the students simply and attractively. These demonstrations should be memorable but infrequent, for the medical student has more than enough to learn already, and endocrinology is only a very limited part of that amount. In postgraduate teaching it might be an advantage to arrange a systematic course of lecture-demonstrations given by those who have made a special study of this specialty.

Recruitment

There are physicians and others who are members of the Section of Endocrinology who have established themselves and made their names famous as endocrinologists, whatever they may officially call themselves. There are younger and more junior Fellows of the Royal Society of Medicine who attend the meetings of the section simply because they wish, quite rightly, to broaden their medical education. A few, however, may be genuinely interested in endocrinology and

would like to specialize in it, if only they dare take the risk. And the question is, dare they take the risk ? Of course, if you want to be successful in life you must always take a risk. You must take a risk if you aspire one day to become a consultant physician, for there are not nearly enough consultant posts in internal medicine to accommodate the many hundreds of hard-worked, underpaid, and well-qualified medical registrars. And you of the present generation live in a competitive age in which only a few can reach the top in whatever walk of life you choose. Nevertheless there *are* sufficient consultant posts in medicine, surgery, obstetrics and gynaecology, neurology, dermatology, ophthalmology, oto-rhino-laryngology, orthopaedics, genito-urinary surgery, paediatrics, anaesthetics, radiology, radiotherapy, and psychiatry to attract recruits who are prepared to spend more years in training for them than they took to become qualified doctors.

But what of endocrinology ? There are, I think, opportunities for training. In most schools of medicine there are posts to be held in the departments of clinical chemistry or clinical pathology where the basic technique may be learnt, and there should be vacancies for men so trained to work at registrar level in the departments of those who have established themselves as experts in some branch of clinical endocrinology. Another method—though I am not suggesting that it is necessarily the only method—of obtaining such training has been provided by the Medical Research Council. In 1951 this body launched a scheme of Clinical Research Fellowships. The holder of one of these Fellowships is paid at registrar level and is given the opportunity of acquiring the techniques and disciplines of those basic sciences relevant to his clinical interests, or of working in a department of recognized standing already engaged in clinical research, such as the clinical units of the Universities or the Medical Research Council. If he makes a success of his Fellowship, there is the possibility that he might obtain one of the Council's Rockefeller or other Travelling Fellowships and thus have the opportunity of broadening his outlook by working in the department of some distinguished foreign expert in the particular specialty he has chosen. Furthermore, he may do this without losing his place in the queue, for the Council has insisted on a promise from the applicant's sponsor of an appointment at the end of the training period. But what appointments are, in fact, available at the present moment, either in general clinical endocrinology or in some branch of endocrinology ? The answer is, I am afraid, "None." Now this is disastrous, for unless you can offer the trainee some prospects, some goal to aim at after you have so carefully, arduously, and expensively trained him, you will find no recruits, and clinical endocrinology in this country will wither and die.

How is this very serious and urgent situation to be remedied ? Not, I think, by setting up a whole crop of new departments of clinical endocrinology, for this would take more time than, in our urgent predicament, we can afford. It would require a large capital grant and a substantial endowment, which are most unlikely to be provided either by the National Health Service or by the University Grants Committee in these stringent times. It would need the greatest good will and active co-operation of the clinical staff of the hospitals in which the new departments are to be set up, and indeed it is very doubtful whether one could "sell" the scheme to medical committees and boards of governors of hospitals, already short of beds and with the present drastic cuts in their maintenance costs, even supposing they were sympathetically attuned to the idea of creating and expanding a new specialty. This does not mean that I do not hope that existing departments of endocrinology will flourish to the mutual benefit of themselves and the hospitals in which they are established, and by their example prepare the way for the foundation of other such departments at the earliest expedient moment. I hope also that existing departments of endocrinology may be given the opportunity of playing their part in training future endocrinologists.

But at the moment, I think, our best chance of overcoming the serious predicament of lack of recruits in endocrinology is to encourage the establishment and expansion of the endocrine aspects of certain branches of the medical sciences which cannot afford to ignore endocrinology if they are to make their proper contributions and retain their high reputation in this age of rapid scientific advances. I will take two examples to illustrate what I mean. The first is paediatrics. Lawson Wilkins has shown the close relationship between paediatrics and endocrinology, and through his inspiration, enthusiasm, and hard work he has made far-reaching contributions, not only to paediatrics, but to endocrinology. He has broadened the scope of paediatrics and, far from snatching the livelihood from the mouths of the paediatricians, he has presented them with a new stock-in-trade, and on account of his work and that of others like him paediatricians throughout the world are being consulted more and more about endocrine problems. If the paediatricians of this country would select and encourage one or two of their promising young registrars and have them fully and carefully trained as endocrinologists, and then be prepared to give them consultant status with charge of beds and full responsibility for the care of patients, I feel sure that this step would redound to the credit of British paediatrics. My other example is gynaecology. In my view there is need for more gynaecological endocrinologists. In the first place, disorders of menstruation constitute a rather complex aspect of applied physiology which can be thoroughly comprehended only by someone with a fair knowledge of general endocrinology and biochemistry, and it is seldom that the gynaecologist has this knowledge. His training and outlook are totally different. The surgical skill and technique of the gynaecologist, the mechanical manipulations of the obstetrician, and the necessarily rapid repetition of pelvic examinations in the out-patient clinic are unlike the careful recording of menstrual cycles and the precise timing in relation to the menstrual cycle of endocrine therapy, familiarity with the dosage, potency, toxicity and efficacy of different preparations, and the complementary activities of the adjoining endocrine laboratory unit. Nevertheless endocrinology is playing an increasing part in gynaecology. Let the gynaecologists single out and encourage a few of their promising young registrars and have them fully trained as endocrinologists, and then appoint them with consultant rank to gynaecological professorial units or special gynaecological hospitals. Then give them an endocrine laboratory, and they will provide an added stimulus to the work and enhance the reputation of the department or hospital concerned.

