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THE JOURNAL OF
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Act. Derm. Ven., (1962), 42, 426

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Arch. Dermatol., (1961), 84, 1029

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HISTORY AND EVOLUTION OF PLASTIC SURGERY

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Plastic surgery is a branch coming from the main trunk of medicine and surgery and the origins are in antiquity.

Of all branches of medical science plastic surgery is probably the most frequently misunderstood. The word 'plastic' is not modern. Today it is used in the main for products of a great modern industry. When one refers to plastic surgery, most people think of cosmetic surgery and unfortunately in some quarters plastic surgery and cosmetic surgery are virtually synonymous. This is far from the case. Again, some persons in ignorance believe that in plastic surgery plastic materials are used to close wounds and to make scars invisible.

The confusion is increased by the somewhat frequent allusions to the wonders of plastic surgery in women's magazines, and readers seem to be encouraged to seek cosmetic surgery.

A definition of modern plastic surgery would be difficult to offer, but it can be considered as the repair or reconstruction of tissues following defects or destruction either congenital or acquired. A better term would be reconstructive surgery. Some call it the application of techniques to any branch or part of surgery. Any part of the body might need repair. The task of plastic surgery is to restore the appearance and function of parts of the body destroyed or damaged by disease or injury, parts removed by surgical operation, parts deformed embryologically and to correct physical deformities.

Plastic surgery attempts to fulfil its purpose by transferring to the site of the loss or defect, tissues from the adjoining parts, from near or more distant parts of the body and sometimes from other individuals and in a limited number of cases animal tissues or foreign bodies of animal, mineral or artificial origin. Such transfers are termed transplantations.

It is impossible to say when the first plastic operations on man were performed. It can be assumed that grafting in plants, which was known in prehistoric times, gives rise to the idea of transferring tissues in man and animals. Progress in surgery has often accompanied changes in methods of warfare and the nature of mutilation.

A common form of injury over the ages was loss of the nose. Prehistoric man was at first armed to defend himself only with his hands and teeth and in close-quarter fighting the nose often suffered. Again, one of the oldest forms of judicial punishment was surgical removal of the nose. In olden times prisoners of war had their noses cut off. It is not surprising that the history of plastic surgery is to some extent bound up with the development of techniques to replace that part of the face lost from sword injury, gun powder and rifle injury, burns, etc.

The word 'plastic' comes from a Greek adjective derived from the verb meaning to mould or form. It is found in the Latin of the first century A.D. as plasticus, and by the time of the Renaissance it was common use in French (plastique) and English.

The root 'plastic' has been in continual use almost from the beginning of the 19th century when the present era of plastic surgery commenced. In 1816 Carpue published a book "An Account of Two Successful Operations for Restoring a Lost Nose." Carpue did not actually

mention the word but in 1818 Graefe published a book in German, termed "Rhinoplastic", and in Latin termed "De Rhinoplastice."

During the next decade a host of new words were coined by tacking the ending 'plasty' on to the Greek names for various anatomical sites, e.g. 'otoplasty', 'blepharoplasty'. It is clear, however, that plastic surgery existed long before the term plastic was employed. It might well be considered the oldest branch of surgery.

Portraits dating from 7000 B.C. were recently excavated around Jericho. Some skulls showed evidence of trephining, presumably to 'let out devils'. Similarly, excavations in ancient Egypt have brought to light many interesting surgical methods in practice about 1600 B.C., for instance, the treatment of the dislocated and fractured jaw and fractured nose.

Some of the oldest records of plastic operations come from India. In the chapters of the Indian Encyclopaedia, the "Ayurveda", which has been copied from time immemorial, it is stated that members of the Koomas caste constructed noses from the skin of the face or forehead for thieves who had been punished by loss of their nose.

Books older than "Ayurveda" have been found in Tibetan monasteries and are said to contain descriptions of reconstructions of the nose from the skin of the forehead. It is possible, therefore, that this knowledge spread to India in the stream of cultural influence which emanated from Tibet into the countries of the East.

It is in some ways surprising that the Bible contains no mention of plastic operations if we except the verse in Genesis "and the rib which the Lord God had taken from man, made he a woman." There are likewise no records in the Talmud. Even the Greek poet Homer, who loved to describe many types of wounds and their treatment, did not mention the possibility of replacement of lost parts.

The first European writer to mention plastic operations was a Roman doctor, Aurelius Cornelius Celsus, who lived in the time of Tiberius Caesar. Celsus gave detailed accounts of many techniques to repair loss of tissue of the nose, lips or ears.

In A.D. 30, Celsus wrote "De Re Medica", the oldest medical document after the writing of Hippocrates. Celsus could be called the father of plastic surgery. In his book he describes the first operative correction for ectropion, ptosis, and entropion of eyelids. He repaired with local skin flaps mutilated ears, noses and lips. He also described a method of separation of fingers in syndactylism and a plastic operation on the penis to cover the glans with skin where circumcision had been too radical—what might be called penile reform. He also described the care of ears and lips cleft at birth or accidentally torn. Following Celsus there was a long period without progress.

A cultural decline followed the fall of the Roman Empire and the twilight of the Middle Ages was not favourable to scientific literature. The only mention of plastic surgery appeared in legends. In Florence there is a fourteenth century picture which shows St. Cosmas and St. Damian transplanting the leg from a Moor who had died, to a sexton with cancer of the leg—an early example of homotransplantation.

History relates how Justinian II (669-711), Roman Emperor, was so harsh a ruler that his subjects rose in rebellion, took the Emperor prisoner, cut off his nose and sent him into exile. Later he escaped, raised an army, recaptured Constantinople and again ascended the throne. The Emperor naturally demanded a nasal reconstruction and today, still preserved in Venice, is a marble bust of Justinian with a new nose, evidently constructed from a forehead flap. Yet, even after this triumph of reconstruction the whole art of facial restoration disappeared from recorded history for more than 700 years.

In A.D. 1215, Pope Innocent III decreed that no priest should perform any surgical operations which involved bloodshed and as a result procedures were turned over to barbers, bathkeepers, executioners, mountebanks and other individuals of low degree. And so the next genuine records of plastic operations from Italy are not found until the middle of the 15th century. In 1442, Branca, a surgeon of Catania in Sicily, carried out plastic repairs of the nose, using skin from the face. His son, Antonio, continued his work and was the first to replace the nose by a flap of skin from the arm.

The Brancas themselves left no writings but in 1460 Heinrich von Pfolspenridt, a Bavarian army surgeon, wrote on the flap-from-the-arm method used by the Brancas. Their technique was also written up by Fioravanti in 1549. He observed their secret work and wrote—"and everyday I went to their house for they have five persons on whom to make noses, and when they wished to perform these operations they called me to watch such a thing, and I turned my face away but my eyes saw very well, and

thus I saw the whole secret from the beginning to end and I learned it."

It was after seeing the Brancas at work that the Roman poet, Elisio Calenzio, wrote of using the nose from a slave to graft to a mutilated person. Voltaire, in his Philosophic Dictionary in 1792, wrote in the following lines of homografts—*

"And so Tagliacotius
A famous Aesculapius
Restored the missing nose.
Listen I pray to this prose
How in a strange way
He cut some skin away
From the bottom of a slave
And applied it swiftly
To the face adroitly
But there came the time alas,
When death of donor came to pass
The recipient's nose did follow
And then alas within the coffin
Lended nose did join the bottom."

The first systematic treatise on plastic surgery ever written was published in 1597 by Gaspar Tagliacotius, the Professor of Surgery at Bologna. In his book he describes in detail his pedicled arm flap for rhinoplasty.

Tagliacotius' temerity in interfering in the affairs of the Almighty found great disfavour in the eyes of the dignitaries of the Church. He was excommunicated and his corpse was exhumed from its grave in a monastery church and placed in unconsecrated ground. The citizens of Bologna, however, were so proud of their countryman that a monument was erected and the figure holds a nose in its hand. For some time after Tagliacotius' death his pupils continued his operations, but during the 17th and 18th centuries plastic surgery was almost completely neglected. In the 17th and 18th centuries no great importance was attached to men or women with missing noses and they had substitutes made of gold, silver or ivory.

In 1731 a female charlatan, Gambacurta, offered for sale her healing balsam in the streets of Florence. She would cut a piece of flesh from her thigh, pass it round on a plate, get it confirmed in writing by the town clerk and then apply the piece of flesh to the wound again. On treating it with the balsam, she got healing without a scar.

*Modified from E. V. ELST. Physiopathology and Treatment of Burns, J. Lorthiow. Presses Academiqres Europen—Brussels, 1964.

In October 1794 the Indian method of rhinoplasty by means of a forehead flap was brought to the attention of European surgeons by an anonymous letter in the "Gentlemen's Magazine" from two English observers who had seen a Mahratta surgeon perform it in India. This letter stimulated Joseph Carpue, a student at St. George's Hospital and later surgeon to the Duke of York's Hospital, Chelsea, to perform, in 1814, the first rhinoplasty in Europe in modern times. His work stimulated surgeons in some European countries, e.g. Graefe in Germany, but had little influence in Britain.

Britain, in the latter half of the 19th century, lagged behind and produced little in reconstructive surgery. It is interesting, however, to note that the principles of plastic surgery were evolved before "Listerism". It was however papers in this period that extended plastic surgery to all parts of the body—not only the face but the extremities.

The descriptions up to now have been all referable to 'flap' transplantations in the reconstruction of missing parts. Even before flaps were employed, the tilemaker caste in India are said to have successfully utilised free graft transplantations of skin, including the subcutaneous fat, taken from the gluteal region, after it had been beaten with a wooden slipper until a considerable amount of swelling had taken place. This process of beating was termed 'flagellation'. The Indians used a secret cement for the adhesion and the procedure was termed the 'Ancient Indian Method'. Flagellation brought more blood to the part. The removal of tissue from one part of the body to another was termed 'free grafting".

Up to the beginning of the 19th century little further was done in relation to the transplantation of free grafts of skin. In 1869 Reverdin reported on grafting of small discs of skin to ulcers and he was followed by Ollier, Thiersch and Wolfe.

Even in the early 20th century there was little interest in plastic surgery in Britain and in 1914 reconstructive surgery had not one single exponent; it was considered purely a minor aide to the general surgeon to epithelialise raw surfaces and was not often practised. The outbreak of war in 1914 with its mounting toll of severe facial casualties showed the medical world the poverty of its surgical reconstructive resources. The trench, or static warfare, produced high proportions of missile injuries of the head and face.

In 1916 the British Dental Association held

a discussion on "The Treatment of Injuries of the Face and Jaw" in London. The German surgeons, with intelligent collaboration of surgeon and dentist, had obviously forged ahead. A Major Gillies had served with the Red Cross in France from November 1915 and had seen the results obtained by French plastic surgeons and dental surgeons and, on returning to England, set up a unit of 200 beds at Cambridge Hospital, Aldershot. Later a move was made to Queen's Hospital, Frognal, Sidcup, Kent, at first with 320 beds but later expanded to over 600. The unit was termed a maxillo-facial unit and was staffed by plastic surgeons and dentists. Many became famous—Gillies and Kilner of Britain, Davis of America, and Magill, the anaesthetist.

Between the two world wars plastic surgery entered a difficult phase. The possibilities of the speciality in peace-time were not appreciated. By 1930 there were only two plastic surgeons in Britain. At the outbreak of World War II Britain had only four fully experienced plastic surgeons and several centres were set up to train young surgeons in the methods of World War I.

The problems of World War II were however in many ways quite different from World War I. World War I was a static war but World War II was one of movement with severe injuries due to high speed crashes, crushes, burnings and fractures. The injuries were not confined to the face but were of the trunk and extremities. The plastic surgeon found himself on much more equal terms with his general and orthopaedic colleagues. Many units were set up. Since World War II most universities have recognised the specialty and brought added responsibilities in teaching and research.

