a period of three months by the radiation of the carbon arc light. Growth during the first six weeks was greater in the irradiated than in the non-irradiated group of infants; but during the second six weeks the growth was less among the irradiated infants. Similar results were obtained using the mercury vapour lamp.

Injurious effects of sunshine are uncommon except perhaps when it is reflected from snow or water; here it may cause inflammatory burns or even blindness. The radiations from ultra-violet lamps, which emit rays of shorter wave-length than those found in the solar spectrum, when applied to the skin are so foreign to the body as to be comparable with the administration of a poisonous drug; either may be beneficial in a suitable subject, but harmful in an unsuitable.

A common effect of slight overdosing is sleeplessness, restlessness, lassitude, loss of weight, and nausea. Resistance to bacterial infection is said to be lowered by treating too large a surface. The most obvious ill effects are in the nature of burns; the skin becomes hot, red, swollen, and inflamed. In the sensitive these may extend beyond the region exposed. After more intensive radiation purulent exudation may occur. Repeated applications have resulted in chronic lesions, a pre-cancerous form of dermatitis. It should be understood that there is no difference between a sunburn, an ultra-violet burn, and a scald. The skin effects are often associated with severe pains in the eyes and headaches, sometimes lasting for weeks.

The eye is readily affected by strong radiations from arc lamps, molten glass, or light reflected from snow or ice; inflammation of the conjunctiva and cornea result, and the lens, and even the retina, may be affected. Ultra-violet rays coagulate protein, and cataract is a coagulation of the proteins of the lens; improper irradiation may certainly induce this condition. In a recent letter in the *British Medical Journal* a doctor writes that as a result of an unqualified person's light treatment on a patient of his, who had a slowly maturing cataract, the patient's vision was reduced in both eyes to perception and projection of light only. Some authorities regard ultra-violet light as the principal factor in the cause of senile cataract; glass-blower's cataract is the result of continuous illumination in which the whole of the spectrum is probably concerned. These effects on the eye can, of course, be obviated by wearing goggles, though this preventive is sometimes neglected, as is shown by a report in the *South Wales News* for June 14th last of a case in the Cardiff County Court, in which a woman was awarded £50 damages in an undefended case against the Cardiff Sunray Clinic. The plaintiff said that she had to face strong rays of light from a lamp and that no goggles were given to her until she had faced the light for two and a half to three minutes.

Physicians are generally agreed that radiation by ultra-violet light is contraindicated in highly nervous and neurotic people; they suffer what is called a grave "psychic reaction," and the treatment does harm. Great caution is necessary in all forms of pulmonary consumption and in other quiescent inflammatory conditions, such as appendicitis. In old people with rigid arteries, in all forms of kidney disease, and in some forms of heart disease the patient is made worse. Eczemas and some other skin diseases are often aggravated by the treatment. It may be that contraindications appear only after the first treatment. The daily press reported recently an inquest on a woman of 47 who died after ultra-violet ray treatment. She had severe burns on her back and legs, and duodenal ulcer followed. The doctor said that he had come to the conclusion that death was due to ulceration consequent upon burns set up by a sun-ray apparatus.

Careful examination is therefore necessary prior to treatment if we wish to be sure that ill effects will not follow. I believe that the expert can determine the necessary dosage for his patient without the risk of harmful general or local effects.

Most of the leading authorities on radiology have pointed out the dangers which may follow the improper use of ultra-violet lamps. Many of the lamps emit rays to which man has never before been exposed. The evidence of the

harm they may do is overwhelming. Few of us would dare to have a prescription containing poisons dispensed by an untrained person, but the dispensers of rays are uncontrolled, unregistered, and may be unqualified.

It is obviously right that the public should be given such information as will enable them to distinguish between those who have been properly educated to dispense rays and others. At the present time all kinds of rays are used by charlatans in Europe and America to impose on the public. Barbers employ them, especially for their lady clients. Beauty institutions have set up baths of blue rays, which are generally harmless frauds, though ultra-violet light has been used. Sun-ray institutes are becoming the fashion, and the public is buying machines and indulging in self-treatment.