I have chosen only two examples: I could develop my theme further. Clinical endocrinologists are needed in thyroid clinics, fertility clinics, and departments of internal medicine, rheumatology, urology, dermatology, allergy, and even surgery. They may be purely clinical endocrinologists with a background training in either physiology or internal medicine, or they may be recruited from the ranks of the specialty on to which it is intended to graft endocrinology. In either case they should have full consultant status. This is not, in my view, an unrealistic dream. It needs enlightened boards of governors and tolerant and sympathetic medical committees, and heads of departments with a determination to carry out their plan. Unless in some such way consultant posts are created soon, endocrinology in this country will surely wither.

The *British Journal Photographic Almanac* for 1955 (Henry Greenwood and Co., 5s., or cloth-bound 7s. 6d.) has several articles on recent progress, both in techniques and apparatus, which will be of interest in hospital radiography departments. It is pointed out how much radiography has benefited from new advances in isotope production, and how photochemistry is helping to unravel complex chemical problems. A six-page table gives summary information about materials for medical photography. The photo-gravure reproductions are excellent.

PNEUMOCOCCAL MENINGITIS

A SHORT SURVEY OF 78 PATIENTS IN THE BRISTOL CLINICAL AREA

BY

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In general the prognosis in pneumococcal meningitis has been poor; indeed, before the availability of the sulphonamides it was almost hopeless, 100% mortality having been recorded by Toomey and Roach (1939) and Silverthorne (1948), and a review of 631 cases from the literature revealed but one survival (Waring and Weinstein, 1948). After the introduction of the sulphonamides the mortality remained at about 60 to 80% (Table I), but marked improvement followed the introduction of penicillin, although very varied results have been reported (Table II). In some the mortality is 20% or less, but the average for the results quoted is 40% (Table II).

TABLE I.—Mortality of Pneumococcal Meningitis Treated with Sulphonamides Alone (Various Authors)

Authors	No. of Cases Treated	Mortality
Appelbaum (1945) ..	139	65%
Dowling <i>et al.</i> (1942) ..	72	94%
Hartmann <i>et al.</i> (1945) ..	34	63%
Hodes <i>et al.</i> (1943) ..	60	58%
Jackson (1950) ..	82 (excluding those treated with sulphanilamide only)	79%
Neal <i>et al.</i> (1940) ..	30	67%
Rhoads <i>et al.</i> (1940) ..	22	68%
Sweet <i>et al.</i> (1945) ..	40	92%
Walker and James (1945) ..	28 (one patient treated with penicillin)	64%

TABLE II.—Mortality of Published Series of Cases of Pneumococcal Meningitis Treated with Penicillin

Authors	No. of Cases	Mortality
Appelbaum and Nelson (1945)	67	61%
Appelbaum <i>et al.</i> (1949) ..	125	26%
Bunn and Peabody (1952) ..	20	35% (25% if 2 patients who died during treatment from other causes are excluded)
Dowling <i>et al.</i> (1949) ..	87	56%
Feibush <i>et al.</i> (1952) ..	22	68%
Galloway and Chambers (1953)	27	33%
Gibson and James (1952) ..	31	10%
Hall <i>et al.</i> (1946) ..	17	24%
Jackson (1950) ..	51	43%
Lowrey and Quilligan (1948)	17	18%
Nemir and Israel (1951) ..	15 (all infants and children)	7%
Ross and Burke (1946) ..	19	16%
Smith <i>et al.</i> (1946) ..	38	24%
Sweet <i>et al.</i> (1945) ..	16	56%
White <i>et al.</i> (1945) ..	50	64%
Total ..	602	40%

Present Series

During the period January 1, 1946, to May 31, 1953, pneumococcal meningitis was diagnosed in 78 patients in hospitals for acute cases in Bristol. Hospitals for chronic cases were not included in the survey. A number of recurrences brought the total number of attacks of meningitis to 84, in 82% of which the pneumococcus was cultured from the C.S.F. either in life or at necropsy, and in the remainder it was seen in a stained smear.

Mortality.—Of the 78 patients 38 died, a mortality of 49%. A necropsy was performed on 28 (74%). The mortality calculated according to the number of attacks of meningitis was 45%.