What then does modern plastic surgery attempt? As has been said, plastic surgery is the application of special techniques—of careful handling, of transplantations, etc. The field is wide but not fixed. Patients of all ages with tissue defects are accepted.

In the newborn there are cleft lips and palates, defects of first arch, fused fingers, birth marks, etc. Many forms of accidents are accepted, maxillo-facial injuries, degloving injuries, crush injuries of hands, finger injuries, wringer injuries and severe burns. Over 30 per cent of all admissions to the South East Scotland Regional Plastic Unit are the results of acute trauma.

Skin cancers and oral cancers form an appreciable percentage of all admissions. Treatment may include not only wide excision of the lesion but also all the regional nodes in continuity. In the face, the first step may be a tracheostomy and then a hemiresection of the jaw. Later extensive reconstructive procedures will be required.

Unfortunately to the lay mind a plastic surgeon continues to be looked on as a beauty surgeon. The amount of cosmetic surgery, however, carried out by plastic surgeons outside the London area is less than 2 per cent. of all their work. Essentially a plastic surgeon is a reconstructive and functional surgeon, one who by training and practice shares a place with his colleagues in the family of surgeons. His patients suffer from loss of functions and/or disfigurement.

Since World War II most universities have recognised the specialty. The plastic surgeon takes part in the teaching of the undergraduate and postgraduate medical student and he also plays a part in research. He has helped to revolutionise the treatment of burns, and has led in the studies of skin homografts, skin preservation and synthetic skin. He has helped in the development of modern anaesthesia. He has stimulated orthopaedic studies of facial abnormalities.

Many tissues can be grafted. Skin, fat, cartilage and bone grafts are common, but muscles, vessels, nerve and organs can be transplanted. Homografts and heterografts are used and tissues can be preserved.. If the homograft rejection response is conquered a new extensive field of replacement surgery will be opened.

Grafts can be applied to any part of the body—ears, eyebrows, eyelids, nose, lips, chin, fingers, foot, etc.

If parts cannot be made in flesh they are made in artificial material.

Not only human beings benefit from plastic surgery, but also animals. Valuable dogs can be saved from destruction by excision of malignant cutaneous lesions and grafting.

The plastic surgeon has also played a prominent part in accident prevention, especially relating to burns.

The plastic surgeon cannot rest on his laurels but, with his surgical colleagues, can continue to help his fellow men. Surgeons from advanced countries have tremendous responsibilities to other countries. They can play a tremendous part in breaking down international barriers by teaching and helping.

Systemic Lupus Erythematosus

A Review based on a Dissertation read before the Society on Friday, 29th November, 1964

R. McD. FOX

Not even the most enthusiastic student of systemic lupus erythematosus (SLE) would claim that it is a common disease, but it is an interesting one not only because it can mimic almost every other known disease, but also because it combines many of the features of commoner but equally ill-understood connective tissue disorders. Among these are rheumatic fever and rheumatoid arthritis. Another impetus to research is the nature of the victims—most of these unfortunate people are girls and young women.

SLE can present in many ways, but most commonly the patient's first complaint is of fever, joint pains, malaise or of the rash which gave the disease its name. But the organs most severely affected are the heart and kidneys, and in the acute attack the patient may die of cardiac or renal failure. More commonly, however, the disease progresses in a series of remissions and exacerbations, and even in the untreated patient it may be several years before death ensues.

Recently-developed techniques have shown that the relatively benign skin condition, discoid lupus (a slowly expanding rash which appears in areas exposed to sunlight), is a manifestation of the same pathological process which leads to the malignant systemic condition. About 50% of patients with this fairly common condition eventually develop some of the clinical or laboratory features of systemic lupus.

DIAGNOSIS :

When one is faced with systemic lupus in the differential diagnosis, some simple tests may be helpful. Often protein is found in the urine. The cellular elements of the blood are usually depressed, and there may be evidence of haemolysis. (In 30% of cases the Coombs Test is positive). The erythrocyte sedimentation rate is raised. LE cells may be seen in the peripheral blood. The plasma gamma-globulin is much in excess of the normal 10 - 15% of the total protein, and electrophoresis shows a peak in the low-molecular-weight division of the gamma-globulins.

PATHOLOGY :

The tissue damage appears to be related to changes in the connective tissue. Many of the bizarre signs and symptoms of SLE are caused by abnormalities in small blood vessels. The basement membranes of the renal glomeruli are also liable to severe damage, which accounts for the proteinuria almost invariably found at some stage of the disease.

There are four distinctive features which may be seen in the lesions :

(1) Degeneration of connective tissue, with deposition of fibrin-like material.
(2) Infiltration with lymphocytes and plasma cells.
(3) Aggregations of material with the staining properties of nucleoprotein (haematoxylin bodies).
(4) Polymorphs with similar material in their cytoplasm (LE cells).

A major advance in the knowledge of SLE was the discovery that these patients often have a positive Wassermann Reaction in the absence of spirochaetal infection. This Biological False Positive Test seemed to indicate the presence of abnormal antibodies, and led to the discovery that the plasma of these patients contains antibodies to a number of organs including heart, kidney and thyroid. There were also antibodies to specific cells, including leukocytes, erythrocytes and platelets, and to subcellular elements like mitochondria, microsomes and DNA. The obvious deduction was that the tissue damage is caused by these abnormal antibodies.

By immuno-fluorescent techniques it was shown that abnormal quantities of gamma-globulin are present in the lesions, together with complement, a substance often associated with antibody-antigen reactions. The fibrinoid material in the connective tissue was shown to consist largely of gamma-globulin. The nuclear material of haematoxylin bodies and LE cells was shown to be combined with gamma-globulin. Attention was drawn to the presence of lymphocytes and plasma cells in the lesions. Both of these are believed to synthesise gamma-globulin.

PATHOGENESIS :

All this seemed irrefutable evidence that antibody-antigen reactions were occurring at these sites.

The most celebrated attempt to explain these immunological phenomena was that of Sir Macfarlane Burnet. He suggested that a cancer-like mutation may occur in an immunologically active cell so that it and its progeny (which he likes to call a 'forbidden clone') synthesise abnormal antibodies. These antibodies react with the body's own tissues. Burnet produced histological evidence to support his theory that the original change occurs in the thymus gland.

The evidence for Burnet's theory rests largely on the experimental condition, Runt Disease. This is produced by suppressing the immune mechanism of an animal by means of drugs or radiation, so that it no longer rejects foreign proteins. When immunologically active cells from another animal are injected, these synthesise antibodies against the tissues of the host. So an artificial 'clone' of cells is produced, reproducing the circumstances envisaged by Burnet. This disease unfortunately bears little resemblance to the naturally occurring disorders.

Many objections to Burnet's theory have been raised. If the connective tissue disorders are caused by abnormal antibodies, one might anticipate that symptoms could be induced in a normal subject by giving him gamma-globulin from a patient with SLE. Again one might expect the babies of mothers with SLE to be affected by the transplacental passage of antibodies. These phenomena do not normally occur in SLE.

Recent research on acute rheumatism and acute nephritis, two of the commonest diseases characterised by the presence of tissue-specific antibodies, has produced strong evidence of a different aetiology. Both these diseases are associated with preceding streptococcal infections. Kaplan has demonstrated that the Group A beta-haemolytic streptococci associated with acute rheumatism have constituents antigenically identical to substances in the sarcolemma of human heart muscle. He suggests that the antibodies produced in response to streptococcal infection may subsequently, in some individuals, attack the sarcolemma. Using similar techniques Markowitz and Lange showed cross-antigenicity between Type 12 Group A beta-haemolytic streptococci and glomerular basement membrane. This could account for the pathology of acute glomerulonephritis.

Although this evidence is striking it may not be relevant to disorders like SLE and rheum-

atoid arthritis. Rheumatic fever and acute nephritis are unique in being associated with preceding bacterial infections with specific organisms. Nevertheless, these results prompted Stevens to suggest that SLE too is a disease of cross-antigenicity. He deduced that the organism responsible was likely to be a commensal. In particular he incriminated an organism usually commensal in women of child-bearing age—the vaginal lactobacillus. No experimental evidence has been produced in support of this hypothesis.

Another setback for the 'forbidden clone' school of thought was the discovery that autoantibodies are a feature of many forms of tissue damage. For example, antibodies to liver are sometimes found for a short time in the course of infective hepatitis. Antibodies to heart can be demonstrated after myocardial infarction, and antibodies to thyroid after thyroidectomies. It seemed possible that the production of small amounts of autoantibody might be a normal sequel to tissue injury.

Richardson suggested that in SLE, as in infective hepatitis, a virus might be responsible for the antigenic changes. However, it seems unlikely that a virus alone could be responsible for the changes of SLE. Recent work on the normal response to tissue injury prompted Weissmann to suggest that connective tissue disorders might be the result of an inadequate response to cellular injury. He incriminates the subcellular organelle, the lysosome. Lysosomes are microscopic intracellular vesicles which contain proteolytic enzymes. Damage to the fragile lysosomal envelope causes the release of these enzymes, which denature surrounding proteins. The changes in the structure of the proteins renders them antigenic, and antibodies are synthesised in response to this stimulus. Weissmann believes that in patients with connective tissue disorders, lysosomes are abnormally fragile. He has demonstrated this *in vitro* and *in vivo*. The lysosomal envelope is strengthened by corticosteroids and antimalarials (such as chloroquine) and made more fragile by progesterone and certain oestrogens. Corticosteroids and antimalarials are valuable in the control of connective tissue diseases; in SLE exacerbations often occur in the second half of the menstrual cycle.

Any cellular damage results in the release of lysosomes, but in patients with connective tissue disorders widespread denaturation occurs because of an inability to stabilise the lysosomal membranes.

Much of this is speculation, but the lysosomal theory offers an attractive explanation for many of the features of SLE. If the enzymes were released directly into the bloodstream, as they would be if, say, polymorphs were involved, they would be likely to act mainly upon the cardiovascular system and on organs like the kidney. Connective tissue ground substance would be particularly susceptible because it has no protective membrane. The damage caused by the enzymes might result in the further release of lysosomes, so perpetuating the disease. The original cell injury could be caused by any harmful stimulus sufficient to interrupt the cell membrane. This could include the action of bacteria, viruses, ultraviolet light, and toxic drugs. Such agents as these could also be responsible for exacerbations.

TREATMENT:

The most valuable drugs in SLE are the corticosteroids, but the antimalarials and salicylates are useful, particularly during remissions. Some clinicians use cytotoxic drugs to reduce antibody synthesis, but their value is not established. Thymectomy has been tried, with disappointing results. Splenectomy may be necessary in cases of severe haemolytic anaemia.

SUMMARY:

The actiology of SLE is still unknown, but there is some evidence that the primary defect is an abnormal response to tissue injury.

I would like to thank Dr. D. L. Gardner for his help in the preparation of this article.

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Muscle Spindles

A. J. STRONG, B.A.

Based on a Dissertation presented to the Society on 6th November, 1964

I. HISTORY AND HISTOLOGY

The action of our muscles is controlled with a remarkable delicacy, and components of the nervous system at every level contribute to this. On the afferent side, the stretch receptors of muscle spindles are the most peripheral elements and have been known to histologists and physiologists for more than a century. Hassall must receive the credit for the discovery of muscle spindles in 1851, but the first systematic description was Weissmann's in 1861. Each spindle consists of a parallel bundle of striated muscle fibres—intrafusal fibres. The bundle is 7 to 12 mm. long, and is surrounded by what Sherrington later called the lymph space, because he was able to inject it with dye via the lymph vessels: this space is enclosed by a thin fibrous capsule. The intrafusal fibres vary in their length and diameter, and are attached to one another at their ends; the ends of the longest fibres are attached to extrafusal endomysium. The spindle is supplied with nerves of various diameters terminating in different types of ending on the intrafusal fibres.

