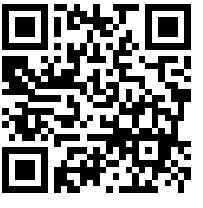

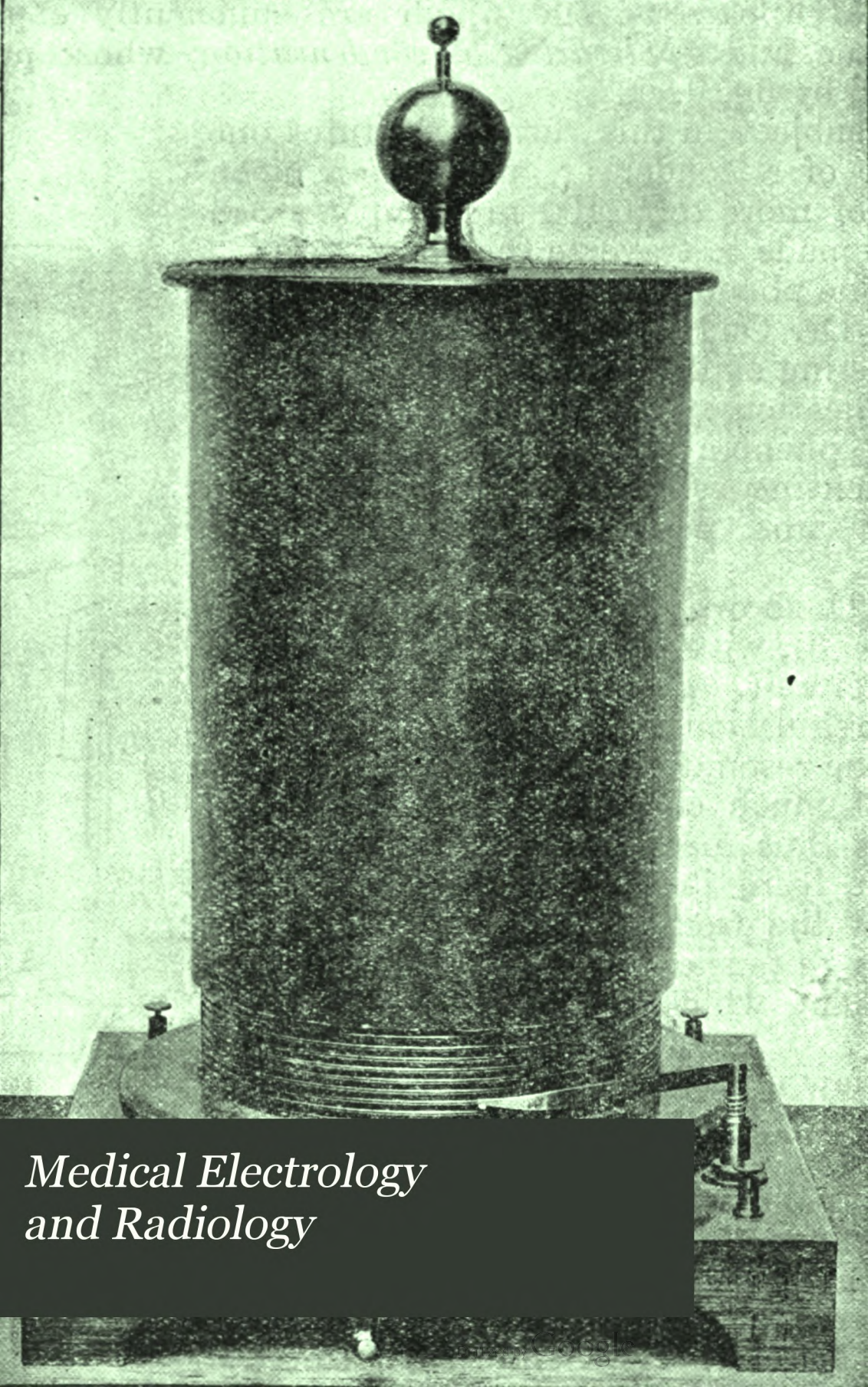

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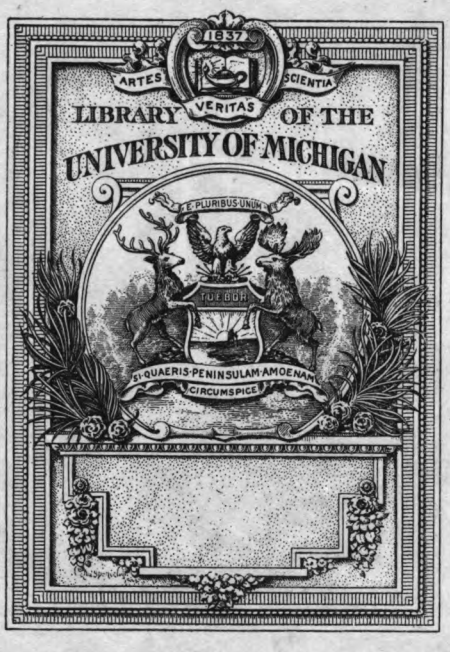

THE

Journal of Physical Therapeutics

No. 1. OCTOBER 15, 1900. VOL. I.

INTRODUCTORY.

THE aim of this Journal is not only to furnish a record of current progress and contemporary work, but to provide a detailed and critical account of what has already been accomplished in the field of Physical Therapeutics.

It cannot be necessary to remind the reader that to devote the pages of a journal exclusively to the consideration of the agencies in question, is by no means to assign to them any predominant *rôle* in the treatment of disease. They represent only one class of weapon in the varied armoury of medicine.

We appeal to medical men to rescue such weapons from the incompetent and unworthy hands into which they have sometimes fallen.

The following letter, which is one of many we have received in reply to requests for literary contributions, is here reproduced by permission :—

DEAR SIR,—The idea of an International Journal of Physical Therapeutics certainly commends itself to me, and I am willing to contribute. Owing to recent progress in physical and biological science, it is only now that the *modus operandi* of such methods is beginning to be understood; and in view of the further fact that their successful employment requires a carefully executed technique, and that such information as is available on this point exists at present only in a scattered and fragmentary form—such a Journal need offer no apology for its existence. It will fill a gap. It is—or ought to be—wanted.

Mansfield Street, W. W. S. HEDLEY.
September 1, 1900.

Although its limits are not ill-defined, Physical Therapeutics is a widely comprehensive term; embracing, as it does, Electro-therapeutics, Hydro-therapeutics, Vibro-therapeutics, or treatment by vibration, Photo-therapeutics, or treatment by light, Radio-therapeutics, or treatment by the radiations of an X-ray tube, Balneo-therapeutics, or treatment by baths, Aëro-therapeutics, or treatment by compressed or rarefied air. Therapeutic and Hygienic Exercises, Massage and Manipulations, Dietetics, Climatology, and, last, but not least, the valuable agencies of heat and cold, all come within its scope.

THE EDITOR.

London, October, 1900.

BIOLOGICAL PHYSICS.

By Dr. W. S. Hedley (London).

Although science fails to draw aside the veil that hides the problem of vitality; although "Life"—that is to say, the hidden influence that determines the production of the living cell, yet remains as great a mystery as ever; still, the relationship of life with matter and energy, the interactions that are ever at work between the body and its environment, must always afford material for profitable study.

As a basis for such inquiries we must first aim at true conceptions of the world around us. We must think of the universe as filled with an "indefinite something" which we call energy. It may perhaps be said that energy is one, but its movements are many. Yet different as they are, these movements all belong to one common type. They are all undulations, or wave movements, their differences being differences in the form, frequency and other qualities of the wave. It is according to the impression they produce on our senses, and according to their results, that we call these wave movements of energy by various names, such as heat, light, electricity, &c.[1]

Now we know that energy cannot be destroyed. If it disappear, it can only do so by being transformed into some other form of energy. This is the great principle of conservation which governs all physical forces, and, of course, holds sway in the living animal, as it does in every other form of matter. Neither can any energy appear which has not in some form existed before. It is therefore evident that, however energy manifests itself, whether in the form of heat, light, electricity, or a muscular movement, or in the momentum of a railway train, there must have been energy to start with. We are left to guess how this initial energy may in the first instance show itself. Falling back upon the "kinetic" theory of matter, which tries to explain all phenomena in terms of the *motions* of molecules,

[1] Richet.

we may, if we like, think of this energy as "minute" motion, that is to say, as interatomic or intermolecular movement, or vibration, imperceptible to our senses, but only waiting for suitable conditions to reveal itself. Thus, a mass of metal lies before us giving no indication that it is the seat of any motion, but, raise it to a higher temperature, there is evidence of energy at once.[2] This is because atomic or molecular movement, which before was imperceptible, has now become so vigorous that it is transferred to our senses as heat. The "minute" motion of the particles of the heated metal communicate their movement to the ether, and the ether waves or radiations thus caused impinging upon any body that lies in their path, communicate to it that kind of atomic movement which originally started the ether wave which is recognised as heat. It is not so strictly a transference of heat as a transference of energy. The chemical energy which we call "latent" may be conceived of as minute motion, interatomic, intermolecular, or both. For instance, the minute motion that exists in the substances which form the explosive may manifest itself as the energy that hurls the projectile through a distance of 10,000 yards. And approaching vital dynamics—whence comes the energy that appears as a muscular contraction, a nerve impulse, or an intellectual conception? This, before its first transformation, may take the form of minute motion existing in the substances that form the food of the animal, and the elements such as oxygen that constitute its environment. Tracing the genesis of this energy through its successive stages—through the animal food which may be traced to the vegetable, through the vegetable which may be traced to simple compounds such as carbonic acid and water broken up under the influence of heat and light—the two latter being necessary for the process—we get back to the energy of the sunshine[3] which, stored up and transformed, may reappear as a thought or a movement of the living animal. Such considerations, although they by no means furnish the key to the problem of vitality, enable us to conceive that every phenomenon of which matter is the seat, and organic matter is no exception,

[2] Tyndall, Gowers. [3] Vines, Gowers.

may be reduced to phenomena of transformation, having their starting point in some initial energy which may perhaps be represented as movement between atoms or groups of atoms—movement which, although imperceptible to our senses, may, as we have seen, constitute a vast store of energy, only waiting for suitable conditions to reveal itself.

Approaching more certain ground, or rather reverting to the point from which we started, we again encounter the fact that the transfer or movement of energy takes place by "vibrations" or "oscillations" or "wave movements" of the ether, such terms being in the present connection interchangeable. These vibrations, oscillations or "waves" are many of them demonstrable. They vary in point of size, frequency, and form, but they all possess the points which characterise a wave. We materialise our conceptions of the latter by thinking of the widening rings that appear upon the face of a placid sheet of water when a pebble is dropped in. In each disturbance, or oscillation, or wave, there is a period of rise and fall, a period, that is to say, when the water rises up from the smooth plane of the general surface, and a second period when the water returns again to the general level. The two phases are known respectively as the "period of departure" and the "period of return." The same points are illustrated in the swing of a pendulum.

The universe, as it makes itself known to our perceptions, is the sum total of the energies represented by various vibrations, or waves of force.[4] These waves of force constitute the active environment of the animal, and influence it, each after their own fashion. It is these vibrations that we manipulate and direct upon the body in the domain of physical therapeutics. The mechanism of their action may be and probably is, that such vibrations evoke other corresponding vibrations in the animal body. In other words, it is in virtue of its own proper vibratory action that our nervous system responds to the vibrations of energy around it. It is by these vibrations that our environment becomes accessible to our senses, and that we are enabled to act on the outer world, and the outer world on us.

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[4] Richet.

These nerve vibrations, or nerve waves, are no mere analogy or guess; their speed is known and their type determined.[5] The former was demonstrated by Helmholtz half a century ago, and their form has recently been ascertained.[6] We know that, varying within certain narrow limits, according to the temperature, the kind of animal, and the character of the nerve, the nervous impulse, or nerve wave, travels at 30 metres per second.

The nature of this nerve current, or nerve impulse, is not yet determined. It has been considered to resemble a molecular disturbance of a liquid in a capillary tube; this is the mechanical hypothesis. It has, again, been likened to the explosion of a train of gunpowder. This is the chemical theory; but against this there is to be urged the great though not insuperable objection that it is difficult to suppose that the nervous substance could be so instantaneously reconstituted, and ready for another effort, as it proves itself to be. But certain chemical changes are characterised by their allowing of immediate re-construction; this occurs in that form of conduction known as "electrolytic;" not improbably the nerve wave resembles this.[7]

The type of the nerve wave has been determined by what is known as the period of its "damping," that is to say, by the deadening process that stops a vibration. Experimenting on these lines, M. Richet tells us that the duration of the nerve wave is one-tenth of a second, and he points out the necessary inference from this, viz., that two nerve waves cannot remain distinct if they follow each other in less than one-tenth of a second. To stimuli of a quicker rate the sensory responses must blend together; it is obvious that they cannot remain distinct. That is to say, "neither peripheral nerves nor cerebral apparatus can vibrate more than ten times a second." In other words, the brain can only order ten distinct voluntary movements of the same muscle in a second. It is not that the muscle cannot obey, "it is the brain that cannot more quickly command."

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[5] By Prof. C. Richet in collaboration with M. André Broca.

[6] At least for the nerve centres, and the peripheral nerves are in this respect probably not different.

[7] Richet.

Whatever the cerebral phenomenon be, whether feeling on the retina, volition on the muscles, thought as appearing in "mental articulation," it is pointed out that the process cannot be repeated faster than ten or twelve times a second. Continuing the consideration of this "time unit," the writer permits himself to speculate as to the "vast sequences of phenomena" that may go on in the intervals, and the infinite variety of molecular vibrations, now masked under a seeming aspect of stillness, that our perceptions could make cognisable "had our nervous system a shorter period of vibration."

How slow is thought, compared with the stupendous rapidity of light or electrical vibrations, measured by their millions a second! Such considerations lead to equally interesting, but more uncertain, ground. M. Richet reminds us that we speak of the nerve wave being ended, and everything restored to order at the end of one-tenth of a second; but that this, although physically and physiologically true, cannot be said to be mathematically so. There still remains, never probably to be extinguished, an infinitesimal disturbance of equilibrium, which "consciousness is alive to." In other words, after the passage of a nerve wave the neuron is never again the same. The strong vibrations actually going on impress our perceptions as "the present," but the vibrations of the past, the waves of long ago, still appeal more or less faintly to our consciousness, for they have not been quite annihilated, and probably never will. The nerve wave of the brain is never completely extinguished. And it is asked how far may such an explanation, or rather such an analogy, account for the physiological fact of memory. Here we reach the borderland of another domain. Hitherto we have regarded the nerve wave as ranking with the other waves that fill the universe—another step would bring us in sight of the abyss between them, the unbridged chasm that separates the blind phenomena of ordinary wave movement from the nerve wave that "knows and judges," that is conscious and intelligent, and can make for higher things.[8]

Such considerations take us quite beyond the field we are

[8] Richet.

exploring, but before parting with their author, and the better to realise the extent to which the body is acted upon by the energies that surround it, we may, as he suggests, think of the living animal as possessed of a network of apparatus in the skin capable of vibrating and transmitting, through sensory nerve fibres, undulations to the nervous centres; the latter in their turn possessing processes by which to telegraph their orders to the muscular and glandular organs. It is even permissible in the present connection to conceive of the animal organism as "one gigantic neuron" receptive of stimulation at the periphery, transmitting the stimulus by ingoing nerve waves, and answering it by excitation of the motor apparatus, which is revealed as movement and nutritional processes.

It is in the light of a growing knowledge of molecular physics, and the study of such points as the above, that we shall get a first faint glimmer of the rationale of the action, not only of those typical vibratory agents of which we make so frequent a use in physical therapeutics, such as the vibrations of heat, light, electricity, but possibly even of the action of certain drugs. It has been suggested[9] that the latter may act by their molecular vibrations influencing the vibratory actions of some special tissue; for instance, the vibration of strychnia molecules may find a response in the vibrations of anterior ganglion cells and so stimulate them. The action of heat and cold applied externally may find its explanation in the modifying influence of these agents upon the disturbed vibratory action of the tissues. Anger, fear, or sorrow, may perhaps alter normal and abnormal rates of vibration. Thus the abnormal vibration of nervous structure that is perhaps responsible for the pain of toothache may be suddenly altered at the dentist's door, under the modifying influence of fear, and the pain may suddenly cease. The action of musical vibrations in altering physiological processes is well-known; it will raise or depress heart action, alter the calibre of arterioles, modify nutrition. Correctly interpreted, each tone ought to supply an antidote for some special pathological vibration![10] According to such a conception, the same may be said of electricity, heat, light, and all vibratory forces;

[9] Dr. G. Adam. [10] Adam.

and it ought to be possible, by exact control and measurement, so to manipulate them as to adapt them to any special vibratory disturbances of the organism.

Such speculations may be permissible, but at best they are mere imaginings, and must not be placed in line with the other proved and probable points previously adverted to, viz., the laws of transformation and conservation of energy, the transference of energy by wave movement, the fact that a nerve impulse, whether cerebral or peripheral, is a wave; that although its precise nature is still in dispute, its rapidity of propagation is known, and its form determined. That the probable duration of the nerve wave is one-tenth of a second, whether it display itself as "an isolated sensation, an isolated act of the will, or an isolated intellectual process." That one-tenth of a second is in fact the shortest time that our consciousness can directly apprehend.[11] Further, that the various energies of the outside world influence the animal organism through the nerve wave; and that the nerve wave, propagated at 30 metres a second, is infinitely slow in comparison with other waves, such as light or electricity, travelling at a speed ten thousand times that of the earth in its orbit.

It is in considerations of this kind that we must look for an explanation of the action of physical agents, and find the key to their more scientific employment. But the time is not quite yet; and until it arrives, physical therapeutics, like many another branch of medicine, must still be based upon a process of cautious experimentation—upon an enlightened empiricism. We must still recognise as our safest guide the aphorism of Norström, that "a record of the cures it has effected is the best plea for any therapeutic measure."

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[11] Richet. (Of course we can *conceive* of much shorter divisions of time.)

SOME REMARKS ON TREATMENT BY HEAT.

By Prof. Edward Welander, M.D. (Stockholm).

Having used treatment by heat since 1892,[1] especially in cases of soft chancre, and with the best results, I propose, at the request of the Editors of the Journal of Physical Therapeutics, now briefly to describe my method.

It is true that the pathogenic microbe of soft chancre has not yet been scientifically demonstrated, but we may say with certainty that it is the bacillus found by Ducrey and called after him. Even without knowing its method of cultivation, and its conditions of life, we may nevertheless indirectly form conclusions as to some of its characteristics, and amongst others to the fact that this bacillus is killed if it is submitted during one or two days to a temperature of 104° to 106° F. (40 to 41 C.).

In 1872, W. Boeck showed that secretions of soft chancre placed in a vaccine tube, and kept heated to various degrees for some days, lost their inoculability at the above temperatures; proving that the bacillus (the spores) were killed at this temperature.[2]

I have often remarked that in the case of patients suffering from soft chancre who were attacked with febrile disorders, such as rheumatic fever, typhoid fever, pneumonia and erysipelas, the ulcer quickly healed. From such facts and various inoculating experiments upon healthy persons, and persons suffering from high temperatures, I could arrive at no other conclusion than that heat killed the pathogenic bacteria of soft chancre. To utilise this fact, if fact it proved to be, it was necessary to be able to apply locally a constant temperature of 104° F. to 106° F. to the ulcer. I did this as follows: the water was warmed in a cistern to the required temperature, and the warm water was

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[1] *Verhandlungen des* 11, *internationallen Dermatologischen congressis in Wien* 1892, and *Nordisht medecinsht Arkiv.*, No. 20, 1893.

[2] In 1889 some experiments, almost exactly similar to those of Boeck and with the same results, had been carried out by Aubert. But it is quite incorrect to say that the latter was the first to show the influence of heat upon the virus of soft chancre. This had been demonstrated more than ten years before by W. Boeck.

conducted by India rubber pipes into very fine leaden pipes, by which the heat was then applied to the ulcer, the latter being covered with moistened cotton, a good conductor of heat; and around the cotton the small leaden pipes were arranged spirally. Through these the water was continually passing away through the rubber pipes. The difficulty was to keep the water at the desired temperature so as to avoid burning on the one hand, and inability to destroy the virulence of the ulcer on the other.

This was at first very difficult by my method, until a Swedish physician, Dr. E. Berlien, constructed his special apparatus, the hydro-thermostat. The inlet and outlet of water are automatically regulated by a floating valve, and by means of the thermo regulators the water can be kept at any desired temperature.[3] It was found that, in order to get a temperature of 106° F. (41° C.) upon the ulcer, the water ought to leave the hydro-thermostat at about 122° F. (50° C.).

For a successful result, it is necessary that the heat should act on every part of the sore, and since skin is a bad conductor it is necessary in excavated ulcers to remove by scissors the excavated margins. It is desirable to clean the surface by means of a curette, thus making it more accessible to the heat. This done, pledgets of wool are moistened with water, and constantly applied, so that they touch every part of the ulcer; then the penis is surrounded with three or four folds of wet wool, after which the leaden spiral is applied, and the whole covered with oiled silk to prevent evaporation and loss of heat. Thrice a day it is necessary to change the bandage, and the patient at the same time can take the opportunity of attending to the wants of nature. If the ulcers are in a favourable position and the heat is efficiently applied, they lose their virulence in twenty-four hours, and at the end of forty-eight hours they are usually quite free from microbes, and covered with small red slightly bleeding granulations. The heat treatment is then no longer necessary but its continued employment will effect a quicker cure. When the heat is given up, an antiseptic lotion or ointment may be used, for instance, boric acid or dermatol, &c.

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[3] *Nordiskt Med. Arkiv.*, 1895, *M.* 16 *and* 17, *Wiener Klin. Rundschau*, 1895 (9, 10, 11).

In many hundreds of cases that have been under my care in the hospital of St. Göran, since 1892, and treated by this method, the results have been highly satisfactory. But it sometimes happens that after some days' treatment the virulence of the sore has not disappeared. Most frequently the cause of this is found in the fact that there are several ulcers, and that one of these occupies such a position that the heat cannot get at it. With a long thick prepuce for example, it is sometimes difficult to retract it sufficiently for the heat to reach the ulcers which lie in the sulcus. In these cases the heat treatment must be repeated. Very rarely I find sores, in their general aspect like soft chancre, but instead of having a base which is usually yellowish, their colour was that of a dirty grey; such ulcers are much slower in answering to the treatment than the typical sore.

If the sores are placed in the external meatus it is very difficult to apply it efficiently. In certain cases it is necessary to apply it in such a way that the leaden pipe is bent in a loop which, covered with wool, is introduced into the anal orifice. If there is phymosis the heat cannot be applied in the usual way. In such a case I use an ordinary glass irrigator[4] of warm water, 113° F. to 122° F.; from this irrigator water is conducted, by an india rubber pipe, to a flat canula of hard rubber, which is introduced as far as possible between the prepuce and glans. If the patient now from time to time compresses the meatus preputii, the whole preputial space becomes completely dilated by the warm water, which can be thus circulated round all the sores: on each occasion I allow a litre of water to pass, and this is repeated several times a day. Sometimes under such treatment the prepuce can be drawn back after two to four days. Often it requires eight to ten days, sometimes longer. It often happens that when the retraction of the prepuce is thus secured the virulence of the sores has completely disappeared, and ordinary antiseptic means are then sufficient. If the aspect of the sores is still of a virulent nature it is necesary for some days to use the ordinary heat treatment just described.

Heat may be employed in this way upon buboes which

[4] *See Wiener Med. Rundschau*, 1895, Nos. 9-10.

present an appearance of virulence. A free incision is reserved as a last resource. If the bubo, in spite of rest and poulticing, has a tendency to increase, I inject a 1 per cent. solution of benzoate of mercury, after which there is painful swelling, and generally fluctuation occurs after two or three days; but often the bubo diminishes during the following days. If this does not occur, and fluctuation increases, I employ Lang's method, which consists in making a small incision through which the pus is removed by compression, and then for a few days injecting a 1 per cent. solution of nitrate of silver, after which the bubo usually diminishes. If it still remains virulent, this shows itself in a few days time, by its assuming the aspect of a soft chancre. If this occurs, I lay it completely open, remove the edges with scissors, clean its base, and apply ordinary heat treatment. Most commonly in two or three days' time the cavity of the bubo shows a granulating surface easy to heal. In these cases it is necessary to bend the leaden pipes in such a way that they form a level surface, of the size and shape of the bubo.

Since 1892 I have used this method of heat treatment. Care and skill is required on the part of the attendants; there is a ward specially set aside for the treatment. It contains two hydro-thermostats, giving accommodation for four patients to be treated at the same time. Formerly soft chancre was very common in Stockholm, there usually being two to four cases under treatment at the hospital. Recently the frequency of these cases has diminished, and this hospital, which gives gratuitous treatment to all syphylitic patients, has been a great gainer, owing to the short time required for treatment by this method. Comparative statistics show that in simple cases of soft chancre thus treated during 1894 the mean duration was 7·7 days, and that it was 26·3 days when treated by other methods. In many cases where the sores were easy of access, they could leave the hospital in two or three days, the ulcers presenting a benign character, easily curable by ordinary aseptic treatment.

The treatment I advocate has, of course, the disadvantage that the patient must keep to bed, and that it is scarcely prac-

ticable out of a hospital. Audry, however, has tried treatment by radiant heat from a thermo-cautery, and Kroesing has thus obtained some favourable results.

It is not only soft chancre that can be influenced by heat treatment, but syphilitic eruptions upon the genital organs with fœtid secretion. Under the above treatment the fœtor often disappears after a day or two, and the syphilitic eruption heals (suitable mercurial treatment of course being carried out) much more quickly than with ordinary local remedies.

Specific sores affecting the bones, especially in young people, where there are no serious alterations in the blood vessels, are satisfactorily disinfected and cured by heat.

Transplantations of the skin under this aseptic heat treatment have sometimes been made, with favourable results.

It is some years since Zinser stated that he had cured favus by heat treatment. I have also made some attempts to treat by heat herpes tonsurans cap. (trichophyton). It is not common in Stockholm; my experience only extends to eleven cases. I have made a great number of cultures of trichophyton (megalosporon), and I have found that a temperature of 106° F. (41° C.) had an influence upon a new culture, but that it could not kill a culture fully developed, even if kept under the temperature for some days. It was shown on the contrary that a temperature of 113° F. (45° C.) almost certainly killed even a developed culture in two days.

If it is desired to use heat in herpes tons. cap. a temperature of 113° F. is necessary to get good results. This is easily secured by employing the hydro-thermostat. In these cases I bend the leaden pipes into the form of a cap, which I place upon the head previously enveloped in moistened wool. Above the arrangement of pipes I as usual place damp wool or silk. The patient is confined to bed for three days. To make certain of results the treatment is repeated during two or three days, with some days' interval.

After such treatment, perhaps trichophyton may be found in the hairs, but it has been shown that cultures could not be developed; and this was further demonstrated by the fact that young patients after treatment remained free from the disease,

with the exception of one case where the heat had not been effectively applied.

Sulphurous acid it is well known has an effect upon these spores and easily destroys even a vigorous culture. I have tried to combine heat treatment with sulphurous acid, by impregnating the wool covering the head with a 5 per cent. solution of bisulphide of calcium, and applying it under the leaden pipes, &c. The results have been good, but the sulphurous acid irritates the skin and the treatment is painful. The number of cases of herpes tons. cap. which I have had occasion to treat by heat is too small to draw any conclusions from, but the results have nevertheless been so good that there is reason to hope that the treatment of herpes tons. cap. by heat will become a recognised form of treatment.

A NOTE ON LIGHT-BATHS.[1]

By Niels R. Finsen, M.D. (Copenhagen).

About five years ago I published some observations upon the excitant effects of light, and at the same time pointed out that the chemical rays might be turned to account in the treatment of disease. To what I wrote then I have now something to add. First, I may mention that since then I have inaugurated and carried out a local treatment of certain skin diseases by using the chemical rays in a concentrated form. This was certainly not what I contemplated when I wrote the treatise in question. A general form of light-bath was then in my mind; that is to say, an exposure of the whole body to the chemical rays of light. This idea I have also carried out in practice, but have not published anything about it, as I do not consider it yet to have passed out of the experimental stage. In the meantime, during the last few years, electric incandescent lamp baths, originally introduced in America, have become rather common, especially in Germany; and in some quarters they have not been altogether dissociated from a certain amount of charlatanism. My researches regarding the physiological action of light have been adduced in support of their claims, and my name has been made

[1] "Meddelelser fra Finsens Med. Lys Institut."

use of in a way that I cannot approve. I am compelled therefore again to approach the subject of these baths, and to deal with them from a rather closer standpoint.

As demonstrated both in my earlier and later investigations, it is upon the most refrangible rays of the spectrum, the so-called chemical or actinic rays, that all the peculiar actions of light at present known, depend. The ability of light to kill bacteria, to cause inflammation, to produce pigmentation in the skin, and finally its excitant action, are all bound up with the chemical rays.

Consequently, if these properties of light be used for therapeutic purposes, a kind of light containing a suitable proportion of these rays must be employed. But in these much-vaunted electric light baths (Kellogg's baths) so common in Germany, it is well known that incandescent lamps are used, the light of which contain a very small proportion of chemical rays,—far less than common daylight. Therefore to assert that these light-baths possess the peculiar actions of light mentioned in my observations, is a great mistake. We cannot—at least in the present state of our knowledge of light action—admit that these light-baths act otherwise than by the radiant heat from the lamps. They are generally sudatory or transpiration-baths in which the heat is produced by lamps instead of by hot air or steam. The inventor of them, Professor Kellogg,[1] does not claim anything else for them; he talks of them as sudatory baths, where the heat is produced by lamps, but he has not credited them with any of that chemical activity which is possessed by light. It is only since these baths were introduced into Europe (by a layman) that the eyes of the proprietor have been opened to the profit that might accrue if he labelled them "Light-Baths"; and credited them with possessing the peculiar "activities" of light. These baths, however, need no false title; as sudatory baths they seem to yield excellent results.

Real light-baths—chemical light-baths—such as I have suggested and carried out, are quite different to these so-called light-baths in their effects. They are cold, they produce a very

[1] Kellogg, *Das Electrische Licht-bad. Aerzlich. Monatsch.*, No. 7, July, 1899.

strong, light action on the skin, and it is upon this property that I place the highest value. This excitant action is, however, too little known to build any conclusions on as yet.

During recent years I have made some investigations[2] upon the action of the chemical rays upon the skin, and pointed out that the dilatation of the capillaries and blood vessels of the skin, produced by light, is not an altogether acute or rapid process, but is in reality of long duration; and that a light-treatment of the skin will result in dilatation of the cutaneous vessels, and determine a more active supply of blood thereto, which in its turn must be assumed to favourably influence nutrition, and enable the skin the better to perform its functions.

For my light-baths I employ sometimes sunlight, and sometimes electric light. In the "sun baths" the patients promenade naked in a sunlit yard, where everything is done to keep down the temperature in order to avoid sweating, by frequent sprinkling of the ground, or, if necessary, by reducing the temperature of the skin with shower baths. Sun baths can be taken at a moderate temperature. These sun baths more nearly resemble "Rekli's air baths," but are widely different therefrom, as well as from the "natural-healer's" sun baths (sweat baths), in their effects.