Some countries have already taken action. The superior Council of Public Hygiene of France, consulted by the Minister of Works and Hygiene, has declared as follows: "That given the serious accidents which may result from the use of ultra-violet irradiations handled by incompetent persons, it is necessary, in the interest of public health, to confine the use of these procedures to hospital services and to authorize their application only by specialist physicians." In the United States the Council of Physical Therapy has reported on the dangers to the public of self-treatment by the sale of generators of ultra-violet energy. It points out that those not familiar with the possibilities of such apparatus place undue confidence in the advertising literature; unsuitable cases are treated or cases not amenable to treatment. The council regards such sales to the public as detrimental to the public welfare and an encouragement for the sale of worthless generators, since the public has no means of determining the quality of radiant energy.

I have endeavoured to show that treatment by radiation may be either beneficial or harmful; that its employment by unskilled people may cause serious ill effects to the patient, and I suggest that the time has come when some sort of protection must be extended to the public.

ULTRA-VIOLET LIGHT AND THE PUBLIC.*

BY

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PROFESSOR DIXON has put before you, with the clarity that has helped to make him one of the most popular lecturers in Cambridge, the position of ultra-violet light treatment as it is to-day. It was the extraordinary value of this form of treatment when properly employed, and the potent dangers associated with ignorant use, that led the British Medical Association to form a special subcommittee. This subcommittee was charged with the duty of considering how best the uses might be safeguarded and the abuses abolished.

The report of this subcommittee was considered in turn by the Science Committee and by the Council of the Association, who formulated a recommendation for presentation to the Representative Body. The final form of this recommendation as passed by the Representative Body is as follows:

"That in view of the risks to the public involved in the use of electricity and radiation as methods of treatment by untrained and unqualified persons it is to be desired (1) that suitable courses of training should be organized under medical direction for persons who wish to administer this form of treatment; (2) that persons who have satisfactorily followed such a course should be entitled to have their names entered on an approved Roll; (3) that one of the conditions attached to admission to, and maintenance on, the approved Roll should be abstention from the treatment of any patient except on the responsibility and under the general supervision of a registered medical practitioner; and (4) that patients who require electrical or radiation treatment should be referred only to those persons whose names are on the approved Roll."

* Read in a discussion in the Section of Radiology and Physio-therapeutics of the Annual Meeting of the British Medical Association, Cardiff, 1928.

HARM BY ELECTRICAL TREATMENTS.

The first question of all in considering the subject is Can electrical treatments do harm? There is ample evidence that they can.

1. Electric Current.

Electricity in its simplest form—that is, plain electrical shock—can kill or permanently injure in much lower voltages than those in general therapeutic use. The literature contains innumerable instances of death resulting from currents of 110 volts and under, especially when the resistance of the subject was lowered by moisture. This in itself constitutes a formidable danger when electric currents are being handled by relatively ignorant and irresponsible persons. The direct current, one modification of which is known as ionization, is in common use in “therapeutic” establishments, and a number of fatalities have occurred where insulation has broken down or where the apparatus, as connected to the existing mains, has been a permanent and potent source of danger.

The alternating or sinusoidal current and its modifications have caused many fatal accidents, usually when administered in the region of a debilitated heart. I may illustrate my point by reference to a recent curious fatality. The majority here will doubtless remember the death of a lady who had a pair of wireless head-phones on, and reached up to turn off a hand-lamp. It came out in the evidence that minor shocks had been received from the hand-lamp on previous occasions; also that this was known to at least one member of the household who was in the habit of administering electrical treatments. Training such as is recommended by the Representative Body would have made a fatality of this nature in that particular household impossible.

