The hypothesis of multiple and overlapping representations allows of an integration of all the phenomena of facilitation with the known facts, and we no longer have to suppose that what deviation and reversal of response really signify is that a given representation actually changes its location from place to place and moment to moment, and that cortical representation is in a perpetual flux.

[Only on the basis of Jackson's theory of representation was it possible to account for the clinically observed facts. But in the field of experimental physiology the facts pointed to the same conclusions.]

The notion of multiplicity of localizations of movements in a single cortical spot stands out clearly enough from a great number of experimental observations. Thus it has long been known that if the faradic stimulus to a cortical point be prolonged a sequence of primary, secondary, and tertiary movements, as they have been called, can be evoked, and these involve a spreading field of musculature.

[The lecturer quoted from Horsley's Linacre Lecture in which he had drawn attention explicitly to the fact that multiplicity of representations at a single focus had always been an inference that could be drawn from experimental observations; also the recent work of two American physiologists, Murphy and Gellhorn (1945), who, using supra-threshold condenser discharges as their cortical stimuli, had found multiplicity of representation throughout the motor cortex of three animal types—rabbit, cat, and monkey—and also extensive overlap of representation, transcending the boundaries of the three great somatotopic regions, those of the head, upper limb, and lower limb. This multiplicity of representation persists in an isolated cortical focus and is not due to spread of current over adjacent areas of cortex.]

This consummation must be profoundly moving to whomsoever has been bred in the tradition of the great neurologists of the turn of the century. At last a great adventure of thought has come safely to port, and in the words of a phrase from Pope's *Essay on Man*, the motor cortex has been shown to be "A mighty maze! but not without a plan." Just as seventy-five years ago the clinically ascertained fact of a localization of somatic function in the cerebral cortex obtained its brilliant confirmation at the hands of Ferrier, so now the hypothesis as to the nature of that localization, based upon clinical observation and formulated so long ago, finds an experimental verification in the laboratory at the hands of two American physiologists. Now this clinical hypothesis may be regarded as valid on its own merits, and not in need of any further verification.

Conclusion

The material and the conditions out of which the clinical investigator has to forge ordered knowledge are a constant challenge to his capacity for conceptual thinking as well as to his powers of observation. This chapter I have put before you is the story of the response to challenge. This particular challenge, which faces the experimental no less than the clinical investigator, is the challenge to conceptual thinking, a challenge we see so brilliantly met in the work we have been considering, or in that of Sherrington in the realms of experimental physiology. Science, it has been said, is formed by the meeting of the two orders of experience, observational and conceptual, and the former can be interpreted only in terms of the latter.

How appropriate to our thought of Victor Horsley is the conception of challenge and response, for his full and eager life was a series of responses to challenge. His name and fame are part of the imperishable tradition of medicine.

A SUGGESTED HOSPITAL UNIT

BY

H. J. McCURRICH, M.S., F.R.C.S., M.R.C.O.G.

Honorary Surgeon and Gynaecologist, Royal Sussex
County Hospital

For some time it has been evident to me that the private or pay block in a hospital is obsolete. In such a block the segregation is based on social and not on medical grounds and the patients lose the advantages that the less affluent obtain from specialized nursing and equipment. While by no means an advocate of specialization to the extent that many consider advisable, whereby a "special centre" is necessary before any malady can be treated, yet I think there can be no doubt that a reasonable degree of specialization is an advantage. I am convinced that this applies as much to the nursing as it does to the medical profession, or even more so. I have on many occasions heard surgeons remark that their cases do better in both the public and private wards of special hospitals restricted to the type of work concerned than do similar cases in nursing homes or the private blocks of general hospitals.

Sisters and nurses tend to be interested in special aspects of their work. Thus in a general pay block a fractured femur may be nursed by a sister specially interested in diabetes, and the requisite special equipment is not available, or, if it is, the staff are not familiar with it. It is for these reasons that private beds have been provided in special hospitals. Not only does this apply particularly to fractures and orthopaedic cases, but it applies to genito-urinary, chest, and abdominal surgery, neurosurgery, and gynaecology.