My "*electric light-baths*" consist of a circular room, about 12 metres across, with two powerful arc lamps 100 ampères each, placed in the centre about 2 metres from the floor. By means of several partitions radial cells are formed, with beds placed in an inclined position, upon which, entirely divested of clothing, the patients rest. The temperature in these baths is so low that the apartment must be warmed for the comfort of the patients; yet notwithstanding the lowness of the temperature the chemical action upon the skin is quite as strong as powerful sunlight. These baths produce a pleasant sensation in the skin of slight prickling and warming.

Some care must be observed with these, as well as with the sun baths, as there is a great difference in individual suscep-

[2] Finsen, *Nye undersögelser over Lysets verken paa huden. Medd. fra Finsen's Med. Lys Institut I.*, 1899, p. 6.

tibility to the action on the skin of the chemical rays. In some persons, so short an exposure as ten minutes produces a very pronounced erythema, whilst in others only a slight reddening of the skin occurs even after an hour's exposure. I will not touch upon the indications for these baths, or give a fuller description of them at present. It has only been my intention to point out the difference between such electric light-baths as are sudatory baths, and that kind of electric light-bath which aims at the real chemical action of light.[3]

THE LIVING ORGANISM A TRANSFORMER OF PHYSICAL ENERGY.

DR. H. GUIMBAIL.

PHYSICAL therapeutics, which may be defined as the art of applying physical energy to the diseased organism, is based upon the general law of the transformation of forces.

Since, in the material order nothing is created, nothing destroyed—everything transformed, it follows that any force applied to the organism must effect some change therein. It is contrary to reason to suppose that the contact of force with living matter is without effect. It would be puerile to contend that organised matter, the aggregation of cells which form the living being, and in particular the nerve cell, do not assimilate physical energy, and that such energy transformed and incorporated in these cells does not modify them for better or for worse.

Both clinical and experimental observation daily confirm this view, and new and considerable light is thrown thereon by a few simple reflections upon the transforming organism.

Every organised being is in strict relationship with its surroundings, that is to say, with the medium in which it undergoes its evolution. The vegetable bound to the soil, the animal free from the soil, but submitted to the influence of atmospheric

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[3] It is proposed to deal with the technique of this light-bath in the next number.—ED.

changes, are both of them in bondage to their environment. The seed, the embryo, require for their development certain conditions without which neither can fructify. Variations, often slight, in their surroundings, may be sufficient to arrest their evolution. They receive the breath of life when certain physical attributes, especially heat, make active the germ which had hitherto shown no sign of life. Such is the fundamental part that physical energy plays with reference to the cell. It is upon physical energy that the cell is dependent for its life. It is under the influence of such energy that matter hitherto inert is roused into activity, and becomes organised.

What is the intimate nature of this phenomenon? Claude Bernard, the immortal French physiologist, declared that if he knew only one thing with absolute completeness, he would know everything.

If the question be asked "what is the origin of life?" no answer can be given, but it would appear to be an incident of a normal transformation of energy, of change from one form of physical energy to another form of energy—that called vital.

Assuming a condition of movement to start with, there would flow from this initial motion an uninterrupted series of other movements—cellular, organic, visceral—these representing simply phenomena of transformation. Such a conclusion is, so far, at least, warranted by the facts, but beyond this the nature of the process must still remain mysterious and unknown.

It is by a series of transformations of energy in its various modalities of light, heat, electricity, movement, &c., that the growth of the organised being takes place; by a defective assimilation of such energy that its diseased conditions arise; and on this view old age becomes merely the expression of diminishing ability on the part of the cell to fix the energy that surrounds it.

But the transformation of the surrounding physical energy cannot be separated from chemical transformation, or the metamorphoses which matter undergoes in its passage through the organism. It is easy to prove that the second strictly depends upon the first; that cellular movement directs, reduces, or accelerates the chemical changes, which in conformity with the laws that govern matter and its attributes, in their turn produce energy.

In reality, the phenomena of chemical transformation which brings about a modification in the number, the nature, or the manner of grouping of the atoms which constitute the molecular edifice, can be represented as an intermediate stage subordinated to physical phenomena or movement. This intermediate phenomenon has its origin in movement and it produces movement. It is still a question of a transformer whose physical origin is manifest and indisputable.

It is thus that life, considered in its physical or chemical processes, is reduced simply to a modality of movement; or more correctly to an *ensemble* of movements various in nature and amount, which cannot be created nor destroyed, but are the result of external or internal forces—that is to say, derived from chemical cellular metamorphoses transformed by the nervous system to minister to the manifestations of life.

From such considerations may be deduced the importance of treatment by physical agents, that is to say, the taking advantage of the reciprocal dynamic influence which exists between the living organism and the agencies which surround it. To deny such evidence would amount to the absurdity of representing the organised body as existing apart from other forms of matter, possessing an independent existence, and isolated from the rest of the universe. We must, on the contrary, regard the living organism as an agent of exchange, a transformer of matter and its physical attributes, that is to say, of energy in its multiple modalities. The living body, in fact, receives energy, transforms it and restores it again.

The scale of organised beings is established according to their aptitude for producing this transformation in the domain of physical energy. The perfectibility of our being is essentially bound up with the same process of adaptation; for the energy which animates our myocardium and determines the extent of vascular tension, which excites our secretions, which creates the condition of defence or immunity against injury or infection, is of the same order as that which presides over muscular movements, or the highest intellectual conceptions. It is physical energy transformed.

THE HYDRO-THERMAL TREATMENT OF NEURASTHENIA.

By Charles J. Whitby, B.A., M.D.Cantab.

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Whether or not we regard the condition which goes by the name of neurasthenia as a purely contemporary phenomenon, the fact of its recent recognition as a definite pathological entity can hardly be questioned. In a standard text-book of some twelve years ago I have sought in vain for any mention of the disorder. Before discussing its treatment, it will be well therefore to give a brief outline of its leading symptoms, thus meeting by anticipation the charge of combating a non-existent or unidentifiable malady. The typical neurasthenic is a person of neurotic family history. His father suffered from depression or sleeplessness; his mother, sister, or maternal aunt were martyrs to some nervous ailment; or his brother has been confined in an asylum. Sometimes, in lieu of this, a strong rheumatic, rheumatoid, or gouty taint, in one or both parents, may be on record. Or the patient may be one of the youngest members of a long and rapidly produced family. The disease is common in both sexes. Adolescence (especially perhaps in women) and late middle age are probably the periods at which it is most frequently manifested. There is often a history of numerous attacks of influenza, each resulting in a distinct and permanent aggravation of the symptoms, or in the addition of some entirely new feature. The patient is generally ill-nourished, and may be more or less anæmic. Muscular development is, as a rule, but not invariably, defective. The pupils are in many cases habitually dilated, and the pulse is unduly compressible. Tachycardia is not uncommon in these cases, and may be associated with ventricular dilatation. Flatulent dyspepsia is almost universal, and so, probably, is some degree of gastric prolapse and enlargement. The hepatic dulness may be excessive. General hyperæsthesia and exaggeration of patellar reflexes are fairly common. The bowels may be loose, but are more often costive and irregular. All, or nearly all, the symptoms are at their worst in the earlier part of the day, and may practically disappear towards nightfall. Sleep is, however,

poor, or broken towards morning. Sexual irritability is often complained of, manifesting itself in males by frequent emissions and the dread of "incompetency." The onset of the disease may be ascribed by the patient to early habits of masturbation. Backache, hemicrania, numbness of the scalp, throbbing sensations in the head, a feeling of pressure on the vertex, or tinnitus aurium, are among the innumerable morbid sensations that may be the chief subjective symptoms. The mental condition may be lethargic, or irritable and restless, or both in turn. There is nearly always great indecision and self-mistrust, and an utter incapacity for steady concentrated activity. A feeling of intense anxiety, a dread of meeting strangers, or distinct agoraphobia, may be manifested. The urine is in many cases habitually alkaline, containing an excess of fixed phosphates; or this condition may alternate with lithuria and high acidity and pigmentation. A tendency to neuralgia is not uncommon.

A distinction is commonly drawn between "spinal" and "cerebral" neurasthenia. In the former the symptoms are most aggravated by physical, in the latter by mental exertion, *e.g.*, reading, writing, chess-playing, &c. Insomnia, paralysis of the will, and morbid sensations in the head are the most characteristic features of the cerebral type of the disease.

It is impossible to enter here upon the difficult but interesting questions of ætiology and pathology. Probably, however, we shall not go far wrong in assuming an hereditary predisposition to premature breakdown of the nervous system in the majority of these cases. The almost universal association with neurasthenic symptoms of evidences of more or less of gastric or gastro-hepatic insufficiency suggests auto-intoxication as one of the chief causes of the disorder. The constant feeling of *malaise* which characterises it has much in common with the sensation of ordinary fatigue, which, we know, is of immediately toxic origin. A fatigued muscle can be revived by washing out the accumulated products of its own activity. This is a fact worth remembering when we come to consider the method of treating the chronic fatigue of neurasthenia. The treatment of neurasthenics is best carried out in an institution, because, first, of the immense advantage of removal from the customary environment; secondly,

of the need for special appliances; and thirdly, of the necessity for constant supervision and occasional modification of the treatment.

The treatment may begin with an early morning ablution, the technique of which is as follows .—

A few inches of water, at 39° to 40° C. (102° to 104° F.) are poured into an ordinary circular shallow bath. The patient rises, bathes the face with cold water, strips, and steps into the bath. From a basin containing salt and water (a breakfast cupful to each quart), at 25° C. (77° F.), a small, rough towel (*not* a sponge) is taken, dripping wet, and with this, frequently re-dipped, the chest, back, abdomen and limbs are rapidly laved. The disadvantage of a sponge is that it produces too little friction, and so fails to promote reaction. After this, a pail or can containing two gallons of water, at about 10° C. (50° F.), may, if thought advisable, be poured over the back and shoulders. The patient is then enveloped in a warm, dry bath-sheet and quickly dried. Friction with the hand to the spine materially assists reaction. Most authorities advise that the patient be now bidden to dress and go out. This will be well in many cases, but sometimes proves too tiring. To return to bed and have breakfast there will then prove more beneficial. The ablution should be continued exactly as described above for three or four days. After that time, the temperature should be lowered by 1° C. (about 2° F.) daily, until a temperature of 10° C. (50 ° F.) is reached. The temperature of the *affusion* cannot well be reduced, but its stimulating effect may be enhanced by increasing the height from which the attendant (standing on a chair) delivers it.

The principal treatment of the day should be at about eleven in the forenoon, except in those cases where morning prostration is so severe as to be absolutely prohibitive of this. In these, the afternoon treatment, presently to be described, may be substituted for what is now recommended. The most generally useful procedure in typical cases consists in an impact bath of some kind, say a graduated spray or needle-bath, preceded by a warming in the Turkish bath (outermost chamber), Russian bath, or, best perhaps, hot-air cabinet (head excluded). The temperature of

this last may be from 45° to 50° C. (113° to 122° F.). The duration varies, according as the object in view is a mere preparatory warming before the impact bath, or actual sweating, from five or six minutes to twenty minutes or more. It is impossible to lay down a hard and fast rule, but generally speaking, these patients should not receive a sweating bath more than once or twice a week, if at all. After five minutes in the Russian, Turkish, or cabinet bath, the cutaneous tactile sensation, if tested by an æsthesiometer, will be found to be considerably heightened, so that a greater neuro-vascular effect is produced by the thermo-mechanical stimulus of the impact bath (spray or needle) which follows than would otherwise be the case. The temperature of the impact bath should, for the first day or two, begin at 38° C. (100·4° F.), and be reduced, in the course of two minutes, to 28° C. (82·4° F.). Unfortunately we have, as a rule, in this country, no means of regulating the *pressure* at which the water is delivered in douches and sprays, but it is most desirable that this also should be subject to accurate prescription. The minimum temperature should be reduced by 1° C., or 2° F., daily, until a temperature of 10° C. (50° F.) is reached at the conclusion of each bath. Moreover, the duration of the bath should be gradually and cautiously increased, until it lasts three minutes *per diem*. After a week or two the half-inch douche should be allowed to play for ten seconds, at the minimum temperature, up and down the spine and over the hepatic and gastric region after the spray or needle bath; and by degrees the duration and extent of application of this may also be increased, always, however, with due regard to the character and progress of the case. Immediately on conclusion of the bath the patient is enveloped in a warm bath-sheet and rapidly dried by the attendant. He then lies down for ten to twenty minutes, after which he should dress leisurely and at once proceed to take exercise in the open air. The object of this is that he may obtain the full benefit of the deepened respiration resulting from the bath.

In some cases the above treatment may be given daily, the only variation being that provided for by the gradual reduction of the temperature and prolongation of the impact bath, and by the fact that the preliminary hot-air bath is once or twice a

week allowed to go on until actual sweating occurs. In many cases, however, it will be found well to vary the procedure two or three times a week by substituting some other form of treatment in the forenoon. Cerebral cases, characterised by great irritability, or by morbid cephalic sensations, often derive benefit from the following procedure, which may be given on alternate days with the treatment just described. A strong decoction (ten ounces, by measure, to the quart) of mustard bran is prepared with boiling water, in a pail or other suitable vessel. This is placed bodily in an ordinary sitz bath, and the patient, sufficiently undressed, sits on a narrow board laid across the front of the bath. An attendant then dips a sponge or small rough napkin in the decoction, the temperature of which should be at least 45° C. (113° F.), and laves the entire length of the spine for four minutes (less, if felt too acutely), frequently re-dipping the cloth and maintaining the temperature unchanged. After this, the spine is laved with cold water (13° or 14° C.) for a quarter or half a minute more; and the bath may conclude by the pouring of two gallons of cold water on the back and shoulders from a height of 12 in. to 18 in. After the above treatment has been administered some half-dozen times, a change should be made in the direction of a more tonic procedure. The mustard decoction should be omitted and the spine laved instead with plain water, at a temperature of 27° C. (80·6° F.), for four minutes, and cold (10° C., or 50° F.) for one minute. The duration of the employment of the higher temperature should be diminished, and that of the lower increased by fifteen seconds daily, until cold water only is used. The back should, after the above procedures (not, of course, those in which mustard is employed) be well rubbed, until reaction begins; and in some cases an application of camphor liniment, the "chillie paste" of hydropathy, or some other rubefacient, is advisable.

The patient should lie down for at least an hour after the midday meal. If the action of the bowels has been otherwise than satisfactory, an enema should be administered in the course of the afternoon. The use of a syringe is to be avoided; by far the better method is that in which the water is allowed to flow in from an elevated reservoir by simple gravitation. Half to

one pint of plain water, at about 32·5° C., or 90° F., will suffice, as a rule; but, in cases in which the evidences of auto-intoxication of intestinal origin are conspicuous, a weekly, or bi-weekly, irrigation with hot water (½ to 1 gall., at 40·5° C.) is decidedly indicated. In accordance with the general aim which governs the course of treatment, the temperature of the ordinary enemata should be lowered by half a degree Centigrade (or 1° F.) at each administration, until a temperature of 15·5° C. (about 60° F.) is reached. On those days when, or in those cases in which, the use of the enema is uncalled for, there is no more widely applicable form of treatment than a sitz bath of ten minutes duration. The patient, undressed, and wrapped in a blanket, sits in water at 26·5° C. (about 80° F.), of a depth sufficient to cover the groins. The abdomen and back may be rubbed meanwhile by the patient with or without the aid of an attendant. After nine minutes the tepid water should be allowed to run out, while an equal quantity of cold water flows in. Finally, two gallons of cold water (10° C.) are poured on the back and shoulders, the patient is rapidly dried, the back rubbed with a dry hand until reaction begins, and the patient is sent into the open air. This bath should be taken daily, if possible, certainly not less than four times a week. It not only acts as a sedative and derivative to the brain in cerebral and insomnial cases, but has a decidedly beneficial effect upon the splanchnic and portal circulation, the action of the bowels, and the tone and function of the pelvic viscera.

Another minor procedure which will be found useful in many cases, and which may be preferred to the hip-bath in the absence of decided gastric or enteric symptoms, is a combination of the ordinary footbath with electrical treatment. The feet, immersed in hot water at 40° to 41° C. (104°-106° F.), rest on a large flat electrode at the bottom of an insulated footbath. The other electrode, consisting of a large damp sponge, is held by the patient in both hands. The current may be supplied by an ordinary faradaic battery (primary coil), or better, may be the quasi-sinusoidal current derived from the alternating electric-lighting dynamo. In the latter case the current must be modified and controlled by a suitable transformer. The current should be very mild at first and gradually increased up to that degree

which is just short of producing muscular contraction. After ten minutes of this, the patient steps into a bath containing one inch of cold water. Standing in this, he treads water for three minutes; the feet are then thoroughly dried, and the patient walks until his feet feel warm. The above course of treatment may be continued, with such modifications only of temperature, duration, &c., as have already been suggested, for four or five weeks. At the end of that time the morning ablution first described may be replaced by the "drip-sheet," a somewhat more stimulating procedure. The patient standing, as before, in a few inches of hot water, is enveloped in a linen sheet drawn out of a pail of cool (15° C.) or cold (10° C.) water. The attendant carries on smart friction of the entire body outside the sheet. At intervals of half a minute or so cold water should be poured on the back, chest and shoulders. The duration of the bath is three minutes, after which the wet sheet is replaced by a dry warm one, and the rubbing re-continued until a thorough reaction is established.

The forenoon treatment may at the same time be changed, this, too, in the direction of greater severity. In place of the spray or needle bath, preceded by a warming, the "half-bath" may be prescribed. An ordinary long bath is filled sufficiently with water at 21° C. (about 70° F.) to cover the rim of the pelvis when the patient is sitting upright in it. The face and head are first sponged with cold water. The attendant rubs the patient's back with his left hand, holding a scoop in his right with which he frequently dips up water from the bath and dashes it over the back, chest and shoulders. Meanwhile, the patient vigorously rubs his own chest, abdomen, and lower extremities. After two or three minutes of this the patient may lie down for a while, friction being still applied to the chest, abdomen, and lower extremities by the attendant. When rested, he sits up again and the former process is repeated. The first bath may, in the absence of rigor or chattering of the teeth, last five or six minutes. Subsequent baths may be gradually increased till double that time can be borne. In some cases these baths may be usefully preceded by (1) warming in the hot-air bath, or (2) the full cold-pack.

It will be noticed that in all that has been suggested above one leading idea has been kept in view. This idea is the gradual, the imperceptible but constant, increase of the demand which is made upon the reactive powers of the neuro-vascular system. The hydro-therapeutic treatment of neurasthenia is indeed primarily an education of the vasomotor centres, though, indirectly, much more than this is doubtless accomplished. The principle is as simple as that by which a gymnast is trained to lift heavier and heavier weights, until by imperceptible degrees his original muscular power is doubled. It is nevertheless true, as has been proved by numerous experiments, that by each properly administered bath procedure certain definite physiological effects are also produced, (1) on the peripheral circulation; (2) on the heart's action; (3) on the blood pressure and distribution; (4) on the number and proportion of red and white corpuscles in the superficial vessels; (5) on assimilation and metabolism; (6) on the excretory functions, and (7) on the muscular strength as indicated by the "fatigue curve" of the digital flexors. The application of cold to the body surface, besides strengthening the heart's action and diminishing (by reactionary dilatation of arterioles) the peripheral resistance to the blood-flow, produces an increase in the number of red blood-cells (in the blood taken from the finger) amounting to 1,800,000 per cubic millimetre; of leucocytes, 13,000 per cubic millimetre, and of hæmoglobin about 14 per cent.[1] However this augmentation be accounted for (and it is probably due to expulsion of cellular elements from the spleen and other organs), it must have the result of considerably increasing the oxygen-bearing capacity of the blood, and in combination with the increased strength and volume of the peripheral circulation, must favour the oxidation and removal of toxins.

The course of treatment for a typical case of neurasthenia should be of not less than two, or, if possible, three months' duration. Considerable tact and firmness will usually be necessary in order to induce the patient to persevere, and to prevent him from deviating into bye-ways of symptomatic treatment. Of

[1] *Blätter für Klin. Hydrother.*, November, 1893.

course, the individual features of the case must be carefully considered, but this done, the whims and caprices of the patient should, as far as possible, be disregarded. There is no commoner cause of failure in these cases than the constant initiation of entirely new plans of treatment.

In this paper, with one trifling exception, no account has been taken of other than strictly hydro-thermal methods of treatment. Even these have been far from exhaustively dealt with. It must not be supposed, however, that the claims of other therapeutic measures are thereby intentionally slighted. The writer fully recognises the value of static, galvanic and faradaic treatment, massage, Swedish gymnastics, dietary and medicines. He has also seen excellent results in these cases from the well-known "Weir-Mitchell" plan of treatment. But space does not admit of their discussion in the present article.

WHOOPING COUGH AND COMPRESSED AIR.

By Dr. J. Delmas (Bordeaux, France).

Introduction.—The treatment of whooping cough by a physical agency which has so evil a reputation as compressed air requires some preliminary considerations with reference to its employment and its harmlessness. In the first place, it is necessary to distinguish between the commercial and the therapeutic employment of compressed air. Now, there is as much a difference between the two as there is between the electric currents in the street and those employed for therapeutic purposes. The sad notoriety of accidents caused by compressed air, chiefly in hydraulic works, and the ignorance of the public which does not distinguish between its therapeutic and its commercial employment, has led to great confusion and unjustifiable mistrust. We must begin by inquiring into the nature of the accidents that arise from compressed air at pressures used in commerce, and we shall then see if the same accidents are possible in using it for medical purposes. In the first place, it may without hesitation be said that compressed air even up to

four-and-a-half atmospheres is harmless, and that the serious effects which have been described cannot be attributable to it. This seeming paradox is easy to prove; for if we examine the sequence of events when work has to be done in compressed air, we see that there are three principal stages: (1) that in which the workman little by little is led up to the pressure in which he is to remain for the execution of his work (period of compression); (2) the period in which the pressure remains constant; (3) the period of "de-compression."

Of these three periods, the two first need not occupy our attention long, for they are absolutely harmless provided that the apparatus remains intact, and there is no sudden escape of air from the compression chamber; and of course supposing the compression to have been effected with the requisite slowness, it being always understood that the pressure is not more than that already named, that is to say, four-and-a-half atmospheres. At this pressure the phenomena that appear are the following:—(1) pain in the tympanum; (2) articular pains; (3) difficulty in respiration; (4) diminution in chest expansion, which has become scarcely perceptible; (5) slowing of the pulse (from $\frac{1}{4}$ to $\frac{1}{2}$); (6) augmentation of the urinary secretion; (7) inability to whistle or sing.

These are, if I may so express myself, maximum effects, for they are such as appear in a healthy man under a pressure of four-and-a-half atmospheres. Further, they occur in workmen who have had to remain a certain time (two hours at least) under this pressure. There is nothing to constitute a true condition of disease; for, from the time that pressure becomes normal, the workman rapidly recovers his ordinary physiological conditions. The articular pains may last more or less long, and they give rise by analogy to a theory of the pains of acute articular rheumatism to which we will refer later. The dangerous phase is the phase of de-compression; it is to it alone that we must refer all the fatal accidents, whether immediate or remote, which may have been noticed during the course of about a century, during which compressed air has been so employed in commerce. The time taken in reducing pressure, which ought to be long in proportion to the difference between the actual barometric

pressure and the pressure to be attained, has always in such cases been fatally shortened, because in commerce the manufacturer looks upon it as a time during which a workman does no work, whilst at the same time motive power is being expended. As for the workman, ignorant of the risk he runs, finding the delay irksome and the time long for want of occupation, he is only in a hurry to get his day's work finished.

The pathology of accidents that occur during the reduction of pressure is very simple, and is the result of a well known law of physics, although not quite an exact law in this case. This law, called Dalton's law, states that the volume of gas dissolved in a liquid is proportional to the presence of this gas, and, it may be added, to the pressure; when the de-compression is too quick, the gaseous molecules contained in the blood finding themselves under a lower pressure, quickly dilate. In dilating they produce capillary obstructions, which are the causes of the symptoms. The diversity of these effects must be referred to different positions of these rapid thromboses. The explosion of the vessel in which the man is at work, or the breaking of supply or exit pipes, act according to the same mechanism, but the effects are in this case instantaneous. We have explained the only danger of compressed air. Now comes the question — can we consider this danger possible in apparatus used for medical purposes? We answer without any hesitation in the negative, and for many reasons. The first is, the very low pressures used, never exceeding half an atmosphere; and 2nd, the slowness of the de-compression, which ought to take, according to most aërologists, at least as much time as compression, but which we have proved ought to be twice as long.

Further, in spite of the number of children treated, and the number of sittings carried out at our installation, so long established at Bordeaux, we have never had an accident either immediate or remote.

Having, I hope, dissipated any idea of possible danger in the use of our remedy, and refuted in advance any possible objections, it is necessary to pass in review the various theories upon the nature of whooping cough, in order to show how we were led to suggest compressed air as a treatment for this very common affection. We can, independently of the microbic nature

of this disease, say that there are two principal theories as to the nature of whooping cough. The first is the nervous or neuritic theory, which attributes the spasmodic cough to an inflammation of the pneumogastric, according to some, of the phrenic or superior laryngeal according to others.

There are those also who consider there is some compression of nerves by tracheo-bronchial structures, too small to be discoverable by any means of investigation we at present possess. It is certain that tracheo-bronchial adenopathy co-exists very frequently with whooping cough, and that, on the other hand, it is an affection of which it is difficult to make the differential diagnosis, considering the few certain signs there are by which it can be distinguished from whooping cough. Thus the theory of compression takes the benefit of the doubt, there being no sufficient evidence definitely to decide the question.

The other theory, which may be called the bronchitic theory, regards the disease as a spasmodic bronchitis, or according to others, a general inflammation of the mucous membrane of the larynx. According to Trousseau, whooping cough is a mixed disease, a catarrho - neuritis, that is to say, there is catarrh co-existing with nervous trouble, and this view does not give to one or the other a special significance, or a true predominance.

The medical man of the present day contents himself with showing that it is only very young children suffering from whooping cough who have catarrh; but their catarrhal expectoration contains a characteristic microbe, the Bacillus tussis convulsivæ; and further this disease is so debilitating that some think they can see in this anæmia an early symptom of whooping cough.

The great characteristic is the cough and spasmodic movement which we need not describe here, but which for present purposes we can consider as constituting in itself the whole disease, at first by its presence, and then by the complications to which it gives rise. Every method of treatment thus resolves itself into the suppression of the cough, that is to say, the suppression of the spasm. It is in looking for a means of diminishing the spasm that I have been led to the treatment of whooping cough by compressed air.

(To be continued.)

Health Resorts and Sanatoria.[1]

I.

THE PRINCIPALITY OF MONACO—ITS SANITATION AND CLIMATE.

By Dr. Vivant (Monte Carlo).

The great characteristic of the climate of the Riviera is the shelter which the Maritime Alps afford against those cold winds which here, as in all parts of the northern hemisphere, blow from the north. The higher this natural shelter, the fewer breaks in its continuity, and the nearer it is to the sea, the warmer and more equable is the climate—the cold winds which blow over the mountain tops striking the sea at a considerable distance from the shore.

Now, in all the "*côte d'azur*," from St. Remo to Cannes, nowhere has nature formed so perfect an amphitheatre as that which dominates and protects the principality of Monaco. Towards the north rises the peak of Mount Agel to a height of 1,150 metres. A detached spur towards the north-east passes above the picturesque village of Roquebrune, and terminating in the sea, forms a promontory—Cap Martin. Another spur directed to the west forms two successive plateaux, the Mont de la Bastille, 800 metres, and Tête du Chien, 500 metres in height. Towards the north these hills form an unbroken semicircle.

From this short description it is evident that the only winds to which Monaco is exposed are the east and south-east, which are warm winds. It must be admitted, however, that the "mistral" sometimes makes itself felt at Monaco, but it is no longer the tempestuous wind which sweeps the valley of the Rhone; for it has lost its violence in following the sinuosities of the coast line the whole distance from Marseilles.

One of the best criteria of a climate is to be found in its flora. Now in the Principality of Monaco tropical plants appear

[1] In each number there will appear an article descriptive of Health Resorts and Sanatoria, at home or abroad.

sometimes growing wild—aloes, the India-rubber plant, the Barbary fig, &c.; and amongst the plants cultivated for their fruit, palms, bananas, oranges, citrons, &c. Covering the sides of the mountains with green, is the olive, which is found at an altitude of even 400 metres. In short, the topographical configuration of Monaco ensures a temperature exceptionally mild and regular, yet with all the advantages of a hill climate, namely: (1) Diminution in the absolute amount of moisture in the air, and the absence of cloud even on the hill tops; (2) temperature low in the shade, high in the sun, a fact which prevents the climate being enervating; (3) an abundance of light, affording in the highest degree the bactericidal effects of the sun's rays; (4) special freedom of the air from microbes; the mountain on one side, and the sea on the other, afford an inexhaustible supply of air absolutely pure, and constantly renewed by currents at various parts of the day, from hill to sea and sea to hill.

The neighbourhood of the enormous liquid mass of the sea, which gives up in winter the heat stored in the summer, ensures an equability of temperature which is never found in hill climates properly so called.

The nature of the soil and the subsoil, everywhere formed by the living rock, and the considerable slope which characterises the whole country, ensures a quick surface drainage; and this explains the relative dryness of the air, and the fact which at once strikes the stranger that, even the day after a heavy rain, the ground is absolutely dry. Such is a short sketch of the advantages which Monaco owes to nature.

But wherever numbers congregate a series of problems arise, the solution of which the hygienist of every country has earnestly studied, especially since the immortal work of Pasteur first threw light upon many points hitherto obscure. In point of sanitation Monaco is second to no city on the Continent. Thanks to the initiative of the enlightened Prince who rules its destinies, great improvements have been made during the last twelve years.

There may first be mentioned the sanitary legislation of February, 1893, concerning compulsory notification of contagious disease (including tuberculosis). The medical man in charge of the case notifies it within six hours after he has made a diagnosis,

or, failing him, the duty falls upon the hotel keeper, or persons in charge of the patient. The notification of such diseases involves the isolation of the case; and on the decease or departure of the patient, disinfection by heat of the clothes, &c., if the disease be one of those enumerated in the list fixed by the order of February 8 and 9, 1893. This disinfection is gratuitous for the poor, being paid for by means of an annual tax charged upon the proprietors of hotels, boarding-houses and apartments. The accusation so frequently made in recent years of negligence on the part of the authorities in Mediterranean stations in not taking measures to prevent the spread of contagious disease, and especially of tuberculosis, is no longer a well founded one, at least in the case of Monaco.

The system of drainage decreed by an ordinance of June 23, 1894, involved the formation of a complete network of drains, which comprises four sections in connection with the four great divisions of the Principality, namely:—

(1) The old town of Monaco.

(2) La Condamine.

(3) Monte Carlo.

(4) Les Moulins.

Each of these divisions, provided with a special collector, comprises two types of drains:—

(A) Those of large calibre, viz., 1 m. 40 by 0 m. 80.

(B) Drains of smaller section, 0 m. 70 by 0 m. 50.

The large-sized drains are the most numerous; all are provided with flushing tanks, containing 2 to 6 cubic metres of water. Four shafts with an upward draught are placed in an elevated situation for purposes of ventilation, and all the openings are syphonated.

The most interesting section to be considered is that of La Condamine. Up to 1899 its drainage flowed directly into the Bay d'Hercule by three different openings. Since May of last year the Bay of Monaco no longer receives the flood water; this has been diverted to a large reservoir in the Bay of Fontvieille, on the other side of the rock of Monaco. For this purpose there has been installed (on the lowest part of the Boulevard de la Condamine) a station comprising three

ejectors, having a capacity of about 2,200 litres; all the drains from this section, under the railway, now discharge at this station. The flood waters collected in these ejectors are automatically driven back by means of compressed air, furnished by a special installation, in conduits which lead them into the principal collector in the Bay of Fontvieille, where they are carried out to sea more than 100 metres from the shore.