Kölliker's theory that these were embryonic centres for the growth of new muscle fibres, and another hypothesis, that they were pathological structures, were not abandoned until around 1890. In 1888 Kerschner had suggested that the muscle spindle was a sensory organ under motor control, and two years later Onanoff performed the crucial experiment of cutting the ventral roots and later examining the innervation of the spindle. In 1894 Sherrington repeated this, concluding that the muscle spindle had equally rich sensory and motor innervations.[1]

At the same time, Ruffini was making a detailed study of the nerve fibres in muscle spindles, and finally identified three types of ending reaching the spindle—the primary, secondary and plate endings.[2] The primary ending divided into ribands which spiralled around the centre of the intrafusal fibres—the annulospiral terminals. The secondary afferents "quickly break up into a large number of varicose axis cylinders . . . of diverse form, round, forked, triangular, leaflike, etc., and often resemble in arrangement a spray of flowers": they lie on the intrafusal fibre on either side of the annulospiral endings. Ruffini's third ending, the plate ending, had previously been noted by Kerschner, who suggested that it was motor. These nerve fibres are the smallest reaching the spindle, running a very tortuous and independent course: unlike the other nerves, they never divide before terminating. He compared the plate endings with extrafusal motor end-plates, and concluded that their structures were so different that both could not be motor. He felt that he did not have enough evidence about primary and secondary endings either to accept or to reject Sherrington's view that the sensory modality they subserved was probably mechanical. Sherrington had never specified which endings were affected by total root section, recording only that the innervation of the spindle was halved. It was not until 1928 that Hines and Tower repeated the

experiment and concluded that the plate endings had a motor function since they disappeared after ventral root section.[3]

A recent and important advance has been the recognition that there are probably two types of intrafusal muscle fibre, with different patterns of sensory innervation, and independent motor innervations. Sherrington first noticed a variation in size of intrafusal fibres sixty years ago, and the idea that this represented more than a normal distribution of values was strengthened by Cooper and Daniel's description in 1956 of qualitative differences between two types of fibre.[4] The larger fibres have a spherical dilatation in the equatorial region, filled with a conglomeration of nuclei: consequently these have been called *nuclear bag* fibres. The shorter, narrower type of fibre has its nuclei arranged in a single chain which extends in both directions beyond the equatorial region, hence its name, the *nuclear chain* fibre. Here the nuclei are less tightly packed and there is no central dilatation of the fibre: the myofibrils are rather fewer in number and suspended in more sarcoplasm than in the bag fibre. Boyd, in a detailed and beautifully illustrated paper in 1962, supports the theory that there are two types of intrafusal fibre[5]. He cut serial transverse sections of mamalian spindles and followed individual muscle fibres from section to section, measuring the diameters: plotted as histograms, the results showed two distinct groups. The morphological differences between the two fibres were also confirmed.

Boyd also mounted whole spindles in profile, impregnating the nerve endings with gold chloride. After dorsal root section, two types of fibre were distinguished in the efferent nerves remaining: the larger, γ^1 efferents supplied bag fibres, while γ^2 efferents supplied chain fibres and had a more diffuse end-plate structure. In spindles dissected after ventral root section, the distribution of primary and secondary afferent endings to bag and chain fibres was analysed: in each spindle the primary afferent had a branch with the annulospiral type of ending on every fibre, bag or chain, in the spindle, while the secondary afferent supplied only chain fibres, with endings of the flower-spray type. This difference is important in allowing the different responses of a muscle spindle to steady and changing tension, and the current anatomical picture of the muscle spindle and its innervation appears to explain the physiological findings very well (Fig. 1).

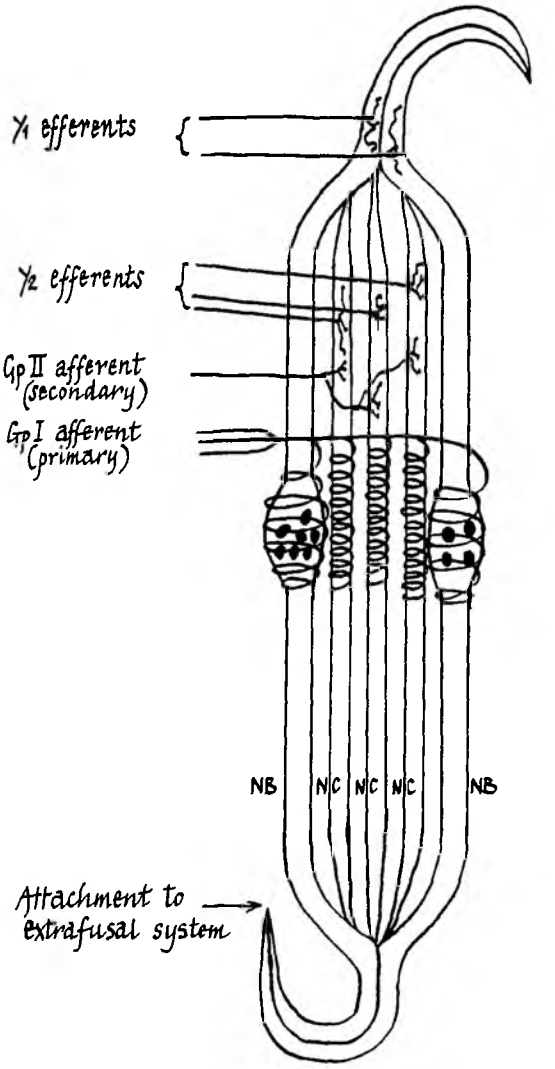

Fig. 1. Diagram of mammalian muscle spindle (after Boyd) showing nuclear bag fibres (NB) with γ^1 motor innervation, and nuclear chain fibres (NC) supplied by γ^2 motor fibres. The primary afferent has annulospiral branches to all intrafusal fibres, while the secondary afferent has flowerspray branches, to the chain fibres only.

II. PHYSIOLOGY

Dynamic and static sensitivity

Adrian and Zotterman made the earliest physiological study of a muscle spindle in 1926, recording from the nerve to the sternocutaneous muscle in a frog[6]: the results revealed relatively little of the behaviour of muscle spindles, but showed how the nervous system handles sensory information at the peripheral level. A series of discrete potentials was recorded, all of similar amplitude and duration; only their frequency altered in response to stretch.

In 1933 B. H. C. Matthews first compared the responses to stretch of different afferent fibres in a muscle nerve, and identified three types of fibre.[7] Some of those in the Group I range of diameter responded to sustained external tension with a transitory increase in rate of firing (adaptation); fibres in the Group II range showed a sustained acceleration of firing while the muscle was stretched, and no adaptation. In both types of fibre the resting rate of discharge was decreased during active extrafusal contraction. A stretch receptor with these properties must be connected in parallel with the extrafusal fibres, corresponding therefore to the situation of the muscle spindle (Fig. 2b).

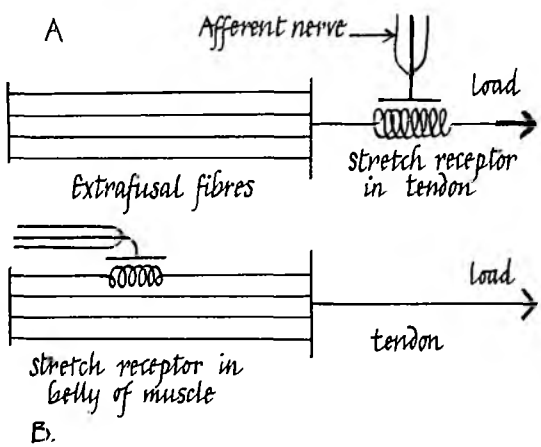

Fig. 2 Diagrams to show the positions of (a) a stretch receptor in series with extrafusal fibres and (b), in parallel.

Matthews also found some fibres of Group I diameter whose rate of firing increased during both passive elongation and active contraction of the muscle (Gp. Ib); this receptor is clearly connected in series with the extrafusal fibres, corresponding in position with the Golgi tendon organ (Fig. 2a).

These results were confirmed and extended by Cooper in 1959[8]: Group Ia fibres had both a dynamic response—to the rate of stretching, and a static response—to the degree of tension at any one time, while Group II fibres showed only a static response. Group Ia fibres correspond in diameter with the primary afferent of muscle spindles, with its annulospiral endings on bag and chain fibres, and Group II fibres with the secondary afferent with flowerspray terminals on chain fibres only.

Mechanical properties of intrafusal fibres

How is a mechanical change—in tension—converted into changes in impulse frequency, and what is the basis of adaptation? In microelectrode studies of the afferent nerve in frog muscle spindles, where impulse conduction had been prevented by anaesthesia, Katz (1950) was able to record graded depolarizations proportional to the rate and extent of stretching.[9] He suggested that small, maintained changes in potential (receptor potential) in the branches of the afferent fibre were transmitted—as a redistribution of charge—to the site of initiation of action potentials. Here, the total amount of depolarizing current from different branches would determine how quickly the membrance potential could be raised from resting to threshold values, and hence its rate of firing.

Adaptation may be either a mechanical property of intrafusal muscle fibres, or an electrical property of the afferent nerve ending. The differences in the arrangement of nuclei and myofibrils in bag and chain fibres, and their different innervations, suggest that adaptation might be mechanical, and there are other reasons. First, flash cine photography has shown mechanical adaptation in another mechanoreceptor, the Pacinian corpuscle.[10] Second, the receptor potential has been recorded in branches of the primary afferent, and shows adaptation[9]: this cannot therefore be a property of the site where action potentials arise subsequently.

From Cooper's (1959) and other work it emerged that the primary afferent, with annulo-

spiral endings on bag and chain fibres, has dynamic and static components in its response to stretch, while the secondary afferent, with endings on the chain fibres only, has a purely static response to stretch. This implies that dynamic sensitivity is a property peculiar to the bag fibres, and a mechanical basis for this adaptation has been suggested. The histological findings are the only clue to the nature of this difference between bag and chain fibres, since the viscous and elastic properties of a single spindle have never been investigated. However, P. B. C. Matthews has developed a useful hypothesis (presented here in modified form).[11]

In the chain fibre (Fig. 3a), the response in its nerve terminals is proportional to the tension applied to its ends: assuming that the nerve terminal responds to changes in its length, then its behaviour could be explained readily if the rest of the chain fibre obeyed Hooke's Law. This states that change in length is proportional to the tension applied; the constant of proportionality (elasticity) would vary with the state of active contraction of the fibre. If the contractile elements in series with the sensory ending were of low elasticity, then all elongation in response to stretch would occur in the segment of fibre beneath the ending, which would therefore be at its maximum level of static sensitivity. If however the outer segments of the fibre were in a highly elastic state, much of the extension, in response to the same stretch, would occur there. Consequently tension on the sensory region would be less, and the static sensitivity therefore lower.

