performance of a suprapubic cystotomy. I have advised operation, and I hope shortly to help my colleague, under whose care the man is, to perform laminectomy to be followed by excision of the damaged area of the cord and transplantation of one or more sections of a rabbit's cord into the gap, in order to try to secure conduction of impressions between the upper and lower segments of the man's spinal cord.

There are, I feel sure, many similar cases of invalided soldiers in various institutions throughout the country who would doubtless be willing to undergo operation even if it gives the barest possibility of success.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, September 13th, 1890, and October 31st, 1896.

An Address

ON THE

NECESSITY FOR EDUCATION IN RADIOLOGY
AND ELECTRO-THERAPEUTICS.

DELIVERED TO THE ELECTRO-THERAPEUTICAL SECTION OF
THE ROYAL SOCIETY OF MEDICINE.

BY

G. HARRISON ORTON, M.A., M.D.,

PRESIDENT, ELECTRO-THERAPEUTIC SECTION, ROYAL SOCIETY OF
MEDICINE; RADIOLOGIST TO ST. MARY'S HOSPITAL.

(Abstract.)

DR. ORTON began by referring to the views expressed by Dr. Thurstan Holland in his presidential address to the Röntgen Society,* and in his letter in the JOURNAL of September 15th, 1917, giving an account of the steps taken by the Surgeon-General of the United States Army to organize military radiographic work; as a result of a conference of leading radiologists a number of schools in charge of experts were established for the teaching of radiographic work, which medical officers intending to do x-ray work were required to attend for three months; the x-ray examination of recruits, especially with reference to chest conditions, was organized, and methods for the localization of foreign bodies were considered.

Dr. Orton said that the organization for military x-ray work had been carried out in this country without consultation with leading radiologists, with possibly one exception, and added that the same remark applied to electro-therapeutics. In March, 1917, the council of the Electro-therapeutic Section of the Royal Society of Medicine appointed a small committee, with Sir James Mackenzie as chairman, to consider the best manner in which to deal with questions concerning the status of medical men holding positions as radiologists and electro-therapeutists, and the steps which should be taken for the promotion and teaching of radiology and electro-therapeutics. After full consideration had been given to the matter at several meetings the following letter was addressed to the Vice-Chancellor of the University of Cambridge on May 26th, 1917:

Dear Sir,

The call for some organization of the members of the medical profession who practise radiology and other branches of electro-therapeutics is urgent, and there is great need that some steps should be taken to establish these subjects on a proper footing both in regard to the public and the profession generally. At present no standard exists; there is no organized teaching of the subjects, and those medical men who have taken up this branch of medicine have had to pick up their knowledge almost entirely by experience—at the expense of their patients. The result of this haphazard state of things is well depicted by Captain Thurstan Holland in his presidential address before the Röntgen Society—the lack of knowledge on the part of those who have been responsible for placing totally untrained men, both lay and medical, in charge of most of the military x-ray departments has led to endless tragedies, while in civil practice much suffering would be saved if competent radiologists were in charge of the departments. In civil general hospitals,

where the x-ray department is properly organized, fully 10 per cent. of all the patients who enter the doors of the hospital find their way to this department, and this in spite of the fact that those in charge are so over-burdened with routine work that there is no time for research or the undertaking of new branches of diagnosis and treatment.

As the outcome of a discussion at the Council Meeting of the Electro-therapeutic Section of the Royal Society of Medicine on March 16th of this year a small committee was formed to consider—

(i) The best means of raising the status of radiology and electro-therapeutics to their rightful place among the branches of medicine, and to attract the better class of medical men to take up these special subjects.

(ii) To suggest what steps should be taken to provide teaching in radiology and electro-therapeutics.

At this meeting, after a prolonged discussion, a sub-committee was elected to go into this matter. After considering several schemes the subcommittee suggested that it was not advisable to start any programme of teaching in London until it was known if facilities could be offered for granting a diploma at Cambridge or some other university.

It was decided to approach Cambridge University in the matter, as it was stated by one of the members that funds would be found not only to provide for the necessary expenses, but also to equip, maintain, and eventually to endow a Research Hospital and Chair if these facilities were granted by this University.

It is intended that the scheme shall be started on broad lines, in order that development may not be hampered, the objects being:

(i) To provide a standard in these subjects.

(ii) To provide the teaching that will be necessary, together with the facilities for hospital experience.