Another cause of pollution of the waters of the port of Monaco also disappeared in 1899. Formerly kitchen refuse, street-sweepings, &c., were collected in carts and taken to a place of discharge behind the rocks of Monaco, in the neighbourhood of the slaughter-house, and thrown directly into the sea. It happened sometimes, under the influence of winds and marine currents, that certain portions of this refuse (paper, straw, corks, &c.), were little by little brought round the point of the rock of Monaco and finally cast into the port. They could be seen there day after day until wind or reverse currents carried them out to sea again. This is now completely done away with, by the installation at Fontvieille of a destructor near the sea, at some distance from houses of any importance.

The destructor comprises four divisions placed back to back, the system of Horsfall, of Leeds. This system is one of those which provide the highest temperatures, and thus secure the most complete destruction of the refuse. Fifty-six square metres of refuse may thus be burnt in twenty-four hours, the temperature attained may even exceed 900° C.; and if, by the employment of dust bins, the mud of the street sweepings be separated from kitchen refuse, &c., even higher temperatures would be reached, and thus a more complete destruction of the smoke be secured.

In speaking of the streets we must remember that their cleaning and watering are carried out with a care that excites the admiration of strangers from every country.

Passing to other points, Monaco is not behind other civilised countries in utilising electric light and energy; the latter in the form of electric tramways with surface contact. If we add that Monaco is provided with well arranged slaughter-houses, and that there is a strict inspection of meat, that the two

principal markets are covered and strictly looked after, that there is a Medical Inspector of Schools, an Inspector of Dwellings, a Health Committee, and that the construction of houses is such that there must be a distance of two metres between the houses, and between the houses and the street, it becomes very evident that the authorities charged with the hygienic arrangements of the Principality have certainly not failed in their duty.

Review of Current Literature.

INFLUENCE OF STATIC ELECTRICITY UPON THE HEALTHY ORGANISM. By M. P. Yvon, Member of the Society of Biology (*Arch. d'Elect. Med.* Pp. 257-276).

The author undertook this series of experiments with a view of ascertaining the effect of static electricity upon a healthy man. His object was to study the influence of the "static bath" upon the elimination of urea and phosphoric acid, as well as upon circulation, respiration, and temperature. The investigation was carried out with the static bath pure and simple; one of the poles of the machine being to earth, and the other attached to the insulating stool upon which he sat as the subject of the experiment. Neither souffle, frictions, nor sparks, were used. The duration of each "bath" was two hours; the instruments used were Wimshurst machines, without sectors, worked by an electric motor, and giving a spark of about 9 centimetres; that is to say, working under a potential of about 115,800 volts, according to Mascart's table. In order to eliminate possible sources of error, proceeding from the acceleration of respiratory and cardiac movement, and the elevation of temperature consequent on walking, the bath was taken, in the second series of experiments, after two hours' rest. Elaborate tables are given as to the general result of the experiments, which show that the composition of the urine was not influenced by the static bath. The marked diminution in quantity passed in the twenty-four hours (a diminution amounting to the difference between 1,306 cubic centimetres and 1,011 cubic centi-

metres) evidently depended upon the elevation of temperature, which rose from 10° C. to 26° C. during the course of the experiment. The net result of all these experiments, after taking every care to eliminate all possible errors, is to show that under the conditions named the physiological action of static electricity upon a healthy man is very slight, if any. The opinion of Duchenne of Boulogne, who wrote in 1855, that the physiological action of static electricity was *nil*, is thus supported by the above experiments.

SOME NEW EXERCISES FOR THE TREATMENT, BY EXACT AND SYSTEMATIC MOVEMENTS, OF TROUBLES OF CO-ORDINATION IN TABES. Dr. Vorstädter, Russia (G. Thieme, Leipzig, 1899. *Revue de Cinésie et d'Electr.*, February, 1900).

To the well-known principles of compensation exercises the author adds a category of movements which he divides as follows :—

(1) Directional exercises principally adapted to regulate the normal direction of movements. They are divided into (*a*) *supported* continuous exercises, which comprise gliding or rolling movements ; marking exercises ; shadow exercises. (*b*) *Free* continuous exercises, which consist of simple continuous movements ; shadow exercises ; and exercises with light and with shade.

(2) Time exercises, which are arranged to modify the abnormal rapidity of movement.

(3) Intensity exercises, specially employed to regulate muscular contractions.

The author concludes by giving a table of results, which enables the reader to realise the precision of movement which can be attained in tabes by the use of these exercises.

We propose in the next number of the JOURNAL to reproduce *in extenso* this *brochure*.

THE TREATMENT OF ATAXY BY COMPENSATORY EXERCISES. Dr. Sarbo. (*Ungar. Med. Presse*, Budapest, 1899, IV., 849, 850. *Revue de Cinésie et d'Electr.*, February, 1900.)

This paper deals with exercises of co-ordination, the usefulness of which is especially shown in the symptomatic treatment of tabes. Slight exercises, such as those of walking and standing,

are applicable to the pre-ataxic stage. If there is much diminution in the tone and strength of the muscles, it is better not to use this method.

If there is failure or perversion of nutrition and the general condition of the patient is feeble, it is in the first place necessary that these conditions be improved. Exercises are contra-indicated in cases of cachexia and obesity. In carrying out the exercises the patients ought to be able to follow and control, by sight, the movements of their lower limbs. Lastly "lightning pains" and "crises" are contra-indications. The author adds that the method is best carried out in an establishment expressly arranged for the purpose, and the treatment ought to last on an average for three or four months.

The results are very good; if carried out during the pre-ataxic stage they prevent the ataxy. When ataxy has already appeared, they improve the symptoms. Romberg's sign diminishes, the walk becomes firmer, &c. The author describes certain inconveniences which may arise during the treatment, and he carefully points out the contra-indications, and details results that follow.

On the Treatment of Ataxy by Exercise. Dr. Weiss. (*Prag. Med. Wochensch.*, 1899, November 23, XIV., No. 47, 595-597.)

The author first passes in review the various methods employed in the treatment of ataxy. Therapeutic exercises consist in executing under the direction of the sense of sight, and in a definite order, movements which afterwards take place, so to speak, automatically. But, in order to prove successful, this method requires perseverance and determination, and whilst availing ourselves of it we need not disdain the aid of psychical influences. A case is cited in which suggestion was of very great service.

School Gymnastics on the Swedish System. A Handbook of Physical Exercises for Elementary Schools. By Allan Broman, R. Gymnastic Central Institute, Stockholm. (John Bale, Sons, and Danielsson, Ltd., London.)

Dealing with principles at just sufficient length to insure their intelligent application in practice, placing before the reader

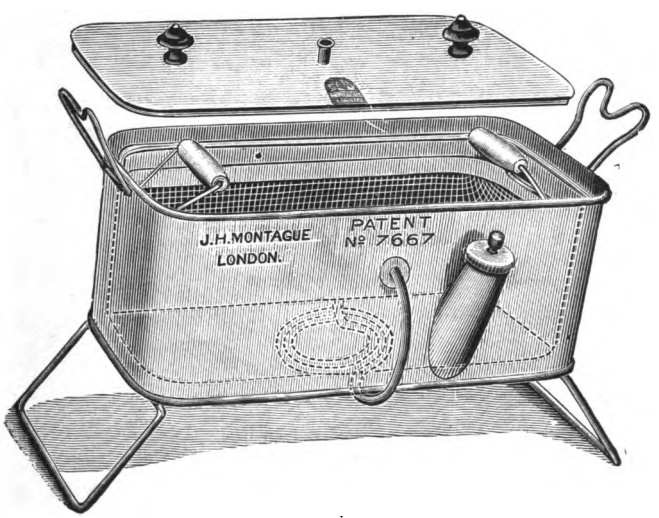
the progressive exercises clearly, concisely, and systematically, aiding description with a wealth of illustration (there are fifty plates), this short manual, of a hundred pages, strikes us as the very model of what such a book ought to be.

New Inventions.

ATMO-THERME STERILISER.[1]

By Louis Cobbett, M.A., M.B.Cantab., F.R.C.S.Eng. (Cambridge).

Surgeons who prefer to use sterile rather than antiseptic dressings will doubtless welcome a steriliser for use in the operating room. The instrument consists of an inner chamber intended for the materials to be sterilised, surrounded by a



water jacket heated by a flame placed below. The steam generated in this jacket is conducted through a coil of copper tubing (the super-heater) placed in contact with the flame immediately below the body of the instrument, and is thereby raised to such a temperature as renders it not only quite dry, but capable of drying that with which it comes in contact. This

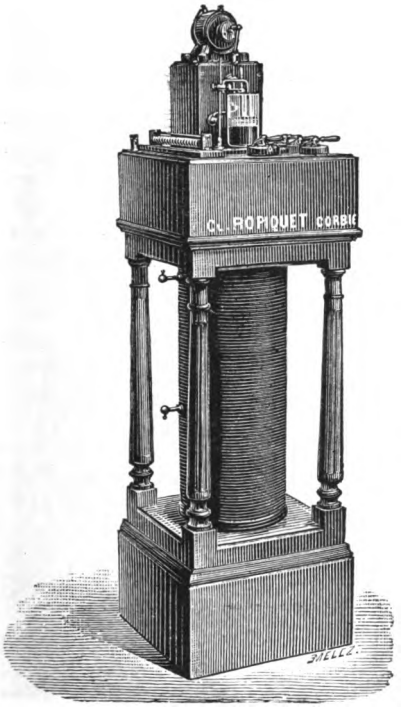
[1] *The Lancet.*

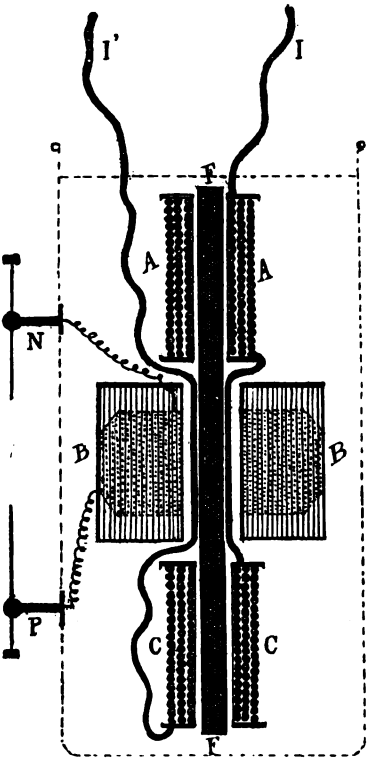
dry super-heated steam is then admitted to the inner chamber, where it rapidly penetrates and sterilises any dressings, &c., which may be within. Some preliminary experiments which I made with an instrument placed in my hands by the inventor for the purpose of testing its efficiency, and which was constructed on principles similar to those of the steriliser shown below, were very satisfactory. Non-sporogenous micro-organisms —viz., Bacillus prodigiosus, Bacillus typhosus, Bacillus diphtheriæ, Spirillum choleræ, Bacillus coli communis, and Staphylococcus pyogenes aureus—were destroyed in ten minutes, though they were enclosed within a considerable quantity of rather tightly packed cotton-wool. Dust-covered cotton-wool similarly enclosed was also sterilised in ten minutes. Spores of Bacillus subtilis contained on thread, enclosed within a tightly rolled bandage which was itself surrounded by half a pound of cotton wool, required an exposure of fifteen minutes to effect sterilisation. These results appear at first sight to differ from those of von Esmarch and others as to the disinfecting value of dry super-heated steam, but in the apparatus in question it is probable that the material to be sterilised is first exposed to saturated steam, and afterwards dried as the temperature rises above 100° C. The instrument used by myself had several minor defects, but I believe these have been remedied in the present instrument. The maker is Mr. J. H. Montague, of 101, New Bond Street, London.

A NEW INDUCTION COIL.

M. Ropiquet claims for his new coil that, with a simpler construction and much lower price, its output is more than double that of the Ruhmkorff coil constructed on the "classic model." It gives a thick spark more than thirty centimetres in length, and can be driven either by accumulators or a bichromate battery (voltage not stated). It has a special interrupter acting by means of a small electric motor driven either by a shunt-current or a single cell. It is especially adapted for X-ray work, and produces a "screen" almost entirely free from flickering.

Fig. 1 shows its appearance; it forms a small, neat piece of furniture, 1 metre in length and 30 centimetres broad. Fig. 2 explains its construction. FF is a bundle of soft iron wire or wood perfectly seasoned and varnished to avoid Foucault currents and hysteresis. A primary wire of large diameter, forming two coils, AA, CC, joined in series and placed at each end of the cylinder. The secondary coil is wound upon the cylinder between the two primary coils. This coil is very near





the central cylinder of soft iron wires or wood, so that there is only sufficient space left for the insulating material, which prevents all sparking or loss which might take place between the inducing and induced current. On theoretical grounds, the inventor winds the secondary in a cylindro-conical shape. Moreover, instead of using only one wire, he uses two or three wires abreast, always in the same order, and in the same direction, so

that the finished coil really represents two or three coils joined in parallel. The inventor states that the new instrument is an improvement upon existing forms, not only for radiography, but also for high-frequency currents, wireless telegraphy, &c.

Notes.

HYDROTHERAPEUTICS.—We have received from Dr. S. Baruch, of New York, whose important work on Hydrotherapy we hope to review in our next issue, the reprint of a clinical lecture delivered at the German Hospital in Philadelphia. The subject is the "Practical Application of Hydrotherapy."[1] The pamphlet contains nothing very new to those who are familiar with the literature of the subject, but conveys in a terse and striking way some of the reasons for regarding this method of treatment as one which is capable of truly scientific application. Dr. Baruch points out that the thermic and mechanical stimulation producible by water may be varied (1) in temperature, (2) in pressure, (3) in duration, at will, and as definitely as the dose of any other remedial agent. He gives pulse-tracings showing the effects on pulse-tension, dicrotism, &c., of impact baths of different kinds. He combats the prevalent fallacy that rapid alternations from hot to cold constitute the most generally useful hydrothermal procedure, as if the sole function of hydrotherapy were the infliction of sudden shocks. Referring to the subject of spinal douches, the author seems doubtful whether the spine has any particular advantages as a point of impingement for the douche over other parts of the body—for example, the chest, We should be inclined to maintain that there is sufficient evidence of a definite neural relation between cutaneous areas and the organs underlying them, to make it probable that a more direct stimulation of the spinal centres is brought about by the spinal douche than by a douche applied elsewhere. The authority of Charcot, who was an advocate for its use, may be cited in favour of the spinal douche. The pamphlet concludes with a plea to clinical teachers to rescue hydrotherapy from the hands of empirics, and restore it to the *armamentarium* of the educated physician.

A STATISTIC.—The various nationalities of the 6,170 members who attended the thirteenth International Congress of Medicine at Paris on August 5 were as follows:—France 2,293, Russia 805, Germany 572, United States 412, Italy 324, Great Britain 222, Spain 219, Belgium 147, Austria 141, Argentine Republic 108, Switzerland 101, Hungary 85, Roumania 60, Egypt 47, Denmark 46, Japan 43, Brazil 41, Turkey 39, Portugal 35, Greece 33, Poland 30, Sweden 28, Bulgaria 26, Mexico 24, Canada 20, Norway 18, Luxemburg 16, Servia 15, Croatu 8, Peru 6, Australia 4, various 202.

"WHAT PRESSURE IS DANGEROUS IN ELECTRIC RAILWAYS WITH OVERHEAD TROLLEY WIRES?"—The *Electrical Review* states that Professor H. F. Weber,

[1] "The Practical Application of Hydrotherapy." By Senior Baruch, M.D. Reprinted from *International Clinics*, vol. ii., seventh series.

of the Zurich Polytechnic, having been requested by the firm of Brown, Bouveri and Co., to give an opinion upon this question, has made a long series of investigations of the physiological effects of the electric current on the human frame, using his own body as the measuring instrument. The experiments were made with reference to the special circumstances of two Swiss railways, where the current was supposed to be supplied through two overhead leads, the rails being used as a third conductor of the three-phase system.

Two series of experiments were made, corresponding with the following cases:—

(*a*) A person seizes the two bare leads with both hands simultaneously, or both of the leads fall on a bare part of the body. (*b*) A bare part of a person standing on the railway, or on a car, comes into contact with one of the leads.

The main result of the experiments is that all pressures between 100 and 1,000 volts must be regarded as equally dangerous; consequently, there is no reason for not using the higher pressures between 500 and 1,000 volts, especially as they lead to greater economy. Further, there was little chance of the passengers or other persons coming into contact with both leads.

The above results may be so far regarded as confirmatory of the opinion expressed in the *Electrical Review* so long ago as 1898, by Dr. Hedley, namely, that all commercial currents, ranging as they do from 80 volts upwards, may be dangerous to life. But this is very far from saying that all pressures between 100 and 1,000 volts must be regarded as "equally dangerous."

The Effects produced in Cultures of Micro-organisms and of Tubercle Bacilli, by Exposure to the Influence of an X-ray Tube. (R. Norris Wolfenden, M.D.Cantab., and W. F. Forbes Ross, M.D.Edinburgh.)—The authors have for the last two years been making observations upon the growth of micro-organisms in different media submitted to the action of an X-ray tube. They detail their work in a paper read recently before the Röntgen Society, published in the *Archives of the Röntgen Ray*, the official organ of that Society. In considering what factors might possibly influence growth in an X-ray culture, various points must be borne in mind: (1) The X-rays proper, (2) cathode rays, (3) the disturbances of the electric field, (4) the production of ozone or other atmospheric changes, (5) increase of temperature, increasing the growth, (6) changes of chemical or other nature in the medium, (7) the light from the tube.

In view of these possible complicating factors, the authors prefer not to attribute their results to X or cathodal rays, but to speak of them as results obtained by the exposures of cultures to the radiation of an X-ray tube.

The outcome of their two years' work is summarised thus:—

(1) It is impossible by any ordinary long exposure, or exposure to high vacuum tubes, to kill growths of bacilli or cocci by X-rays.

(2) Such an effect would be contrary to the effect of X-ray stimulation of seeds, the germinating properties of which are greatly stimulated by X-rays, and fermentative processes are hastened, *e.g.*, yeast grown in Pasteur's fluid and the souring of milk.

(3) These effects upon low vegetal organisms are also produced in cultures of bacilli, the vegetative properties of which are stimulated to excessive growth, while they are profoundly altered in their biological and physiological characters.

(4) An apparent death in cultures so treated is only exhaustion of vitality

from excessive proliferation, since only rest is required to enable the organisms to again take on active growth. These effects, observed in non-pathogenic cultures, are repeated in cultures of tubercle, of which may be distinguished a fast-growing strain and a slow-growing strain; the latter is particularly susceptible to adverse influence of the medium, namely, over-drying. This over-drying may be produced by X-raying the medium, and the erroneous conclusion might be arrived at that a culture had been killed by X-raying, whereas its failure to grow was capable of quite another explanation.

THE PHONOGRAPH.—At last the phonograph reproduces musical and vocal sounds without that grotesque distortion of the voice so suggestive of the squeak of Mr. Punch. The Phonograph is now a marvellous piece of work. The news of its latest application was given to us a few days ago by a young American soprano, who has lately been studying in Paris for the Grand Opera. Before she left New York she had occasion to visit a "throat specialist." After a few preliminary remarks the doctor asked his fair patient to stand in front of his phonograph, and a record was made of the soprano's voice. On calling a second time the lady repeated the performance, and the two records were then listened to with rapt attention, and the doctor, after taking some notes, then enlivened the interview by repeating a few of his choice musical selections; in other words, records of "eminent" voices "before and after treatment." This is hardly serious work, and in some measure reminds us of another practice, happily uncommon, known as "treatment by diagram," which permits the patient to inspect a chart showing the alterations in the area of heart dulness, that have resulted from the "baths and exercises."

We have experimented with the most sensitive "diaphragms," but have never been able to record heart sounds. The rushing noise made by the needle while cutting the spiral groove upon the waxen cylinder, seems, as might be expected, to cover up the "lubb dupp" of the heart, as well as pulmonary sounds, whether normal or abnormal. Still the great improvements in the phonograph, which we have noted during the past three years, make us abstain from saying that the machine will never take a place amongst the legitimate methods of the consulting room.

A SUDORIFIC BATH.—It often happens in private practice that the indications for some form of diaphoretic treatment are recognised, while at the same time the drugs commonly employed for that purpose are, for one reason or another, unsuitable. The following simple method is recommended as a trustworthy means of obtaining a thorough sweating. An ordinary reclining bath is filled with water at 38° C. (102° F.) to a depth sufficient to cover the patient's body in the recumbent position. To this is added (cautiously, as the acid is apt to "fly" on contact with the water) one ounce of strong sulphuric acid. The patient, having first bathed the face thoroughly with hot water, steps into the bath, and reclines in it for twenty minutes. Long before the conclusion of the bath beads of sweat will appear on the forehead. On conclusion of the bath the patient steps out of the bath and is at once packed in hot blankets. During the next thirty minutes a very thorough sweating will occur. The writer has found by experiment that nothing like the same amount of diaphoresis is produced by a simple hot-water bath of equivalent temperature. The method was, so far as is known to the writer, invented by a layman, who had a water-cure establishment in Leicester. The question

as to its intrinsic value is, however, not affected by its empirical origin; and it is well worthy of a trial in acute bronchitis, gout, rheumatism and the exanthemata of childhood. Two or three such baths may be given daily, and it is stated on good authority that pertussis, in its early stages, may be aborted by a week's treatment of sulphuric-acid baths.

C. J. W.

THE ELECTRICAL FOUR-CELL BATH.—This arrangement is an application of the well known method of passing currents through the body by immersing the four extremities in separate vessels containing water, to which one or other pole of the battery is led. It is one of the oldest and best of the hydro-electric methods, either for cataphoretic, or the more usual electrical applications. It is obvious that anyone with an ordinary chair, four vessels, and a battery, can effectively carry out this procedure. But Dr. Schnée has devised an apparatus under the above name by means of which the objects in question are conveniently and effectively attained.

FIVE INTERNATIONAL CONGRESSES.—I. THE CONGRESS OF THE FRENCH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, was held between August 2 and 9. The section of medical electricity, owing to the illness of Prof. d'Arsonval, was under the presidency of M. Leduc, M. T. Marie, of Toulouse, being vice-president, MM. Bergonié and Michaut (Dijon) secretaries. The chief papers read were the following:—Report: **M. Bergonié.** Reports upon the production of ozone for medical use: **M. Bordier.** The employment of the metronome in medical applications: **M. Leduc.** Experimental researches upon the physiological effects of Hertzian franklinisation: **M. Bordier.** August 4.—The necessity of establishing independent relationship between the various painful points in neuralgia: **Gasparini.** Upon the etiology and treatment of tic douloureux of the face: **Gasparini.** Report upon the physiological, bacteriological, and therapeutic action of ozone: **M. Bordier.** Therapeutic action of ozone in some cases of whooping-cough: **M. Vernay.** Confirmation of the theory of the transport of ions through the tissues: **M. Bordier.** Electrolytic introduction of ions into the living organism: **M. Leduc.** The afternoon of August 4 was set aside to visit the Exhibition and electrical instrument makers' exhibits at the Exposition Universelle. Various forms of static machines were examined. One by **M. Bonetti,** a six-plate machine (ebonite), 90 centimetres in diameter, showed a tremendous output. X-ray tubes were successfully illuminated by these machines. **M. Maisonneuve** showed a variety of instruments for galvano cautery, electrolysis, &c. **MM. Radiguet and Massiott** showed the action of their new interrupter, also a resonator of Oudin, and an electro-therapeutic table, for the use of street currents, by means of a rheostat, the patient being in a "shunt" circuit. Monday, 6. Influence of electricity upon the development of animal organisms: **M. Capriati.** Remarks upon some points in the growth of the bones: **M. Morin.** Radiographic diagnosis of spontanecus fractures in general paralysis: **MM. Lalanne and Regis.** Development of the head shown by radiography: **M. Scheier.** In the afternoon another visit to the Exhibition was made and amongst the exhibits seen were those of **M. Rebeyrotte.** He showed various instruments, and amongst others **M. Ropiquet's** coil used for the production of X-ray and high-frequency currents. **M. Rochefort** showed the action of his transformer with a Foucault contact-breaker. **M. Verdin** showed some excellent apparatus used in electro-physiology, as well as in medical

electricity. **M. Parvillee** showed some apparatus, all of which was not strictly medical; such as heating apparatus, soldering irons, bed-warmers. He desired to conduct the party to the Feria Restaurant, where, for the first time, all the cooking was done electrically. On the 7th the Association made a general excursion to Chantilly. 8th.—Electrolysis in the treatment of stricture of the urethra: **M. Fort.** The action of currents of high frequency upon the activity of the reduction of oxyhæmoglobin: **M. Tripet.** Electricity and retracted cicatrices: **M. Keating-Hart.** Action of currents of high-frequency upon the quantity of heat given off, and upon the products of assimilation: **MM. Bordier and Leconte.** Mode of action of high-frequency currents *apropos* of calorification: **M. Bonniot.** Electro-therapeutic rheostat; determination of its constants: **M. Bergonié.** Description of an electro-therapeutic installation: **M. Michaut.** Construction of a medical volt-meter: **M. Leuilleux.** The remote results of the electrical treatment of trigeminal neuralgia by powerful galvanic currents: **M. Bergonié.** The theory of transport of the ions, and the choice of the intrauterine electrode: **M. Weill.** Results of treatment by circular electrolysis in stricture of the urethra: **M. Bordier.** Treatment of disease by the continuous current: **M. Leduc.** The afternoon of the 8th was dedicated to a last visit to the Exhibition: Instruments for stereoscopic radiography were shown by the *Allegemeine elektricitäts Gesellschaft*, but unfortunately, could not be put in action on account of the too high voltage used at the installation at the Exhibition, and the order not to use charged accumulators in that part of the building. **MM. Siemens and Halske** showed a very large and powerful Ruhmkorff coil with a Siemens interrupter, using the current at 225 volts.

II.—The International Congress of Medical Electrology and Radiology. July 27.—Under the presidency of Prof. Wertheim-Salomonson of Amsterdam. The papers were as follows:—Report upon the therapeutic basis of franklinisation: **Chatzky** (Moscow). Introduction of medicinal substances into the tissues: **M. Leduc** (Nantes). Electrolysis as an aid to the extraction of metallic bodies from the tissues: **M. Cirera Salse** (Barcelona). Report upon the Dubois-Reymond law; and measures in electro-biology: **M. Dubois** (Berne). Experimental researches upon the persistence of the motor point of a muscle whose nerve is degenerated: **M. G. Cluzet** (Toulouse). Voltaic alternatives in paralysis and neuritis: **Edmundo Xavier** (St. Paul). Treatment of hæmorrhoids in the acute stage by currents of great frequency and high potential: **M. Doumer** (Lille). July 28.—Report upon the electrical symptoms of paralysis: **M. Wertheim-Salomonson** (Amsterdam). Wallerian degeneration: **M. Weiss** (Paris). Treatment of infantile paralysis: **M. Larat** (Paris). Upon the treatment of severe angiomas by electrolysis: **M. Redard.** Electrodes: **Miss Lucy Hall Brown.** Report upon the general indications for franklinisation: **M. Tripier.** The progress realised in medical science by means of radiography: **M. Grunmach** (Berlin). New treatment of Basedow's disease: **M. Thielée** (Rouen). Some observations upon the technic and diagnostic signification, and the therapeutic power of monoplor Faradic currents: **M. D'Arman** (Venice). Are fever and inflammatory conditions contra-indications to the employment of electricity? **M. Sudnik** (Buenos Ayres). Medical rheostat: **M. Guilloz.** The action of the continuous current upon nutrition, studied in the respiration of the surviving muscle under the action of the continuous current: **M. Guilloz.** Instrumentation preparatory to the application of electricity as a therapeutic agency: **M. Mount-**

Bleyer. July 30.—Report upon the present state of radio-therapeutics: **MM. Schiff and Freund** (Vienna). Influence of frequency upon the fatal effects of alternating currents: **MM. Prévost and Battelli.** Treatment of chilblains and burns: **M. Thielée** (Rouen). Vital energy: **M. Moutiers.** Currents of great frequency and high potential in the treatment of leucorrhœa, and its usual complications: **M. Doumer.** The employment of commercial currents for the production of X-rays and of high frequency: **Delezinier** (Limoges). Easy method of determining the exact position of foreign bodies in the organs: **Ropiquet.** July 30, afternoon. — Report upon the electrical treatment of neuralgia: **Leduc.** Two cases of cancroid cured by Roentgen rays: **Stenbeck.** High intermittences: **Boisseau du Rocher.** Upon the method of unipolar induction and its advantages. Its application to endo-diascopy: **Bouchacourt.** The question of incidences in medical and surgical radiology: **Guilleminot.** Upon an easy method of regenerating Röntgen tubes: **Cirera Salse.** Radiography and unknown fractures: **Destot.** Upon certain methods of measurement in radiography and radioscopy: **Destot.** Radiocinematoscopy: **Destot and Sauve.** Rotary interrupter for fluoroscopic stereoscopy: **Guilloz.** July 31.—Morning visit to the electro-therapeutic clinic of M. Dr. Labbé, in the hospital Boucicaut. Visit to the exhibits of electrical instrument makers. July 31, afternoon.—Upon the diagnosis of chest affections by means of Röntgen rays: **Béclère.** Exact determination of the position of foreign bodies in the organism by X-rays: **Guilloz.** Radiography, especially stereoscopic radiography, in the study of congenital dislocation of the hip: **Redard.** New method of direct radiography: **Bruner.** Radiography of the lower margin of the liver, and of calculus of the kidney: **A. Eid.** Results given by a Foucault mercury interrupter: **Morin.** Examination of the mediastinum by X-rays: **Mignon.** Upon some progress realised in the practice of radiography: **Daguerre-Bignon.** Upon the determination of the normal ray and the use of diaphragms for radioscopy: **Béclère.** August 1, morning.—Treatment of cuperosis by electrolytic scarification: **Vasticar.** August 1, afternoon.—Report upon the physiological properties of currents of great frequency and high potential: **P. Oudin.** Report upon the therapeutic properties of high frequency, high potential currents: **Doumer.** Report upon the physiological and therapeutic properties of ozone: **Labbé.** Treatment of pulmonary tuberculosis by high frequency effluve proceding from the resonator of Oudin: **Gandil.** The modern treatment of lupus: **Weil.** Actions of high frequency effluve upon tuberculosis and malignant tumours: **Rivière.** Remarks upon neuralgias of the brachial plexus, and upon their electrical treatment: **Dignat.** Actions of light upon the ataxic: **Foveau de Courmelles.** Employment of continuous currents in affections of the uterus and its appendages: **La Torre.** Rational procedure of radio-pelvimetry: **Carlos-Santos.**

III.—XIIIth International Congress of Medicine.—Radiography in the study of fractures and dislocations: **E. von Bergmann.** Radiography in the study of fractures and dislocations: **G. Maunoury.** Reduction of fractures by radiography; influence of apparatus upon this reduction: **Tuffier.** Indications furnished by radiography in articular and juxta-articular injuries: **Loison.** Demonstrations by radiography of surgical osteo-genesis: **Ollier.** New documents upon the structure of nearthoses, and the organisation of the extremities reproduced after articular resections: **Ollier.** Upon the greater precision of diagnosis in military medicine obtained by the use of X-rays: **Stechow.**

Laryngeal stricture treated by electrolysis in a case in which a tracheal canula had been used for sixteen years: **M. Boulay** and **J. Boulai.**

IV.—International Congress of Physics. Held at Paris on August 6 and 12. President, M. Cornut.—For the first time in the history of this Congress, there was a section of biological physics. It was presided over by M. Charpentier, M. Broca being secretary.