The simplest assumption to explain the properties of the primary afferent is that its static response derives entirely from its endings on the chain fibres, and its dynamic response from the bag fibre endings. The bag fibre ending could show a response proportional to the velocity of stretching, if the region it covered again obeyed Hooke's Law but was mounted now in series with a viscous and an elastic element (Fig. 3b). The significant property of a viscous element is that it can transmit all or part of the tension applied to it, depending on how quickly the stretch is applied. Thus when the bag fibre comes under tension, the full effect initially reaches the central region, leading to a maximal initial depolarization in this branch of the primary afferent. With more

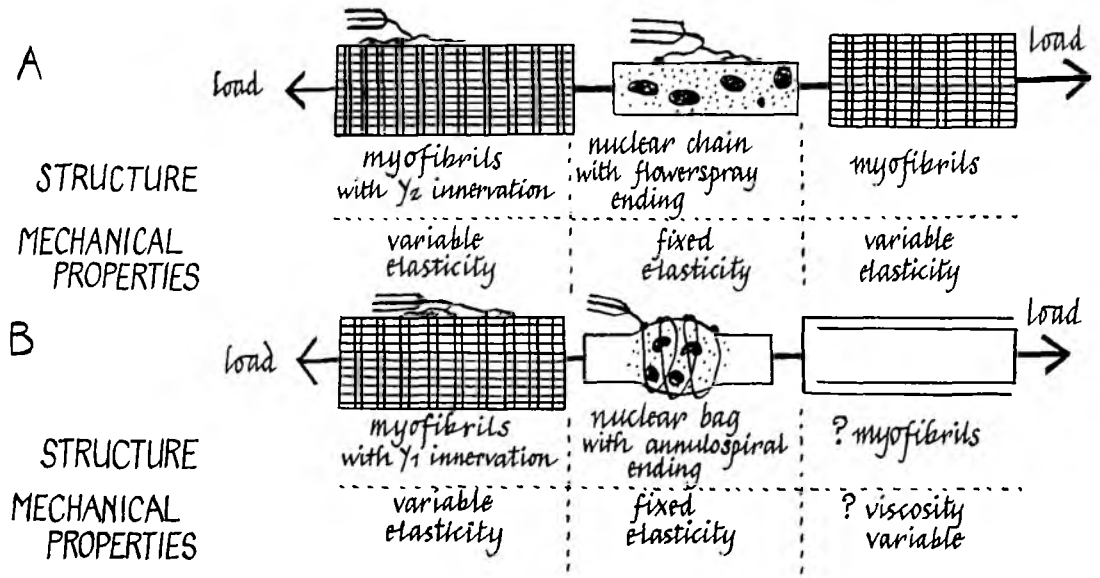

Fig. 3. Diagrams to illustrate possible mechanical properties of (a) nuclear chain and (b) nuclear bag fibres. The viscous element peculiar to the latter may represent a property either of myofibrils in these fibres or of the sarcoplasm of the nuclear bag region.

rapid stretching a greater proportion of tension will be transmitted to the central region, hence its response to the rate of change of tension. The ending adapts because the tension falls off rapidly as the viscous element collapses. The level of dynamic sensitivity of the ending might be controlled by the element of variable elasticity in series with viscous and receptor elements: in this way the amount of extension of the receptor with a given tension would be altered.

Boyd had evidence for separate γ innervations of the nuclear bag and nuclear chain fibres, and it would be reasonable to expect that stimulation of one particular γ fibre might alter either the dynamic or the static sensitivity of a primary afferent fibre to stretch. P. B. C. Matthews performed this experiment, recording from primary afferents in the dorsal root, and stimulating single γ fibres.[12] All thirteen efferents isolated raised the rate of discharge of the primary afferent, at constant length of the muscle: the primary ending has branches to the chain fibres, and according to the above theory the response would occur because the elements of variable elasticity, the myofibrils, shorten when their elasticity is reduced, so stretching the receptor segment. Six of the thirteen efferents increased the dynamic response of a primary afferent to stretch, while the other seven lowered it. This latter group would perhaps act by shortening the chain fibres: since these are connected in parallel with bag fibres, the effect would be to reduce the proportion of tension on the bag fibre endings, and hence their dynamic sensitivity.

The function of muscle spindles

Merton (1953)[13] suggested application of the principle of control by negative feedback to the monosynaptic reflex (Fig. 4). Any one rate of firing of α motoneurons will clearly be adequate to maintain the length of a muscle against a particular tension. If the tension is increased, the muscle extends: this increase in length would be reflected in extension of the muscle spindles and accelerated firing in their afferent fibres, some of which have excitatory synapses on α motoneurons. Consequently, motoneurons at a level of excitation just below their threshold would now fire, the length of the muscle returning to its present value. If the muscle is to be shortened under constant tension, increased fusimotor activity or γ bias can achieve this. Because the endings with static sensitivity lie in series with contractile elements in the intrafusal fibre, the rate of afferent firing will increase, causing additional α motoneurons to fire, so that the muscle shortens. Shortening gradually ceases as the extra reflex stimulus to the extrafusal system is reduced by the shortening.

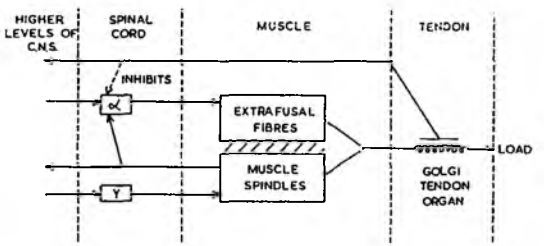

Fig. 4. Control of muscle tone by negative feedback (Merton). For explanation see text.

Owing to the time required for reaction to a changing external load, circumstances may arise where the response never keeps pace with the load. This can be avoided in a stretch receptor with dynamic as well as static sensitivity, since the size of the new load can now be recognized immediately, in terms of the rate of stretch. The initial response will be correspondingly greater, and therefore adequate to absorb the extra load. It is possible that γ^2 fibres, through control of static sensitivity, might regulate γ bias and thus the length of a muscle at a given tension, while the γ^1 fibres would control the speed with which a muscle reacts to rapid changes in the applied tension.

Over-correction is another possibility: if a muscle maintaining its length under a constant tension now receives an additional load, the monosynaptic arc overcompensates. Overshoot in the opposite direction would follow, and such a mechanism might form the basis of some types of tremor. However, in an overloaded or ischaemic muscle, tremor may perhaps be a purely mechanical property of the extrafusal fibres.

Conclusion

The type of function suggested for muscle spindles, acting as part of a servoloop to maintain the muscle at preset lengths under varying loads, is well suited to the maintenance of posture: the extensors of the leg are well

supplied with spindles—23 per gm. of muscle in the case of soleus in the cat.[14] However, spindles are also found in smaller muscles subserving finer movements, although the incidence is rather irregular: the extraocular muscles of man, apes, goats and sheep contain spindles, while in other species there are none. Clearly, muscle spindles have a part to play in the control of fine as well as coarse movements, although the inevitable (conduction and synaptic) delays in a servoloop might be a disadvantage in the control of rapid movements.

Some information on the interaction between muscle spindles and higher centres of the nervous system has recently been obtained. Appelberg[15] stimulated the red nucleus of rabbits and found that the dynamic response to stretch in the primary afferent fibre was increased, and its static sensitivity decreased: this could occur if the nuclear bag fibres contracted, or if the chain fibres were inhibited. In either case this would increase the proportion of extension applied to the sensory region of the bag fibre. Appelberg favoured the second explanation since he had also shown that stimulation of the red nucleus reduces the activity in γ fibres (taken as a group). The red nucleus receives efferents from the deep cerebellar nuclei, and this system might therefore form the basis of a cerebellar contribution to the control of tone in anti-gravity muscles. Muscle spindles apparently do not subserve conscious position sense, since this can be abolished by injection of anaesthetic into a joint.[16]

Once the mechanical properties of muscle spindles are understood, further investigation must inevitably concentrate on their control by structures such as the cerebellum and basal ganglia.

I should like to thank Mr. M. Dixon for drawing three of the diagrams.

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J. B. BAIKIE — DOCTOR AND EXPLORER

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Dr. James Balfour Baikie died, aged thirty-nine, on the West Coast of Africa one hundred years ago. His name appears in the History of the Royal Medical Society as having been its President in 1847-48; that and nothing, absolutely nothing, more. Yet this man was one of the most remarkable of the many great medical graduates of Edinburgh in the nineteenth century and his name is revered by all scholars of West African history.

Nearly a hundred years after Baikie's death, Professor Perham writes: "He was a man of rather different type from the other great African travellers. His tastes were extremely cultivated (the catalogue of his large library, which was sold after his death, shows this very clearly): by temperament he was a calm and dispassionate scientist—an intellectual rather than a moral or spiritual crusader; cool, humane, above all intelligent." It was his use of quinine prophylactically, and subsequent successful establishment of an interior trading post on the Niger that altered the entire course of British foreign policy in West Africa. There is surely enough here to justify a biographical note in "Res Medica".

In the latter half of the nineteenth century, towards the end of the slave trade, the European powers became interested in West Africa for more legitimate activities which might still prove profitable. There was confusion in the underlying motives of the expeditions which were sent out. Sometimes their primary object was to be the suppression of the slave trade, sometimes the spread of Christianity, and sometimes the pushing of the sales of Manchester goods. A philanthropic society even sent sixty London prostitutes to Sierra Leone to make them honest women by marriage with the natives. The interior of the country was virtually unknown although there had been trading stations along the coast for several centuries. Wild tales were told of the potential wealth of the inland territories because of the ivory and gold which were brought down the rivers. Sometimes openly, but more often surreptiously, the great European powers financed exploration parties which drew up strange informal treaties with the local tribal chiefs. The result was a confusion of conflicting territorial claims which were reconciled in 1885 at Berlin in a manner which was a credit to no one. Among other territories the vast stretch of country which is now Nigeria fell to the British. A sequence of heroic explorers had proved that a great river flowed from about Timbuktu on the southern edge of the Sahara into the Atlantic but all efforts to find its mouth failed until Richard Landor, having been taken prisoner well inland, was brought down for barter on the coast. Thus was the delta of the Niger discovered. Between 1795 and 1855, thirteen expeditions had ascended the Niger and gradually charted its course finding that it divided about two hundred and fifty miles inland where the Benue turns South towards the Cameroon mountains. The fate of these expeditions was almost uniformly disastrous. The very first British expedition in 1553 had had a crew of 140 Europeans of whom only 40 returned alive. In 1832, of an expedition of 48 men with Laird and Lauder, 9 survived. In 1841, the Fowell Buxton expedition lost more than a third of its white crew. Not only had the mortality been appalling, but the expected wealth had not materialised, and by 1850 British foreign policy was set against any further attempts to develop the interior, it being considered that the climate was such that no European could survive for any useful period. Moreover the riverine tribes were far from complacent and those towards the delta took strenuous action against vessels attempting to move inland and undermine their monopoly of the river borne trade. It was against this background that MacGregor Laird organised and financed with Government support yet one more expedition. MacGregor Laird was a man of the greatest perseverance and but for his vision the development of Nigeria would

have been long postponed. The expedition sailed in 1854 with Baikie as ship surgeon. It was to have been led up the Niger by Consul Beecroft of Fernando Po, but he had died there before it arrived and Baikie took charge. His account of the expedition was published in 1856. The quality of the man is probably better shown by extracts than in any other way, but let it be remembered that at the time of writing Baikie was only 29 years old. Moreover, no one who has not actually experienced the humid heat and insect life of tropical rain forests can have any idea of the stoicism quietly inferred in these pages. Baikie's routine was a fourteen hour day and: "I, in addition, always slept on deck and was roused regularly at twelve o'clock, and at three in the morning for the purpose of recording meteorological observations, but while in the river, I had constant health. I mention these circumstances to show that, under proper precautions, Europeans may not only live quietly, but even commit with impunity what, some years ago, would have been considered as terrible indiscretions."

Baikie was a passionately accurate observor of all that went on around him.

"The average price of a stout male slave is from ten to twelve bags of salt, or from 60,000 to 70,000 cowries, and for a good-looking young female, eight to ten bags of salt, or from 45,000 to "50,000 cowries."

"In New Kalabár circumcision is universal, in Bonny it is only practised on slaves. In Bonny the breasts of the women very soon become loose, flaccid, and pendulous, while in New Kalabár they keep plump and firm; the men too, of New Kalabár are more determined and warlike."

"The principal marks are three perpendicular ones along the breast and belly, the centre one being straight, and side ones being curved; another behind, following the curve of the armpit, and going downwards; seven short, perpendicular incisions on the forehead, and a curved row of small lines under each eye."