In my opinion, the ideal conditions are those in which a surgeon works as part of a self-contained team of agreeable and co-operative colleagues, medical and nursing, in a self-contained unit having all the facilities required for the efficient execution of his work, both public and private. The unit should therefore have general and private wards; it should, in the case of a surgical unit, have operating theatres, and an x-ray room for pyelography, salpingography, encephalography, or the correction of fractures, depending on the type of work engaged in. It is hard to think of any major surgical division that does not, for its finest technique, require the help of x rays. There should be facilities for out-patients, both public and private, and a small clinical laboratory. Under such conditions a good technique could be developed: no doubt each "firm" would plan its own special technique, and this might be the subject of friendly rivalry. In this manner the method could be judged by results. In a pay block it is difficult to get a special technique followed in detail, and the procedures are apt to be a blend of the ideas of several surgeons—so often the best features of each method fail to be incorporated in the blend, and one often feels that the *exact* technique of any competent surgeon (if one cannot get one's own) would be better than a hotchpotch of many.

I have been thinking of these things for many years, but I have been stimulated to put my thoughts on paper by the inspiring article by J. C. Spence on the subject of children's hospitals (*Journal*, Jan. 25, p. 125). I submit, as an illustration of what I mean, a plan kindly drawn up for me by Mr. Owen Watson, A.R.I.B.A., and his staff. It does not profess to be perfect in detail, and as I have already put these experts to a great deal of trouble by alterations and revisions I have refrained from further alterations as the plan illustrates my theme. There is, however, one detail that strikes me as needing changing—the plaster room should adjoin and communicate with the x-ray room, and it might be an advantage for the laboratory to communicate with the theatre suite. The private wards would be better grouped in one group and should not face the back of another building. Obviously, if such a plan were to be drawn up in connexion with a proposed hospital the nature of the treatment to be carried out there and the available site, as well as the personal views of those who were to work in the unit, would make considerable alteration necessary. I therefore feel that at this stage there is no need to ask for the plan to be redrawn to provide for comparatively trivial revisions.

Medical practitioners might like to draw the attention of paraplegic patients to a new quarterly journal entitled *The Cord*. The journal may be ordered from the Editor, Paraplegic Branch of the British Legion, Stoke Mandeville Hospital, Aylesbury, Bucks, a year's subscription costing only 2s. Though the journal is issued by the Paraplegic Branch of the British Legion it will cater also for the interests of those paraplegics who are not members of the Legion. It will provide information about appliances and medical treatment suitable for paraplegics, and how they may best be obtained. General problems of housing and employment will also be discussed. The present number contains an entertaining short story, and announces the offer of a two-guinea prize each quarter for the best short story submitted by a paraplegic reader.

Accommodation

The following are the main provisions in carrying out the scheme.

- General wards: male, female, and shuttle
- Private wards (single rooms)
- Theatre and anaesthetic rooms
- X-ray and developing room
- Plaster room if the unit deals with orthopaedic or fracture cases
- Splint store and store for Balkan beams, etc.
- Resuscitation ward
- Balconies adequate to accommodate a fair number of beds

There are, however, certain features to which I would draw attention.

Shuttle Ward.—To those not acquainted with this feature I would explain that a shuttle ward is one which forms an annexe to either the male or the female ward, it being situated between the two and with a door leading into either ward at each end.

trekking case. Attempts to reserve the single rooms for bad cases break down in practice, I find. If single rooms are provided, the private wards need not be separated for the sexes any more than are the rooms and floors in a hotel.

Resuscitation Ward.—The question of a resuscitation ward must be considered. It has advantages in the way of equipment and facilities, but there are objections. A much better relationship exists between nurse and patient when the nurse who has cared for him *in extremis* also nurses him through his convalescence: it is encouraging to the nurse and builds up a keen and happy spirit in the clinic. The beneficial influence of the gratitude of patients to the nursing staff is familiar to all who have worked in hospitals, and many patients make a point of returning when fully recovered in order to thank the sister of the ward and to bring her some flowers. On the other hand, it is an advantage to segregate a desperately ill patient, and to be able to come and go without disturbing the other patients; to

By opening the door into the male ward and closing that into the female ward the shuttle ward becomes an auxiliary male ward. It has no kitchen or sanitary accommodation, and is therefore cheap to build; it uses the kitchen and sanitary arrangements of the ward with which it communicates. This arrangement enables fluctuations in the number of each sex awaiting admission to be dealt with. If there was a big female waiting list, the shuttle ward could be used to reduce this by becoming a female ward, but if as a result a small hold-up of male cases occurred the shuttle ward could become a male ward for a week or two, and so on.