V.—International Congress of Electricity.—Held at Paris, August 18 to 25. M. Mascart, President.—Representatives of different nationalities were present as delegates of the various Governments. Germany, Professor F. Kohlranch and Professor Dorn; England, Professor Perry, F.R.S., and Sir William Preece, F.R.S.; Austria, Professor Jullig; Belgium, M. Eric Gerard; United States, MM. Carl Hering and Kennely; Hungary, M. de Faudor; Italy, M. Columbo; Russia, Professor Chatelain; Switzerland, Turrittini. There were five sections, electro-physiology being the fifth, presided over by M. Bergonié, in the absence of M. d'Arsonval. Several causes combined to make this section very sparsely attended, the chief cause being that questions of electro-physiology and electro-therapeutics had already been exhausted at the various Congresses already held. This is much to be regretted, inasmuch as a medical man might learn many valuable lessons from the scientific knowledge and technical skill of the non-medical members present. Three papers only were to be presented, namely, (1) The sterilisation of the tissues in tuberculosis; (2) Coloured light rays in the treatment of tuberculosis; (3) Analogy between the constitution of magnetic and electro-magnetic lines of force in machines, and the arrangement of the cells in plants, this last paper being by **M. Stanoiclitch.** As the two former papers belong to medicine rather than to electricity, it was decided that they were not suitable for insertion in the *Bulletin.*

Electrical Heating.—That electricity is the best agent for heating purposes goes without saying, but its cost has hitherto been the bar to progress. Now, however, that many electric supply companies have come to see the great advantage of having "long hour users" of the current, reduced charges are offered for heating purposes. In the foregoing report of the Congress of the French Association of Science, mention is made of the Electrical Heating and Cooking Apparatus shown by a French firm. It should be mentioned that English exhibitors were also *en évidence.* In this class the Dowsing Luminous Radiator[1] was a subject of much interest and inquiry. Without entering into constructive details it may be described as a bright cheerful fire, in an artistic fire grate, as portable as an ordinary fire screen, so that it can be carried in the hand from one part of the room or house to another, according to the requirements of the moment—a fire as easy to light and extinguish as an ordinary electric lamp, a fire whose output of radiant heat can be accurately regulated, a fire without combustion, and therefore guiltless of contaminating the atmosphere.

[1] 24, Budge Row, London, E.C.

THE
Journal of Physical Therapeutics

No. 2. NOVEMBER 15, 1900. Vol. I.

Editorial.

It has been made a question whether this Journal would not as well, or even better, fulfil its purpose if certain changes were made in point of size, price, and date of publication. These suggestions must be fully considered, and the further views of subscribers, on these and similar points, will be highly acceptable. But, under any circumstances, no such change would take effect until after the first number of next year.

The opportunity is taken of repeating the introductory announcement of last month, viz. :—That the aim of the Journal is not only to furnish a record of current progress and contemporary work, but to provide a detailed and critical account of what has already been accomplished in the field of Physical Therapeutics.

It was pointed out that, owing to recent progress in physical and biological science, the *modus operandi* of such methods is now, in some measure, beginning to be understood ; further, that their successful employment requires a carefully executed technique, and that such information as is available on this point exists at present only in a scattered and fragmentary form. It was therefore considered that such a journal as this need offer no apology for its existence ; it would fill a gap—it would supply a want.

It cannot be necessary to remind the reader that to devote the pages of a journal exclusively to the consideration of the agencies in question, is by no means to assign to them any predominant *rôle* in the treatment of disease. They represent only one class of weapon in the varied armoury of medicine. Medical men are appealed to, to rescue such weapons from the incompetent and unworthy hands into which they sometimes fall.

Although its limits are not ill-defined, Physical Therapeutics is a widely comprehensive term; embracing, as it does, Electro-therapeutics, Hydro-therapeutics, Vibro-therapeutics, or treatment by vibration, Photo-therapeutics, or treatment by light, Radio-therapeutics, or treatment by the radiations of an X-ray tube, Balneo-therapeutics, or treatment by baths, Aëro-therapeutics, or treatment by compressed or rarefied air. Therapeutic and Hygienic Exercises, Massage and Manipulations, Dietetics, Climatology, and last, but not least, the valuable agencies of heat and cold, all come within its scope.

SCIENTIFIC HYDROTHERAPY.

By Dr. C. J. Whitby.

"The Principles and Practice of Hydrotherapy." By Simon Baruch, M.D. (London: Baillière, Tindall and Cox, 1900.)[1]

The thanks of all those who are interested in progressive medicine are due to Dr. Baruch for a solid contribution to the literature of hydrotherapeutics. Though obviously a labour of love, it represents an immense amount of work, and deserves, not a mere perfunctory reading, but careful and oft-renewed study. The first point to be noted about this excellent book is that it is the work, not of a therapeutic specialist, still less of a narrow-minded sectarian, but of an open-minded physician, whose wide knowledge has been gathered from thirty-five years of all-round practice, and whose firm conviction of the great value of hydrothermal methods rests on the solid rock of personal experience and observation. Not that Dr. Baruch has neglected to support his own conclusions by those of other accredited authorities. On the contrary, there is hardly a statement in this book on the physiological or therapeutic effects of the various procedures described therein which is not supported by ample experimental, clinical or statistical evidence. Witness, for example, the chapters on the Brand treatment—by cold baths with friction—of enteric fever, wherein an amount of testimony for the superiority of this to any other method of treating the

[1] Pp. 440. 75 Illustrations. Price 16s. net.

disease in question is marshalled, which can only be described as overwhelming. No impartial reader can rise from the perusal of these chapters without having attained a clear conviction that it is the sacred duty of every medical man who is called to attend a case of enteric fever to advise, nay more, to insist upon the adoption of the strict Brand method of treatment.

In treating of the physiological effects of external applications by water, stress is laid by the author on the enhancement of the contractile activity of the cutaneous and other vessels. In confirmation of his own view of the importance of this function, he quotes the observations of Dr. Woods Hutchinson on the "skin-heart" as a factor of the human circulation. This physiologist advances many reasons for believing that the extraordinarily universal and vigorous muscular coat, in our arteries and veins has a higher vital function than merely that of mechanically narrowing the calibre of the vessels. Or, as Wesley Mills aptly expresses it, "an inherent tendency to rhythmic contraction all through the vascular system must be taken into account." According to this theory, which certainly yields a plausible explanation of the well-established effects of external applications of cold water, this so-called "improvement of tone" in the superficial vessels, is really an active and not a passive one, a local rather than a reflex change. The reasons adduced in support of this theory of the "skin-heart" and its stimulation by baths of low temperature (*e.g.*, by the Schott-Nauheim treatment of heart-affections) do not admit of condensation, but the whole passage is of great interest and therapeutic significance. In the chapter devoted to the *rationale* of the action of water in health, stress is laid on the distinction, commonly overlooked, between the reflex and hydrostatic effects on the circulation of thermic applications. Thus Schüller's experiments on trephined rabbits prove that the main effect of cold applications to the body is a widening of the pial vessels proportional in amount to the dimensions of the part subjected to the stimulus of cold, and directly consequent upon the narrowing of the cutaneous vessels. In the very *beginning* of the cutaneous application, there is, however, observed, a rapidly changing alternation of calibre in the pial vessels, and this transient

limitation of the hydrostatic effect is probably due to reflex vasomotor influences.

The effect of thermic stimuli upon the density and corpuscular richness of the blood is fully treated, and the author gives a tabular statement of results obtained in experiments made by himself in this connection. The result of these is confirmatory of the statements of Winternitz, Knoepfelmacher and others, to the effect that cold always produces a concentration of the blood, with increase of the number of red blood cells in the peripheral circulation, while heat produces contrary effects. The view of Winternitz, supported by the results of experiments of Loewy and Breitenstein, is that the increased density of the blood is due, not to changes in the plasma, but to the extrusion of blood cells from internal organs. The power for good or evil of thermic applications is clearly evidenced by the results of these investigations, but perhaps the most graphic testimony to their potency is derived from the consideration of the effects of cold water upon the muscular power, as indicated by the fatigue curves of the digital flexors before and after such treatment of the body-surface. The curves, as registered by Mosso's ergograph, showed as the results of the gradually-cooled bath (96° F. to 65° F.) an average enhancement of working-capacity in the flexors of the middle-finger, ranging from thirty-nine contractions before the bath (3,603 kgm. of work) to eighty-seven contractions (9,349 kgm. of work) after it. A rain-douche of 50° F., under a pressure of two atmospheres, increases threefold the sum of work the muscles are capable of doing. The cold pack, followed by cold immersion, produces similarly striking effects. The effects of bath-procedures upon assimilation have also been the subject of considerable attention, the preponderance of evidence being in decided agreement with the results of Strasser's experiments as described by the author of the work before us. Strasser found that the excretion of nitrogen is always increased during a course of bath treatment, and this increased elimination must, he considers, be attributed to increased metabolism, a more active change of tissue and the better utilisation of the food. This is supported by the clinical observation, that side by side with the increased nitrogenous elimination, there is

often a distinct gain of body weight. It is also a noteworthy fact that the quantity of nitrogenous bye-products ("extractives") which normally constitute seven-eighths of the total nitrogenous excreta sank after the bath period to 1·5 per cent. The chapter dealing with physiological effects concludes with the statement that owing to the compensatory agencies which counteract them, the effect of thermic stimuli upon the body temperature, in health, is practically *nil*. Popular, and even medical opinion has long been too exclusively occupied with this one aspect of the problem of hydrotherapeutics. There is a wide-spread impression that the whole and sole object of cold water treatment in fevers is to lower the temperature by direct abstraction of heat. This *anti-thermic fallacy* (as it might well be called) is convincingly exposed by Dr. Baruch, who boldly asserts that the reduction of temperature is perhaps the least important factor in the therapeutic effects to be expected from the application of cold water.

The second part of the book deals with the technique of the various procedures. In order to simplify this part of the subject the author confines himself to the description of such methods only as have proved serviceable in his own personal experience as a general practitioner and hospital physician. The technical descriptions are at once clear and minutely detailed, and are further elucidated by some excellent illustrations. In dealing with the subject of cold affusions the useful hint is given that, when fever patients are the subject of such treatment the friends or relatives (except those whose help is actually required) be excluded from the room. It will suffice, the author thinks, that they may observe the change wrought by the procedure in the delirious or comatose patient.

The writer is quite in agreement with Dr. Baruch's view as to the fallacy underlying the attempt to cool deep-seated parts by the external application of ice-bags. The invasion of cold is at once resisted by the heat-regulating mechanism, and so long as this remains intact the object in view will not be attained. The experiments of Dr. W. G. Thompson on etherised dogs, into the abdominal cavities of which long-stemmed thermometers had been introduced, are confirmatory of this opinion. Silex found

an actual increase of temperature in organs over which ice had been applied, while in cases of iritis the temperature of the conjunctiva was increased by the application of ice compresses: warmth diminished it. There are, however, reasons for thinking that, in the case of *meningitis*, some cooling of the surface of the brain may be effected by ice-bags, or equivalent applications. In Dr. Baruch's opinion the ice-bag finds its greatest therapeutic utility as a præcordial application in threatened heart failure. He prefers, however, the application of a cold wet compress, covered by a coil through which iced-water is made to flow.

In the chapter on the full bath, the graduated bath of von Ziemssen (90° F., cooled by degrees over a period of thirty minutes to 72° F.) is unfavourably compared with the cold bath (65-70° F.) devised by Brand of Stettin. Apart from the practical difficulty of reducing the temperature of water, in which a patient is reclining, by 18 to 20 degrees, the absence of the preliminary shock of the minimum temperature is therapeutically a disadvantage. Once grasp the idea that the cold bath is given not so much with the object of abstracting heat as of rousing and invigorating the nerve centres, and antagonising the toxic process, and the superiority of Brand's method of bathing will be obvious enough. In both forms of bath active chafing of the limbs and body (exclusive of the abdomen in typhoid cases) is an *essential* part of the procedure. In place of positive benefit actual harm may result from cold bathing in fever cases where friction is omitted, as also from the irrational practice of packing the patient in ice sheets, sprinkling him with iced water, and so forth. Paessler's experiments on rabbits infected with Loeffler bacilli, tend to show that the resultant circulatory failure and final lethal effect of the toxins produced in the system are attributable, not to any damage to the heart itself, but to paralysis of the vasomotor centre in the medulla. We agree wirh Dr. Baruch that the good effect of the cold bath upon the peripheral circulation is probably due to stimulation of the vasomotor centre. Its beneficial effect upon the whole circulation, however explained, is an indisputable fact. Equally well established is the marked increase in the quantity and toxicity of the urine of enteric patients while undergoing this treatment. The final test is, of course, the statistical one, and

here the Brand method has suffered by the inclusion of a number of imperfectly managed cases. Even with these the cold bath treatment shows a far lower mortality than can be attained by any other method. But for the best results the technique of Brand must be strictly adhered to. Thus of 1,223 cases strictly treated by Brand, Vogt, Jurgensen and others, only twelve died: a mortality of 1 *per cent.* Moreover, of these twelve deaths *not one occurred in any case that came under treatment before the fifth day.* Brand therefore claims, in virtue of this experience, that all cases of typhoid fever coming under treatment before the fifth day should recover. In view of such testimony as this (and there is plenty more to the same purpose in the book before us), how heavy is the responsibility of those who slight, or actively oppose, this method of treatment on such trivial grounds as those of its inconvenience of administration, or distastefulness to the patient or his friends! Dr. Baruch himself, who, before adopting the Brand method, lost 33 per cent. of his typhoid cases, has treated thirty-two successive cases in private practice without a single death. For the febrile diseases of infancy Dr. Baruch, following the practice of Eroess, strongly recommends baths at 95° F., of from five to ten minutes' duration. The chapter on the hydriatic treatment of exanthemata, is one of such general interest and importance that we hesitate to attempt any sort of condensation. It deserves careful study, for simple as are the methods of treatment advised, they are very judiciously chosen, and should be strictly adhered to by those who are desirous of giving them a fair trial. Generally speaking, in the management of these cases the author favours warm semi-recumbent baths (95° F.) with brief affusions of water at a somewhat lower temperature, trunk packs, wet compresses to the seat of local manifestations, and ablutions of various kinds. Measles cases bear the abstraction of heat badly, scarlatina cases somewhat better.

The chapter on irrigation contains some interesting matter, notably the remarks on the treatment of intestinal obstruction by lavage of the stomach. The first case of ileus relieved by this treatment was reported by Kussmaul. Feculent masses were removed from the stomach, and the patient subsequently passed a thin watery stool. Since then other successful cases have been

recorded, and Senator advises that in all cases of ileus lavage be employed every five to eight hours. Even if a cure be not effected, great immediate relief is brought about, and the chances of successful operation are certainly not diminished. Following the practice of Kruli, the author advocates the irrigation of the large intestine as a useful adjunct in the treatment of catarrhal jaundice. He begins with tepid water and reduces the temperature daily till cold water is employed. Hot rectal irrigations are strongly recommended for uræmia. For the purpose, he says, of demonstrating the flexibility of water as a remedial agent, the author has included some paragraphs on the use of steam as a styptic. It has been chiefly employed in gynæcological (intra-uterine) operations.

In the chapter devoted to the treatment of pneumonia, Dr. Baruch advocates the view which regards this disease rather as an infectious disease with local manifestations, than, as has hitherto been the accepted theory, a merely local inflammation with constitutional effects. In his opinion pneumonia is no more a lung disease than typhoid is a disease of the bowels. The toxæmic effect upon the nerve centres is, he considers, in both, the true danger to be combated. It is certainly true that the extent of the local lesions is no safe guide to prognosis in pneumonia. Important therapeutic consequences are deducible from this conception. Apart from general baths of moderately low temperature, frequently renewed cold wet compresses are perhaps the most generally useful hydro-therapeutic procedures in the treatment of pneumonia. Ice packing is not recommended by the author.

Special attention is merited by the chapter presenting a description of the best form of hydrotherapeutic installation for hospitals and other institutions. Due stress is laid on the necessity for scientific precision; the too-frequent absence of any means of properly regulating the temperature, pressure, and duration of douches, sprays, &c., is justly censured, and an illustrated account of an actually existing installation which fulfils all these requirements is given, which can hardly fail to be useful. As regards the regulation of pressure, for example, there is a range of from ten to thirty-five pounds, and the

attendant, without moving from his place, can vary the pressure, temperature, or mode of delivery of the water at will. It is to be wished that this excellent example were more frequently followed in this country than has hitherto been the case.

In the chapter on "The Hydriatic Prescription," the vagueness and lack of attention to technical precision of many, even of the most eminent and enthusiastic advocates of hydrotherapy are deplored; and to this cause is justly attributed much of the hesitation on the part of the rank and file of the profession in the adoption of this valuable method of treatment. The work concludes with a historical epitome of the rise of hydrotherapy to the position it now holds as a branch of rational medicine, and an eloquent plea for a more thorough investigation of its claims, and the systematic teaching of its technique in our medical schools.

Dr. Baruch's work is undoubtedly destined to hold a prominent place in the literature of the subject, and may be confidently commended to the careful consideration of every unbiassed practitioner.

WHOOPING COUGH AND COMPRESSED AIR.

By Dr. J. Delmas (Bordeaux).

(*Continued from page* 31.)

The attempt to cure a disease by merely attacking one of its principal symptoms, may at first sight appear rather ridiculous; but it by no means unfrequently happens that the only course open to us is to treat symptoms, where we cannot deal with the pathogenic cause. Certainly in the disease under consideration, symptomatic treatment has produced results so excellent that they have been a source of astonishment to myself. My object in the first instance was, as I have already explained, simply to diminish the frequency and violence of the cough, without for a moment supposing that, by so simple a means, it was possible in any way to influence the evolution of the morbid symptoms.

The cough of whooping cough, often described, and yet more

familiar from actual experience than from any description, is not, if I may so express myself, a play in one act; it comprises a number of scenes and tableaux, presenting to the onlooker a performance at once dramatic, and even agonising. The classic description of Trousseau (in his medical clinic at the Hotel Dieu) which gives a strikingly life-like picture of the attack, may once again be reproduced here:—

"A child suddenly stops in the midst of its play; its gaiety gives place to sadness; if in the company of other children, it draws away and tries to avoid them. Its mind is full of the dread attack which is felt to be coming on; there is that sensation of pricking and tickling of the larynx which always announces its approach. At first the child tries to prevent the cough; in place of breathing naturally it holds its breath; it seems instinctively to understand that the air, entering unhindered into its larynx, will certainly bring on the exhausting cough of which it has such sad experience. But, I repeat, whatever the child does is without effect. At best, the explosion can only be delayed; the cough will have its way. The little sufferer is immediately seen to look about him for some *point d'appui* to which he can cling. If an infant, it throws its arms round its nurse's neck; if an older child, and standing up, it stamps upon the floor in its anguish; if lying down it turns quickly on its chest to catch hold of the curtains or the bars of the bed. Thence comes the puffy face, and this puffiness, sometimes lasting for three weeks, is in some cases by itself sufficient to suggest to the experienced eye the probability of whooping cough.

Reverting to the cough:—with a brisk, noisy expiration the cough begins; this is followed by a series of short, aphonic, convulsive expirations, more and more violent, true *cris de plaie*, but less and less perceptible. At this moment, there is a pause which may last ten or fifteen seconds, during which the chest is fixed at its maximum physiological limit of expiration. During all this phase of the cough the air expelled from the chest is not renewed, and the patient, with eyes injected and full of tears, purple lips, swollen face, is fixed immovably in a state of anguish bordering on asphyxia. Then at last comes a long crowing convulsive inspiration, which terminates the cough and brings a short instant of repose. This is the beginning of recovery. But immediately a second cough rings out, to be followed by others, but of decreasing intensity, and little by little the inspirations of recovery, instead of having a crowing character, become aphonic, a proof that the spasm of the glottis is diminishing. The attack may then be considered over. The succession of coughs constitute the attack. With the cough, there appears a thick glairy tenacious mucus from the mouth. The end of the attack is often marked by true vomiting." (Dieulafcy, vol. i., p. 165.)

According to this description, it will be seen that there is a moment when the cough produces a paroxysm in which, during forced expiration, the child for the moment undergoes a temporary crisis of asphyxia. This terminates with a noisy and

convulsive inspiration often comparable to the crow of a cock. But this is not the concluding scene of the drama, and the performance is not over until the moment when the cough finishes by progressive diminution of the whoops, which becoming less and less long, and less and less violent, terminate, as in asthma, by the expulsion of glairy and tenacious mucus, difficult to expectorate. It is then, and not until then, that the cough may be said to be over.

It is evident that dominating the whole situation is the expiratory spasm which induces the asphyxial tendency; and it was especially against this, the most important phenomenon of all, that I thought of directing the treatment by compressed air; because comparing this symptom with certain affections for which forced dilatation is the best treatment, it was hoped, without pushing things to extremes, to palliate the condition by diminishing the very considerable reflex action which the cough represents.

But this was only the first point. If we study whooping cough as a general disease of microbic origin with a strongly "anæmiating" tendency, which is the modern view, it is evident that, by means of compressed air, we influence the anæmia, for the first effect of the compressed air bath is to increase the respiratory capacity of the blood, and in this connection a further remark may be made:—

The blood, according to the definition of Claude Bernard, from a physiological point of view, constitutes the interior *milieu* of the organism; consequently it is the intermediary between the air, or rather certain of its constituent gases, and the tissues. This liquid will be more or less fit for the support of the individual according to the quantity of nutritive elements which it may be capable of fixing in the first instance, and then handing over to the various organs. The formula which will answer for this double action will be the respiratory capacity of the blood; and every method capable of increasing this capacity will constitute a form of general treatment for any anæmic condition; that is to say, any condition in which the blood absorbs smaller quantities of oxygen, and consequently has less to give up to the organs which depend upon it for their support.

Paul Bert has shown that although the blood of animals placed in an atmosphere rich in oxygen but at ordinary pressure, is not much more oxygenated than under normal conditions, nevertheless by simply increasing the pressure without modifying the formula of the atmospheric air, the total quantity of the oxygen in the blood is increased. This increase will amount to a tenth, for pressures comprised between one-tenth and one-fourth of an atmosphere. It thus appears that compressed air, useful in the first instance to deal with the principal symptom, viz., the spasm, also constitutes a general treatment to combat the anæmia.

Before concluding, I would also advert to the sedative effect upon the nervous system of compressed air; an effect which Hayem considers can be connected with the augmentation of atmospheric nitrogen. This sedative effect cannot fail to be serviceable in whooping cough.

METALLIC INTERSTITIAL ELECTROLYSIS.

By Dr. G. Gautier (Paris).

The discoveries of Galvani (1791) and of Volta (1800) represent a scientific event of the highest order. Its importance can only now be fully realised, when, a hundred years later, we look back upon the achievements of a science whose undiscovered limits, although daily growing narrower, still leave a wide field for hopeful exploration in the future. It is in the year 1820 that we see Electrotherapy entering upon its scientific period, with Magendie, Baumé, Fabré-Palaprat, using the Galvanic current. Then Faraday (1832), by his great discovery, directs this branch of physics into quite a new channel. Soon afterwards, Pixii constructs his first magnetic machine, Rhumkorff invents his Volta-Faradic apparatus, and the latter, under the auspices of Duchenne, of Boulogne (1847), is universally adopted.

With Remak (1856) the continuous current, for the moment neglected, is again taken into favour, and its future fully assured. Ciniselli and Tripier study the action of the poles, and the kind

of cicatrix that follows their action. Thanks to the effects produced upon the tissues by the analytical power of the continuous current, these observers are able to point out the physics of the chemico-galvano-caustic method. The conditions which allow us to study this analytical effect of the current are realised whenever a fluid conductor is placed in the circuit of a battery of sufficient strength; the acids collect at the free extremity of the positive electrode, alkalis at the free extremity of the negative electrode. Now acids and alkalis in the nascent state act upon the interpolar substances which are capable of decomposition (the tissues) after the manner of a caustic, producing eschars, hard or soft, retractile or the reverse, more or less deep and extended, according to the duration and intensity of the current.

These effects of the galvanic current can thus be looked for and studied, in the cure of strictures of the urethra, where the soft, thin and little contracted cicatrices of the negative pole are utilised; in the cure of nævi, the hard and contracted cicatrices of the positive pole would be indicated. They are seen also when we attach the positive pole to an electrode which is not attacked by the products of electrolysis, such as gold or carbon, the other (indifferent) pole being connected to a large electrode which is a good conductor, such as potters' clay, agaric, etc. Apostoli's method is based upon these last considerations. It may be formulated in these terms: For the cure of fibromas and metritis affecting the uterine cavity, a strong galvanic current is used during a short time, using a platinum or charcoal sound with the positive (the active pole); a clay pad (the external indifferent electrode) being on the skin.

What is happening at the contact of the electrodes? Oxygen and chlorine are disengaged when the electrode is attached to the positive pole, hydrogen and sodium when it is attached to the negative pole. The products of electrolytic decomposition produce the eschars whose distinguishing characteristics I have mentioned above, and which can be regarded as the result of the chemical differences between the anions and the cations. These chemical transformations which accompany the passage of the current come under Faraday's law, viz., that equal quan-

tities of electricity passing through different electrolytes displace equivalent quantities of different ions. The positive and negative ions are only appreciable at the point of entry and exit. It has been necessary to revert to those points in order to lead up to another and a different application of the current, which has many consequences of great interest.

In 1891 I put the question to myself whether it would not be advantageous to replace the metallic electrodes, *not* attacked by the action of the current, by "soluble" electrodes, such as copper or silver, that is to say, electrodes which *are* attacked by the action of the current. To enable me to form an opinion on this point I determined to study the effects of this kind of electrolysis in widely different cases, such as ozæna, fistulas, metritis, fibromas, &c. From these trials I formed the opinion that copper was the most suitable metal, and I published, in 1892, some very encouraging results upon this method, which I called "Interstitial Electrolysis," and which in 1893 was the subject of a series of lectures entitled "The Usefulness of the Positive Pole." I have few modifications to make in my original publications, my opinions not having in any way changed.

In 1895 Cheval, of Brussels, published a memoir very clearly proving the cure of ozæna by my procedure; and later Bayer expressed his approval. In France the method was at first rejected as useless, and as not without danger. In America it was taken up with enthusiasm. Recently M. Gouguenheim, physician of the Hospital Lariboisiere, and his house physician, Dr. Lombard, after complete and impartial consideration, expressed themselves as follows: "Already introduced by Gautier, this method was applied by Cheval with great success. In 1895 he announced 91 per cent. of cures (of ozæna) after only one sitting. Since then the treatment of ozæna by cupric electrolysis has been tried by different observers, and it has encountered both warm partisans and fierce opponents. It is certain that the method is a very valuable one; the results obtained are remarkable, especially if compared with the very temporary improvement obtainable from other forms of treatment."

Dr. A. Weil, dealing with the treatment of metritis in his "Practical Treatise on Gynæcological Electrotherapeutics," thus

expresses himself: "M. Gautier systematically employs intra-uterine electrodes which are attacked by the products of the decomposition of the electrolyte (the electrodes of Apostoli, platinum or carbon, are *not* acted upon by the results of the electrolysis), and distributes the current with medium intensity for a quarter of an hour or twenty minutes. For my part, I prefer this method; for without requiring such high intensities, it appears to me more active than when non-oxydisable electrodes are used."

Lastly, without citing the favourable opinions of American and German medical men, I would call attention to the treatise on medical electricity of my collaborator, M. Larat, who, for eight years has used this method with advantage, and he gives it his warmest approval.

Let us now examine the difference between chemical galvano-caustic, with *insoluble* electrodes, that is to say electrodes *not* acted upon by the current (carbon, platinum), and metallic interstitial electrolysis, where *soluble* electrodes are used, that is to say, electrodes (copper, silver) which *are* acted upon by the current.

I proceed to justify the two terms, metallic and interstitial, by two propositions. The first, which concerns the metal electrode, can be thus stated: with a current of the same intensity and duration and the positive electrodes of the same diameter, the "insoluble" electrode will produce at its contact with the tissues sloughing (eschars). When the electrode is a "soluble" one, slight infiltrations without mortification will occur.

From this first proposition follows the second, of evident interest; it may be thus stated: according to the theory of the ions, the metallic oxychloride passes from molecule to molecule penetrating into the depths of the tissues; there it exercises a disinfecting and healing action; whilst the products of electrolysis with the insoluble electrodes are deposited upon the surface of the tissues which they destroy.

These two proceedings, whose polar effects are absolutely opposite, on account of their soluble or insoluble components at the positive pole, obey the same laws that govern the other effects of the current, whether these effects be chemical, thermal, vasomotor, &c.

(To be continued.)

ON SOME NEW EXERCISES FOR THE TREATMENT, BY DEFINITE SYSTEMATIC MOVEMENTS, OF TROUBLES OF CO-ORDINATION IN TABES.[1]

By Dr. L. Vorstädter (Bialystock, Russia).

Before I mention the special object of the exercises which I have devised for the treatment of tabetic ataxia, and detail the methods of carrying them out, I must briefly advert to some of the principles upon which all kinesotherapy is based.

Frenkel has shown that it is possible to transform the unco-ordinated movements of the ataxic into co-ordinate movements, if the patient will steadily persist in the attempt to perform the different forms of movement (walking, standing and balancing) in accordance with the proper movement that was really intended. This result can, according to the same authority, be explained as follows. According to von Leyden-Goldscheider's theory, there must be in the first instance the sensory (centripetal) impression, the nature and origin of which must be recognised by the brain, in order to originate the motor excitation necessary to perform any co-ordinate movement. Every cutaneous excitation, or muscle tension, or posture combination, is centripetally transmitted to the brain as a distinct perception, and thence originates the motor (centrifugal) impulse. Now if in the tabetic the peripheral impression is faulty through degeneration of the ingoing nerves, then also will the outgoing motor impulses be at fault, and become manifest as troubles of co-ordination. The correcting influence of exercise treatment may, according to Frenkel, be explained in the following way:—Through *exercise* not only will the motorial central organs of the tabetic be accustomed to react in a certain sense more accurately, and require a slighter central impulse to perform the co-ordination, but a second important psycho-dynamic influence comes into play, when the sense of sight is added to compensate the defective sensation in the peripheral nervous system. That is to say, the sense of sight will take the place of the defective peripheral sensory impulses.

[1] Verlag von *Georg Thieme*, Leipzig.

It must be pointed out that the compensatory exercises have no connection with general muscle gymnastics, and do not aim at exercising the *power* of the muscle, but the *regularity and effectiveness of their movements.*

Compensatory exercises can be carried out in various ways, *with* or *without* the use of apparatus. According to *Frenkel*, all exercises for the lower extremities can be performed without apparatus.

The general principle of the usual apparatus is to bring the scope of the exercise *ad oculos*, and train the patient to utilise the sense of sight to aid the outgoing motor excitations. Such apparatus, as suggested by *v. Leyden*, *Jacob*, *Goldscheider*, and others, is in general use.

For some time past I have interested myself in treatment by regulated exercises; and last year during a stay at Nauheim, I compiled a system which, although founded upon the generally accepted principles of compensatory exercises, presents the following peculiarities.