So far as it has advanced at present the scheme of the Subcommittee provides for:

A. A central organization in London, housed in an institute, where teaching facilities would be available in the scientific part of the curriculum, the practical experience being available in the large hospitals. Later, if necessary, centres could be started in other towns.

B. A post-graduate diploma in one of the older universities where a research hospital would be built. This hospital would be devoted to the scientific investigation of the many physiological, pathological, and physical problems that are waiting to be worked out. This hospital would be available for those who wished to work on various problems, and especially for those who were investigating with a view to the M.D. thesis.

Appended you will find outlines of: A, The London Scheme; B, the Cambridge Scheme:

A. The London Scheme.

A representative board, elected annually, would be responsible for this scheme.

1. The intention is to provide a central institute in London, equipped for general organization, and also for post-graduate teaching, where the necessary appliances would be available for demonstrations, and where all lectures on scientific subjects could be given.

2. Arrangements would be made for teaching in physics, chemistry, pathology, and clinical medicine, and for lectures by specially qualified medical men in those branches of radiology in which they had specialized. Special lectures and demonstrations in allied subjects would also be arranged, and whenever distinguished colleagues from abroad visited this country they would be invited to deliver lectures.

3. In conjunction with the university which grants the diploma, the board would draw up the general lines of teaching, not only for the London school, but for any other schools that might be formed.

4. The board would arrange for students to hold appointments as clinical assistants in the various x-ray and electrical departments that would be available in the London hospitals.

5. The board would arrange centres throughout the country in close touch with the central institute, where it would be possible to arrange for post-graduate teaching.

6. The institute would be the centre for the spread of knowledge of these subjects and of the work done in this country; and, if possible, the existing x-ray journal would be utilized as its official organ.

In the future it is probable that many overseas workers will be attracted to this country, and a strong

* Journal of the Röntgen Society, January, 1917, vol. xiii, No. 50. BRITISH MEDICAL JOURNAL, November 18th, 1916, p. 696. A fuller expression of Dr. Holland's view was contained in an address published in the JOURNAL of March 3rd, 1917, p. 285.

effort should be made to establish an attractive post-graduate school where the subjects could be taught in a manner worthy of their importance. It is especially important to get the scheme started as soon as possible, even in a small way, for when the war is over there will be many medical men who have done the comparatively mechanical war x-ray work who will be attracted to the subject, and who will welcome the idea.

Lay assistance is necessary in x-ray and electro-therapeutic work, and provision will have to be made later for the training of qualified assistants, to whom a certificate would be granted.

The next step would be to approach the General Medical Council on the question of the recognition of radiologists, and the making of it illegal for any other than a qualified member to practise these subjects.

This would at once lead to the raising of the standard and the multiplication of posts of responsibility which would attract the better type of medical man to the new subjects.

B. The Scheme for Cambridge.

Clinical material for adequate teaching facilities is not available in Cambridge, but, on the other hand, there is quite sufficient for research, and the intention would be that, while London, and possibly other large towns, are the teaching centres, Cambridge should be the examining and research centre.

For this purpose it is necessary that there should be some man in charge in Cambridge who would, in conjunction with the duly appointed board, make the necessary arrangements for the examinations and undertake the direction of the research hospital.

In the first instance the duty of the man in charge would be to find out what men were at work and what work was being done in the various hospitals throughout the country, and to enlist the active and sympathetic support of all workers, not only in the central institute in London, but also to obtain their co-operation in the research work. As far as possible he should also be in touch with the work that is being done abroad, especially in Canada and the States.

There is room for endless research in radiology, not only on the physical side, but also on the human, for example, in the investigation of the alimentary tract, and especially in the action of drugs, etc., and it is proposed that a research hospital should be started with twelve or more beds and certain laboratories attached; this should be placed as close to the Addenbrooke Hospital and also to the existing laboratories as can be arranged.

In the first place it would be advisable that this hospital should be started in temporary buildings as it is impossible to foresee on what lines the hospital would develop.

Yours, etc.,

Another meeting was held on June 15th, 1917, when the following encouraging replies to the letter addressed to the Vice-Chancellor of Cambridge University were read:

The Vice-Chancellor wrote (May 28th, 1917):

I brought your letter before the Council of the Senate this morning. The proposals contained in the letter were received favourably and the whole question was referred to a special board for medicine, with the request for an answer to the Council before the end of the term.

