nothing of the psychic mechanism involved. Moreover, what began as a single discomfort may have been gradually elaborated into a complex closely simulating organic disease. It is in such cases that careful inquiry into the "setting" of the scene at the outset of the trouble may be of value. What was the patient doing? What was the nature of the social and family contacts? Was there emotional strain at the time?

The interpretation of symptoms is impossible without a good working knowledge of anatomy and physiology. Otherwise, we must miss the meaning of many discomforts. Pain may be felt at the site of trouble or referred to some other point. It may radiate in various directions from the storm centre; it may be influenced by rest, by position, by bodily movements; it may have definite time relations with visceral movements, notably in the digestive tract; it may arise in peripheral nerves which have close relations with certain joints. And here one is tempted into a little speculation. What would happen if during the next five years it were impossible to make physical examinations or resort to laboratory procedures? No doubt the death rate would rapidly increase. But, confronted by a single avenue of approach to the patient, the doctor would develop to a high degree the art of cross-examination. He would try to fathom human nature to the depths. He would go back to the study of anatomy and physiology with intense interest. Moreover, he would not have to be a specialist, since the symptoms of disease are particularly within the province of the family physician.

THE PRESENT STATUS OF PHYSIO-THERAPY

BY THE PUBLICATION COMMITTEE, CANADIAN RADIOLOGICAL SOCIETY

II.

IN a previous article, "A Historical Review of Physio-therapy",* it was noted that physio-therapy had had an evolutionary period much the same as other departments of therapy have had, with the exception that it has been more frequently exploited by irregulars, perhaps because of the element of mysticism that has ever surrounded the subject, and because to no small degree it developed outside the profession and was really never formally adopted, although intensively practised by many worthy and well recognized medical men.

It was realized shortly after the outbreak of the Great War that every resource of science must be thrown into the combat, and also that every possible medical effort must be made to return the casualties more quickly back to active service, or at least reduce them to a minimum pensionable disability. It was at this juncture that the medical pioneers in the field of physical therapy came into full and just recognition. During the war literally thousands of technicians were trained to administer treatment by physical agencies under the direction of many medical men specially and intensively trained to direct this work. Because of this, hundreds of medical men had the opportunity not only of seeing the direction of work but of appraising the results. This gave great impetus to physio-therapy after the war. In addition, manufacturers of electrical equipment, who had profited so handsomely by their output during the war, now prepared an intensive sales advertising and educational campaign amongst the profession generally, which had real value in interesting the otherwise uninformed, and, finally, bio-physical research, which had been going on before the war, became tremendously stimulated. The net gain was a marked advance, for physio-therapy now became known as a science as well as an art, and, most important, world-wide professional recognition was gained. This recognition is rather greater than at first sight would appear, for many of the profession are not yet familiar with the fact that our largest medical schools have since started to teach their undergraduates the scientific principles on which this subject is based. It may still appear, however, to some, that the subject we are discussing is comparatively small and has a

* See *Canad. M. Ass. J.*, 1931, **24**: 263.

limited field of usefulness, but on closer study it is apparent that the field is indeed large and has a very wide sphere of usefulness.

Based on physical considerations having regard to increasing wave-lengths and decreasing frequencies, it is usual to consider much of the subject in relation to the spectrum. With this in mind, we have to consider in the following order, radium, x-ray, ultra-violet rays, visible light, infra-red rays, and the higher frequencies such as are used in high frequency apparatus (diathermy). Then we have a group of physical agents headed by galvanism, and, in close association with this, static, faradic and various modifications of the sinusoidal current. Lastly, there are the very large fields of hydrotherapy and massage. With this sketch in mind it is not difficult to visualize a rather large subject the foundation of which is well established in scientific fact. So well has the scientific side been developed that, with a knowledge of physiology, physio-therapy can be administered with great confidence and the result rather accurately predicted. If we are inclined to be critical of physio-therapy it might be wise to ask ourselves if we have the same accuracy in relation to drug-therapy. That no little degree of accuracy does obtain, and that certain conditions can with better advantage be combated by physio-therapeutical measures than by any other, will be pointed out in this and succeeding articles.