A. The *division* of all exercises into three classes, with different motor objects in view.

B. The *strict utilisation of sight impulses*, and simultaneously enhanced *excitability of the central motor organs* to centripetal impressions.

C. The possibility of a *systematic gradation* of the form of exercise, for the purpose of their methodical utilisation.

A.—The classification of the exercises depends upon an analysis of tabetic movement phenomena. Here *three different abnormal phases of movement* can be distinguished, and these together form the *ensemble*, characteristic of tabetic ataxia. These movement abnormalities are as follows:—

(*a*) *Misdirection of the movement.*

The tabetic moves his limb in a *direction* not corresponding with his will.

(*b*) *False speed of the movement.*

The tabetic generally takes his steps too quickly, he "thrusts" his leg. It also happens that some patients perform each single step at an unequal speed. At the commencement, it is scarcely perceptible, and then he rapidly throws the leg forward.

(*c*) *Abnormally increased intensity of movement, and of the muscle tension.*

The tabetic has, so to speak, a too heavy footfall, he pounds the ground with his foot.

These three phases may be different in different patients; sometimes one and sometimes another is predominant, and sometimes all three are equally prominent.

On the basis of these observations I have formed a corresponding classification of correcting exercises, which are directed to deal with each movement abnormality, as follows:—

i. "DIRECTIONAL EXERCISES," whose chief object it is to correct the abnormal *direction* of movement.

ii. "TIME EXERCISES," which are directed against the abnormal *speed* of the movement.

iii. "INTENSITY EXERCISES," whose aim it is to regulate the *energy* of the movement, and *muscle tension* (the footfall).

How I have attempted to attain these ends will appear by the following description.

The second object in view, that stated under B, applies to the whole system of exercises.

I have tried to attain *exactitude* in movements, at the same time that I have multiplied their combinations. The precision of the movements, which during the exercises keeps employed the sense of sight, at the same time stimulates psychical activity until it attains a condition of automatic volition. Besides, through the multitude of the exercise-combinations, the patient acquires a great interest in the diversified exercises, whereby his attention and endurance are always kept alert and fresh.

Finally, object C is attained by the fact that the exercises are, step by step, made more difficult. It thus becomes possible to select, in every special case, the correspondingly difficult exercise form, and to graduate it to the suitable degree.

DESCRIPTION OF THE DIFFERENT CLASSES OF EXERCISES.

I.—*Directional exercises* consist in teaching the patient to follow with his ataxic foot *the outline of a given pattern, in a prescribed direction, without interruption.* This kind of exercise,

which I term "continuity exercise," can be performed with or without support.

The supported continuity exercises are:

(1) Sliding or rolling exercises.

(2) Tracing exercises.

(3) Swinging exercises.

(4) Shadow exercises.

The free or unsupported continuity exercises are:

(α) Simple continuity exercises.

(β) Shadow exercises.

(γ) Light exercises (positive and negative).

(1) *The sliding or rolling exercises* are performed by means of a sliding or roller shoe, or sandal. It consists of a wooden sole having four points of contact with the ground.

This shoe is fastened to the foot of the patient by buckles and straps.

Two of the contact points are balls, and are movable in all directions. On the fore part at *a* (fig. 1) is a kind of holder into which can be affixed a steel pencil with a round end, which can be directed to the right or left side of the foot.

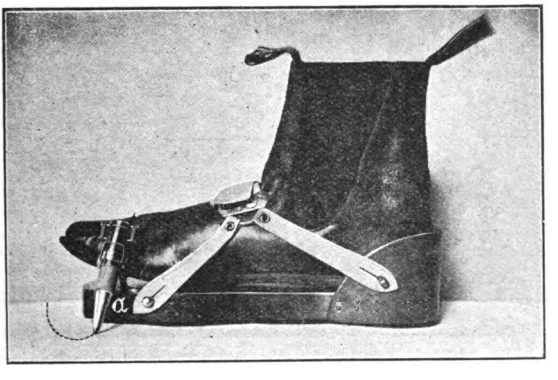


FIG. 1.

A pattern, drawn on thick and not too rough paper, having been fastened to the floor in front of the sitting patient, he commences to follow the contours of the design with the foot to which the slide or roller-shoe is attached, in such a way that the steel pencil is *uninterruptedly* in contact with the outline of the figure (fig. 2). In very severe cases it is better to use a sheet of stretched cloth, or similar material, instead of paper, as the movements are thus performed much more easily. I use as exercise de-

signs two special drawings about 200 cm. in diameter. One is a system of concentric circles (figs. 3, 4, 5, 6): the other a system of concentric squares. Both are crossed by several lines, and the crossings marked by letters and numbers. Such patterns allow of numberless combinations, which the patient can be directed to perform by the numbers and letters.

(2) Gradually increasing in difficulty, next come the "*Tracing exercises.*" They are performed with the same shoe, but now it carries a tracing-pen instead of the steel pencil (fig. 2). This pen makes conspicuous tracings of all the movements. The task allotted to the patient is to closely follow with his foot, that is with the tracing pen, a given design. It is advisable to draw the pattern in dotted lines, or in red, and use a black or a blue pencil as a tracer to obtain different and easily distinguishable outlines. In the sliding exercises the tracing pen, or the steel pencil, must be placed to the left for the right foot, and to the right for the left foot. By comparing his markings with the traced line the patient can at once see the slightest inaccuracy in the movement, and can thus exercise the strictest self-control; and his increasing interest in the work will be tantamount to an enhanced psychical excitation.

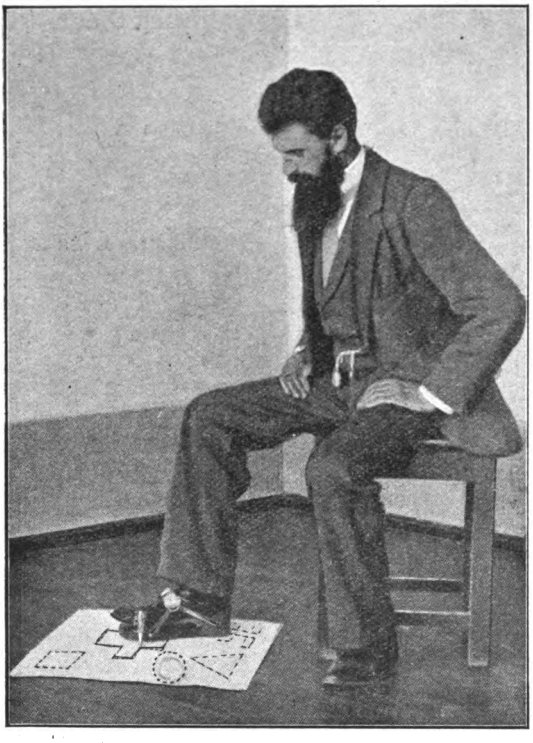


FIG. 2.

The tracing exercises can also be utilised for diagnostic purposes, as they distinctly disclose the slightest disturbance

in co-ordination. The exercises also furnish an exact indication of the progress of the case.

(3) The *swing exercises.* Here the patient, standing or sitting, and resting his foot in a free hanging strap (figs. 3, 4), has to follow the contour of a given design with the point of his shoe, in the following manner:—To the toe of his shoe is fastened, by a rubber strap, a pointer with a circular opening at the end (figs. 3, 4, 5). Through this opening the patient should fix his eye upon the outlined figure, and uninterruptedly follow it by a gliding movement of his foot. These exercises can also be performed with the leg kept in a horizontal position. For this purpose the design is fixed to the wall, and the patient rests his leg on the strap in a horizontal position, while he stretches the strings by his hands to raise or lower his foot as desired (fig. 5). The swing exercises are a more difficult form of exercise to the tabetic than the previous ones, as the resistance, which as a centripetal impression should assist the tabetic in performing regulated motions, is so very small in the swing exercises. The resistance can, however, be increased, if the straps are fastened at their middle or in any way made shorter.

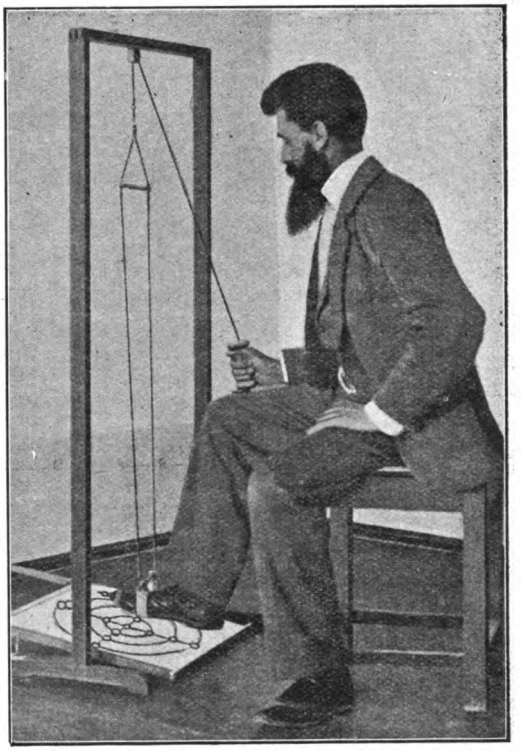


FIG. 3.

(4) The "*Shadow exercises,*" which are a modification of the "Swing exercises," differ therefrom in the fact that, instead of

the pointer itself, its *shadow* is used to control the exercise movements. For this purpose the design is illuminated obliquely, preferably by artificial light. The "shadow exercises" form a higher combination than the swing exercises, as they require a special attention on the part of the patient, and can only be performed by patients who have already been trained, or in whom the ataxic symptoms are in their early stage. This fact may perhaps be explained in the following way. In the shadow exercises the central perception responding to the sight impulse, which directs and controls the motion impulse, does not come direct from the moved limb, but only from its shadow; that is to say, the reaction between the centripetal and centrifugal impulses occurs only in an indirect way. Or the explanation may be this: — In the shadow exercises the patient is misled by the difference between the real length of his limb, and the shadow.

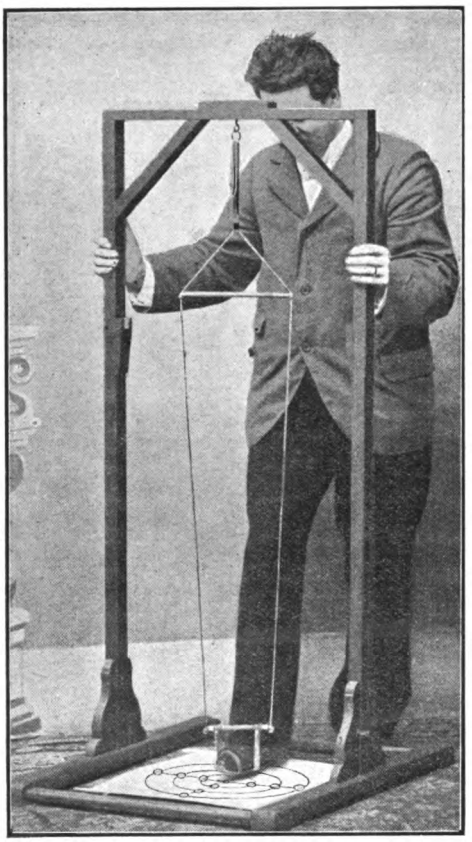


FIG. 4.

The "swing exercises," besides continuity exercises, permit also of "hitting exercises," where the patient has to hit certain points, numbers or letters on the pattern, in such a way that numbers, &c., can be clearly seen through the opening in the pointer. It is advisable not to let the patient begin hitting exercises until he has gained a certain proficiency in the continuity exercises.

(*a*) *Simple continuity exercises* are performed by means of the

pointer as before, but with the difference that in this case the patient has to move his foot free in the air without support, so that it is only suitable for patients already accustomed to the exercises or in the early stage of the disease. The pattern can be placed horizontally (fig. 6) or vertically, and the patient may perform the exercises first sitting and then standing.

The free continuity exercises can also be practised as "stretch and bend exercises," in which case the patient during the stretching or bending of his leg, uninterruptedly looks through the opening in the pointer at a spot of the pattern, so that the movement of his foot must follow a straight line.

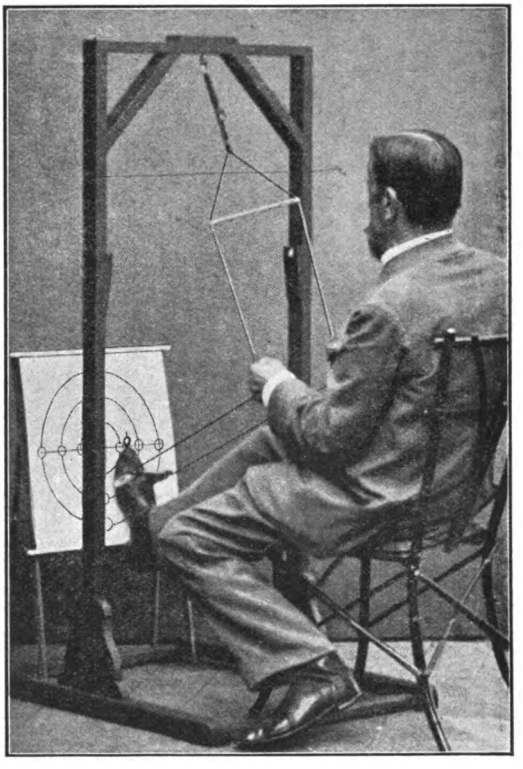


FIG. 5.

(β) *Free "Shadow exercises,"* which are a higher standard of exercises *a*, need no further description, as they are carried out in a way similar to the supported shadow exercises.

(γ) *Light exercises*, which are practised in a dark room on light figures, present a still higher standard of difficulty, inasmuch as the patient can only imperfectly, or not at all, see the moving limb. There is thus less assistance from the sense of sight, but, on the other hand, it is accompanied by an increased excitation of the motor central organs, which is often of great importance.

The light exercises can be performed in a *positive* or *negative* manner, and are used as well as continuity and hitting exercises.

The *positive* light exercises consist in the patient using the shoe-pointer to perform free continuity, or "hit exercises," at lineal light figures, which are produced by a dark lantern direct on the wall or floor, in a dark room. The positive light exercises can be practised after a still more difficult fashion if the patient be exercised upon *moving* instead of upon *fixed light spots*. By means of a hand mirror a light spot thrown on the wall or floor by a dark lantern is by a corresponding movement of the mirror moved slowly or darted about in any desired direction (fig. 7); and it is now the duty of the patient to follow the spot by the movement of his foot in such a manner that he can see it continuously through the opening in the pointer.

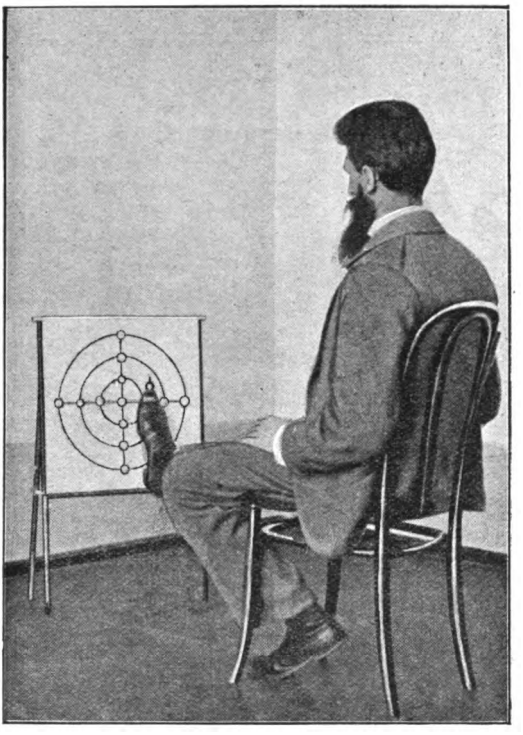


FIG. 6.

This exercise causes the patient special difficulty, inasmuch as he has no previous knowledge about the design, as the direction in which the spot will move is only disclosed by the movement of the spot itself.

To practice hitting exercises with moving light spots, the spot is moved to the desired place, and the patient has to hit the spot at once with his pointer. In a moment the spot is extinguished only to appear in another place, &c. These exercises demand close attention and quickness, as the patient is quite in ignorance of where the spot will appear.

The last kind of light exercise, which I term "*negative light*

exercises," generally consist in the patient having to follow certain designs *from his memory*, and in the dark, with his foot. This can be performed in two ways :—

(*a*) In a dark room a design is illuminated by a dark lantern, and, after the patient has closely looked at it, light is cut off. The patient has now to follow the *contour* with his shoe-pointer in the dark, or to hit special *spots*. To facilitate the movement and control it, the design may be *momentarily* illuminated.

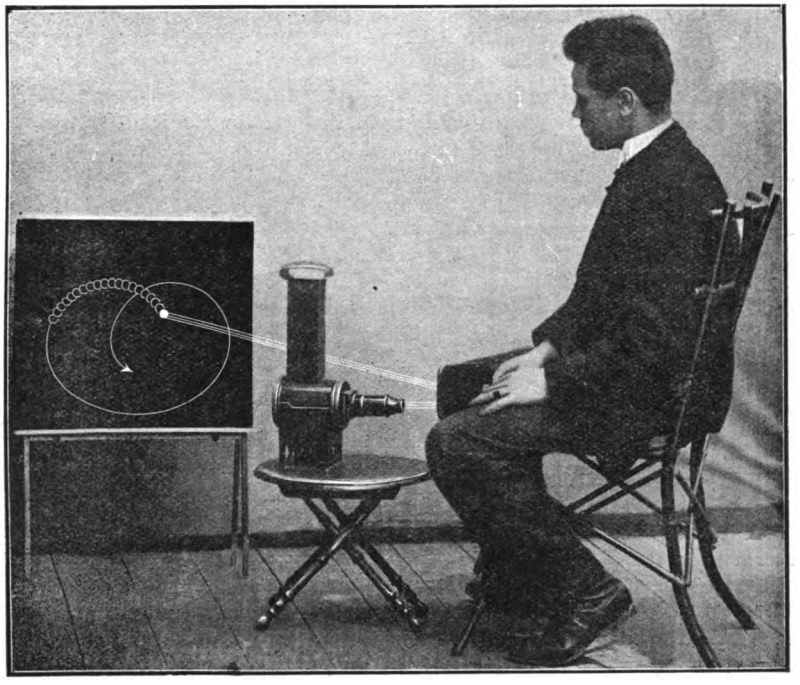


FIG. 7.

(*c*) On a sheet of white paper a lineal design or a light spot is projected by a dark lantern, and when the patient has looked at it long enough, it is cut off by a diaphragm or other means. Now he must from memory practise continuity and hit exercises in connection with the design that has now disappeared ; and to assist and control his movement, the light now and then is made momentarily to appear.

When the patient is so far advanced that he can perform this exercise with a certain dexterity, then he can at last com-

mence the next exercises in point of difficulty, the "*blind exercises*," that is, exercises with "*closed eyes.*" These consist simply in the patient, having closely observed a design, a line, or a spot, "*closing his eyes*" and drawing the design, or hitting the spot, with the pointer; and to control and assist the movement he now and then opens his eyes for a moment and closes them again.

(*To be continued.*)

MEDICATED ATMOSPHERES.—Writing in the *British Medical Journal*, Mr. Godson (Manchester) says that in the early months of the year he sent round a circular to a number of general practitioners in the hope of obtaining an answer to the question: What drugs yield the best results in the paroxysmal stage of whooping cough, and which are most frequently employed? He found that the relative popularity of the various drugs is as follows:—Belladonna 32 per cent., carbolic acid 28 per cent., bromides 20 per cent., creosote 12 per cent., antipyrine 6 per cent., opium as paregoric 2 per cent. None of the answers were enthusiastic except from those who had used creosote as a vapour. The results obtained are far more satisfactory when the inhalation is continuous than when it is intermittent. The simplest and best method is to sprinkle the drug on a cloth and hang the cloth in the sick room to dry. In this way a highly impregnated air can be constantly supplied to the patient. The inhalation appears to be free from danger, except where the chest is full of moist sounds, in which case its effects should be carefully watched.

A PLEA FOR THE ADOPTION OF THE CENTIGRADE SCALE.—Of the three thermometric scales commonly used in this and other countries, the centigrade is the only one which has any prospect of general adoption. This being so, it seems a pity that some effort should not be made to hasten that desirable consummation. In reading translated articles from continental monographs, one frequently meets with statements of temperature in terms of the Réaumur or centigrade scales. To stop and transform these is an interruption and an inconvenience, but the habit of "thinking" in the centigrade scale could easily be acquired. It seems high time that medical men established a demand for clinical thermometers graduated in that form which, on the principle of the "survival of the fittest," is certainly destined to become universal. Instrument makers would not be slow to take the hint, and the change could be effected without difficulty in the course of a few years. For a time it might be well to use charts printed with both scales, the new one being, however, assigned the place of honour on the left, instead of, as now is the rule, relegated to the right hand side of the paper. A similar argument applies, of course, to the desirability of adopting the metrical system of weights and measures. Our present amorphous usage of "drachms" and "scruples" is a survival from the pre-scientific era. Already, in laboratories and scientific text-books, the exclusive use of the decimal system is practically universal.

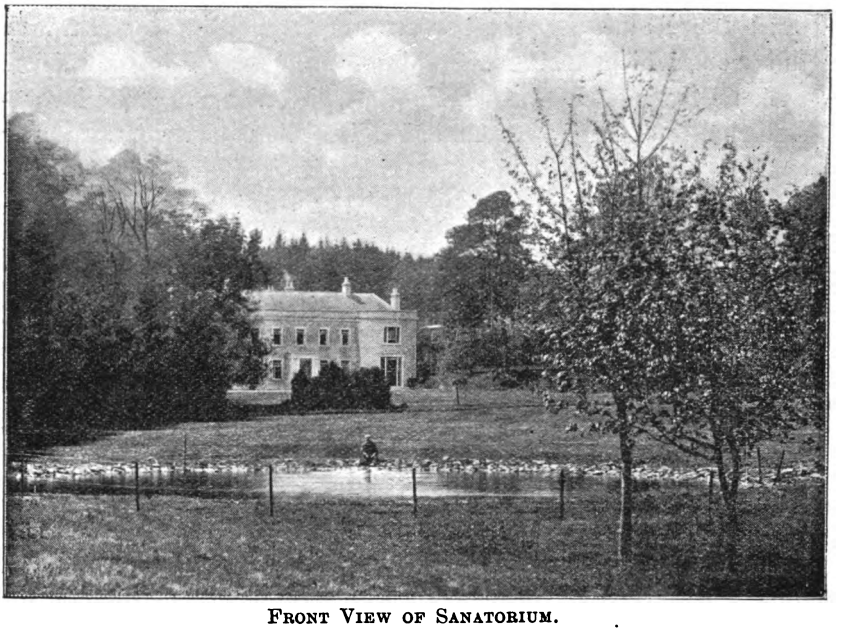
Health Resorts and Sanatoria.

II.

THE MENDIP HILLS SANATORIUM, HILL GROVE, OVER WELLS, SOMERSET.

THE hygienic or "open-air" treatment of consumption and allied diseases is so much to the fore in public and medical interest at the present moment, and the subject is intrinsically of such vast importance to the national welfare, that the busiest practitioner must feel the necessity of acquainting himself with the facts which will enable him to choose for his phthisical patients the particular sanatorium which offers the most favourable chance of recovery. The Mendip Hills Sanatorium, recently opened for the reception of such cases, is situated two and three-quarter miles from the sleepy old cathedral city of Wells, in Somersetshire, and three miles from Binegar Station on the Somerset and Dorset Joint Line of the Midland and Great Western Railways, on the south-eastern slope of the range from which the institution derives its name. The sanatorium stands 850 feet above sea-level, and within a few hundred feet of the lodge there is a heather-grown and gorse-clad height, the topmost point of which, indicated by a cairn, has an elevation of 1,000 feet. From the summit of Penn Hill, as it is called hereabouts, a magnificent view of the surrounding country is obtained, a prominent feature being the conical tower-crowned eminence of Glastonbury Tor, while away to the west one catches a glimpse of the Bristol Channel, or, more properly, Burnham Bay. The sanatorium itself is, with the exception of a few small solitary farmsteads planted at wide intervals among the surrounding pastures, quite isolated, and is approached by a long avenue, the lodge-gates being a quarter of a mile from the house itself. The illustration gives a fair idea of the front (one wing being hidden by foliage) as seen from a neighbouring point in the grounds. The furniture throughout is, as usual, of the simplest, all blinds, curtains and upholstery being scrupulously debarred, the floors polished, the walls distempered in pure light tints, the bedroom windows of the wide-opening casement variety. To

the writer's thinking there is something very pleasing about all this, in refreshing contrast to the stuffy over-crowded "cosiness" of ordinary apartments, and, even æsthetically speaking, it would seem that a higher and more correct taste is appealed to by such surroundings than by the copious bric-a-brac so dear to the heart of modern housewives. The house is lighted throughout by electricity, and there is an installation of hot-water radiators, no open fires being allowed. Some of the bedrooms are very spacious, commanding lovely views of the grounds and planta-



FRONT VIEW OF SANATORIUM.

tions. There is a dairy of selected Jersey cattle, beautiful coquettish little creatures, with mild inquisitive eyes, and an abundance of cream and butter, prepared on the premises, is thereby obtained for the patients. To make assurance doubly sure, all milk is sterilised before use. Ducks, geese and poultry, in considerable numbers, are also kept.

The special feature of this sanatorium, apart from the pure and bracing air which induces good spirits and appetite in even the least promising cases, is the great extent and beauty of its grounds. These cover an area of some 160 acres, three-fourths

of which are covered with thickly-grown plantations of fragrant fir and larch trees. Through these plantations walks of varying width, some quite level, others of sloping surface, wind and intersect, forming long sheltered avenues several miles in length. Carpeted with moss and fir-needles, sheltered from wind and rain, redolent of the resinous gum exuded from the bark of the trees, these avenues form the most delightful retreat for patients to roam or rest in. The stillness here is only broken by the occasional whirr of a startled pheasant, by a rabbit darting across one's path, or by the squirrels at play in the branches overhead. In addition to the plantations there are some forty acres of less thickly wooded ground, partly meadow, partly wilderness, with sheltered nooks and secluded hollows. As the demand for accommodation outgrows the possibilities of the main building it is intended to build others, and several sites of suitable aspect and elevation have already been chosen for this purpose in different parts of the estate. In the conduct of the house everything is made subservient to the prime consideration of its existence, the recovery of the patients. Breakfast is early (eight o'clock) so as to obtain the full benefit of the morning air. Those who are well enough to be about all day return to their rooms after the evening meal, and there is no hardship in this, for constant exposure to the keen mountain air is by no means conducive to a desire for burning the midnight oil. The resident physician at Hill Grove is Dr. C. J. Whitby. One of the most successful of the already numerous sanatoria on Nordrach lines (the one known by the title of Nordrach-upon-Mendip) is situated on the same range and at about the same level as Hill Grove, some seven miles away, towards Cheddar. It is probable that there does not exist in Great Britain a locality combining more fully the advantages of pure air, moderate elevation, seclusion, shelter, charm of surroundings, a bracing yet not inclement climate, and a porous subsoil, than that upon which the Mendip Hills Sanatorium has been established.

III.

AN INTERESTING INSTALLATION.

It deserves to be widely known that there exists in the middle of London an establishment where treatment by the various agencies of high temperatures, light, electricity, movement, and the most modern hydrotherapeutic methods, is available. It presents the further very commendable feature, a feature which alone gives it recognition in these pages, that it is only upon the "prescription," or at least with the sanction, of their medical men that patients are admitted for treatment. The establishment in question is not new; it is really an extension of one already existing.[1] Its principal *rôle* has hitherto been the application of high temperatures produced by Radiant Heat, and in this it seems to have met with a large amount of medical support. The heat, in this system, is obtained from specially prepared filaments incandesced by electricity, the heat and light being thrown upon the body by means of a particular kind of reflector. This apparatus, from having been shown at societies, and described in the medical Press, is tolerably familiar to medical men, and need not be further referred to.

Phototherapeutics is represented (1) by the Finsen method, now well known, of treating with concentrated chemical rays, lupus and other superficial and local diseases of bacterial origin; (2) by the Blue Light Bath, an arrangement by which a powerful electric light is projected upon the body through blue media. It seems to be now demonstrated, or to be within measurable distance of demonstration, that the blue, violet, and ultra-violet rays produce skin pigmentation, capillary dilation and hyperæmia, more complete oxygenation of the blood, as well as a general stimulating action upon the organism.

Movement.—This department consists of Swedish massage and gymnastics, ordinary massage, mechanical massage and vibrations; and will shortly be reinforced by the addition of mechanical gymnastics on the Nycander system.

Vibrotherapy is carried out by means of an ingeniously

[1] The Dowsing Institution, 28, York Place, Baker Street, W.

constructed vibrator capable of adjustment to any rapidity and strength. The procedure seems to be useful, not only in neuralgia, constipation, and some forms of deafness, but in dealing with general conditions, improving the function of muscles, nerves and glands, strengthening the contractions of the heart, and favourably influencing conditions dependent on want of balance in the various tissue exchanges throughout the body.

The Hydrotherapeutic "Service" is admirable, and probably unique. By means of all sorts of delicate adjustments and measuring instruments, the practice of hydrotherapeutics is here reduced to a veritable science.

(*a*) "Massage under douche" is a combined procedure of hydrotherapeutics and massage, in which a patient lies upon a waterproof mattress or bath-table, under a horizontal pipe furnished with numerous nozzles of various shapes, which play showers and jets (electrised or otherwise) upon the body at regulated temperatures and pressures. This hydriatic procedure has of course effects of its own, but one of its chief results is that the muscles being thus completely relaxed, massage can be performed in the most painless and effective manner. (*b*) "*The abdominal douche*" is another proceeding of combined douching and massage. Here two "operators" are required, one of whom directs the jet of water (electrised or non-electrised) at high temperature and pressure, which jet follows the hand of the masseur as the latter operates upon the abdomen. It is used in some cases of dyspepsia, nervous gastralgia, distension, &c., the result of gastro-intestinal atony.

The "Nauheim" Bath.—No hydrotherapeutic service would be complete without this, but it is now too well known to need description here.

Electricity.—Without detailing the more ordinary electrical apparatus, *the Hydro-electric Bath* and *Hydro-electric Douche* may be noticed; both are supplied with galvanic, faradic, and sinusoidal currents. The action of the electric bath as a powerful modifier of general nutrition is fairly well known to medical men, but by no means so well as it deserves to be. The "Douche" method of applying electrical currents consists simply

in conducting them to the body of the patient, not by metallic conductors, but by jets, or sprays, of water. Used in this way, the electric douche proves itself to be a nervine tonic, hastening cutaneous sensibility and quickening motor excitability. It further influences nutrition and absorption by its control over the distribution and circulation of the blood current.

New Inventions.

A NEW CONTINUOUS CURRENT TRANSFORMER.

Ever since current from the main came to be applied to the ordinary requirements of medical and surgical practice, there has been the ever present difficulty, for those on continuous current circuits, of finding a simple means of heating cauteries and lighting exploration lamps. For the former 4 volts and 20 ampères are required; for the latter 7 to 12 volts, and ·75 ampères to 1·5 ampères. But the current is usually supplied to houses at about 100 or 200 volts. How, then, can such a voltage be best reduced? Of course this can be effected by means of a motor transformer, *i.e.*, a dynamo driven from the mains. But few medical men care to face such an installation; it is expensive, noisy, and non-portable. Therefore it has been usual to meet the difficulty by employing a rheostat. But this, besides being expensive, non-portable, and requiring special leads from the distributing board of the electric light circuit, is at best a wasteful device, consuming as it does an amount of energy much in excess of what is required. Thus in the case of the cautery: 4 volts and 20 ampères = 80 watts; therefore on the 200-volt circuit there must be consumed $(200 - 4) \times 20 = 3{,}920$ watts. In other words, by the use of a rheostat nearly 4,000 watts of energy is expended and only 80 utilised.