Baikie was an able geographer and linguist, being able to record comprehendibly the innumerable tribal place names and dialects which he met:

"Adamáwa is not synonymous with the name Fumbina, but merely, I apprehend, applies to that portion of it which has been conquered by the Púlbe (i.e. Fulátas). I am inclined to think that formerly along the south side of the Binue, from the confluence of the Kwóra to the Fáro, there were three extensive territories, namely A'kpoto, Korórofa, and Fumbína, and that all the other tribes are of more recent origin. Thus the Mitshi tribe has encroached partly on A'kpoto, and partly on Korórofa . . ."

Baikie had that imperturbality which alone enabled the great explorers of Africa to survive:

" . . . I had walked alone for from seven to eight miles, when I lost almost all trace of the path. Having ascertained by my compass the position of the river, I endeavoured to work my way in that direction, but soon got more entangled than ever. I climbed up several trees to look around, but could not discover a single guiding mark. I was completely in the bush, the grass and brushwood being so long, thick and close, that every step I took was a severe exertion. It was now past sunset, and getting rapidly dark, and as it was only too evident that I had lost my way without any chance of bettering myself, the next question came to be how I should pass the night. The most comfortable and safest spot seemed to be up a tree, so I tried one, and got as high as I could, but did not much relish my quarters. All the others near me were too small, but I recollected having observed some time before a tall Baobab, which I determined again to search after. I took a good mark, so that, if unsuccessful in my cruise, I still might have something to fall back upon, and starting with a good run to clear the grass, was fortunate enough in a few minutes to get a glimpse of the wished-for harbour of refuge. Luckily for me it had a double trunk, with a distance between of about two feet; so tying my shoes together, and casting them over my shoulder, I placed my back against the one trunk, and my feet against the other, and so managed to climb until I got hold of a branch by which I swung myself further up, and finally got into a spot about twelve or fifteen feet from the ground. Here I placed myself on a branch, about a foot in diameter, projecting at nearly right angles, and by leaning against the main trunk and stretching out my legs before me, I found I had a tolerably comfortable seat, when I might peer into surrounding obscure."

When the "Pleiad" could proceed no further Baikie continued for two days by pinnace, but ran into hostile natives at Dulti on the Benue and could get no further. But the main objects of the expedition had been fulfilled, there had been no casualties and a return was made after sixteen weeks in the river.

Baikie's success with the expedition of 1854 made him the obvious choice as a leader of a

further expedition which set out in 1857 in the "Dayspring". His achievement this time, though less spectacular, was no less remarkable and ultimately important. All went well until the vessel was completely wrecked at Jebba three hundred and fifty miles up the Niger. There was no loss of life and all returned home except Baikie who stayed on and maintained virtually single-handed for five years the first inland trading centre in Nigeria. This was at the confluence of the Niger and Benue, where there is now the large and quite important trading town of Lokoja. But at that time there was no settlement and it was here that Baikie lived and established for himself and for the British an extraordinary prestige, entirely without force of arms. Not only did he become recognised as a safe rallying point for those fleeing from the slave raiding peoples of the North but without violence maintained peace among the tribes over a vast area where peace had never been known.

Baikie received permission to return home in 1864, but died on the way in the house of a fellow Orcadian at Sierra Leone. He was only thirty-nine years of age.

Hundreds of brave and devoted men have died unrecorded in the development of the vast continent of Africa. Baikie's name deserves to be remembered firstly because of his achievement in taking an expedition into the interior and maintaining it without a casualty by the use of quinine prophylactically and secondly by establishing, developing and holding the town that is now Lokoja.

The Romans had protected themselves from malaria empirically by the use of nets. Quinine in the form of cinchona bark had been used for centuries as a treatment for "ague" and "fever". Laveran did not discover the malaria parasite until 1880, and in 1883 King showed Anopheles to be the vector by biting. Baikie's prophylactic use of quinine was therefore empirical, but this in no way detracts from his feat in enforcing a routine which maintained health by the taking of five grains night and morning.

There is no means of knowing from what Baikie died, a diagnosis of "fever" being then acceptable on the West Coast. But it is more than probable that he died from malaria by discontinuing his quinine a few days too early. It was only later that the necessity of continuing treatment throughout the potential incubation period of the parasite was realised. There was a saying that outside Sierra Leone the bones of those dying at sea were so numerous as to impede the boat.

The question of descendants from Baikie is one of the greatest difficulty because in his time escaped slaves frequently took the name of their white protector and with recent political developments it is common for those to have been given up in favour of African names.

James Balfour Baikie was born at Kirkwall on August 27th, 1825, came to Edinburgh University from Orkney, and lodged at 14 Pitt Street. It was a great period in the history of the medical school. The Chair of Anatomy was held by Alexander Monro, tertius, that of Materia Medica by Christison, of Surgery by Syme and Midwifery by Simpson. Baikie took his M.D. in 1847 with a Thesis on the "Mode of treating persons who have been cut down when suspended by the neck". In March 1848, he entered the Royal Navy serving successively in the "Volage", "Vanguard", "Ceylon" and "Medusa". Following a cruise on the "Hibernia" in the Mediterranean he became assistant surgeon at Haslar in 1851 and remained there until his appointment to the "Pleid" which had been built by MacGregor Laird specifically for the Third Niger Expedition of 1854. During his life Baikie received only the scantiest official recognition but after death was not without honour in his own country. There is a large freestone monument to him in St. Magnus Cathedral, Kirkwall. On it is the epitaph written by his friend Colonel Balfour of Balfour and Tunabie: "William Balfour Baikie, R.N., F.R.S.Scot. Born at Kirkwall 27th August 1825. The Explorer of the Niger and Tchadda, the Translator of the Bible into the languages of Central Africa, and the Pioneer of Education, Commerce and Progress among its many nations. He devoted his life, means and talents to make the heathen savage and slave a free and Christian man. For Africa he opened up new paths to light, wealth and liberty; for Europe new fields of science, enterprise and beneficience; he won for Britain new honour and influence and for himself the respect, affections and confidences of the chiefs and people. He earned the love of those whom he commanded and the thanks of those whom he served, and left to all a brave example of humanity, perseverance and self sacrifice to duty. But the climate from which his skill and kindness shielded so many, was fatal to himself and when relieved at last, though too late, he died at Sierra Leone 12th December, 1864."

RES MEDICA

LOOKING TOWARDS POST-GRADUATE EDUCATION

Just how good is post-graduate training in Britain?

The graduate entering the hospital services, wishing to specialise, is beset with uncertainty. 'The rat race' and 'no-room-at-the-top' are often dramatised. While this may contribute to the uncertainty, it is by no means the whole cause.

It is less often pointed out that the graduate can never be certain that he will gain all-round experience and high-quality training in his field.

In the U.S.A. and Canada the graduate doing a Residency training knows from the outset that in the course of 4 or 5 years (or however long the training may be (e.g. proctology 7 years)) he will rotate through a series of departments related to his field, he will participate in a planned educational programme carried out at a high level and progressively take on greater responsibility. In other words he can be reasonably confident that his training will be thorough and of a high quality.

In Britain, the Spens and Platt reports have both emphasised that all posts from House-Officer to Senior Registrar should be considered as training posts. But are they?

In peripheral hospitals the problem is perhaps most acute. While doctors usually work extremely hard to provide a medical service for the community, there is seldom a sense of continuing medical education. Sir George Pickering, reviewing the problem three years ago, suggested that large peripheral hospitals should become 'Teaching units' with certain basic facilities. There should be facilities not only for good medical services (radiological, laboratory, post-mortem) but also library and meeting rooms, etc. There should be a clinical tutor whose responsibility it would be to plan an educational programme of clinic-pathological conferences, talks, demonstrations, etc. Inspite of a meeting sponsored by the Nuffield Foundation to discuss these matters, little seems to have emerged. Presumably any such scheme would require the support of the government in order to supply the necessary funds, and the endorsement of the 'Royal Colleges' who might well stipulate a period of training in a peripheral hospital for their degrees.

The consequences of peripheral 'teaching units' would be far-reaching; there would be a reduction in the gulf between teaching and non-teaching hospitals, a general increase in the standard of post-graduate training, improved standards in peripheral hospitals, and perhaps a decrease in the 'brains drain'.

The situation in teaching hospitals is far from ideal. Because appointments to a unit are made independently, a graduate cannot be assured of a range of experience in his training. In comparable American and Canadian hospitals, 1 to 2 hours a day may be set aside for 'education'. But here such opportunities are fragmentary.

What are the facilities for training the future General Practitioner? General medicine, surgery, and obstetrics are important, and well catered for by 'house-officer' experience. But many future General Practitioners would like a range of further experience in Opthalmology, E.N.T., Skin diseases, paediatrics, and casualty work. Seldom do practitioners gain such experience, mainly because it would take a long time. As half the graduates eventually go into general practice, a rotating speciality course would undoubtedly fulfil a need.

Until good post-graduate training becomes widespread, the clinical student will continue to look to the future with uncertainty, with many seeking their training abroad.

From Our Library

On Drugs — Has all this labour of the present day and of so many centuries been in vain? Have we gathered, after all, but a heap of worthless dust? Is the drug, as some hygienists say, a mistake from beginning to end? One believes that it is not so, and that this dust is brimful of energy, that its particles are literally alive and that as their energy is applied rightly or wrongly, so the result is life or death.

D. M. Dunlop 'Drugs and Drug Takers' 27th November, 1925.

On Sisters

The introduction of Sisters into the New Hospital will indeed be a blessing . . . No longer will a nurse who has taken offence at some trifle be able to set the whole ward against the house surgeon—there will now be a counteragent to prevent this.

Let us hope that these ladies will undergo a special education before entering on their duties, otherwise they cannot take up that position of nurse and lady combined which it is intended they should.

James Forrester 'The New Royal Infirmary' 19th Jan. 1872.

On Empirical Treatment

We are no longer content with the empiricisms which satisfied our ancestors, but desire to know the 'modus operandi' of the remedies we use; and so far is this feeling carried that many are ready to give up without hesitation the most time-honoured methods of treatment, if they appear irreconcilable with our present knowledge of Anatomy and Physiology, while they are apt to look somewhat slightingly on the experience by which such practice is supported.

Joseph Lister. 'On the Mode in which External Applications act on Internal Parts.' 15th Dec. 1855.

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REHABILITATION SERVICES FOR THE INJURED

R. R. S. HOWARD

Based on a Dissertation read before the Royal Medical Society on Friday, 23rd October, 1964

Not until the start of the 20th century did the organisation of rehabilitation services on a comprehensive scale develop. In this, Britain played a leading role largely due to the influence and leadership of one great man—Sir Robert Jones. Robert Jones was selected in the 1890's to organise the first unified accident service in Great Britain, which was set up to deal with the injuries sustained by the large body of men employed in the construction of Manchester Ship Canal. The social conscience of the time did not include rehabilitation per se in the accident service, but the experience gained there by the young surgeon bore fruit in the First World War when as a famous orthopaedic surgeon, he was given the task of organising special military hospitals with full rehabilitation facilities.

In 1915 he established an orthopaedic centre at Alder Hey, Liverpool and there he stressed the vital importance of follow-up and deplored the movement of patients from hospital to hospital. He had this to say in a famous letter of 1916: "There is also a want of cohesion between departments of treatment, such as massage, physical exercises, electricity and manipulative and operative groups of cases, all of which properly controlled make for success in orthopaedic surgery. It appears to me that we want one large orthopaedic hospital combining all these departments, and staffed by expert men under a director, who should be the final arbiter as to the conduct of treatment." As a result of this letter, Hammersmith Workhouse at Shepherd's Bush was authorised in 1916 as a hospital for orthopaedic cases and became the

first experimental hospital in training the disabled. In his "curative workshop" he stressed the importance of work having a direct curative bearing upon the recovery from injury and he also said, "we depend largely upon the psychological element to help in the recovery."