2. X Rays.

I am not going to spend your time by describing to you in detail the dangers of ignorant applications of radium and x rays. They are far too well known. Sir Humphry Rolleston has treated the subject fully in the Mackenzie Davidson Lecture of 1927.¹ The literature abounds in references to injuries resulting from even the most skilled and cautious applications of radium and x rays. Dr. Heinz Lossen,² in analysing 183 cases of injury from x rays, found that an appalling proportion were due to carelessness and ignorance. Of six plain electrical accidents, two were caused by carelessness and three by ignorance. Twenty-eight patients were burnt under treatment, even though the technique was applied correctly, but of seventy-one burns inflicted by incorrect technique, twenty-two were due to careless and thirty-three to ignorant handling of the apparatus. Forty patients were burnt under diagnostic examination, ten through carelessness and twenty-eight through ignorance. These figures cover only the work of qualified persons; they offer a foundation for speculating on the results of an investigation into the use of x rays by the unqualified.

This state of affairs has led to the institution of special courses and diplomas in radiology and electro-therapeutics for medical men; and already in many hospitals the holding of such a diploma is a necessary qualification for the appointment of radiologist.

3. Ultra-violet Light.

An argument sometimes advanced is: “Control x rays, radium, and obviously dangerous things like that if you like, but surely no one can do much harm with an ultra-violet lamp. At the worst, all that can happen is an uncomfortable sunburn.” That idea I most strongly condemn.

Professor Dixon has shown you the dangers of ultra-violet radiation, and public interest demands imperatively that it should only be used by trained and experienced persons. Professor Dixon and I have examined the evidence of damage by ultra-violet light treatment from the contributions of many writers, and our astonishment in surveying the bibliography is that legislative action should not already have been taken in all civilized countries.

Of the list of ailments that have been adversely affected by ultra-violet light treatment let me only mention three: quiescent phthisis, chronic nephritis, and arterio-sclerosis.

These alone should be sufficient to warn off the unqualified therapist. How is he to determine the presence of quiescent phthisis, chronic nephritis, or arterio-sclerosis? Many of the contraindications to ultra-violet light treatment are such that the fully qualified doctor finds it hard at times to be certain of their presence. There is not the least hope of the unqualified detecting them before damage is done, and yet the attitude of the Ministry of Health is hardly favourable to restrictive legislation, or is one that requires further convincing. The Minister of Health, on May 17th, 1926, in answering a question by Colonel Day calling for control of unskilled treatments, said:

“I have not received any evidence of injury resulting from the use of ultra-violet rays by unqualified persons, but if the honourable member is aware of any specific cases in which such injury has arisen I should be glad if he would furnish me with particulars with a view to further inquiry.”

4. Diathermy, etc.

May I for a moment remind you also that infra-red rays are not free from difficulties and dangers when improperly employed? A medical man reported in the *British Medical Journal* (1927, ii, p. 1118) that he had suffered from agonizing pain and syncope with prolonged weakness and loss of sensation after the application of radiant heat to the left leg for twenty minutes at 12 in.

Diathermy, generally considered to be merely a means of heat, is actually a radiation treatment of the tissues manifesting itself as heat after the waves have been absorbed and degraded into heat waves. The dangers of the use of this current are primarily those of technique, causing severe chronic burns, while shock from the primary transformer is also not unknown. A man who was having his chilblains treated was suffering, unknown to the operator, from syringomyelia, which rendered his fingers anaesthetic. The result of his treatment was severe blistering and ulceration. This is a condition which no unqualified therapist can be expected to recognize.

THE CASE FOR A ROLL.

Innumerable examples might be cited, but without further elaboration it is clear that the whole field of medical electricity has possibilities of causing temporary or permanent injury, of adversely affecting diseased conditions, and even of causing death. The evidence for the dangers is overwhelming, and it is obviously a matter of vital public importance to take the most effective means of preventing them. The words of Sir Alfred Mond, when introducing the Dentists Act, 1921, in the House of Commons, apply most aptly to the present position of the so-called “medical” electrician. He said:

“It is by mere accident that a large, uncontrolled, unregistered, unqualified service has been allowed to work in this country, and that one of the most difficult and important operations on the human being has been allowed to be practised by anybody who sets himself up, without any knowledge of any kind, and that the public have been entirely unprotected against this kind of thing. We are now . . . endeavouring to bring [dentistry] up to a higher standard.”