The above-named instrument solves the problem much more satisfactorily, and supplies a real want. It is practically a reversal of an induction coil, in so far as it converts current of high pressure into current of lower pressure, *i.e.*, instead of "transforming up" as a coil does, it "transforms down." Like

a coil, it consists essentially of a nearly closed magnetic circuit with a vibrating keeper, *i.e.*, an automatic vibrator, or Wagner hammer, completing the circuit in one spot. This keeper is actuated automatically by the energising current, and thus by its makes and breaks sets up oscillations of the magnetic lines of force, which result in the induction of alternating currents of certain E. M. F. in the secondary windings. As the uses (viz., cautery and light) for which these secondary currents are intended do not depend for efficiency upon the current being continuous, the alternations are of no consequence. It is a given energy (watts) that is required to heat the cautery, or light the lamp. To regulate the intensity of the light or heat, sliding rheostats are provided as part of the apparatus. The instrument can be connected to the supply circuit anywhere in the house, by means of the ordinary lamp holder; and cautery and light may be used at the same time. Thus the user, besides having a portable instrument, and one without risk, or liability to get out of order, has the further satisfaction of knowing that he is not consuming more than half an ampère of current, and that his transforming apparatus, instead of using fifty times the amount of energy required, shows an efficiency of 80 per cent.[1]

Review of Current Literature.

ACTION OF HIGH-FREQUENCY CURRENTS UPON ELEMENTARY RESPIRATION (ACTIVITY OF EXCHANGES BETWEEN THE BLOOD AND THE TISSUES). M. Tripet (*Comptes Rendus*, 130. Pp. 1785-1787. June 25, 1900).

THE object of the author was to study the effects of high-frequency currents in reducing the oxyhæmoglobin; that is to say, in influencing the activity of the exchanges between the blood and the tissues. MM. Apostoli and Berlioz have proved that under the influence of high-frequency currents the production of urea is augmented and brought near the normal amount, viz., 27 to 30 grms. in twenty-four hours, in cases where defective nutrition showed itself by a marked "hypo-azoturia." Cases were watched during a course of two years, that is to say, before, during, and after the treatment. The examination of the blood was carried out by means of the hæmatospectroscope of Henocq, the activity of the reduction of hæmoglobin being ascertained by his procedure of

[1] The instrument is introduced by Mr. Isenthal, 85, Mortimer Street, and costs about £12.

elastic ligature of the thumb, and the results were marked upon special observation forms. The examinations were made every four weeks from the beginning to the end of the treatment. Some of the cases were thus followed during more than six months. The results of the treatment may be summed up as follows: (1) In thirty-seven cases, high-frequency currents increased the activity of the reduction of oxyhæmoglobin, and this was especially apparent in cases of impaired nutrition (rheumatism, internal fibromata, &c.); (2) in six cases where before the treatment the activity of reduction was increased, the high-frequency currents brought about a diminution of such a kind as to reduce it to normal; (3) in six cases only in which the morbid processes continued unchecked, the activity of reduction of oxyhæmoglobin continued to decrease in spite of the treatment. From these observations it follows:—

(*a*) In case of the failure or perversion of nutrition, treatment by high-frequency currents has the effect of regulating the activity of reduction of oxyhæmoglobin.

(*b*) In cases where the activity is below the normal, treatment increases this activity, and maintains it at or about the normal standard.

(*c*) In cases where this activity is exaggerated—for example, in diabetes—the treatment diminishes the activity and brings it down to normal.

MASSAGE OF THE SHOULDER. By Dr. E. Gierstsen. Medical Society of Kristiania (*Journ. des Prat. after Norsk Magazin for Lægevidenskaben*, 1899).

DR. GIERSTSEN insists on the good effects of massage in the treatment of anchylosis, of the atrophy (that follows subluxation,) of muscles supplied by the brachial plexus, of acute injuries before fixation has become complete, &c. Of course, all this is nothing new, but we agree with the author in the necessity for not overlooking the following points:—

The principal rule in massage is "*festina lente.*" Always commence by *effleurage*, which improves circulation, but at the same time carry out *pétrissage* and vibration upon the neighbouring muscles. The capsule is treated by rather painful frictions; the fingers gliding upon the skin effect a malaxation of the subcutaneous tissues. The fibres of the deltoid are kept relaxed by raising the arm of the patient to 90° and resting it upon the knee of the operator. Besides this the capsule is worked from within outwards, that is to say, the scapula and clavicle are fixed, and the arm is seized by the elbow and made to execute passive movements, whilst the head of the humerus forcibly compresses the capsule against the neighbouring parts, as well as against the fingers of the hand which holds the limb in position.

CONTRIBUTION TO THE STUDY OF SCOLIOSIS AND ITS TREATMENT. Dr. G. Dayez (*Thèse de Paris*, 1899).

THE author gives two hundred cases in support of the method pursued by his teacher, Dr. Bilhaut. It is necessary forcibly to elongate the spinal column, either in the horizontal position with or without mechanical apparatus, or in the vertical with Sayre's apparatus. The corrected position is maintained by a plaster jacket. As to treatment by exercise on the French or Swedish system of gymnastics, the author is no advocate of a method which only puts off time by waiting for massage and electricity to effect the restoration of muscles which are only perhaps atrophied. Gymnastics and exercises are, he considers, only effective in the scoliosis of faulty position. These

measures necessarily fail in scoliosis with ossoeus deformity. Nevertheless, he advises that the treatment of scoliosis should be completed by utilising gymnastic massage and various physical exercises. Our treatment, he says, does not exclude gymnastic exercises. Indeed, the author speaks of them as "crowning the work" by increasing the active resistance, in re-establishing the equilibrium between the groups of muscles upon which depend the movements of the vertebral column, and in securing its normal action and strength.

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(To be continued.)

Technique.

NEW TREATMENT OF EXOPHTHALMIC GOITRE.—At the recent International Congress of Medical Electrology and Radiology, M. Thiélée (Rouen) read a paper on a new treatment of Basedow's disease, by sinusoidal voltaisation, applied by means of the hydro-electric bath. This method has yielded him better results than the galvanic or faradic method.

The practical application is as follows:—Four separate electrodes are immersed in the bath, and the intensity of the current is at first raised to 20 or 30 milliampères. Later on the patient will stand a greater intensity. When the patient leaves the bath, bright red marks are observed on the skin, as if he had been subjected to a galvanic bath. During the application, the patient experiences various sensations, as phosphenes, acid tastes, &c.

In support of this method the author relates three cases; with from twenty-three to twenty-five applications, he obtained improvement in the goitre and in the three classical symptoms, an improvement which seems to have been permanent. In Addison's disease, the author believes that similar results might be obtained on account of the pathological resemblance of the two affections.

THE ACTUAL STATE OF RADIO-THERAPEUTICS. (Report read at the International Congress of Medical Electrology and Radiology by MM. Schiff and Freund, Vienna.)—Ever since their first appearance the X-rays have awakened the interest of dermatologists. Kaposi, Freund and Schiff were amongst the earliest to perform experiments with a view to establishing their action. The principal indications for the employment of radio-therapeutics are skin diseases, and amongst them notably: (1) dermatitis provoked by parasites, as M. Schiff was the first to demonstrate; on lupus vulgaris the action of the rays exercise an especially favourable influence; (2) those affections of the skin in which the removal of hairs constitute an essential element for cure (Freund). As special indications the authors of the report point to diseases of the scalp, favus, sycosis, tinea tonsurans, &c., of which some are endemic in certain countries, affections which heretofore often proved refractory to all therapeutical means, yet upon which radio-therapeutics have exerted a rapid and undoubted action.

The technique recommended by the authors consists in placing the part to be treated under an ordinary Crookes tube, having first ascertained the susceptibility of the patient to the X-rays, a susceptibility which varies within wide limits. The duration of the sitting varies from five to twenty minutes, and the distance from the tube from the part to be treated from 5 to 10 centimetres. In order to protect the neighbouring sound parts the author shields them with a leaden sheet in which holes, more or less large, are cut according to the dimensions of the diseased areas. As these leaden masks may be used successively by several patients, or more than once by the same patient, they are lined with cardboard, which alone is in contact with the skin. The masks, on account of their small value, can be thrown away after each sitting.

The intensity of the primary current of the coil does not exceed one ampère and a half, with an electromotive force of 12 volts. M. Schiff attributes the absence of all accidents from his applications to the relatively low intensity of the current used, and also, curiously enough, to his use of accumulators in preference to currents from the main.

Thus the indications in question apply especially to the following affections: lupus vulgaris, hypertrichosis, sycosis, favus, tinea circinata, tinea tonsurans, folliculitis, furunculosis, acne, lupus erythematosus.

Trials made in a considerable number of patients justify the statement that henceforth a radical cure of the aforesaid diseases can be assured.

The cure of favus and sycosis requires but a short time (some weeks), that of hypertrichosis at least eighteen months of uninterrupted application, and, moreover, a further treatment to follow.

The duration of the treatment of lupus depends upon the extent of the disease. Observations that we have already made permit us to state that a large number of the modifications which the skin undergoes under the influence of the rays are due to the effect these rays produce on the vascular system of the skin, as Kaposi had already presumed.

According to the recent researches of the authors, it is now certain that in treating skin diseases with the rays, the silent discharges of the high tension current collected in the tube play a considerable part. Freund has studied the physiological effect of direct sparks, silent discharges, and other invisible radiations. He arrives at the following conclusions: direct sparks, whatever be their origin, such, for instance, as direct discharges from an induction machine, or produced as silent discharges from the d'Arsonval-Oudin apparatus, may cause the hairs of animals to fall out. Direct sparks can destroy both recent and full-grown cultures, or arrest their growth.

Experiments have been done on staphylococcus pyogenes aureus, bacillus typhosus, those of diphtheria, anthrax, tuberculosis, the fungus of Soor, and the achorion of Schönlein.

This action of direct sparks is increased by putting the part exposed, to earth, by the nearness of the electrode, by more rapid interruptions, and by increasing the intensity of the primary current.

These effects are produced through thin layers of wood, paper, aluminium, tin and skin. The action is extended to micro-organisms suspended in liquids. The physiological effects of negative discharges is greater that than of positive, but it is exercised over a smaller area. According to these experiments the X-rays have no physiological importance. Neither Becquerel's rays nor phosphorescent rays exert any physiological action.

Pathological effects produced in the skin by direct discharges consist of hæmorrhages into the dermis, of inflammation, and alterations in the vascular system.

M. Schiff, after reading his report, demonstrated with the lantern divers cases of skin diseases treated by radio-therapeutics, and the state of the patient both before and after treatment could be thus compared. The first case was one of hairy pigmented nævus, treated by the author at the beginning of his experiments in 1897. After repeated intense exposure the nævus disappeared completely, but considerable inflammation, with sloughing of the tissues, resulted, which took many months to heal. Another case was that of a lady suffering from hypertrichosis. The treatment lasted eighteen months, and although the condition was cured the skin was not quite uninjured. The third case was one of favus of the scalp. Two years afterwards the condition was completely cured, and showed a normal scalp with a good growth of hair. The fourth case was one of sycosis of fourteen years' standing, cured in seventeen applications, without relapse two years afterwards.

M. Schiff also showed a much benefited case of lupus of the nose, and one of lupus of the face in which the surgeons had refused to operate, so much improved that it raised cheers in the audience.

Discussion.—M. Foreau asked if there were not a contradiction in these cases of skin disease in which a cure was effected, with reproduction of the hair, and those in which the treatment caused the permanent destruction of the hair.

M. Oudin said that at first, when accumulators were used, more accidents occurred than now that currents from the main are used. On the other hand, does M. Schiff attribute the curative action of radio-therapeutics to the electrostatic field which surrounds the tubes, or to the rays themselves? He recalled the experiments performed at St. Lazare on the action of X-rays, upon the nutrition of hairs, and pointed out the great difference he has observed under the same experimental conditions in different subjects. He

added, moreover, that in the clinical cases of Mr. Bernard, reported by M. Bergonié to the Electro-therapeutical Society, epilation was produced under the hole in the sheet of aluminium, but not under the sheet itself.

M. Restot reported the experiments he made with the gavanoscopic frog in the electrostatic field, to discover its extent. If this field is active one must inquire whether the X-rays are active too, and if there really is such a thing as radio-therapeutics.

As to the physiological effect which M. Schiff attributes to the action of the X-rays on the vaso-motor system, he is of opinion that from the observed symptoms one must refer them to an action on the peripheral nerves.

M. Guilloz, of Nancy, believed that the method of protection invented by M. Schiff, by means of a leaden screen, cannot be sufficient, for as it has been pointed out, this screen emits secondary rays whose action cannot be neglected.

As to the action pointed out by M. Schiff on the vasomotor system, he would be quite willing to admit it, for he himself has observed skin diseases benefited by medication influencing the vasomotor nerves.

M. Wertheim-Salomonson thought the action of X-rays themselves could not be neglected. The X-rays, indeed, are now considered a radiation of very short wave length. These rays pass through the human body and are absorbed, and upon that absorption would depend the accidents that have been pointed out. Moreover, the effect of other radiations used in treatment, for example, the luminous and violet rays, would be of similar nature.

M. Stembo, of Vilna, showed that the X-ray treatment of neuralgia has given him good results, and it seemed to him that the action of these rays on the skin and on deep nerves are different.

M. Bouchacourt said that whenever he observed accidents or sensations in the numerous experiments with the endodiascope with which, since the discovery of the X-rays he has been ceaselessly occupied, he has attributed them not to the rays themselves, but to purely electrical emanations proceeding from the apparatus.

M. Bergonié, in a question so much controverted, and after the magnificent results that M. Schiff had just shown, thought it well that each one should state his own personal opinion, based upon his own experiments. So far as his own experience went, whenever he used a tube of low resistance, around which no electro-static field was produced, in spite of long exposure, he has never produced either accidents to the skin or falling of the hairs. On the other hand, with a high resistance tube, from which there was a discharge to the surrounding objects, and therefore also to the patient, he has observed slight erythema, with but only indifferent radiographic or radioscopic results, pictures without marked contrast. In short, the obtaining of a good radiograph with marked contrasts never gives rise to affections of the skin, however long the exposure; whereas a bad radiograph without contrasts, in which the bones are passed through, gives rise to more or less marked alterations of the skin. As to the explanation given by M. Wertheim-Salomonson, he believes that effects produced, both curative and harmful, are not due to the absorption of the X-rays by the tissues—the most harmful rays being the most penetrating and the least absorbed, and the least harmful, or, what comes to the same thing, the least curative, being the most absorbed.

M. Schiff answers successively to M. Foveau that the action on hairs depends upon the duration and the intensity of the exposures, and to M. Oudin, M. Destot, and M. Guilloz that aluminium has not appeared to him a suffi-

ciently protective metal, and leaden masks have given him complete satisfaction; and, lastly, that he is at one with all who think that the curative actions he has observed are due, not to the rays themselves, but to the electrical conditions that accompany their production.

Compressed Air-Baths and Medicated Atmospheres.—The compressed air-bath is a *séance* lasting about an hour and a half, in an iron chamber or "bell," where the patient is submitted to an augmentation of pressure varying from $\frac{1}{8}$ to $\frac{1}{2}$ an atmosphere. He sits in his ordinary dress and occupies his time in reading or writing. A telegraph allows him to communicate with those outside. Thus comfortably installed, he breathes air purified by filtration. About a quarter of an hour is required to reach the pressure, carefully determined beforehand for each case ("compression"). This pressure is kept constant, and the patient remains under it for about an hour, during which the air is constantly renewed in the bell by the working of the machinery ("constant pressure"), then the pressure is slowly reduced to normal. This period ("decompression") lasts for at least a quarter of an hour and terminates the sitting, which thus occupies, on an average, about an hour and a half. The compressed air can be charged with the vapour of creosote, eucalyptus, guiacol, &c., and thus antiseptic atmospheres are obtained, capable of modifying the most inveterate catarrhs.

In considering the physiological action of compressed air, two factors must be taken into account, (1) the *mechanical influence* of compressed air; (2) the *chemical action* of a medium more rich in oxygen. The *mechanical element* comes into play in the following way: compression of intestinal gases by the lowering of the diaphragm, whence results augmentation of the respiratory capacity, more compression of the capillaries of the lungs, reduction of their calibre and thus diminution of the hyperæmia of the respiratory mucous membrane. The *chemical action* is as follows: as pressure augments, the energy of the oxidations increases (Paul Bert) on account of the greater tension of the oxygen; the oxidation of the hæmoglobin is therefore more rapid. Hence the respiratory function is more active because hæmatosis is carried out upon a surface which is more extended, and in a medium which is more rich in oxygen.

An Easy Method of Regenerating Röntgen Tubes.—At the recent Electrical Congress in Paris, M. Cirera-Salse reported on the above subject, saying that the tubes used for the production of Röntgen rays are known to have but a short life. With use, the vacuum increases, and the internal resistance rises to such a point that the passage of the current becomes impossible; from a Crooke's tube it tends to pass to a Hittorff tube.

There is a way to remedy this inconvenience, and to re-establish a suitable vacuum.

This means is within reach of all those who are in the habit of looking to their laboratory apparatus themselves, and requires no special or complicated instruments.

The tube is put in the circuit of the (working) electrical generating apparatus; the small tube, whereby it is exhausted during its construction, is left free. This tube is heated and drawn out, and then with a a pair of pincers it is broken in the capillary part.

A small quantity of air will then enter the tube. The lamp is then applied, as soon as the tube is illuminated, and it is thus sealed up again.

Notes.

Wind Exposure and Phthisis.—In a paper read recently at the Royal Medical and Chirurgical Society[1] Dr. William Gordon (Exeter) said that the differences of the average annual death rates from phthisis in the rural sanitary districts of Devon were probably mainly due to differences in exposure to west and south-west winds. They could not be explained by differences in general sanitation, rain-fall or soil, although the latter appeared to have a subordinate influence.

Dr. William Cayley thought that the previous speaker had certainly proved two points: (1) That in some parts of Devon phthisis was more prevalent than in others, and (2) that in these districts westerly and south-westerly winds prevailed, but the relation of cause and effect had not been distinctly shown. He thought that, like the people in the Scilly Islands, exposure to the prevalent winds might cause them to shut themselves up in their small, badly ventilated houses, and this might be a factor in the result.

Dr. G. B. Longstaff thought that the dwelling and occupation of the patients should be taken into account. As to dampness the general impermeability or otherwise of the soil seemed to be of less consequence than the dampness or dryness of the ground immediately surrounding the houses. Distribution of rainfall, as well as racial proclivities, and the question of inter-marriage, as well as the fallibility of diagnosis, should be taken into account.

Sir Douglas Powell thought the author had established the fact that prevalence of strong winds corresponded with high phthisis mortality. Dr. Haviland had showed the same thing, and that no particular wind was concerned. The reason was probably to be found in the shutting up of doors and windows.

Sir Hermann Weber said that for a long time it had been recognised that windiness had an injurious effect on phthisical patients. Strong wind from any quarter seemed to have this effect.

Dr. Braine-Hartnell thought that wind exposure was the most important external factor in phthisis—much more important than rainfall. It seemed that the wind acted as a depressant of vitality. In connection with sanatoria there ought to be woods where the patients could seek shelter in windy weather.

Dr. Pye-Smith thought that the difficulty in the use of statistics in this case was from taking too small quantities, and too small areas. Another fallacy was the confusion of the cause of the occurrence of phthisis, the lodgment of the bacillus, and the cause of its mortality.

Dr. Herringham said three plans of investigation were needed: the use of large numbers, the individual cases, and the careful examination of a small area by one to whom it was well known.

Sir William Broadbent believed that in a disease, the cause of which was so complex, there were always sources of fallacy in attempting to account for its causation on one hypothesis. The connecting link between the prevalence of south-west winds and the mortality of phthisis seemed to be wanting. The conclusion they must come to was probably that of Dr. Haviland, viz., that windiness and not any particular wind was the injurious agent, and this in two ways: by causing persons to shut themselves up in their houses, and by hastening the changes leading to death from tuberculosis.

[1] Reported in *British Medical Journal*.

On Radiography in Undetected Fractures.—M. Destot (Lyons) reported on the above subject at the recent Congress in Paris.

He referred to the need of complete anatomical studies to interpret radiographic negatives. The surgeon, lacking this, cannot read radiograms, and the radiographer who contents himself with making pretty pictures fails to make the most of this wonderful method of observation.

He then points out amongst unrecognised fractures those of the metatarsal bones, observed both among soldiers and civilians. They occur in subjects with an excessively arched foot, subjects to whom the term digitigrade might be applied. The fractures most frequently occur in the second and third metatarsal bones. The fracture of the scaphoid bone is produced by falls on the feet, and is often associated with fracture of the astragalus. Fractures of the calcaneum are exceedingly common. They are produced either by tearing away of the tendon (Boyer's fracture) or by splitting. They can be clinically diagnosed, and radiography should only be necessary as a means of confirmation. As to fractures of the astragalus, the observer has noted thirty-nine cases.

Simple fracture is, as a rule, at the junction of astragalus and the neck. This is the most frequent type, and is produced by a fall on the feet. Another type, the malleolar, is a combination of fracture of the astragalus and malleoli. The calcanean type, also very common, is that in which the astragalus is fractured, together with the calcaneum, by the "ramming" action of the tibia and fibula. The speaker also recognises the navicular type, in which the astragalus is crushed by colliding with the scaphoid. It is the type with the most serious prognosis.

The speaker further points out fractures of the condyles of the tibia as common causes of mistaken diagnosis. In this fracture the shaft of the tibia is driven into the condyles and splits them. The prognosis must be very guarded. He cites as a last fracture of the lower extremity, difficult to recognise without radiography, the subperiosteal greenstick fracture of the shaft of the femur, and the fractures of the pelvis with driving inwards of the acetabulum.

In the upper limb he cites fractures of the scaphoid, which he was first to point out. As to the fractures of the wrist, forearm and elbow, although they may be diagnosed, it remains for radiography to show the more minute details, and indicate rational treatment.

In conclusion, the speaker said that in the light of radiographic observation, the whole history of fractures must be re-written.

The Physiological Effects of High Tension and High Frequency Currents.—(M. P. Oudin. Report made at the International Congress of Electrology and Radiology.) The author of the report gives in a few words the history of the discovery of currents of high frequency, and refers to the three principal methods of producing them—the methods of Morton, of d'Arsonval, and of Oudin. These methods produce very different physiological and therapeutical effects; but the author is of opinion that, even using the same method, it is difficult to secure an identical instrumentation, and results will accordingly vary.

The effects of the currents can be divided into actions:—(1) On motor and sensory nerves, (2) On the circulation, (3) On oxidation generally, (4) On micro-organisms. From the works of d'Arsonval it is known that high frequency currents would seem to have no action on sensibility or motility; neither motor nor sensory nerves were excited by his experiments, whether

he employed to produce them alternating currents, or a primary current with very frequent interruptions. If others, after him, in repeating these experiments have found motor or sensory effects, it was that they used a different technique; more especially because, in the production of these high frequency currents there occurred stoppages at which moment the nerves were excited—in a word, there was no continuity in their production. The action upon the circulation has been observed by many authors. A lowering of blood pressure at the time of application, and, on the other hand, an intense vascularisation of the skin, were observed. They would therefore cause, according to the speaker, a most active draining of the circulation.

The action of high frequency currents on oxidation in the organism is an effect fully established by the works of d'Arsonval. According to the author, an increase in respiratory exchanges, and in the quantity of the excreta, is observed. These facts have been confirmed by a great number of writers, but they have been recently controverted by others.

There is here a divergence of opinion that the author attributes to a difference in the instruments used in the experiments, and this would probably be explained by fresh work.

As to the action of high frequency currents on microbes and toxines, the author again reminds us with good reason that it is to d'Arsonval and Charrin that we owe most of the results obtained on this subject. Their experiments on bacillus pyocyaneus have shown from the first that the action of high frequency currents is incomplete, and that, if increase of temperature be eliminated, they have but a weak influence on the vitality of the microbe. As to toxines, some of them can be attenuated, but the author believes that henceforth, researches to prove really useful must be conducted *in vivo* not *in vitro*.

THE THERAPEUTIC PROPERTIES OF HIGH FREQUENCY AND HIGH TENSION CURRENTS.—This was the subject of a report by M. Doumer at the recent Congress of Electrology and Radiology. This portion of the total report is a sequel to that of M. Oudin. According to the speaker, the therapeutical effects of high frequency and high tension currents are much more distinct and precise than their physiological effects. At first it was imagined that diseases like glycosuria, gout, rheumatoid arthritis, and even albuminuria would be cured, and great hopes had been built upon these currents. Disillusion soon came, and although occasionally happy results were seen, they were rare. It would seem these currents are no more efficacious than those in use before their discovery, and give with the diseases above enumerated no better results. It was thus that static electricity, applied as early as 1893 to local affections of the skin, either as silent discharge or sparks, cured certain skin affections, both moist and dry, with surprising rapidity. This treatment of skin diseases by static electricity has become, so to speak, a classic method; but it is observed not only that the area treated is cured, but a deep and general result follows, that extends to the whole organism. The high frequency currents obtained, preferably with Oudin's resonator, seem more efficacious substitutes for static electricity. As early as 1897 M. Doumer applied them to the treatment of anal fissure, and obtained results so good that cure was, so to speak, the rule, and benefit was obtained sometimes on the first application. The congestive phenomena in the pelvis, which so often accompany this pathological state, disappear also by the use of high frequency currents. As the author has announced in a former communication, hæmorrhoids are, in the majority of cases, susceptible of cure.

In the female the application of high frequency currents have effected no less good. They quiet local pain, cause the disappearance of hyperplasia, the sequel of former inflammation; if they do not immediately cure they at least relieve metritis, even when gonorrhœal. In one word, all inflammatory states justify this form of application.

Their curative action on chronic pulmonary tuberculosis is one of the most recent applications of these currents. The two authors of the report, MM Doumer and Oudin, have arrived at the conclusion that by the application of high frequency currents the general condition is improved, the bacilli diminish, the anorexia and fever decrease, and the pulmonary lesions cicatrise, even to a complete cure. The results obtained are constant.

Is it by a bactericidal action that these results are obtained? The speaker thinks not, for, in the majority of cases, improvement from the application of high frequency currents was noted before the number of bacilli in the sputum diminished. On the other hand he found that local tuberculosis was but little affected.

The hypothesis of a direct microbicidal power in the high frequency currents must therefore be rejected, and most of the therapeutical properties of these currents must be explained by the condition of increased resistance in which they place the organism, which enables it to struggle against adverse influences, with better chances of success.

THE AMERICAN ELECTROTHERAPEUTIC ASSOCIATION.—The tenth annual meeting of this association was held at New York on September, 25, 26, 27. A large number of interesting communications were read bearing chiefly on questions of the hour, such as the Treatment of Tuberculosis, Electric Light as a Therapeutic Agent, "Morton Wave Currents," X-ray work, &c Amongst the more technical contributions was one by Mr. Chas. T. Child, E.E., Technical Editor of the *Electrical Review* (New York), "On Methods of Generating and Transforming Electric Currents for Therapeutic Use." Another paper, also by a non-medical member, and reported to have been extremely well received, was that of the Rev. N. Lawrence on "Electrotherapeutic Sins." One of the commonest of these was the practising of this form of treatment by physicians who, however well they might understand "ordinary medicinal therapeutics, were often almost completely ignorant of electrical laws." The "so-called electro-magnetic body appliances" were then submitted to destructive criticism; and in conclusion allusion was made to the practice far too common, and perhaps especially "prevalent amongst clergymen, to give testimonials about things which were not at all understood by the person thus so extravagantly singing their praises."

THE TELAUTOGRAPH.—A new writing telephone has recently been unveiled before a favoured few, and is considered by the *Electrical Review* to "constitute an immense step in advance." It is capable of reproducing simultaneously a true *facsimile* of the hand-writing of a distant writer. The working of the instrumeut is explained in the current number of the *Electrical Review*, and an admiring description given of "the pen writing quickly, hesitating as the writer ponders over his next word, dotting its *i's*, and crossing its *t's*, and darting into the ink-well when necessary, as though impelled by an invisible hand; and indeed so it is!"

THE

Journal of Physical Therapeutics

No. 3. DECEMBER 15, 1900. VOL. I.

Editorial.

(STANDING ANNOUNCEMENT.)

As stated in previous numbers, the aim of this Journal is not only to furnish a record of current progress and contemporary work, but to provide a detailed and critical account of what has already been accomplished in the field of Physical Therapeutics.

Owing to recent progress in physical and biological science, the *modus operandi* of such methods is now, in some measure, beginning to be understood; further, their successful employment requires a carefully executed technique, and such information as is available on this point exists at present only in a scattered and fragmentary form. It is therefore considered that such a journal as this need offer no apology for its existence; it is hoped that it will fill a gap—that it will supply a want.

It cannot be necessary to remind the reader that to devote the pages of a journal exclusively to the consideration of the agencies in question, is by no means to deal with them as something apart from general medical practice, still less to assign to them any predominant *rôle* in the treatment of disease. They represent only one class of weapon in the varied armoury of medicine. Medical men are appealed to to rescue such weapons from the incompetent and unworthy hands into which they sometimes fall.

Although its limits are not ill-defined, Physical Therapeutics is a widely comprehensive term; embracing, as it does, Electro-therapeutics, Hydro-therapeutics, Vibro-therapeutics, or treatment by vibration, Photo-therapeutics, or treatment by light, Radio-Therapeutics, or treatment by the radiations of an X-ray tube, Balneo-therapeutics, or treatment by baths, Aëro-therapeutics, or treatment by compressed or rarefied air. Therapeutic and Hygienic Exercises, Massage and Manipulations, Dietetics, Climatology, and last, but not least, the valuable agencies of Heat and Cold, all come within its scope.

ELECTRICAL TREATMENT OF UTERINE FIBROMA AND FIBROMYOMA.

By Prof. E. Doumer (Lille).

In reading the monographs, treatises, and encyclopædic articles which have appeared during the last fifteen years upon the treatment of uterine fibroma and fibromyoma by electricity, it would almost appear as if there were only one form of electric energy (the constant current), and only one method of applying it (the method of high intensities), available for the treatment of such cases; and every writer who has dealt with the subject seems to start with this idea. Some of them—and these the most numerous—go on to condemn electrical applications as dangerous, or at least useless; the others, defending the treatment, defend the method at present universally known as the "*Method of high intensities*," or the "*Method of Apostoli.*"

This article is addressed to both one and the other; to the partisans of electrical intervention in order to remind them that besides high intensities there are to be found in the arsenal of electro-therapeutics a whole series of milder measures—measures more practical, and often more effective. To the opponents of electrical treatment it may be urged that it is upon the method of high intensities that they base their objections, objections which are not to the same extent applicable to other procedures, which it is wrong to condemn as a whole. If it were only a question of defending Apostoli's method this article would not be required. It would be sufficient to refer the reader to the noteworthy report which Prof. F. la Torre of Rome read at the International Congress of Medical Electrology and Radiology of 1900. Within the limits assigned to it by la Torre, this method constitutes a useful procedure with which every gynæcologist ought to be acquainted, and ought to put in practice before having recourse to the knife. But, this said, I hasten to add that the method in question by no means comprises all the resources of electrical treatment; indeed, it includes only a very limited number of them. It is neither the most simple in its technique,

nor the most constant in its effects. Every gynæcologist ought to know and apply it when the indications present themselves; but it is by no means the only method which is commendable, and which it is necessary to be familiar with. At any rate, it cannot be regarded either as the last resource in electrical intervention, or the first that ought to be employed.