At the end of the war, the country was faced with the problem of training disabled ex-servicemen and to meet their needs the Ministry of Pensions set up Government Instructional Factories in 1917. These were transferred to the Ministry of Labour in 1919 and have become the Government Training Centres of the present day. Also in 1919 the King's National Roll was created—a scheme whereby employers who took on a quota of disabled ex-servicemen received a preference in the allocation of Government contracts.

Between the Wars, interest in rehabilitation continued as indicated by the 1935 British Medical Association "Committee on Fractures" and the 1939 Delevigne "Inter-Departmental Committee on the Rehabilitation of Persons Injured by Accidents". About this time, two training colleges were established to train any (not just the young) disabled with a view to placing in employment.

Under the impetus of War in 1939 it became obvious that the utmost use of all available manpower was essential and an Interim Scheme for Training and Resettlement of the Disabled was started in 1941. In December of that year, an inter-departmental committee on the rehabilitation and resettlement of disabled persons was appointed under the chairmanship of Mr. G. Tomlinson, M.P. After careful and thorough deliberation, the "Tomlinson Report" was published in January, 1943.

It emphasised that 'rehabilitation in its widest sense is a continuing process' which has two aspects, the Medical and the Social or Industrial. The report drew attention to the need for close co-operation between Health and Industrial Services, with continuity of care as the patient passes from one service to the other. 'Ordinary employment', the goal for all the injured is practicable for the majority. Only a minority require sheltered conditions and these should be provided by the government.

The Report also recommended that a Standing Joint Committee of the Government Departments mainly concerned—those of Education, Health, Labour, etc. be set up for the supervision of administration of the scheme; and this was immediately appointed.

As a direct result of this report, the Disabled Persons (Employment) Act of 1944 was passed which made provision for a Register of Disabled Persons superseding the King's National Roll, and firms which employ over twenty persons must take at least 3% of their staff as registered disabled. The Act also required the Ministry of Labour to make better provisions for enabling disabled persons to secure employment and empowered the Minister to appoint officers to act for the purposes of the act—that means, it created the D.R.O. (Disablement Resettlement Officer) service of which mention will later be made.

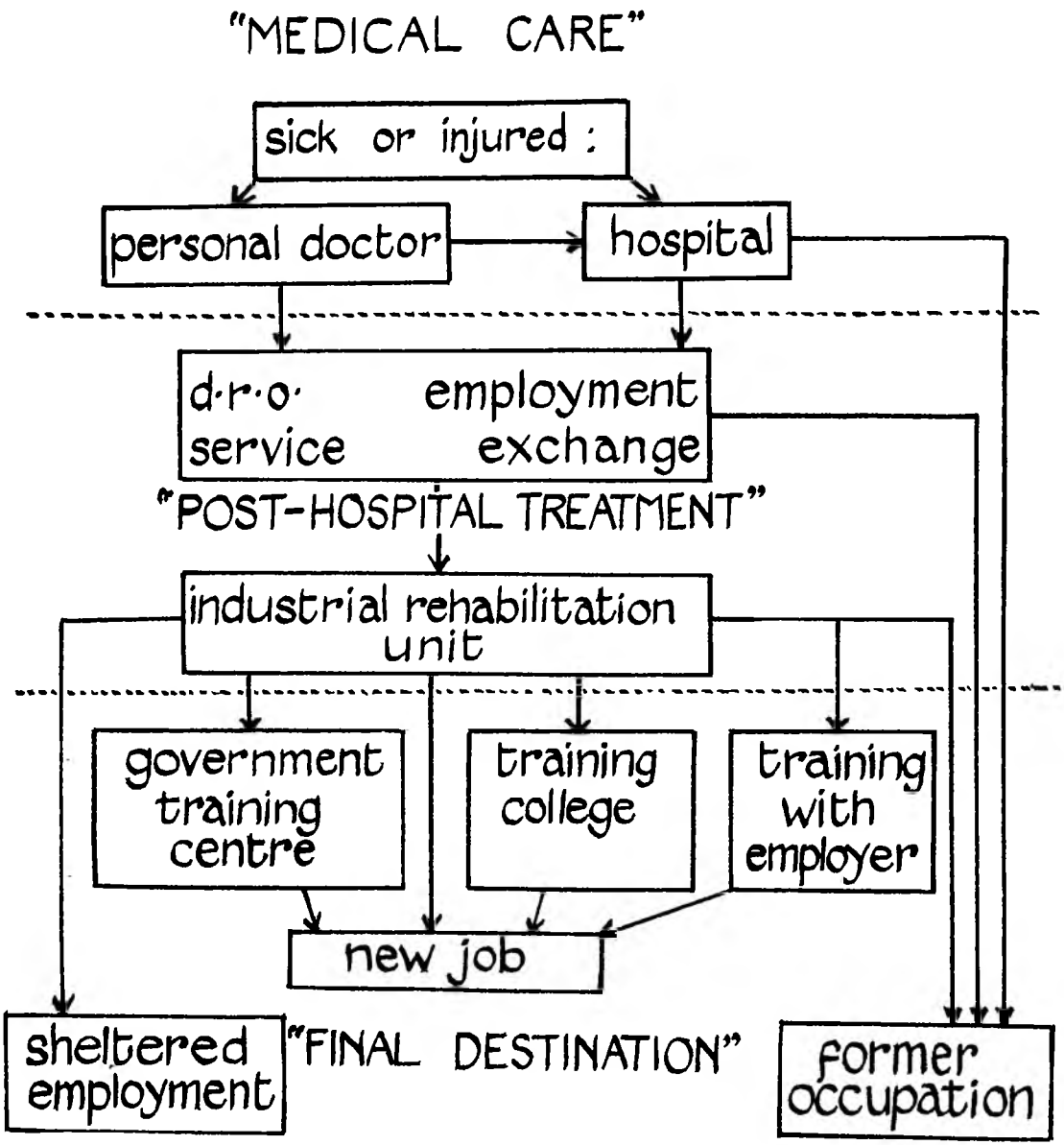
After the end of the War—in 1946—began the social legislation planned during the war period in the "Survey of the Inter-Departmental Committee on Social Insurance and Allied Services" under the leadership of Sir William Beveridge. The National Health Service Act in 1946, then the National Insurance Act in 1946 which provided sickness and unemployment benefit, retirement pensions and maternity benefits; the Industrial Injuries Act 1946 which superseded the Workmen's Compensation Acts, and finally the National Assistance Act 1948 which marked the end of the Poor Law and the start of a new social welfare code. —This was the fundamental legislation.

In 1953, another committee, under the chairmanship of Lord Piercy, was set up "to review in all its aspects the existing provision for the rehabilitation, training and resettlement of disabled persons." The Piercy Report was published in 1956 and the conclusions were that the facilities enabling the disabled person to get suitable employment were comprehensive and well-established, needing little change; that since 1944 there had been a widening and deepening of the concept of rehabilitation on the medical side; and in general the completeness of statutory provisions which existed for services for the disabled was impressive. A few recommendations requiring legislation gave rise to the Disabled Persons (Employment) Act 1958 and the committee emphasised most strongly the need for complete co-operation between the various services.

Just what are the services available to-day, and how are they in fact used?

An outline of the scheme should be considered as a whole Diagram opposite.

Most patients with serious injury are treated in hospital and the trivial injury which can be treated by a G.P. seldom gives rise to problems in rehabilitation. Therefore, the hospital facilities deserve consideration. In a large



general hospital there is usually a physiotherapy department, an occupational therapy department and an almoner service to help the consultant with the rehabilitative care of his patients. But the ultimate treatment rests with the consultant surgeon, and the activity of the rehabilitation team will depend largely on his enthusiasm and outlook. Most consultants now are very good in this respect and pay a great deal of attention to the ultimate goal in planning treatment.

HOSPITALS

Often the stay in the acute accident centre is short so that only the initial rehabilitation work is carried out there, the later and more

vigorous rehabilitation taking place in a convalescent type of hospital. As an excellent example of this latter type, the Astley Ainslie Hospital in Edinburgh can be mentioned. The object is "total medical care" and patients referred after primary treatment in some other hospital (usually Royal Infirmary of Edinburgh) are in general not discharged till they are "completely rehabilitated". To achieve this object, use is made of an O.P. Physiotherapy Department and an O.P. Occupational Therapy Department which runs some unique facilities. There is, in the hospital grounds, a "home unit"—self-contained premises run by the O.T. department for training in use of toilets, bath, dressing, cooking etc. Patients can live in this unit for short periods and their capabilities can be fully assessed. This extremely valuable service is also available for patients referred by the G.P.

Also on the grounds is a mining rehabilitation unit, complete with simulated coal face, conveyor belt, and hutches; which allows miners to work for some considerable period under fairly realistic conditions in order to determine their capacity to return to former employment.

The "home unit" is perhaps of special value, as it provides training facilities not available under any Goverment Scheme for a sizeable group of patients otherwise largely neglected.

Another special hospital is that of Edenhall, Musselburgh, which in 1959 was started as a 5 year pilot scheme for long term treatment of paraplegics. This hospital of 28 beds admits about 30 new cases per year with an average stay of 9 months. The re-employment rate of discharged patients is low—only 10%, but it must be remembered that:

(1) paraplegia is a very severe disablement
(2) earning capacity is therefore limited
(3) victims of industrial injury may collect up to £15 per week compensation
(4) delay in settlement of claims for damages may effect the desire of a patient to start work.

Though a small proportion of the injured, paraplegics deserve special mention as they present challenging problems in rehabilitation at all levels.

D.R.O.

Now the D.R.O. Service can be examined. In many ways, the disablement resettlement officer is the key man in the Government Scheme for he is in contact with the hospitals, the G.P.'s, the I.R.U.'s, the Training Centres and the employers and he also (and most important of all) takes a personal interest in every patient. The C.R.O. is primarily a civil servant, an employment officer of some experience with special interest in the disabled. His main task is the placing in employment of disabled persons who have difficulty in finding work; most of these people are on the Disabled Persons Register, but the D.R.O. also assists a number of persons who are not so registered. Registration is voluntary, but a person must be likely to be disabled for at least 12 months, yet not be so severely disabled as to be incapable of remunerative employment either in open industry or in sheltered conditions. In small employment offices, the D.R.O. is often part-time and he may be, for example, the manager of the same office. The work done by these men is of very great value and there is no doubt that it is their personal character and their close personal contacts with both the medical profession and the employers which enables them to fulfil their vital role. The efficiency with which the service works is a tribute to the enthusiasm of the men in it.

I.R.U.

The Industrial Rehabilitation Unit at Granton is one of 17 such units in Great Britain and like the others it has two main functions—

(1) *Assessment* of the patient's aptitude for various types of work.
(2) "*Toning-up,*" both physically and mentally, for return to the conditions and tempo of full-time work.

Patients work regular hours throughout the week at jobs under contract from various firms —the work must therefore be finished on time and so the patient is under a certain pressure and at the end of the course they can have confidence that they will be able to do a normal day's work.

There are 90 patients at Granton with an average stay of 8 weeks. They travel into work every day, but there is also resident accommodation for those who live too far away. Referral is from hospital or G.P. via the D.R.O., there is a waiting list of 150 patients at the present time (Summer 1964).

On average, 15 new patients attend every week. Within the first two days each newcomer is seen by the Supervisor; the unit doctor who examines the patient and recommends any special diet or exercise required; the psychologist who gives personality, intelligence, aid aptitude tests; and by the social worker if necessary

to help sort out financial or family troubles. After these interviews a conference is held and the potential of the patient judged—this is confirmed by his progress in the workshop under the workshop supervisor. After one week another conference is held and each patient reviewed in the light of progress reports; on performance basis the date of next review is decided. In this way the programme is "tailor-made" to fit each individual and if there are signs that progress is not as expected the patient can be given some other job. At the end of the course, the last conference is held to decide on the final report to be sent to the D.R.O. about the type of employment which would suit the patient. It is the D.R.O. who must then place the patient or arrange for further training.