Private Wards.—Some advocate that two or three patients should share a room. This is satisfactory for trivial illnesses or for convalescents who are particularly sociable, but those who have shared a small ward with a patient taking two or three days to die of general peritonitis will need no further argument to convince them that, generally speaking, private single rooms are better. For myself, if I could not have a single room I would prefer to share with twenty rather than with one, as I should not be so likely to have such close contact with a dis-

use bright lights instead of groping to do an intravenous transfusion in the semi-obscurity of shaded lights, and to carry out all noise-producing procedures without disturbing other patients. The patient in such a ward is usually oblivious to the general turmoil.

It seems that both these advantages could be secured by having a recovery ward attached to each general ward. In the plan it is shown as having an observation window into the duty room. The ward staff, supplemented if necessary, could look after the very ill patient, would not lose contact, and would have the joy, if successful, of seeing the patient reach convalescence. On the other hand, if resuscitation failed, their disappointment and distress would be mitigated by the fact that they are not entirely engaged in this rather wearing occupation.

In the case of single private wards, there are few advantages in having a separate resuscitation ward.

Personnel

This is not the place to enter into details, but certain principles should be established. To ensure unification there must be

unified control. There should, on the medical side, be one surgeon in charge of the whole unit. On the nursing side there should be a senior sister as unit sister, with theatre and ward sisters under her. She might combine her duties with a double appointment, as, for instance, unit sister and sister-in-charge of a ward or the theatre. On the other hand, she might take charge of wards or the theatre when the sister in direct charge of these is away, and she could advise and help the staff nurse, whose relative lack of experience should make her welcome such support.

The second principle is that of continuity. In many hospitals a complete change of residents occurs periodically, and the new resident has to spend a week or two finding his feet, with a consequent drop in efficiency. It is an advantage in any unit to have a senior and a junior house-surgeon. The junior becomes in time the senior and by that time is familiar with the work of the unit, and the newly appointed junior is supervised and helped by his senior, especially in the earlier weeks of his appointment. This principle should extend throughout the clinic. It does not follow that one man need progress all the way, held up for years by lack of vacancies, but new blood can be introduced at various levels without, however, a complete rupture of continuity. One sees in some municipal hospitals the ill effects of neglecting this principle. Whole-time surgeons are appointed without adequate deputies, and every time a fresh appointment is made a new man arrives, often with little or no introduction. He does not know any of the old patients, or the methods and traditions of the hospital. He inevitably finds a certain number of failures, for whom he feels no responsibility and little affection.

Continuity on the nursing side would be obtained by having several sisters and a unit sister.

Other Features

The importance of adequate clinical notes and records is universally recognized but as a rule most inadequately provided for. In this plan provision is made for a records office and accommodation provided for typists and clerks to help in keeping adequate and—what are too often lacking—legible clinical notes.

I do not wish to give the impression that I favour special hospitals: I am entirely opposed to the further creation of such hospitals. I feel that constant contact with those engaged in other branches of work is good for both doctors and nurses, and prevents isolation and a narrow outlook. In my opinion a general hospital should consist of a collection of units such as I have described above with a central administrative block containing, amongst other things, staff dining and common rooms where meeting one's colleagues in various branches would be automatic.