Should we be looking for proof of the fact that treatment by physical agencies has the virtues claimed for it, there are many places where we might look and there are very many indeed to whom we might appeal for information. Is it possible that our better medical schools would teach these measures if they were lacking in particular virtue? In every mental institution in this country the patient receives treatment by physio-therapeutical methods. This only obtains because of the decided advantages that are found to accrue. A sanatorium that did not depend on helio-therapy as a valuable adjunct would be indeed to-day a curiosity, and it is very doubtful if any pretentious hospital, private, civic, or military, can be found in America that does not make use of physio-therapeutical measures. Should this not be construed as very favourable this not be construed as very favourable evidence of proved worth? We might also look to large industrial insurance companies, concerns interested in making dividends by saving money in caring for the casualties of the industrial life of the country. What is their pronouncement in the matter of physical therapy? There is but one answer. They advocate its use at the earliest possible moment in every case where convalescence can be speeded up or permanent disability lessened, and thus it happens that countless numbers of those that are injured each year are receiving the benefits to be derived from the scientific application of physical therapy.

A brief glance at conditions elsewhere might not be amiss. Everyone familiar with European conditions is perfectly aware that the wastage from sickness and injury in highly industrialized areas, over the year, is a tremendous financial factor in the life of the community. This factor is so great that it has become a matter of interest to the state, and to combat it in a very large way "light" clinics, "rheumatism" and "rehabilitation" clinics have been set up, sponsored in many instances by the Ministers of Public Health. In these institutions are to be found every conceivable form of physical therapy under the direction of physicians skilled in this work. There we will find men, women and children "below par", patients suffering from every possible form of "rheumatic" involvement (arthritis, myositis, neuritis, fibrositis), and victims of traumatic injury in endless numbers. In the United States we find physio-therapy receiving professional recognition in the American Medical Association through the Council of Physio-therapy which the Association set up some years ago, and which is contributing so much to its rational advance.

To every advance there must be a set-back, and a few months ago such did obtain in this work, when in practically every daily newspaper in the land there appeared the now famous Medical Research Council Report on Light Therapy. Everyone will recall the parallel that was drawn between light-therapy and the mustard plaster. Everyone, unfortunately, did not read what light therapists from all parts of the world had to say, by way of answer, nor has everyone read Lord Moynihan's recent castigation of this body. The point of the matter is that a gross injustice was done and an unnecessary set-back to the work resulted.

Inevitably also, as is so frequently pointed

out by men working in this field, catastrophe must follow if care and caution are not exercised. *Monotherapy* is by no means *physiotherapy,* and there is the grave danger that failures registered in treating cases by "single" physical measures will be charged to insufficiency of the physical agent used, when in reality it is inadequacy on the part of the prescriber. It is rarely indeed that one single measure can produce the best results in treating disease by this method. *Complementary association* of measures in most cases is not only desirable but obligatory, if the best results are to be obtained. This resolves itself into knowing and practising the whole field. A physician practising physiotherapy with a one-treatment measure is equivalent to an internist practising with one drug or a surgeon with one scalpel. The situation undoubtedly arises from modern high-pressure salesmanship. "Buy a quartz lamp and pay your rent". "Purchase a diathermy machine on easy terms and satisfy your patient". In spite of the fact that manufacturers have helped to advance the field of usefulness of physiotherapy by their campaigns of salesmanship, indiscretion in this particular is bound to lead to an unfavourable situation in the end.

In presenting the claims of physio-therapy for professional recognition, it would be well to recall the very wide defection of the profession's clientèle in Germany, many years ago now, when many irregular types of practitioners, and particularly the "Naturists", became active. So pressing was the situation, that a special commission, headed by Kussmaul, was set up to examine into it and to determine the cause. As a result it was concluded that the regulars had no basic knowledge or experience in the action and use of physical agents which the irregulars had mastered. Immediately the German medical schools were re-organized and began to teach these things intensively, with the result that the regular profession came again into its own. This experience is worth recalling. Is it not possible that in America we have a somewhat similar situation? Education, and not legislation, is the best weapon with which to combat the "irregular" tendency in medicine. The intensive literature and fine-appearing samples that daily crowd our desks are evidence that millions are being spent yearly on purely symptomatic drug therapy. How many of these high-priced and highly recommended drugs are specific? As a profession we must shoulder this responsibility. If they were not prescribed the campaign would collapse because of financial failure. In the field of medicine every student is taught that our sheet anchor is *"vis medicatrix naturæ"*. To assist nature and speed up her processes is our opportunity. In no small measure physiotherapy serves this purpose by restoring normal environmental factors from which we to no small degree have departed in our life of artificialities.