Follow-up 6 months after completion of the course is made by letter, and most patients reply with details of job, pay etc. A wide range of patients is accepted at the I.R.U., the largest single group—22% comprise the pyschoses and neuroses. Injuries account for about 20% of the patients and this group enjoys the highest proportion (70%) in work or accepted for training within 3 months of completion of the course.

Vocational training is not given at I.R.U.'s, but if assessment at an I.R.U. suggests that a patient requires such training, he may be able to attend a Government Training Centre. There are 22 of these in Britain, and 4 Residential Training Colleges which provide courses in a wide variety of trades lasting from 26 to 52 weeks, according to the trade. The Ministry also will make provision for training at technical and commercial colleges in appropriate cases.

SHELTERED WORKSHOPS.

The Ministry is not directly responsible for running any sheltered workshop, but it has close links with Remploy which employs over 6,000 severely disabled in some 90 factories throughout the country. It also provides financial assistance towards training, trading losses and capital expenditure to Local Authorities and voluntary organisations running sheltered workshops, who, between them, provide work for about 5,000 disabled persons.

There are two excellent voluntary organisations here in Edinburgh, The Simon Square Centre and the Thistle Foundation.

The Simon Square Centre began in 1902. It is a voluntary organisation but acts as the agent for the Local Authority to comply with the provisions of the National Assistance Act of 1948 and so in an indirect way receives some Government support. In Simon Square, sheltered work is undertaken by about 113 severely disabled, looked after by Social Workers and Occupational Therapists. Injuries are very little in evidence, most patients being chronically disabled arthritics, victims of C.V.A., D.S. and epilepsy. But Simon Square is very much more than a sheltered workshop, it has recreational facilities, social clubs, lunch clubs and in fact provides an extremely valuable and lively social service for the community. The most striking thing about the centre is the terrific atmosphere of enthusiasm and gaiety which diffuses from the staff to all who attend the centre.

The "Sheltered Workshop" is again a mere fraction of the Thistle Foundation. Incorporated in 1944, its main object was to provide better care and treatment of severely disabled ex-servicemen in Scotland than was made after the First World War. This it achieves in a truly remarkable way—there are about 100 self-contained houses, specially built and designed for the convenience of the disabled person, grouped round a fully equipped clinic. Most of the houses are four apartment, and all incorporate ground-floor bathroom, toilet and patient's bedroom, as well as living room and kitchen. As each house is private and self-contained every patient must have someone living there to look after him and indeed most of the patients are married, some have relatives to care for them, and one or two manage to get a married couple to live in. The whole idea is that the disabled man leads as normal and independant a life as possible. In the clinic building there are O.T. and Physiotherapy departments, a small pool for hydrotherapy, a large gym and a small sheltered workshop where a few of the men are occupied on knitting machines making hose-tops for Highland Regiments. The range of social and sporting activities and the enthusiasm of the staff and patients are impressive. Quite often a man comes there with little hope of ever living an independent life—the problems of coping with severe disability have often caused mental resignation and overwhelming self-pity has killed the desire to overcome the disability. Within the atmosphere of this foundation, however, they find a new inspiration, a change of outlook and a desire to be independent as they learn how to come to terms with their new life.

The main weakness in the present scheme is the delay between hospital and post-hospital care. A delay of six weeks at this critical period is common, and during this time no organised rehabilitative measures are ensured in any way. Closer contacts between the hospital and the I.R.U. are obviously desirable, and an exercise in collaboration between a General Hospital and an I.R.U. was reported by Fletcher and Wheble in the B.M.J. of January, 1964. By this method, the average time between injury and attendance at I.R.U. has been halved in nearly all cases. An even more interesting plan is that for a comprehensive centre planned at the Belvidere Hospital in Glasgow where the I.R.U. is to function side-by-side with the medical rehabilitation centre.

SAIGHTON CAMP

No civilian scheme will ever work as efficiently as the Army Medical Rehabilitation Unit at Saighton Camp, Cheshire. It was established as A.M.R.U. in 1957 and is the only one for the whole British Army. It holds 150 patients with an average stay of 12 weeks, after which time 80% are completely fit for return to unit. About 10% are discharged the service as unfit for active duty. Most common injury in the army is, of course, sporting injury, next road accidents—"bullet trouble" accounts for a very small percentage at present! Typical of the cases they treat is the torn meniscus—10 days after menisectomy, the man has his stitches out and is sent straight to A.M.R.U., there he will perform graduated exercises from 9 a.m. to 5 p.m. for about 8 weeks under the supervision of specially trained P.T. Instructors—not slim physiotherapists, but muscular athletes. At the end of this time the man is fitter than the average civilian will ever be in his life!

The statistics for rehabilitation from this camp are staggering but the staff to patient ratio is 1 : 10, the average age of patients is only 20 years, the group is artificially selected by being accepted for the army in the first place, and the patients are under army discipline all the time.

This article has attempted to explain a little of the meaning and method of rehabilitation, and to suggest how the present good system could be improved.

The most important individual in this scheme is, and always shall be, the patient. And it is the duty of all who come into contact with him to remember the goal of treatment — independence. Only by bearing in mind the meaning of this word for each individual will one succeed in treating the whole of the patient, not put the hole in the patient.

ACKNOWLEDGEMENTS

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Some Aspects of Homoeopathy

I. McKEE

Based on a Dissertation read before the Royal Medical Society on Friday, 13th November, 1964

Homoeopathy has existed as a branch of medicine for over one hundred and fifty years and its practitioners in this country are all fully qualified medical men. There are seven homoeopathic hospitals within the framework of the National Health Service and Her Majesty the Queen and His Royal Highess the Duke of Gloucester are both Patrons of the Royal London Homoeopathic Hospital. In 1950 Parliament passed the Faculty of Homoeopathy Act whereby the Faculty was legally recognised and its objects defined. Now these are real achievements and although they mean nothing in terms of proving the validity of Homoeopathy they do mean we cannot turn a bind eye and ignore the whole subject completely.

THE BIRTH OF HOMOEOPATHY

Christian Samuel Hahnemann was a German doctor practising in Saxony during the latter part of the eighteenth and early nineteenth century. As a young physician he was deeply dissatisfied with the state of medicine in his day —in fact some of his complaints still seem relevant. Patients were not treated as individuals or even whole people and diagnosis consisted of applying descriptive labels to groups of symptoms, for example: the vapours, the pox or goal fever. Treatment had little rational basis but consisted of running through a whole range of remedies from bleeding to purgation and administering blunderbuss concoctions of drugs with varying effects upon the patient.

Hahnemann quickly rebelled against contemporary concepts of the nature of disease but realised also that no attitude to the problems of diagnosis could be of much help to the patient unless it were matched with an equally rational method of treatment. In the year 1796 he was engaged in translating into German the Materia Medica of William Cullen. In particular he disagreed with Cullen on the pharmacological action of Peruvian Bark of which quinine is the active constituent. In an effort to test the effect of this drug he took the bold step of administering a dose to himself and found to his surprise that it caused the symptoms of ague—the very disease of which quinine was the cure. If this drug could both cause and cure a disease then why not others? This observation marked the birth of Homoeopathy.

Smallpox inoculation[1], a controversial topic throughout all of the latter half of the eighteenth century, was another example of both causing and curing or at least preventing a disease by the same agent.

COMPILING THE EVIDENCE

The difficulty now arose that little was known about the symptomatic effect of drugs upon the normal healthy human body. Over the next

twenty years Hahnemann conducted extensive "planned provings" upon his friends, his family and himself. These subjects were free from the symptoms of any disease at the time of drug administration and undertook to avoid any mode of life or action that could result in symptoms which would prejudice the result of the experiments. Some volunteers were given unmedicated preparations unknown to themselves in order to eliminate as much as possible the effects of autosuggestion upon the trials. Each observer was asked to record with great care every single symptom he had experienced and all these recordings were checked and cross-checked repeatedly. Gradually a pattern of symptom response for each substance developed and after these twenty years Hahnemann produced his findings in his mammoth work Materia Medica Pura.

When a disease caused certain symptoms in an individual he found that as with the ague, the administration of the substance that caused exactly the same symptoms in a healthy subject often effected a cure, although this was not always the case. The principle: "*Similia similibus curentur*"—let likes be cured by likes was not entirely a new one. Two hundred years earlier Paracelsus had advanced the same idea and it was even contained in Hippocratic writings. Only Hahnemann, however, attempted to prove the truth of this suggestion and when his experiments showed to his satisfaction that it was indeed true then it became the corner stone of Homocopathy. Subsequently other investigators carried out more experiments or provings and added their results to the originals. Fifty years later knowledge had increased to such an extent that the homocopathic Materia Medica edited by Allen compromised ten large volumes of which as many as ninety-three pages were devoted to the three thousand nine hundred and twenty symptoms produced by

PHOSPHORUS

THE INFINITESIMAL DOSE

Earlier on I pointed out that not all patients were cured by the administration of homocopathic remedies, in fact some were made worse and in others abnormal reactions occurred. Hahnemann postulated that in disease the body was extraordinarily sensitive to the dose and that the large dose used in conventional therapy over-stimulated the defence mechanism of the body and exhausted it. Therefore, if the correct remedy were chosen, minute doses would be more effective. Thus homocopaths consider that the more dilute a drug becomes the more potent it becomes and the process of dilution is known as potentisation. Quite how small the homocopathic doses are will be realised when it is pointed out that the dilution of the average therapeutic dose is one part of active ingredient to 1×10^{60} parts of inert base. The doses that are regarded as being more powerful and dangerous in the hands of unskilled practitioners are of course much more dilute.

THE INFREQUENT DOSE

If the drug to be used has been chosen correctly then not only is a minute dose most effective but it need rarely be repeated. If there is any improvement at all in the patient's condition after the initial dose then further dosage will not help that improvement and may hamper recovery as long term toxic effects result from over medication. If improvement does cease then another dose may be given but if new symptoms develop or if there has been no improvement at all then another drug must be sought.

THE SINGLE DRUG PRINCIPLE

In Homocopathy the correct remedy is the only useful remedy. There is no need for more than one drug to be administered at a time and in fact this is strongly contraindicated as the two may well cancel each other out. This is not nearly so controversial an attitude to-day when the pitfalls of polypharmacy are well appreciated but in the early nineteenth century it was revolutionary: Then it seemed wise to attack disease with every drug available and one preparation in the 1783 Pharmacopoeia contained fifty separate drugs.

THE CHOICE OF DRUG FOR THE SPECIFIC DISEASE SITUATION

The homocopathic physician makes a careful diagnosis on several planes before deciding exactly which single remedy to use. There are:

1. *The Provisional Pathological Diagnosis*

Every effort should be made to find out which tissues are diseased and how far cellular function has been deranged. Surgical advice may

be needed, for if tissues are irreversibly damaged then no form of medical treatment can restore them. Certain drugs have an affinity for certain tissues and so the pathological diagnosis may help in the selection of a remedy.

2. *Actiological Diagnosis*

Symptoms caused or aggravated by specific factors will be remedied by drugs influential upon those factors.

3. *Symptomatological Diagnosis*

This is one of the most important fields of diagnosis. It is not that the patient has a cold. A cold in which the discharge is watery and burns the nose needs a completely different remedy from one in which the discharge is thick and causes no discomfort. Every symptom must be examined exhaustively and details are all important for one factor missed will result in an ineffective remedy being chosen.

4. *Constitutional Diagnosis*

Experience has shown that some remedies, whilst theoretically suitable for the treatment of a patient must be rejected because they are unsuited to the constitutional type that is the patient. This phrase "constitutional type" includes not only the physical characteristics of the patient but whether he is lazy or fastidious, cold or warm blooded, an extrovert or an introvert.