Every one knows the principle of this celebrated method. It is to convey into the cavity of the uterus, by means of an insoluble electrode, a current of as high an intensity as the patient can tolerate. Apostoli begins with 50 m.a.; in subsequent sittings, where the case has proved tolerant, this intensity is raised to 100, 150 and even 200 m.a. In all his works he insists upon these high intensities, which in some measure constitute the characteristic feature of his method. According to my view this practice is not sound. Begotten of a secret desire which haunted every one who occupied himself with electrical gynæcology to destroy the tumour, or at least to reduce its size and bring about the disappearance of the symptoms which accompany it (pressure, pain, hæmorrhage), this method has shown itself unable in the great majority of cases to attain the end to which it originally aspired, viz., to deal direct with the pathogenic cause; it has therefore now descended simply to the position of a symptomatic treatment, and like the methods which have preceded and followed it, it has come to see its pretensions restricted to the arrest of hæmorrhage and the relief of pain.

To attain such results, is it necessary in the majority of cases to resort to the employment of high intensities? This is a point which must be carefully examined; for it is not a matter of indifference whether strong or weak currents be employed. If the therapeutic effect be equal, it is obvious that strong currents ought to give place to weak ones, on account of the dangers which accompany the former. Although these risks have been much exaggerated, it is nevertheless necessary to recognise the fact that they are real, especially when these strong currents are in inexperienced or unskilful hands. The febrile reaction which follows their employment, and the deep and extensive eschars which may result from faulty management, must also be taken into account.

It is thus incumbent upon us to place the method of *high intensities* face to face with the method, or rather methods, of *moderate intensities*, and candidly to compare the therapeutic results which can be attained by one, or by the other.

Under "*moderate intensities*" I comprise every mode of applying the constant current in which the intensity does not exceed 50 m.a., whatever be the nature of the electrode—insoluble (platinum, charcoal), soluble (copper, as Gautier proposes, silver, as Boisseau du Rocher advises), or the vaginal tampon which Danion has happily re-introduced. Without comparing the respective merits of these various methods of electrisation, it is to be noted that they all possess two properties in common, and almost to the same degree: they arrest hæmorrhage, often very quickly, and often relieve the pain which accompanies fibromata and fibromyomata. In the absence of personal experience anyone can easily convince himself of this by looking through the works that have appeared on the subject. All writers who have employed such currents are unanimous in recognising the fact of their remarkable power in arresting hæmorrhage. For my part, I have for many years tried these various procedures, and I have no hesitation in saying that I have always found them superior to high intensity methods. In cases where they have proved unable to arrest the hæmorrhage, the method of Apostoli has equally failed.

They are less effective in relieving pain than in stopping hæmorrhage; but are high intensities superior in this respect? I think not. They diminish the pain in about half or two-thirds of the cases, and this is nearly the proportion which I have found in employing moderate currents. It thus appears that the two advantages which, in defending the methods of high intensities, we usually place first, far from belonging exclusively to these, are also shared by methods milder, simpler, easier and less dangerous. Nothing, therefore, so far, justifies the assertion that high intensities are to be preferred to the moderate currents here advocated.

Is this alleged superiority of high ntensities to be found in the uncertain hope of seeing the size of the tumour diminish? Seductive as the theory of the electrolytic destruction of tumours

may be, and notwithstanding the beautiful physiological researches of M. Weiss upon the degeneration of muscular tissue under the influence of strong continuous currents, it is to be remembered that nothing has been less clearly proved in practice. In scarcely 14 per cent. of the cases treated by the Apostoli method has there been shown any diminution in the size of the tumour, and such diminution as has occurred is often very slight, and scarcely deserves to be cited amongst the satisfactory effects of electrical applications. Further, the true cause of this reduction is by no means well determined; whilst according to some the diminution of the tumour is due to the degeneration of the pathological elements which compose it, according to others—and these the greater number—the diminution in size is due simply to the decrease in the peri-neoplastic congestion, and does not affect the anatomical elements of the growth itself. Without entering into a debate which the absence of precise and sufficient anatomical data makes useless, I am content to show that any reduction in the tumour by means of high intensities is most frequently *nil*, sometimes of slight extent, rarely sufficiently marked to attract attention.

Besides looking at the question from this point of view almost identical results are obtained by the method of moderate intensities. It is not unusual to see under the influence of the arrest of the hæmorrhage an actual decrease in the volume of the tumour. This diminution, it is true, is most frequently slight, and once reached it cannot be exceeded, even with frequent applications, and long-continued treatment. In this respect Apostoli's method perhaps has the advantage, but the results which it furnishes are so rarely positive, and so often incomplete, that they do not justify its exclusive employment; at best they afford an indication in cases where, after the arrest of the hæmorrhages, after the diminution of the pains, after the disappearance of the peri-neoplastic congestion, it is desired to reduce the tumour, whose size is productive of discomfort. In such cases high intensities can be employed. This is the only precise indication which I recognise for their use.

But besides these procedures where we employ moderate continuous currents, thereby reducing danger and difficulty to

a minimum, there is another method which it appears to me cannot be spoken of too highly, a method absolutely without danger, and which in point of efficiency is equal and even superior to the electrolytic methods—I mean intra-uterine faradisation, or the even simpler proceeding of intra-cervical faradisation. This method—by no means new, as it was employed so long ago as the year 1834, but which really dates from the works of our teacher, Dr. Tripier—has never received the attention it deserved. Whether it is that, applied without rule and with defective apparatus, it gave many unsatisfactory results, or whether it is that the *éclat* which for twenty years surrounded the method of Apostoli, had, in spite of the works of Massey, of Franklin Martin, of Rockwell, monopolised attention, this method has remained in unmerited oblivion, from which it appears to me that an attempt ought to be made to rescue it.

Few therapeutic measures show to the same extent so remarkable an efficiency, with absolute freedom from danger. During more than three years that I have employed it, it has seldom failed me, and it has succeeded in cases where electrolytic applications have proved useless (see the thesis of my pupil, Dr. Philippot). It is true that to obtain such results it is necessary carefully to select a suitable quality of induction current. Induced currents of *intensity* and of relatively feeble pressure, such as those produced by the coarse wire coil of Tripier's apparatus, with the interruptions not too rapid, are to be chosen. The oscillations of the contact-breaker may be from about two to ten a second. I would not say that rapid interruptions are not effective; although less active than slow interruptions they nevertheless give fairly good results. The negative pole should be the active pole, and this should be placed in the uterine cavity, or cervix. The position of the positive or indifferent pole is not a matter of importance; it is my custom to place it upon the abdomen. The sittings should be short (about three minutes), the frequency of the application depending upon the case; from two or three a day to arrest a hæmorrhage actually in progress, to two or three a week when it is a question of treating a menorrhagia. The intensity of the current should always be such as can be easily borne. No useful object is attained by employing painful currents.

The freedom from risk in making such applications in the treatment of uterine fibromata and fibromyomata need not be insisted on. I have never known the least accident attributable to their administration, and yet my patients often have to walk or drive considerable distances immediately after the treatment.

Faradisation, carried out according to the technique which I have thus briefly indicated constitutes, in my opinion, the treatment of choice for the symptom "*hæmorrhage*." Its action is rapid, bringing about the arrest of hæmorrhage in a few hours, and it reduces in a few weeks, often from the very first month, menorrhagias of great extent and long duration to a condition of normal menstrual flow. Contrary to the opinion of Tripier, the effects of this treatment are lasting; moreover, its application is so easily carried out, and so well borne, that there is no inconvenience in prolonging it for several months, or in recommencing it if there is any relapse. It also relieves pain more quickly and better, it reduces congestion in the affected organs more frequently, and eventually diminishes the size of the tumour in a greater number of cases, than is found with electrolytic applications. I have never been able to understand the aphorism that some surgeons would like to make into an axiom that "every myomatous uterus ought to be removed," for I cannot see how a non-bleeding fibromyoma, which is not causing pain, and not undergoing a rapid or extensive development, can be a source of serious danger to a patient.

It seems to me prudent, before having recourse to a cutting operation, to try every method of treatment capable of preventing such a necessity. Constant recourse to the knife appears to me to be irrational and unscientific; it deprives the woman of an organ which can yet be of service, and whose removal may bring about troubles of the nervous system, the gravity of which we are now beginning to appreciate; it bars the way to any other progress than that of operative technique, it makes the medical man lose sight of the supreme object of his art, which is to cure, and it makes the patient run the risks of an operation which, although brought to great perfection, nevertheless presents a mortality which unhappily is not yet a "negligible" quantity.

If these few lines succeed in drawing the attention of gynæcologists to some procedures with which they are not as a rule familiar, my object will be attained; and I am persuaded that these methods, once duly tried, will be largely resorted to, with satisfaction to the medical man, and benefit to the patient.

SOME NOTES ON HYPNOTIC SUGGESTION.

By Dr. Charles Lloyd Tuckey (London).

There is a saying that there are more ways of killing a dog than by hanging it, and there are many ways of curing disease. The *Journal of Physical Therapeutics* is obviously chiefly devoted to the consideration of material remedies, and it is therefore very liberal of its editor to admit to its pages an article dealing with psychical treatment.

The interdependence of mind and body is recognised by everyone, and the influence of mental states upon bodily functions is seen every day. On the one hand, we see, for instance, how a good stroke of business or a mental shock may act as a powerful stimulus to, and promoter of, functional health, or the reverse; and, on the other hand, how judicious exercise and regimen may bring about healthy thoughts and feelings in patients suffering from mental depression, or perverted ideas. By hypnotic suggestion we make an honest and scientific attempt to treat many diseases through the mind. It is time that the question should be dealt with by the medical profession, for we see in the vogue attained in this country and America by such a system as "Christian Science" so-called, how the public are deluded, and medical men injured by the ignoring of one of the tendencies of modern thought.

It is very important to success to bear in mind that by hypnotism we endeavour to influence the organs and functions through the highest cerebral centres, which constitute not only the physical basis of mind, but also exert a supreme control over the entire system. Every muscular fibre and organic cell has, as Beaunis says, its ultimate representation in a cortical cell.

Liébeault contends that hypnotic suggestion enables us to attack disease at its centre instead of at its periphery, and to get at the manager of the business, as it were, direct, instead of wasting time with clerks and subordinates. He is, of course, an enthusiast.

Bernheim is prone to attribute nearly all curative results to "suggestion," whatever the method used, and cites as an example the success which at first attended the practice of suspension in locomotor ataxy.

In this connection one is reminded of the advice of a professor to his pupils: "Make haste, gentlemen, to use a new remedy while it does good." It is often impossible to apportion the credit due respectively to the remedy and to the imagination, and the study of suggestion affords valuable information on this point. Certainly, no physician can afford to neglect this factor in treatment, and the most successful practitioner will probably be he who can best use this potent ally—not necessarily, of course, or consciously with hypnotism.

Professor Woods, of Philadelphia, describing a visit he paid to Nancy some years ago, said the atmosphere there was "heavy with suggestion"; and this is true not only of Nancy and of Lourdes, but of many fashionable health resorts.

Bernheim succeeds in at once hypnotising over 90 per cent. of his hospital patients, and a large proportion of these become somnambulic. He does not obtain such striking results in his private practice, and the experience of other observers points in the same direction.

The method adopted at the public cliniques on the Continent is as follows:—Each case is recorded in the usual way and a diagnosis is made after examination. If he is considered suitable for hypnotic treatment the patient is taken into the operating room and told to sit or lie on a chair or couch. There will be three or four other patients in the room in different stages of hypnosis, and the spirit of imitation is thus aroused. In many cases it is sufficient for the operator to simply close the patient's eyes with his fingers and tell him, in a decided tone, that he is to go to sleep, for that result to immediately follow. But the method usually adopted is that of Braid, the patient being made

to look at a bright object held a few inches above the eyes, so as to tire the accommodation and cause slight convergent strabismus. After a few seconds the pupils are generally seen to dilate, the eyelids to oscillate, then the cornea rolls upwards and the eyelids close.

The patient may have fallen into somnambulism, shown by his being anæsthetic and by amnesia on waking, or there may be only slight languor produced, with disinclination to move and inability to open the eyes. Though it may be taken for a rule that the deeper the hypnosis the greater the effect of suggestion, this is not invariably the case, and "suggestibility" is often present with only very slight drowsiness. In the public cliniques of Paris, Amsterdam, and Stockholm the physician goes round to each patient, making the suggestions appropriate to the case. These are generally directed to combating the symptoms. For instance, in a case of writer's cramp, the patient is told that the spasm or paralysis will disappear, and that he will regain power and control over his movements. At the same time massage and movements may be used. Braid generally combined local treatment with suggestion, and was very successful in so treating chronic rheumatism, old inflammatory troubles about joints, and sprains.

The patients are allowed to rest for twenty minutes or half an hour, and are then awakened by being told to open their eyes. There is never any difficulty about the awaking; but it is advisable to suggest absence of excitement or discomfort, and to see that the patient is thoroughly himself before leaving the house. In private practice the procedure is much the same, but better-class patients require more time. It is, of course, very important only to hypnotise women in the presence of a witness.

In regard to the theory of hypnosis, modern physiology, and especially the localisation of functions in the brain, enable us to form a good working hypothesis.

Heidenhain regards hypnosis as inhibition of the cortical cells, and supposes that this inhibition may be removed in part by suggestion, when we wish to influence an organ or function through the higher centres.

The theory held by Mr. F. W. H. Myers and propounded by

him at the annual meeting of the British Medical Association, held at Edinburgh, 1898, is interesting. He supposes that underlying ordinary consciousness is a deeper layer of our being which he terms the "subliminal self," and which is in touch with the infinite, and can draw upon it for knowledge and power.

Genius is, he thinks, an "emergence of faculty" from this source, and it is appealed to and accessible by suggestion. Hypnotism, by shutting off the life of relation, enables the whole attention of the organism to be concentrated in the desired direction.

That hypnotic suggestion enables us to control processes which are ordinarily beyond the reach of the will is proved by experiments which have frequently been carried out under rigorous scientific conditions. For instance, blisters have been produced in highly sensitive subjects by simply touching the part with the finger or some inert substance and suggesting the presence of a strong irritant. I have before me the photograph of the back of a woman's hand, taken in Dr. Wetterstrand's clinique at Stockholm, in which two well-marked blisters are shown.

The woman was a somnambule and very sensitive. Wetterstrand applied his finger-tips lightly to the spot and suggested that there was great heat and inflammation. In a few seconds local redness was apparent, and this was followed by vesication, just as after using blistering fluid. Of course it is rare to meet with so striking a case, but as it is permitted to judge of the action of a remedy from an excessive dose, so we may from such experiments form an idea of the power of hypnotic suggestion in affecting the vaso-motor system.

The subject is a very large one, and it is impossible in a short article to more than touch upon a few details. A gratifying and not too common feature in medical experience is met with in this treatment; I refer to the unanimity which prevails among its practitioners. The results arrived at are the same, whether they come from London, Moscow, or Rio de Janiero, and the best way of testing these is by putting them to the proof. This is easily done; a susceptible person is chosen who suffers from neuralgia, headache, or some functional nervous ailment. He is hypnotised,

and suggestions are made combating the symptoms complained of. The chief point to bear in mind is that the treatment is a psychical one, and that it is therefore important to do nothing to shake the patient's confidence or arouse his distrust. Anæmic young women are perhaps the easiest subjects, and it is observed by all practitioners that hypnotic suggestion is very beneficial in improving the nutrition of these patients.

A large proportion of the poorer class of patients will be found easily hypnotisable, and it is only when one comes to deal with chronic cases and people of critical and sceptical temperaments that the difficulties of the treatment become apparent. I began by thinking that hypnotism was a remedy within the reach of every practitioner, and one to be freely used in cases which resisted ordinary treatment. Experience has, however, convinced me that it would be unwise in the present state of public and professional opinion for the general practitioner to make any but rare and exceptional use of this agent. To the prejudice still felt in many quarters against hypnotism must be added the objection that its efficient employment takes more time than can be spared by the ordinary practitioner; for unless one can devote almost unlimited time and patience to a difficult case it is better not to undertake it.

Among the diseases in which hypnotism has been found of great value, and in which it should be thought of when other remedies fail, are: (*a*) Nervous diseases of functional origin, such as writer's cramp, migraine, neuralgia, headache, hysteria in its many manifestations, enuresis nocturna, irritable bladder, insomnia, chorea, neurasthenia, and some cases of epilepsy and asthma.

(*b*) Neurosis of psychic origin, including masturbation, kleptomania, agoraphobia, nail-biting and other bad habits in children.

(*c*) In some constitutional diseases, especially rheumatism and gout, hypnotic suggestion is not only useful in relieving pain, but it also exerts an influence on the circulatory aud nutritive processes, and so produces a curative effect. Bernheim uses hypnotism very largely in his wards at the Hôpital Civil at Nancy, and finds it valuable in relieving pain in the course of acute disease, such as pleurisy, cough in phthisis and pneumonia, and sleeplessness and restlessness in typhoid and other fevers.

(*d*) In diseases of the female generative organs hypnotism has a powerful effect, and is successful in amenorrhœa, dysmenorrhœa, and menorrhagia. In women, especially, suggestion often removes constipation and induces regular action of the bowels. It does this both by increasing peristaltic action and promoting intestinal secretion.

(*e*) Finally, as a corrector of bad heredity and an agent of moral reform, hypnotism is, I believe, without a rival. In chronic alcoholism, drug habits, and moral degeneration, the patient in the hypnotic state is placed in a position to receive and profit by suggestions which in his ordinary condition would quite fail to touch him.

In the changes which modern medical practice is undergoing, alongside the increased importance which is being given to new methods of physical therapeutics, may be observed the new interest and importance which is attached to the psychical aspect of disease. There is ample scope to work on both lines.

METALLIC INTERSTITIAL ELECTROLYSIS.

By Dr. G. Gautier (Paris).

(*Continued from page* 63).

II.

Theory.

This deep action, thanks to galvanisation with the soluble positive electrode, can be made evident by a series of experiments.

First, let us ascertain if the copper electrode undergoes a loss of weight during the passage of the current. Before the experiment I weighed two copper needles. The weight of one (A) was ·34912 gr.; of the other (B) ·34645 gr. Then these two needles were inserted into the muscles of a rabbit's leg and connected with the positive pole of a battery giving a weak current, 9 m.a., during 10 minutes. The needles were again weighed, after having wiped them, and dried them with blotting-paper.

The first (A) weighed ·34900 gr.; the second (B) weighed

·34625 gr. Therefore the loss is (A) ·00012 gr.; (B) ·00025 gr. This loss represents the quantity of copper deposited as a salt in the muscles.

The decomposition of pure copper being evident, there remained two questions to be determined: In the first place, is the new salt, the oxychloride of copper, toxic? In the second place, has the nascent body penetrated deeply into the tissue?

Although numerous applications of this method seem to show the reality of this double phenomenon, it was desirable to have experimental proof of it.

The oxychloride of copper is not toxic. Granted that the serous liquids are composed partly of chloride of sodium and potassium, I made artificial solutions of chloride of sodium 1 and 2 per cent. I then submitted these solutions to electrolysis, using copper as the positive electrode. Having thus obtained an oxychloride of copper which is insoluble in water, it was washed and dried *in vacuo* in order to suspend it in water in the proportion of 1 to 2 per cent. With this solution I made intra-muscular injections in three rabbits. In the first subject the amount injected was one cubic centimetre, and it was not followed by any reaction; in the second animal the amount injected was two cubic centimetres; in the third subject, four cubic centimetres. There was no reaction, and, even at the end of two months, no appreciable change had supervened. Since this salt in the nascent state did not produce any reaction, it was of consequence to determine its chemical composition. With pure red copper obtained by galvanic deposition I have obtained, at the positive pole, an apple-green deposit, which is the oxychloride of copper. This precipitate, washed and dried, was submitted to analysis under the action of heat at 110° C., and was shown to be represented by the following formula: CuCl, 2 CuO.

Such is the composition of the salt of copper which constistutes the greater part of the compound formed in submitting to the action of the positive electrode (copper) muscular tissue and mucous membranes. More complex chemical reactions occur on contact with the acids contained in the organic secretions natural and pathological. When a muscle detached from the body is

submitted to the action of a continuous current, there is obtained at the positive pole sulphuric, phosphoric, hydrochloric, and nitric acids, and at the negative pole potassium, sodium, and ammonium. These latter reactions have comparatively little interest from our present point of view.

The oxychloride of copper penetrates the tissues in direct proportion to the intensity of the current and the duration of its flow. This fact can be proved experimentally by the following test:—Examine the modifications of structure which are noticeable, for example, in the uterus of a rabbit, at the end of ten applications of intrauterine metallic interstitial electrolysis with the copper electrode. In a rabbit, commencing ten days after parturition, I made, during two months, ten applications of the method. An important point to notice is that in the rabbit we can introduce a copper electrode of the size of an ordinary hysterometer into the interior of the Fallopian tubes; for the orifices of the appendages are very permeable, and situated at the very fundus of the uterus. After the fifth application I made a laparotomy to examine the organs which had been the subject of experiment, and there was neither a traumatic lesion nor even congestion. I immediately carried out a galvanic application of ten minutes with 20 m.amp. The appearance of oxychloride of copper at the end of the application was manifest, not only upon the surface, at the place of application of the electrode, but intracellular diffusion was evident. The abdomen was closed, and the animal was left alone for ten days, when four fresh applications were made. After this last series, total ablation of the uterus was performed, and microscopic examination showed—(1) that the deposit of copper salts upon the internal surface of the uterine mucous membrane was very appreciable; (2) that the penetration of these salts into the tissues was complete, the parts, both externally and internally, being saturated with insoluble oxychloride of copper, and of the soluble organo-metallic salt. The latter was recognised in the following way:—If we place upon different points of the mucous membrane and the muscle a plate of steel or of iron, there appears, after some seconds, a layer of metallic copper deposited upon this plate.

Dr. A. Weil in every respect confirms my conclusions, formu-

lated for the first time in my lectures of 1891.[1] "I prefer," says he,[2] "the method of the soluble electrode, and I base my opinion on the theory of the ions. Let us suppose a hysterometer of a metal, which is acted upon by electrolysis, attached to the positive pole of a continuous current battery, in the endometrium; and let us suppose the tissues formed simply of a normal serum, that is to say, a normal solution of chloride of sodium of 7 per cent. If the electric circuit is closed by an indifferent electrode placed upon the abdomen, chlorine and oxygen are disengaged at the positive pole; this oxygen and chlorine attack the metal and form an oxychloride, so that we find ourselves in presence of a series of molecules of oxychloride, and a series of molecules of water and chloride of sodium. Suppose a first chain formed by an oxychloride of the following formula: MOCl and H^2O, we should have—

+ OClM OClM OH^2 OH^2
+ OCl MOCl MO H^2O
+ OCl OCl MO MO H^2O.

In the same way, if we consider a chain formed of metallic oxychloride and chloride of sodium, we have—

+ OClM OClM ClNa ClNa,

And if the current continues to pass—

+ OCl MOCl MCl NaCl
OCl OCl MCl MCl.

"If we take a chain composed of metallic oxychloride and an albuminous compound, it will be the same; the metal progresses thus from molecule to molecule, in order to penetrate into the depth of the tissues.

"Let us now examine the instrumentation, and the practical application of metallic interstitial electrolysis.

(*To be continued.*)

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[1] *Technique d'Electrotherapie.* Maloine Edit.
[2] *Electrotherapie gynæcologique*, p. 156.

ON SOME NEW EXERCISES FOR THE TREATMENT, BY DEFINITE SYSTEMATIC MOVEMENTS, OF TROUBLES OF CO-ORDINATION IN TABES.

By Dr. L. Vorstädter (Bialystock, Russia).

(*Continued from page* 74.)

II.—Time Exercises.

The principal scope of these, as already said, is to make the time proportions, and the speed of movement, dependent upon the will of the patient. The apparatus by which these exercises are carried out consist of two wooden sandals (guide shoes), which are each connected to a detachable turntable (fig. 8). The

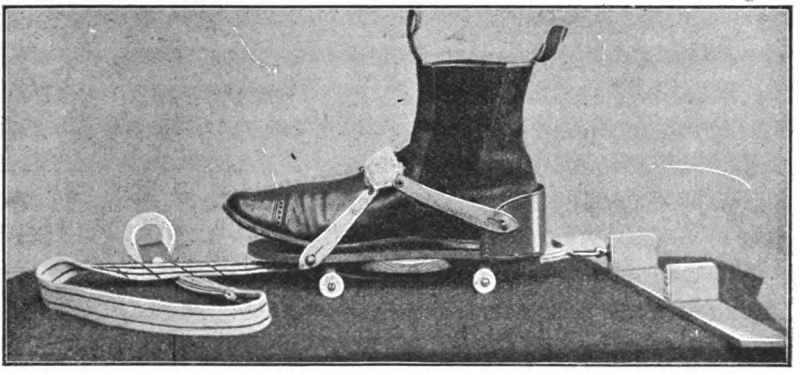

Fig. 8.

turntables have each four rollers, and are movable along guide-tapes, forwards and backwards. Both guide-tapes are divided like measures, and fastened to a crossbar at one end. The whole thing is attached to the floor by placing the forelegs of a chair on the crossbar, and the patient sitting upon it (fig. 9). The rings at the free ends of the straps are for making taut the straps during the exercise. The forward as well as the side movement of the shoes are indicated to the ear by the noise of a vibrating spring. After the guide-shoes are buckled on to the feet of the patient, and the straps made taut (see left strap, fig. 9), the exercises consist in the patient slowly moving his feet *forwards* and *backwards*, and he has to stop movement at certain places

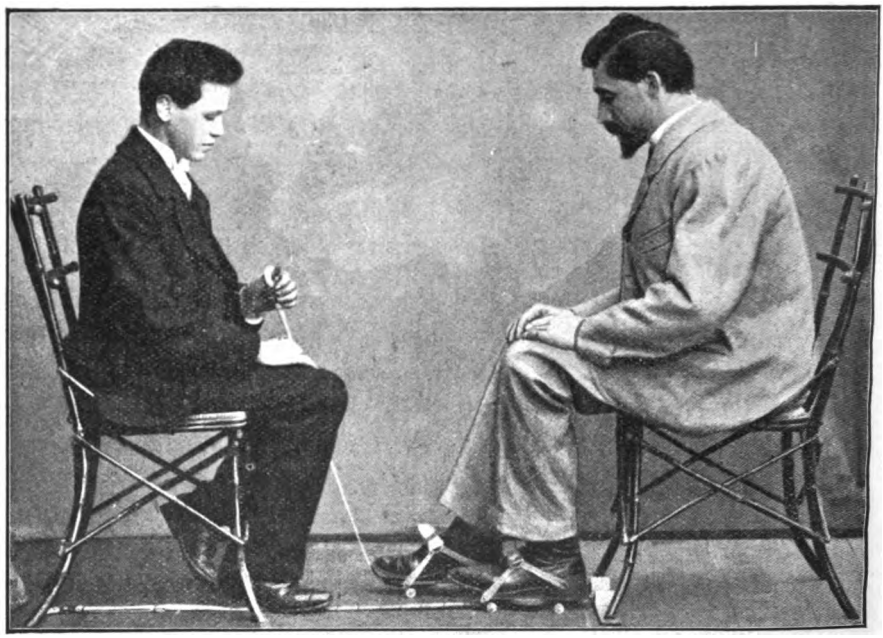

FIG. 9.

or numbers on command. This apparently simple task is very difficult for many patients, and therefore I have employed the ear to help the sight in these cases, which, as is known, renders real assistance to the patient, as he is rapidly able to estimate the speed of his movements by the time of the vibrating sound.[1] In very bad cases the patient must also be helped by mechanical interference, namely, by the tightening of the guide-straps from their free end (see right strap, fig. 9), where a resistance capable of regulation can thus be offered to the forward movement at the foot.

The guide-strap by enforcing a certain direction helps the

[1] This utilisation of the hearing must not be confused with the acoustic sense excitation proposed by Gräupner (Nauheim) for the movement exercises. Gräupner tries by a certain contrivance to make audible to the patient the touch of certain spots in a certain path, that is acoustically marking the movement sense; whereas here *not* the moment of *pause*, but the *moment* of *movement* has the attention of the ear, so that the patient during the movement acoustically gets a controlling consciousness of the time proportions.

special purpose of these exercises, as the patient has only to direct his attention to the *timing* of the movements and less to the direction. When the patient has had enough exercise with the guide-strap he can dispense with it and train without it.

III.—Intensity Exercises.

The intensity exercises, which have to regulate the energy or tension of each muscle, are performed with the help of a free-hanging strap which is movable up and down by means of a roller and counterweights. The roller gives a vibrating sound in turning, and the strap is marked and numbered like a ruler.

The patient, sitting (fig. 10) or standing, regularly pulls the strap up and down with his foot, and stops the movement at any particular point as ordered. The patient should perform these movements *easily* and *softly* at the beginning with each foot separately, and later with both simultaneously, in opposite directions, &c. It is advisable first only to order small stretches, and only later let the exercise be performed on longer stretches and with both legs. The patient should look at the markings on the strap during the exercise, which helps in the movements through the sight impulse, and the simultaneous

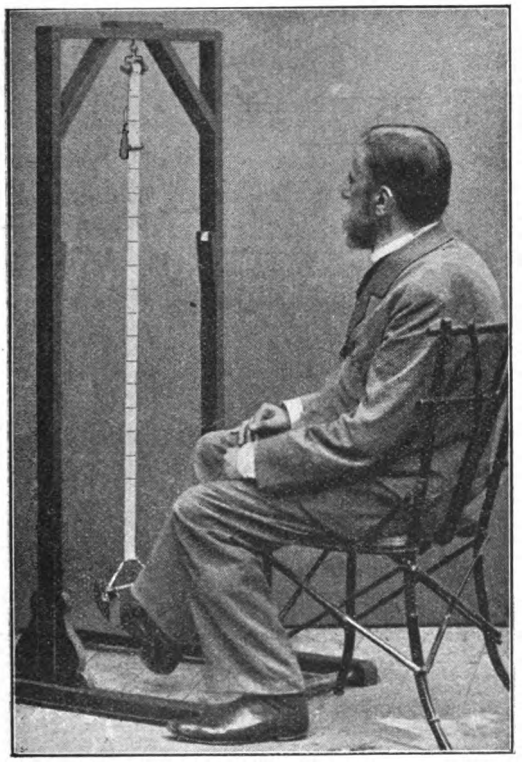

Fig. 10.

acoustic control will materially help the patient to acquire a soft tread. In bad cases it will even happen that the simultaneous utilisation of both factors (sight and hearing) is not sufficient help to the patient, and then a third assisting element must be resorted to, namely, the direct stimulation of the muscle-sense. This is brought about by increasing the resistance by means of augmenting the balance-weights. This simple appliance provides the medical man with a means of regulating the energy or intensity of the movement, as he has at his disposal the three dimensions of muscle work—"mass (weight)," "path" and "time," and can combine them as he pleases.

Here I must remark that the separation of the different exercises is not to be considered *absolute*, but only to give prominence to separate movements for different purposes. When a patient is practising *directional exercises* he is not *exclusively* but only *principally* occupied therewith, as he, to a certain degree, involuntarily must perform the other exercises at the same time.