A hasty glance over the field of accomplishment may serve to call to mind that physiotherapy had definite conquest to its credit. No other single measure surpasses in value radium in treating malignant disease. In the treatment and diagnostic field the x-ray has no near competitor. The testimony of all sanatoria is proof of the relation of sunlight therapy to disease processes. The relation of visible light to growth and function in the animal and vegetable world is too well known to dwell upon at this time, except to add that any measure that promotes desirable metabolic change must be useful in treating disease. The infra-red ray has possibly relieved more pain than any other single measure. That diathermy can localize heat and influence deep-seated lesions is not seriously questioned to-day by anyone that has made adequate inquiry. In the static current we have a method of "decongesting" that has no peer. If massage is indicated, in the faradic, sinusoidal, and Morton wave currents we find instruments that will stimulate to function every tissue that has a contractile element in it. The field of galvanism, so little understood, is qualified to influence beneficially chronic, painful, and degenerative conditions better than any other weapon of attack we possess. And, lastly, Simon Baruch, of New York, and Winternitz, of Vienna, have through their research and writing made perfectly clear that in water, scientifically applied, we have a therapeutic agent competent to favourably influence any and all pathological states. How many of us are familiar with the scientific truths underlying this statement?

Are these conceptions generally appreciated by the profession? In succeeding articles the principles of action of these various agencies will be set forth in detail. It will then be ap-

parent that physio-therapy *is not,* if properly used, for the purpose of treating symptoms, but to assist nature in correcting the situation that produces the condition complained of. Physio-therapeutical applications, to be helpful, must be applied only after adequate diagnosis and with full understanding of the pathological state that has led to physiological unbalance.

To meet the demand that must be increasingly made on modern physiotherapy it would appear that the hospital centre is the ideal situation for such a department. Here, not only will the physician learn increasingly of its worth, but the patient will be assured that the medical profession has provided every physical agency that can contribute to his return to health with the greatest possible saving in time and money. This accomplished, we shall attain the position that the German medical schools taught as essential, because of necessity, over a quarter of a century ago.

THE ADMINISTRATION OF BROMIDES AND IODIDES

BY V. E. HENDERSON AND G. H. W. LUCAS,

Department of Pharmacology, University of Toronto,

Toronto

IF one compares the taste of a solution of sodium chloride, 4 grains to the ounce (isotonic strength), with those of similar solutions of potassium and ammonium chloride, both the sodium and potassium solutions have little but the faint salty taste of an isotonic saline. The taste of the ammonium solution is somewhat sharper and more persistent. Tripling the strength leads to the potassium solution being slightly more unpleasant than the sodium. The ammonium solution is definitely unpleasant. When we prepare solutions of the bromides of this latter strength, the sodium bromide differs little in flavour from the chloride, but is less pleasant. The unpleasantness is more marked with the potassium salt, and the ammonium bromide solution is distinctly sharp, unpleasant and persistent. Sodium iodide is definitely more unpleasant than the chloride in any concentration, and again the unpleasantness is more evident with the potassium salt.

Many physicians seem to think that there is a special virtue in giving bromides of potassium, ammonium or strontium, rather than the sodium salt. This seems to be based on the fact that very marked changes in the function of the isolated heart or gut can be produced by increasing the concentration of potassium or calcium. Indeed, any change in the balance of the various salts present will produce changes in function. The body, however, is daily absorbing considerable quantities of sodium and potassium, excreting in the urine alone some 250 grains of sodium chloride, and some 100 grains of potassium. The calcium and magnesium daily excretion is less easily obtained. Further, the balance of these bases in the body is maintained with great constancy, as may easily be seen from the fact that blood contains more sodium proportionately than the tissues. Strontium is absorbed with difficulty from the gut, and, if absorbed, must compete with a much larger amount of calcium and magnesium. It is now generally recognized that the effect of bromides and iodides is due to the brom or iod ions.

The action of bromides and iodides depends upon their acid radicles substituting for chlorides in the body. The stomach may even secrete some hydrobromic acid when large doses of bromides are given. The intensity of the effect of bromide depends on the degree of substitution of bromide for chloride, so that a person who is not taking ordinary salt in his food shows the effects of bromide administration more rapidly. Pharmacologically, there seems no reason for using any other bromide or iodide than the sodium salt. Originally the potassium salts were cheaper, as they were more easily produced from sea-weed, and the sodium salts were rare, but to-day there is no substantial difference in price.

Rarely, one may wish to give a bromide and at the same time to change the acid base balance to the acid side. Then, alone, does