Space prevents further elaboration of this scheme, but enough has been written to present the idea as a subject for consideration, discussion, and development by those interested in the welfare of clinical medicine and surgery and the improvement and advance of our hospital service. It would be a great relief, I feel, to have one's work centralized, and not to waste one's strength and energy in transportation and in toiling up flights of stairs in inadequate nursing homes carrying bags of instruments and appliances, with the fear that the one instrument that may really be needed has been left at home; having to make do without such aids as suction or portable x-ray apparatus, and with no trolleys or lifts to carry the patient from the operating table to his bed. Surely what is best for the patient is best for us all; the finest work demands that all the most up-to-date facilities and aids should be available whenever required, and the practitioner's energies should be conserved and directed to the work for which he has prepared himself by years of study and experience and not be dissipated in trivial but fatiguing tasks.

At a meeting of the North of England Obstetrical and Gynaecological Society held recently Mr. F. J. Burke described a case of theca-celled tumour of the ovary. The patient was 74 years of age; the menopause had been 22 years previously. She had been a spinster until the age of 72. Apparently some rejuvenation had taken place, for sexual desire and marital intercourse were normal. She stressed that her marriage was the great event of her life. A theca-celled ovarian tumour weighing 20 lb. (9 kg.) was removed.

Preparations and Appliances

NON-CLOTTING NEEDLE FOR INTRAVENOUS INJECTIONS

Drs. G. P. FOX and J. H. TAYLOR, London Hospital, London, E.1, write: The increasing use of the intravenous route for anaesthesia brings the problem of maintaining the patency of an indwelling intravenous needle into special prominence. While on a visit to Stockholm in 1946, one of us (J. H. T.) was impressed by a needle devised by Dr. Torsten Gordh, of the department of anaesthesia at the Karolinska Hospital, and made by the surgical instrument firm of Stille.

This needle is the essence of simplicity and efficiency, and was fully described in *Anesthesiology* (1945, 6, 258). It consists of a shaft 3 cm. long of about 20 s.w.g., with a slightly thickened shoulder-piece 2.2 cm. in length, upon which is mounted at the end and at right angles to the shaft a small upward prolongation, surmounted by a detachable screw cap within which is a tightly fitting rubber diaphragm of 1.5 mm. thickness. The shoulder-piece is fitted with a thin-winged fin which lies snugly on the patient's skin and is maintained firmly by a strip of adhesive strapping. The overall length of the needle is 5 cm.

The patient is anaesthetized with a preliminary dose of thiopentone, and as soon as he is unconscious the needle is inserted into any convenient vein of the forearm or hand and maintained in position by the strip of adhesive strapping encircling the shoulder wing and the patient's arm. Further injections are made as required by piercing the rubber diaphragm with a very fine hypodermic needle mounted on a 10-ml. syringe.

The principle upon which clot formation is prevented is that blood cannot flow back into the needle once it is within the lumen of the vein since the distal end is closed by the rubber diaphragm. It is advisable before inserting the needle to inject a little of the anaesthetic fluid through it so as to expel any air which may have entered the needle through removal of the screw cap during sterilization.

The needle is easily sterilized by boiling, and the life of the rubber diaphragm varies with the extent of its use, but using only very sharp fine hypodermic needles a diaphragm will last from two to four months. No additional apparatus is required, and even an arm-board can be dispensed with if a suitable vein is found near the wrist and the hand is kept on the pillow by the side of the patient's head. We have used this needle now for over a year, and have never encountered clot formation within it, even when it has remained *in situ* for over four hours; neither have we seen any thrombosis higher up the vein, provided the needle is kept firmly within the lumen by means of the adhesive strapping. The uses to which this Torsten Gordh needle can be put are many. The anaesthetist will find it of service particularly when employing a thiopentone-nitrous-oxide-oxygen combination using intermittent, fractional doses of thiopentone and tubocurarine. In this case, since thiopentone and tubocurarine together form a dense precipitate, it is necessary to inject a small quantity of sterile saline after each injection in order to prevent the formation of such a precipitate.

Recently a minor modification of this needle has been made for us by Blease Anaesthetic Equipment, Ltd., of 223/7, St. John Street, London, E.C.1. The shoulder wing has a thin rubber arm-band and buckle attached to it and this makes for easier fixation to the forearm without the use of adhesive plaster. In addition, the screw cap embodying the diaphragm is mounted at an angle of 45 degrees instead of at right angles, thus streamlining the needle, which is then less likely to project from the arm.