Dr. Lawrence Humphrey, secretary of the special board for medicine, wrote (June 7th, 1917):

The special board for medicine considered your letter re medical radiology and welcomed the proposal. It was unanimously agreed to approve the general principle, and the board were prepared to recommend that steps be taken to institute a diploma. It was thought advisable that the scientific teaching should, as far as possible, be carried on in Cambridge and that the appointment should be rather a director or reader and not a professor. The board appointed a small committee to consider the details and, if desired, to meet members of your committee to discuss the matter.

The Committee further considered that, in view of the importance of the questions involved, and of the necessity for unanimity of opinion, it would be a proper step to invite the leading radiologists and electro-theraputists to attend a meeting, and the Secretary was authorized to call such a meeting and to invite the co-operation of the deans of the various London schools. Most of the deans have replied approving of the scheme, subject to the consideration of details, and there can be no doubt that in the near

future it should be possible to arrange for post-graduate teaching at several of these schools.

The meeting of radiologists and electro-theraputists was held at the Royal Society of Medicine on July 23th, when, after much lengthy argument and discussion, the following resolution was carried unanimously:

That this meeting of medical men practising as radiologists desire to express their approval of the initial steps taken by the gentlemen who have submitted an outline of a scheme, and to thank them heartily for the work they have done; and further we propose that the gentlemen who have already taken action in the matter should form an executive of a larger committee representative of all the London and provincial schools.

If such a body had been in existence at the beginning of the war it would have been in a position to advise the military authorities as to the general organization of radiology and electro-therapeutics, and, further, to undertake the teaching of men appointed to the various departments on standard methods; unfortunately this was not the case. But is it yet too late? From what I have seen and heard even in the last few weeks I should say decidedly No, but I fear nothing so simple as saying No will help us out of the anomalous position in which we find ourselves; but, as Captain Thurstan Holland has truly said, "The time has come to enter a strong protest against the continuance of methods which allow of such anomalies to exist." I think we are now in a position to enter such a protest. From what has been done there appears no doubt that the Cambridge part of the scheme could soon be in active being, if the necessary financial support can be arranged. It remains for us to see that the London scheme is put upon a sound basis, so that the two may be able to co-operate in practical teaching and research work.

To do this we must endeavour to establish a central institute in London with facilities for post-graduate teaching on a fairly large scale, in order that men who desire to study these subjects may be able to do so under conditions comparable with those already established in other countries.

The task is not easy, and I foresee that there are many obstacles still to be overcome, not the least being the lack of funds. The way, however, has been paved, and if we push on with sufficient energy and determination there is no reason why in the near future our efforts should not be crowned with success.

THE MYCOLOGICAL DETECTION AND DETERMINATION OF CERTAIN CARBOHYDRATES AND OTHER CARBON COMPOUNDS IN PATHOLOGICAL WORK.

BY

ALDO CASTELLANI, M.D., M.R.C.P.,

LIEUT.-COLONEL ROYAL ITALIAN MEDICAL SERVICE (NAVY); MEMBER OF PERMANENT COMMITTEE, INTERNATIONAL SANITARY COMMISSION;

AND

FRANK E. TAYLOR, M.D., M.Sc., M.R.C.P., F.R.C.S.,

LECTURER ON BACTERIOLOGY, KING'S COLLEGE, UNIVERSITY OF LONDON; PATHOLOGIST, ROYAL WESTMINSTER OPHTHALMIC HOSPITAL.

VARIOUS carbohydrates and other carbon compounds are currently used in the identification of certain bacteria and higher fungi. The reverse process may also be carried out, namely, certain hyphomycetes and bacteria presenting permanent biochemical reactions may be used in the determination of various carbohydrates and other carbon compounds in pathological work.

For many years ordinary German yeast has, as is well known, been used in the detection of glucose, but this is the only substance for which so far such method of detection has been employed in pathological investigations. As a matter of fact, the method is scientifically incorrect, at least when using the German yeast obtainable in London, for judging by the results of the investigation of several specimens collected by us, this yeast ferments with the production of gas, not only glucose, but several other sugars. When, therefore, gas is thus produced it does not mean with certainty that the sugar present is glucose; it might be levulose, or some other. To detect glucosæ recourse should be made to really specific germs for that sugar—namely, germs which will ferment glucose only.