As John Burns said in the discussion in the House on the Midwives Act, 1902:

“If it is necessary to register doctors, to educate them and to exalt the standard of their qualifications, then surely nurses and midwives ought to be highly trained and registered.”

To his “doctors” we can add to-day “midwives and dental surgeons.” Then why not electro-therapists?

Analogy with Chemists.

I hear of many patients each year who have been sent by their practitioners to unqualified persons for electrical treatment, without any attempt to control or to specify this treatment. This sort of thing is more or less tantamount to a doctor saying to a patient, “Go to the chemist and get something for your headache,” but it is distinctly worse than that, for to-day and for over a century in England we have taken our prescriptions to any dispensing chemist with a tranquil mind. We have no doubt that he will accurately compound that prescription for safe administration to ourselves. We have equally no doubt that on his shelves lies enough of the very remedy we are going to take with benefit to kill us many times over. Our reason for going so trustingly to the cheraist is that ever since 1815 chemists have been a trained and registered

class. Before the Apothecaries Act, overdosing or harmful compounding was not infrequent. Just as morphine in small doses may save a life, and in larger doses take it away, so suitable doses of electrical rays and currents may save, while unsuitable doses may harm or kill. Just, therefore, as in 1815 the public demanded protection from the untrustworthy chemist, so now should they demand assurances that those who are exposing their delicate body mechanisms to currents and rays of electricity shall have had adequate training and experience.

As Sir William Priestley said in the *British Medical Journal* in 1896 (ii, p. 1121):

"In England the principles of liberty are carried so far that men insist on their right to employ quacks if they choose, and on being treated medically, even to their own hurt, if it so pleases them. The only possible limitation is to insist that the public shall be able to distinguish between those who have been educated and registered and those who have not, and to impose penalties on those who pretend to be registered when they are not so."

On this principle were founded the Medical Acts of 1858 and the Dentists Act of 1878.

The formation of a roll or register of persons regarded by a competent authority as suitably qualified to administer medical electricity would enable those of the public who cared for their own safety to be sure of their therapist. It would also be of great value to doctors, who would thus be able to select a suitable assistant to whom to send their cases. The duly qualified among the medical electricians would welcome it, if for no other reason than that it would protect them from the unfair competition, backed by advertisement, of those who have spent neither time nor money in acquiring skill and experience, and who are not bound by any ethical rule of modesty or truthfulness. The advancement of knowledge and scientific research would be forwarded by any central body whose duty it was to examine and certificate workers in this field; and, indeed, permanent and continuous research is impossible without some strong co-ordinated body of intelligent workers.

The difficulties and the needs have already been recognized by three associations—the Institute of Radiology, the Chartered Society of Massage and Medical Gymnastics, and the Institute of Blind Masseurs. These all provide suitable courses of instruction, and impose safeguards and ethical standards. These organized bodies are already available, and have only to be provided with the necessary public support and legislation to make their existing registers into one authoritative whole, with the prestige and power of the law behind them. Unsupported they can do comparatively little. The patterns for such a register are obviously those of the Central Midwives Board and the Dental Board.

The Penal Clause.

Distinct from, but closely linked with, the formation of a register is the difficult question of a penal clause—that is to say, legislation forbidding the unregistered to engage in these particular forms of practice. This was very acutely debated in the House of Commons on the occasion of the passing of the Midwives Act, 1902. As Mr. Heywood Johnstone pointed out, with the sole exception of the Apothecaries Act, 1815, the current of legislative authority had up to that time been against penalizing the unqualified practitioner. The Medical Act, as we all know, provided a register, ethical supervision, and adequate standard of education. The Dentists Act of 1878 did the same thing for dentists, laying down that an unregistered person should not be allowed to use the title of dentist or any title implying that he was specially qualified for dentistry. The words "specially qualified" led to a number of cases in court, until finally the decision of the House of Lords in *Bellerby v. Heyworth* established that the words imported a professional qualification entitling to registration, and not merely skill or competence. This decision was the charter of the unqualified dentist, and there grew up in consequence a situation in the realm of electrotherapy which bears a striking resemblance to that in the realm of electrotherapy to-day. The result was the establishment in 1920 of a Departmental Committee to "investigate the extent and gravity of the evils connected with the practice of dentistry and dental surgery by persons not qualified under the Dentists Act, 1878." That committee sat for twenty-seven days and examined twenty-seven

witnesses, producing a voluminous body of evidence. It then spoke with no uncertain voice.