DRUG CLASSIFICATION

Whilst formulating a diagnosis the physician will be narrowing down the number of possible remedies until one emerges which is then used in therapy. As in conventional medicine, some practitioners have a flair for their work and instinct plays a large part in drug selection. Others have to follow the rules and indications laid down by their predecessors and contemporaries until they too arrive at the drug most suitable for the patient. One practical problem that immediately becomes obvious is that there are so many drugs in the modern homoeopathic Pharmacopoeia and so many listed symptoms that it could take an age to select one drug to match a specific symtomatological, actiological, pathological and constitutional picture. In order to make this task easier the drugs in the Pharmocopoeia can be classified in several broad divisions. These are :

(1) Classification by the Prominent Characteristics of Drugs

Each remedy has some effects which occur time and time again in individuals. For example *Aconitum* causes extreme thirst and restlessness in most people.

(2) Classification by the Source of Remedy

Sources are (a) Botanical; (b) Chemical; (c) Biological, and (d) Electrophysical.

(3) Classification by Tissue Affinities

For example *Iodum* has an affinity for the thyroid gland. The provisional pathological diagnosis will show which tissue is involved.

(4) Classification by the Physical Features of the Patient

It is thought that there is a close relationship between certain drugs and outstanding physical features. For instance when a tall, delicate red-heared fidgety patient crosses the threshold of your surgery the drug *Phosphorus* should spring to mind as a cure for his troubles.

(5) Classification by Mental Factors

Subjective sensations as symptoms are considered as specific for one disease process in one individual and when prominent may well indicate the correct remedy. Emotional states such as intense jealousy or hate have corresponding remedies.

(6) Classification by General Reactions of Drugs

Drugs can be classified by the general effect they have on the body, i.e. a number all cause sweating. Also they can be classified by the effects they have on the general modalities of individuals. This is an expression to denote the way an individual reacts to a wide variety of influences. Such drugs either increase the subjective feelings of wellbeing under given circumstances or else increase the sensation of depression. A change in the normal reaction to an influence such as the influence of heat or cold is highly significant and may help in the final selection of one drug from a group.

(7) Classification by Causal Factor

Some drugs are extremely useful in illnesses with certain specific causes—a history of head injury is a strong indication for Natrum *Sulphuricum*.

It is obvious that one cannot rigidly dissociate the process of diagnosis and of drug selection as so much of the diagnosis is symptomatological and symptomatology forms the basis of so much of the choice of therapy.

UNORTHODOX SCHOOLS

In January Dr. William Scheussler formed the School of Biochemistry which reduced the number of Homoeopathic remedies to twelve inorganic mineral salts. The school still exists

and in fact one advertisement in a recent issue of the British Homoeopathic Journal[2] claims that its diluting processes are carried out mechanically for twelve working days before any remedy is sold. In the United States of America a school of isopathy developed which treated like exactly by like—the cure for tapeworms was a purée of tapeworms heads! Study of these and other schools makes fascinating reading but is not relevant to this article.

WHY HAS HOMOEOPATHY NOT PROGRESSED?

Homoeopathy reached its peak in Britain in the mid nineteenth century when there were 300 practising physicians. Why has it not progressed since then?

Surprisingly enough one of the main reasons has been the very factor that eased its introduction into Britain, namely its social respectability. Queen Victoria's Uncle, Prince Leopold, Queen Mary and King George VI have all been advocates of Homoeopathy but in the same way that a shop with a Royal Appointment tends to be regarded as an exclusive establishment so homoeopathy tended to be regarded as a plaything for the Aristocracy. Secondly conventional medicine has made most progress over the last seventy-five years and although homoeopaths consider that modern drugs have only a short term effect and their use is fraught with danger owing to known or unknown side effects, there is no doubt that conventional medicine is more spectacular and exciting.

With the development of methods of mass communication over the last seventy-five years scientific arguments which previously had limited audiences became familiar to the public who then tended to be more critical of the unconventional theories put to them. In some ways it is a case of a little knowledge becoming a dangerous thing. Although the average citizen often does not have the knowledge to support or reject a theory on its merits he now knows which theories are acceptable to Authority, whether Authority be the Royal Society or the Royal College of Physicians, and accepts their judgement in pre-digested form. A Society is developing in which more and more time is spent obtaining paper qualifications as these are now the only passport for advancement and less time is spent on original thought. We are eliminating the unconventional in favour of the drab orthodoxy of the production line scientist. The sad thing is that the authority who issues the paper qualifications and upon whom we all depend now for our livelihood is riddled with vested interests. Almost every great scientific advance in history was achieved in the teeth of bitter opposition from the Establishment. Orthodox medicine has had so much publicity in newspapers and on the radio and television in recent years that all who question its basic assumptions tend to be grouped together as fools or quacks irrespective of the merits or demerits of their arguments.

Finally Homoeopathy has become stifled because of its very urge to become respected by the medical profession. The hierarchy have always insisted that only qualified doctors could become homoeopathic physicians and although the 1950 Act of Parliament gave the Faculty the right to run courses and confer Diplomas it did so only to qualified practitioners. It did not insist that medical schools teach homoeopathy and today not one medical school in Britain offers a course in the subject. It is not surprising that after five or six years of orthodox medicine the Graduate has at best no interest in Hoemoeopathy and in many cases an instinctive distaste for something that did not appear in his curriculum or was even denigrated by his teachers. In addition the prospect of extra unremunerative post graduate work with no guaranteed income at the end of it all is hardly enticing. Many people consider that this search for respectability is doing them far more harm than good[3] and that the Profession would be better served by loosening its links with conventional medicine and offering courses and Diplomas to all who wish to avail themselves of the opportunity.

HOMOEOPATHIC CONTRIBUTIONS TO MEDICINE

Homoeopathic physicians have made valuable contributions to the Art and Practice of Medicine. Almost alone amongst physicians can they claim to have followed the exhortation of Hippocrates: "First, do no harm," and anyone who has seen the results of say thalidomide or chloramphenicol in some patients can hardly be proud of conventional medicine on this score. We owe much to homoeopathic physicians for our concepts of the importance of the individual, the psychogenic nature of disease and the importance of avoiding unnecessary

polypharmacy. The chief obstacle to the acceptance of Homoeopathy as a legitimate form of medicine by the Profession is the extremist viewpoint held by some of its practitioners. Others are more flexible in their outlook. One contributor to the British Homoeopathic Journal[4] in 1958 described the adherence to the single infinitesemal dose as "a piece of bravura displayed by the ultra-Hahnemannians" and earlier a noted homoeopathic practitioner, C. E. Wheeler, stated that the central Law of Homoeopathy was that governing the choice of remedy and that it could be practised without the use of minute doses. In the Glasgow Homoeopathic Hospital the outlook is even more moderate[5], Physicians do not hestitate to use antibiotics, digitalis or diuretics at the climax of an illness or if homoeopathic remedies are unsuccessful. They make full use of surgical, biochemical and radiographical facilities in coming to a diagnosis but in the main treat patients with homoeopathic remedies and claim considerable success. These people strike a fair balance between conventional medicine and the outrageous extremism of some of their colleagues. They respect but are not slaves of therapeutic orthodox. Being flexible in their outlook they appreciate the benefits of penicillin whilst suspecting the virtues of aspirin or anticoagulants. It is for us to be flexible too and to consider their case on its merits without prejudice and without mistrust.

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GENERAL READING

A GUIDE TO HOMOEOPATHY 3rd edition 1962 by British Hom. Assoc.

ELEMENTS OF HOMOEOPATHY by D. M. Gibson, M.B., B.S., F.R.C.S.

INTRODUCTION TO PRINCIPLES AND PRACTICE OF HOMOEOPATHY — Wheeler.

Book

MANUAL OF SURGICAL ANATOMY. By Bruce, Walmsley and Ross. 1964. E. & S. Livingstone. Price £4 10/-.

A manual of Surgical Anatomy which sets out to 'be of value to both senior clinical students and to those who are pursuing surgery after graduation' must steer a difficult course. The senior clinical student is concerned with the principles of surgical treatment, although going into anatomical detail occasionally. The graduate requires discussion of anatomy in terms a practical problems. This book lucidly fulfills the requirements of the latter. The surgical relevance of anatomy is carefully and adequately shown. In fact the pre-clinical student, dismayed by the apparent irrelevancy of anatomical teaching, may find it interesting.

The book is well set out, and clearly written. Illustrations are good, with diagrams, drawings and X-rays.

D.L.D.

ELECTROCARDIOGRAPHY FOR THE ANAESTHETIST, by W. N. Rollason. Blackwell Scientific Publications, Oxford, 1964. Pp. 124. Price 30/-.

This small book is, of course, written primarily for anaesthetists, and so has a bias towards the information required in this specialty. However, because there is little space 'padding' the sections on the normal and the abnormal ECG are particularly lucid. The effect of anaesthetic agents on ECG and the use of the electrocardiogram during surgery should be of interest to any surgeon and his junior staff.

Being brief, it can be read very quickly, and should prove a valuable introduction to what is often regarded as a very complex subject. Any book on this topic must have a large number of illustrations and those in this book have obviously been chosen with care to make their point clearly.

R.R.S.H.

ELECTRO-CARDIOGRAPHY. By R. W. D. Turner. 2nd Edition 1964. E. & S. Livingstone.

When the second edition of a book follows the first by only one year, as this one has, there is usually a good reason for it. On reading Dr. Turner's book the reason becomes apparent. Electro-cardiography, a complex clinical tool, is lucidly explained. The book is clearly set out, with ample illustrations. It starts from fundamentals, is not too technical, attempts some rationale of ECG changes in disease, and never looses sight of the clinical implications of the subject. Undoubtedly it will continue to be popular with students and physicians.

D.L.D.

Reviews

TEXTBOOK OF SURGERY. D. A. MacFarlane and L. P. Thomas. Pp. 759, 227 illustrations. 60/- net. 1964. E. & S. Livingstone Ltd., Edinburgh and London.

For some time one has wished that there was a surgical equivalent to Davidson's Medicine. In this book that wish may well have come true.

Of medium size, it includes sections on all the common surgical conditions written in simple and straightforward terms. I particularly like the use of simple line drawings instead of a multitude of photographs—these provide the essential information in a clear, readily remembered manner, and are so much easier to understand than complicated pictures with irrelevant detail.

This book is certainly an excellent introduction to surgery and should prove highly acceptable as such. It will not, however, obviate the necessity to refer to the well-known larger works to fill in detail.

However, it should provide a sound framework upon which more extensive information can be built and by providing this framework in a clear and simple manner, should make the subsequent task very much easier. It is an essential book for the undergraduate particularly at the start of clinical studies, but is less likely to be of value to the post-graduate.

R.H.

AN INTRODUCTION TO DIAGNOSTIC NEUROLOGY. Vol. III. Exercises. E. & S. Livingstone. 1964. Price 12/6.

When the label 'Exercises' is attached to a book, the average student shudders and looks for less disturbing pursuits. It would be unfortunate, however, if this drab-looking little book were passed by. It demands the participation of the reader, and demonstrates the need for clear thinking. One's ignorance and confusion are pointed out all too clearly. The problems presented are those which face the neurologist at the bed-side. A good little volume!

D.L.D.

A NURSE'S GUIDE TO ANAESTHETICS, RESUSCITATION AND INTENSIVE CARE, by W. Norris and D. Campbell. E. & S. Livingstone Ltd., 1964. Pp. 114. Price 20/-. First edition.

This is a very pleasant small book, well written and copiously illustrated. It presents the main outlines of its subjects clearly and without too much needless detail.

While of prime interest to members of the nursing profession, it is worthwhile reading for the medical student. Here he will find the different types of anaesthesia—local, spinal, epidural, and general simply explained, and also the techniques of intensive care and resuscitation. The careful layout and the many photographs and drawings make this a very easy book to read, and, more important, to remember.

R.R.S.H.