"There are a large number of unregistered practitioners of indifferent general education who have set up without any training or instruction whatsoever. By means of specious advertising and personal canvassing, they ply their calling to the danger of the public, but with very lucrative results to themselves. The evidence is conclusive that it is the least reputable section of unregistered practitioner that has increased most, and tends to increase. This constitutes a menace alike to the public health, the registered dental profession, and the more reputable unregistered practitioners. . . . Under the existing law any person, however ignorant, unskilled, untrained, can practise dentistry and inform the public by advertisement and otherwise that he practises. The only protection the public has is an action for damages in case of injury or the fear of a possible prosecution for manslaughter in the case of death. The persons who have taken up the calling comprise a body of men representing every degree of skill, from the totally uneducated unskilled man to the highly qualified practitioner. . . . It is impracticable for the general public to know whether they are to be treated by properly qualified persons or not."

Every word of this might stand as a description of the position to-day in medical electricity. Yet this was the state of affairs forty-two years after the establishment of a register supervised by the General Medical Council, but unsupported by any penal clause. It is impossible to avoid the conclusion that valuable time might be saved and terrible damage averted if we took to heart from the start the lesson of the Departmental Committee's findings. Unhesitatingly—forty-two years too late—they reported:

"We have considered most carefully the different representations which have been made to us, and are of opinion that, in the interests of the public, dental practice by unqualified persons should be prohibited under penalty, and that nothing short of this is likely to prove efficient. We are further of opinion that the most satisfactory way of distinguishing a qualified from an unqualified person is by the formation of a register of qualified persons. Unqualified persons should not be permitted to hold themselves out as willing to practise dentistry or perform dental operations."

The opponents of the penal clause in the Midwives Act held that it would be contrary to the general principles of English justice, that it would create a new offence, and that it would constitute a monopoly. Those in favour of the penal clause pointed out (see Hansard, vols. 103 and 109) that the omission of that clause would make the bill inoperative, futile, and to a certain extent mischievous, that it was a matter of common knowledge that there were a considerable number of unqualified women who constituted a serious danger to the public, and that a bill which did not suppress the evils out of which the movement for registration had grown would only result in the increase of the irregular, incompetent, and dangerous practitioner.

Sir John Tuke argued that it did not create a new offence, but merely extended an existing principle of law to a dangerous class of people, and that the principle had already been applied to chemists, solicitors, and auctioneers, with the object of excluding undesirable persons. Mr. Griffith Boscawen maintained that unless the ignorant persons from whom dangers arose were prohibited from practising in the future, the worse class would go on as before, and a great deal more harm than good would be done by the establishment of a register. The *Medical Register*, as Sir W. Foster pointed out, had not stopped the unqualified practitioner, nor had it caused the public to seek advice exclusively or even increasingly from bonesetters and quacks. In the end the penal clause was inserted in the bill.

When to these views is added the actual experience of the working of the Dentists Act, with and without a penal clause, the argument seems unanswerable.

SUMMARY.

If the unqualified, unregistered chemist, dentist, and midwife is to be forbidden by law, then the unqualified electrotherapist, who certainly handles therapeutic measures as dangerous as those of any chemist's shop, and performs operations as delicate and difficult as those of any midwife or dentist, ought to be put in the same position.

REFERENCES.

¹ *British Medical Journal*, 1927, ii, p. 9. ² *Acta Radiologica*, 1927, viii, 345.