Lastly, I will mention another contrivance, which, although it has nothing in common with the exercises described above, still can be of a certain value. This little apparatus, which I call "*foot-balance*," follows up the idea of applying direct mechanical excitation to the impaired muscle sense of the tabetic patients. For this purpose I utilise the *perception* of weight, and load the patient with *slide weights*, which, by *any alteration in the position* of the foot or the leg, automatically *change* their position, and also that of the load, so that, in consequence of this enhanced excitation of the muscle sense the different cerebral perceptions will be conveyed to the

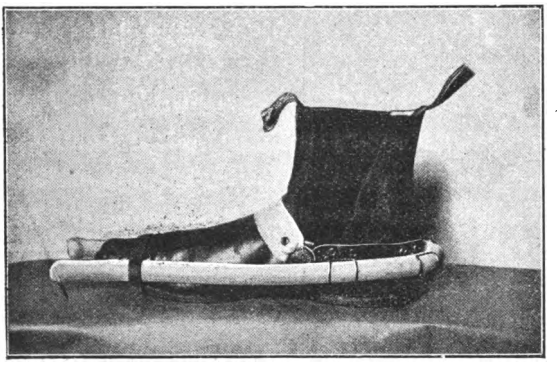

FIG. 11.

motor centres of the patient with greater intensity. The *foot-balance* is simply a border strapped round the sole (fig. 11) provided with slide weights. If the toe be raised or lowered the weights move forward or back, and their knock against each other also gives the patient an audible signal as to how his movement proceeds. The *foot-balance* can be combined with every kind of exercise treatment, and can be profitably utilised at any time.

The system of exercises described can be combined with any exercise method and utilised as supplementary or after treatment. The necessary apparatus is simple and portable, and therefore within the reach of every patient for home use. This I held to be very important, as the tabetic, besides the work in special institutes, must have unlimited home exercises to prevent the full development of the symptoms.

During last winter I treated a few tabetic ataxics exclusively and systematically with my exercises, and have ascertained the following facts:—

(*a*) The exactitude which the exercises demand does not cause the patient the difficulty that might *a priori* have been expected. This may be because in attempting precise movements the patient only has to do with small stretches of path, and it is obviously easier for him to co-ordinate small stretches of path, step by step, than deal with more extensive ones from the beginning. Hence follows the conclusion that precision must be of great service in exercise therapeutics and can be attained by using short stretches; a fault can thus be at once corrected, and any great co-ordination errors be prevented.[1]

(*b*) Collectively the exercises cause only a minimum of muscular effort, especially those which are performed with support.

(*c*) The exercises offer the patient an occupation which,

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[1] Since this article was written I have read Prof. Goldscheider's "*Anleitung zur Ubungsbehandlung der Ataxie*, 1899," which I have studied with great interest. I was highly pleased to see therefrom that Prof. Goldscheider lays great stress upon the precision of the exercises, their strict supervision, and upon the necessity of stimulating the mind of the patient.

thanks to its numerous combinations, and the fact that it is for his welfare, interests him and fully engages his attention.

(*d*) Patients are not all able to perform the different exercises with the same ease; one patient has difficulties with one exercise and another with another. This depends upon the fact that in different patients the three motorial moments (direction, speed and power), are not attacked to the same degree.

(*e*) As to the results, they were as follows: Slight cases (early stage) improved in 40 sittings, in so far that co-ordinate walking going up steps, &c., became decidedly easier; this also was observable in the exercises. In severe cases improvement in walking, &c., was only observable after 60 or 70 sittings. These lasted about one-and-a-half hours, including pauses, and were taken in series of 10 to 15, with three to four days' interval between each series.

The annexed figures (fig. 12) show photographs of the original tracings of three different patients. For purposes of comparison I have selected three identical figures out of the whole collection of designs. The sets 1 and 2 are from severe cases, 3 from

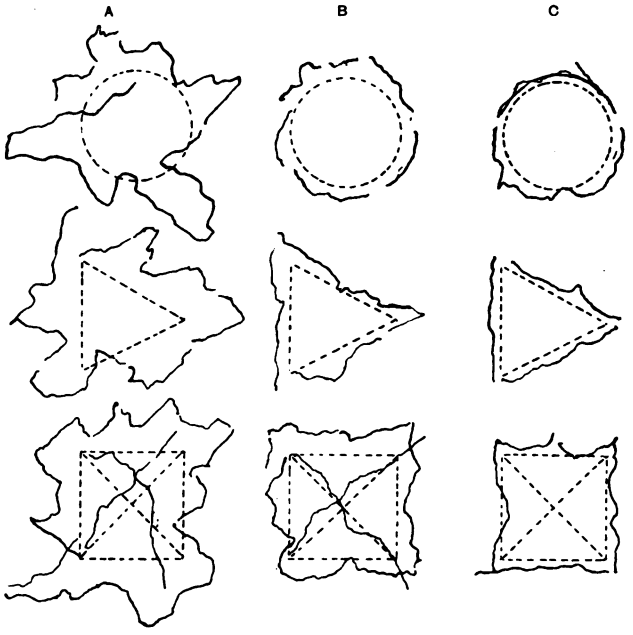


FIG. 12 (1).

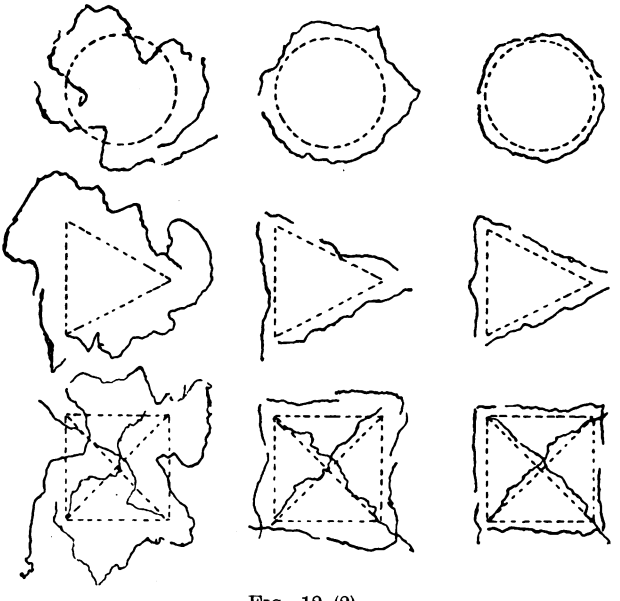


FIG. 12 (2).

a slighter case. A shows the commencement, B the middle and C the end of the exercises.

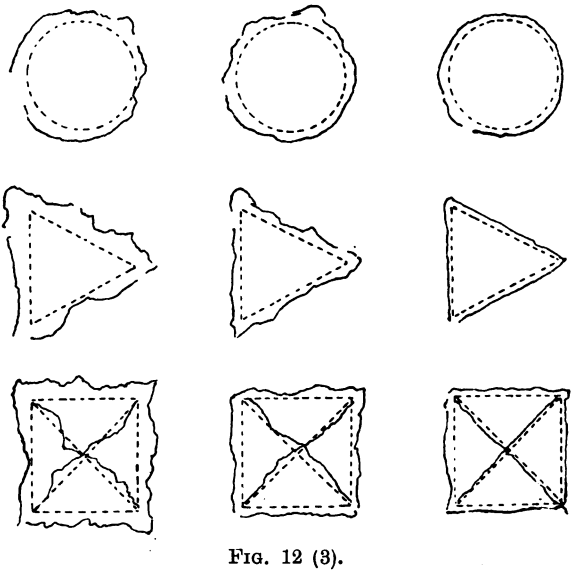


FIG. 12 (3).

So early as last summer, on my return from Nauheim, I had in Berlin, through the kindness of Prof. *Mendel*, who gave me

permission to use his private clinic, an opportunity of testing upon tabetics a "*tracing shoe*" made in Nauheim, and to convince myself of the efficiency of these kinds of exercises. After working out the whole system, and testing it during the winter, I had the honour while passing through on my way to Nauheim, some weeks ago, to show and demonstrate the chief part of my exercise apparatus at the Charity Hospital before Herr Geheimerath, *v. Leyden*, and *priv. docent* Dr. P. *Jacob*, and had the pleasure of their approval. To enable me to make further observations, Geh. *Leyden* was kind enough to give me an introduction to Dr. *Bittelman* at Nauheim, who was good enough to place all the tabetics in his clinic at my disposal. I have allowed the patients to exercise in the presence of Dr. *Bittelman* and others during a certain time daily, and these patients can also corroborate what I have said above under *a*, *b*, *c*, *d*. Concerning the final result it is impossible as yet to say anything with certainty, as in this case my exercises were used only as supplementary to others, and could only be continued for a short time.

INCANDESCENT LIGHT CABINET-BATH AND FINSEN'S CHEMICAL (ACTINIC) LIGHT BATH.

By Dr. Felix Wilhelm (Bertheldorfs Sanatorium, Germany).

When we observe the brilliant filament of the incandescent electric lamp, at a sufficient distance for the effect of the heat to be imperceptible, the shape of the filament, on account of its intense brightness, causes the same sensation that results from looking at the sun. If now we imagine a photo-electric cabinet, lighted up by a cluster of fifty incandescent lamps, the extraordinary similarity of the effects upon the eye of the rays of the sun and of this group of incandescent lamps, must strike any one. Moreover, if we consider that fifty of these ½-ampère lamps would amply suffice to light an average villa, and that this number of lamps (of 800 candle power) is collected for therapeutic purposes around a single patient, and in a space that measures but one meter in diameter, and not much more in

height, it is not easy to see why Finsen refuses to such an arrangement the name of "light-bath." It is hard to understand why, according to him, this is but a "sweat-bath," whilst baths of actinic light alone "constitute true light-baths."

These arguments, especially directed against the light-bath widely employed in Germany, are to be found in the article "A Note on Light Baths," by Niels R. Finsen, M.D., in the JOURNAL OF PHYSICAL THERAPEUTICS, October 15, 1900.

Apart from the covert reproaches in this article, against German physicians, for having adopted the unsuitable name of light bath, like charlatans and quacks, has not Finsen himself recognised the favourable influence even of red light on smallpox patients? Moreover, at St. Petersburg, Finsen's red room, fitted up on a large scale for smallpox patients, has really given excellent results. Nor have good effects failed to follow the application of red light to measles and scarlet fever; and Winternitz has, this summer, published two communications upon the favourable influence of red light on various skin diseases, without having been able, as in the case of the incandescent bath, to have recourse to the effects of either heat or perspiration to account for these good results. Blue light that cures lupus, proceeding from the extreme actinic end of the spectrum, and red light, from the opposite end, unite—*extremes meet*—in skin therapeutics, and act specifically as distinct kinds of *light*, each in its own way. And further, in the article referred to, Finsen especially states that his applications of light baths, including the true actinic light baths, are still in the experimental stage. As long as this is the case, he ought to refrain from condemning our incandescent lamp cabinet as a light bath.

Every amateur photographer knows that he must not examine a sensitised plate by the light of a *candle* unless he has, with a dark red glass, deprived the light of its actinic rays. Now an incandescent lamp cabinet supplies a light of 800 candle power. Why, under these conditions, should it not emit enough actinic rays to deserve the name of light bath? Moreover, we can now fix the lamps invented by Professor Nernst of Goethingen, in Edison's bulbs, instead of incandescent lamps, and they give double the amount of light. Thus a light *twice as intense* is

obtained, of a *pure white* or rather *greenish* colour, a light consequently derived rather more from the *actinic* side of the spectrum. The *General Electric Company*[1] of Berlin has already carried out several installations with Nernst lamps. The tension necessary is for the time being 220 volts; but for an expense of a few hundred marks, a voltage of 110 can easily be obtained.

Had we only wanted a perfect sudorific bath without light, we had already for this object the "electrotherme," of Prof. Rumpf and Dr. Lindeman, an apparatus which has proved exceedingly useful, and which at any rate leaves no doubt as to the cause of its therapeutical successes. Therefore, those physicians who only needed an electric hot air bath, elegant, cleanly and easy to move, could not do better than fit up an electrotherme; but most physicians wanted a *light* bath. An incandescent lamp cabinet was therefore arranged with a definite object, and with careful consideration.

I even know of cases in which arc lamps were used for the production of the light. But they were hard to regulate, burned unequally, and were abandoned for incandescent lamps, considered preferable as a source of mixed light, so long as the last word, on the specific effect of spectral colours, has not been said.

Look over the lists of orders from large electro-technical firms for the cabinet bath, now under consideration, and you will find the name of many a colleague of a notoriously critical turn of mind. It is scarcely necessary to point out that a physician, before making so important an order, at an expense of several hundred marks, makes due inquiries and obtains all the information that is available. What is also to be remarked, on the other hand, is the fact that the cost of the electric energy is less with arc lamps, two or three of which together, it is well known, do not consume more current than one alone.

With Finsen's arrangement (a circular room 12 metres in diameter, with two powerful arc lamps of 100 ampères each placed in the centre at a height of 2 metres, with the patients lying around in radial cells on inclined beds) a light bath can easily be administered to a number of patients twice or thrice

[1] *Allgemeine Electricitats-Gesellschaft.*

as great; as can be done with the incandescent light bath, even if each light of the cabinet have but ten candles. Incandescent light baths, even in small hospital installations, are no cheaper than Finsen's light baths, in which there may be *two* arc burners (with the same current as for one) at the same price as *one* incandescent lamp cabinet. Moreover, a considerable number of those who use incandescent light baths have also arc lamps. It is therefore not monetary considerations, as Finsen supposes, that has decided the choice.

Every German physician who practises radio-therapeutics, will appreciate the great value of the actinic rays, and will always be ready to recognise Finsen's merits, but, like him, he will not be ignorant of the fact that the actinic rays cause an inflammation and pigmentation of the skin, and will desire, in many cases, expressly to avoid these results, without giving up the other therapeutical uses of light. And nothing will better fulfil his object than the incandescent light bath, with its relative poorness in actinic rays. In one of his writings Kellog lays stress on the fact that of all the electric energy consumed in an incandescent light bath, only 5 per cent. is accounted for in the luminous rays. The red, blue and violet rays are, of course, not included in this 5 per cent., inasmuch as it is known that these rays raise the percentage to 30, and with Nernst's ½ ampère lamps, even to 60 per cent. On the other hand, neither do arc lamps give as much as 100 per cent. of light, but only 85 per cent. We find the following remark a little earlier in the same article by Kellog: "On examining, by means of the splanchnoscope, a human body, on whose abdomen an electric lamp of 16 to 32 candle power was burning (a single incandescent lamp), the whole true pelvis shone with a bright red *light*."

Our body, and it is its treatment that first concerns us, absorbs immediately below the surface, by means of the red blood, the actinic rays (blue and violet), according to the *law of colour absorption*. The other rays penetrate, even through bones, as *brilliant light*, to the innermost parts.[1] Why should

[1] Perhaps this is also the case with the blue and violet rays, if at any rate the latest hypotheses on the phosphorescence of the blood be experimentally verified.

these red rays not act as favourably on the inside of the body, as in the cases of skin diseases quoted by Winternitz, they do on the surface? Why should not incandescent lamps, which are rich in red rays, and therefore economical, be used for their production? Why should we not call these rays that are easily visible to our eye, *light* and call the therapeutical procedure, which makes use of them, light *baths?*

A branch of the healing art as young as photo-therapeutics, requires exact expressions, precise and technically clear. According to Kellog light rays are divided, for therapeutical purposes, into three classes: "Heat rays, luminous rays, and actinic rays." The whole scale of the rays—if it be allowed to compare it to the musical scale—extends over about four octaves, of which the luminous rays occupy about one-sixth.

The heat rays occupy the two lower octaves, and therefore contain the red and ultra red.

From what has already been said it is evident how necessary it is to clearly distinguish heat rays, and to avoid misunderstandings and too marked a collision between common speech and technical expressions—to speak of invisible heat rays or strictly *heat* rays and red rays, or more generally hot luminous rays. It is because all normal sighted men first perceive them as *light* and not as heat, that red lights are so universally used as *signals.*

Whilst smallpox, measles, and scarlet fever progress more favourably under the influence of red light, and patients apparently can bear it for a long time, the action of greater heat equally prolonged would be impossible to bear, especially in febrile conditions, and would consequently produce by retention of heat (thermostasis) unfavourable results. It is therefore not only general theoretical considerations that lead us to *distinguish heat from red light,* but therapeutics *compel* us.

Says Kellog, necessarily making use of the terminology of common speech: "In hot baths, in Turkish vapour baths, in hot-air baths, *heat* reaches the interior of the body by conduction, after penetrating *slowly* through the layers of tissues that *oppose a great resistance to the passage of heat rays, but allow light rays easily to pass.*"

As a fact, the average duration of a hot-air bath, or of a vapour bath, is two or three times greater than an incandescent light bath. It is very properly the light as *light* which has gained for the latter its claim to preference.

We may express ourselves as in perfect accordance with the view that a *portion* of the incandescent rays are transformed in the body into heat; and on this account incandescent light cabinets can render excellent service as sudation baths. But there is no necessity for always allowing them to act so powerfully, and for so long a time that transpiration ensues. In every well-arranged incandescent light bath the lamps can be fixed or taken away; the duration of the bath can thus be prolonged by using only half, or one third of the lamps, or by leaving them lighted until the patient feels comfortably warm, without making him lose the beneficial action of light as such. For, assuming that the rays of a single incandescent lamp are sufficient in passing through the abdominal wall to produce in the interior of the body a strong red light—twenty-five or more of these lamps would surely be less likely to fail in producing a true light action in the innermost parts of the body.

On many occasions I have stated that I am in accord with Finsen and Kellog, in the view that a certain percentage of the light of incandescent lamps is transformed into heat in the body; and even that the incandescent light bath, unlike the chemical radiation of Finsen, produces directly more heat; and thanks to the latter fact the warming which is necessary to supplement the light bath of Finsen can thus be economised; and on the other hand it is the light which enables a higher temperature to be more easily borne. "Under the influence of electric light," says M. Siemens, "plants can bear a powerful stove heat without losing their vigour." From my personal experience I can affirm that in an incandescent light bath I can easily support a temperature of 75° C., whilst in a hot air bath I begin to feel symptoms of malaise before the temperature reaches 45° C. I should like to know the experience of *confrères* who have made similar experiments.

I would further state that the thermometer rises in the ultra violet part of the spectrum; also that all the luminous

rays, including the red, possess a chemical action, and in fine, that on account of a lively reaction of the skin (this is the case in light baths) transpiration occurs at comparatively low external temperatures. This is said, not in order to protest against the excellent practice of employing incandescent light baths as sudation baths, but only to maintain their importance as light baths, and preserve the name they justly deserve as such. Not only do I agree on this point, but I would even strongly advise all photo-therapeutists to indicate in their publications, whether they intend to speak of incandescent light, of Nernst light, or of arc light. The common term "electric light bath" is scientifically incorrect.

In concluding this article a further short note may be permitted. In Germany we have too dearly bought the widespread use of physical therapeutics not to recognise that the physical agent *par excellence*—the classical physical agent—light, acts therapeutically *as light*, by its so-called chemical rays alone.

It must further be maintained that without taking account of heat, light is also transformed in our bodies into other forces, electrical, osmotic, and various other mechanical energies (the therapeutics of molecular vibrations) and investigators, whose work it is to analyse, should turn their attention to these processes. But great care should be taken in establishing a terminology, not to alter the meaning of *general* conceptions, clearly defined by what is apparent to the senses, nor to appropriate common phraseology for special purposes. Light remains light.

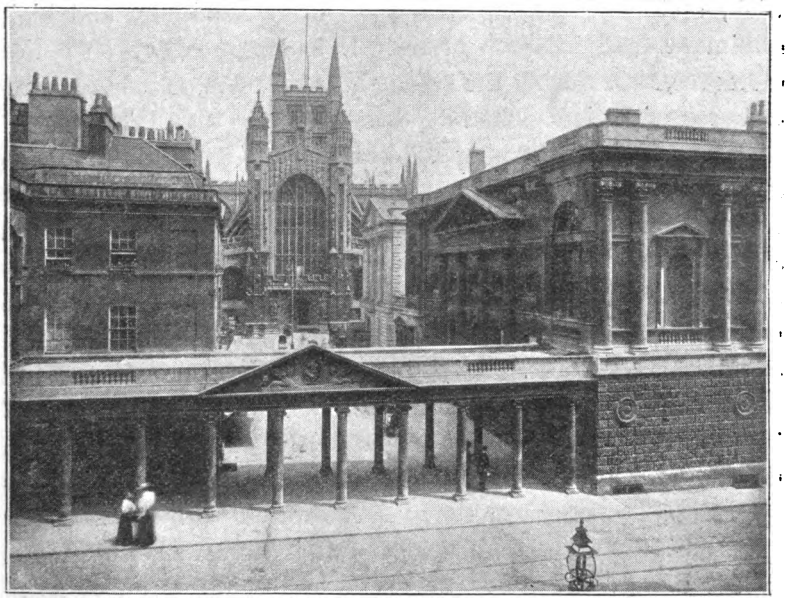
Health Resorts and Sanatoria.

IV.

BATH AS A HEALTH RESORT.

By Preston King, M.D.Cantab. (Bath).

Nestling in one of the prettiest parts of the Avon valley, surrounded by hills which protect it from the extreme cold winds of winter, Bath may well lay claim both to her title of Queen of the West, and also to her established reputation as a health resort for invalids.



Pump Room and Abbey.

The surrounding country, at whatever season we may see it, is remarkable for its beauty. In spring, which is earlier by a fortnight here than in the eastern counties, it perhaps is at its best; but when the green of summer is changing upon the wooded slopes into the rich and many-coloured hues of autumn, or in the

depths of winter, when the naked trees, clad in hoar frost, stand out upon the snowy background, offering welcome shelter to the little farms and homesteads they surround, it equally presents a lovely landscape, and gives us some of the prettiest views of perfect English scenery.

The climate of Bath varies, within certain limits, with the different parts of the town; for even in the heat of summer there is a cool and bracing air on the slopes of Lansdown, which quite rewards the extra toil of getting there.

The weather is very much like that of the rest of England; constant chiefly in its variation, and remarkable mostly for its frequent surprises.

Taking all the year round the thermometer records a temperature in Bath which, compared with Cambridge, Oxford, Greenwich, and Gloucester, shows a 5° lower maximum and higher minimum than in those places. It has frequently been noticed, moreover, that during the recent hot summers, London has been favoured with eight or ten degrees more heat than Bath.

The season for "taking the waters" is generally recognised as a winter one. There are some things to be said in favour of this custom, but more probably against so artificial and arbitrary an arrangement. The waters are equally efficacious at any season of the year. At the Mineral Water Hospital, where fashion does not intrude, we find that "cures" are effected equally well in summer as in winter. There are, moreover, obvious reasons why certain sufferers should prefer the summer for their visit. For the old, and for those who are especially susceptible to changes in the temperature, the advantages of such a course are self-apparent; not only can they use the waters with less risk, but—quite as important—they can get out into the air either walking or for drives, and enjoy the parks and country round, as they could not do in the winter.

For the ordinary visitor the best time for a course of the baths is during the latter part of spring or the early autumn; and the experience of recent years shows that this fact is beginning to be more fully recognised. Many who have been in the habit of going to some Continental Spa for treatment—and to whom so long a journey is no light matter—are finding more and more

that in Bath there is an equally effective means of cure, lying almost at their doors.

"English waters best suit English bodies" was the saying of an old physician; and if the slavish observance of fashion, which decrees that sufferers must seek health abroad, were only broken through, many who are now unable would attest that these words are true.

The thermal waters rise to the surface at three points, supplying respectively the King's, the Hetling, and the Cross baths. These springs are all within a narrow area, and though at the surface they are quite distinct, they doubtless have a common origin within the ground. The temperature varies slightly, that of the two first named—which supply the bathing establishment—being about 117° F. to 120° F., whilst at the Cross bath it is only 114° F.

The chemical constituents of the water from the different springs are found to be alike, though differing slightly in their relative amounts. They contain chiefly the sulphates of calcium and sodium, with a small quantity of the carbonate of iron. On first issuing from the earth they are effervescent, nitrogen forming about 90 per cent. of the gases given off.

Water is nature's great solvent, and the good that follows a thorough washing out, and flushing of the various organs, can easily be imagined even by those who have never tried it.

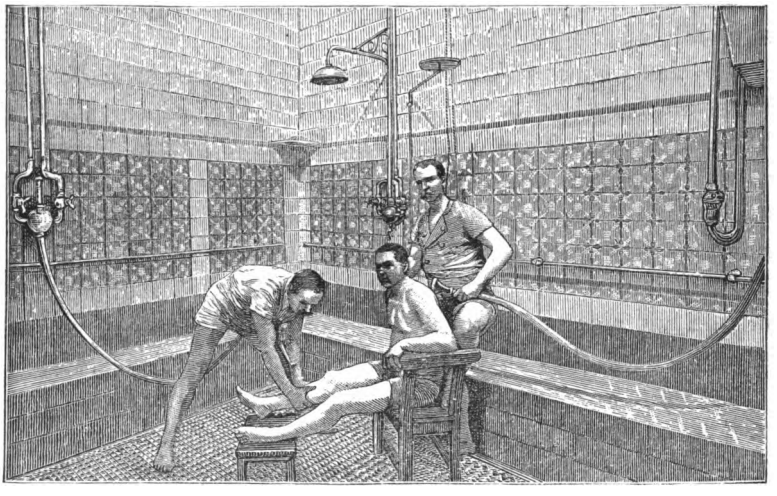
The Bath waters, however, have a distinct advantage in the treatment of disease over ordinary water, for they possess certain medicinal and therapeutic properties peculiarly their own. If we do not know why this is so, and if we cannot explain how it is that so apparently simple a mineral water has such curative effect, at least we know it is a fact.

Some people, upon whose kidneys ordinary hot water has no especial effect, find considerable inconvenience in the excessive action of these organs after drinking the thermal waters; and when it is remembered that they are taken during a period of increased activity of the skin, produced by the hot bathing, this diuretic effect is all the more remarkable.

The waters appear to possess a special virtue in those many cases where trouble results from the presence of uric acid, for

they have a distinctly solvent action upon this subtle cause of so many ills. "In our experiments it was shown that Bath water dissolved over five times the amount of uric acid that distilled water would similarly take up at blood heat, *i.e.*, just under 100° F. Since the waters are drunk hot, and used hot for bathing purposes, this fact may have an important relation to the therapeutics of Bath waters, in the treatment of chronic gouty affections and rheumatism." [1]

The external application of the waters is a no less essential part of the "cure" than their internal use—indeed in many cases it is the more important of the two. Bathing is generally followed by the hot "pack," by means of which the fuller action of the skin is encouraged and kept up.



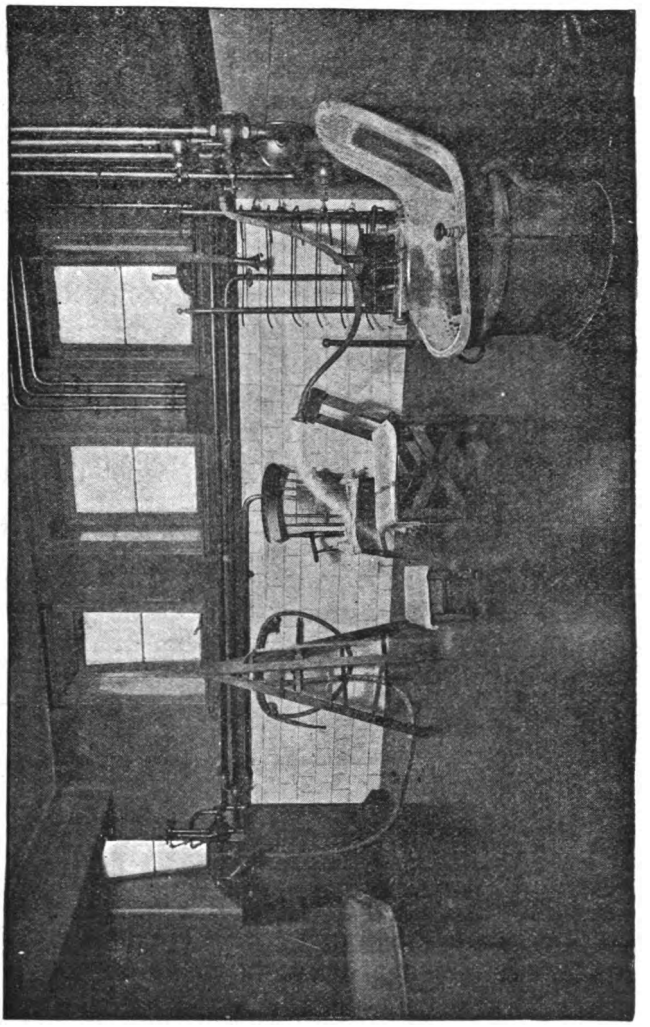
AIX MASSAGE BATH.

There is no doubt that, properly used for drinking and for bathing, we have in our thermal waters a powerful therapeutic agent against disease, which only needs to be more widely known to be of still greater use.

For ordinary bathing purposes the Deep and Reclining baths are used at a temperature of about 99° F. to 104° F., and in conjunction with these baths the "wet" or undercurrent douche may be employed. By this douche a powerful stream of water,

[1] *Lancet* report on Bath, October 14, 1899.

at three or four degrees higher temperature than the bath, is directed on to the affected part, and is of great help in the treatment of local pain, or for the reduction of thickening about the



VICHY ROOM.

joints. The Chair bath is a modification of the deep bath for the benefit of those who are unable to stand. In this, by means of an ingenious arrangement, a wooden chair, in which the patient sits, is lowered by hydraulic power into the water.

Next in importance to these baths comes the Aix massage douche, which is applied by skilled attendants, and is a copy of the system employed at Aix-les-Bains. Then there are the "lumbar chair," the needle, the rain spray, the Scottish and other forms of so-called "dry" douches, which are of benefit in the treatment of local affections and neuralgic pains, such as sciatica, lumbago, &c. There is also the vapour bath, which may be used either generally, or only locally to one or more joints, and the sulphur bath; this last is formed by the addition of sulphide of potassium to the ordinary water, and is most useful in the treatment of eczema and other forms of skin disease, especially when they are due to gout.

The whole of the bathing establishment is under the management of the City Corporation, and in this respect Bath has a distinct advantage over continental spas; for these as a rule are in the hands of the Government, and it is easy to understand what that means.

The Corporation rightly realise that it is not their aim to make the baths a source of income—and this the ratepayers know full well—and they spare no expense in order to provide proper accommodation, and to render the baths not only as efficient, but also as luxurious as possible.

The result is that, in the excellence of its bathing arrangements, Bath holds a position second to none among the spas of Europe.

V.

INSTITUT PHYSICO-THERAPIQUE DE PARIS.[1]

Dr. J. A. Rivière, of Paris, was the first to carry out the idea of combining in one vast establishment all the newest and most perfect apparatus for the employment of physical agents in the treatment of disease. It perhaps may be regarded as the most complete medical establishment in the world; and thanks to Dr. Rivière's special knowledge of mechanics and physics, it is stamped with the mark of all that is modern and progressive.

[1] 25, Rue des Mathurins-Opera.

Few of the many medical men who visited Paris for the Medical Congresses of the Exhibition of 1900, failed to visit this establishment, nor, having visited it, to be impressed with its completeness and extent. In a short hour they there had the opportunity of becoming acquainted with the most improved medical apparatus known. Frequent visits to other countries, and the labour of many years, have enabled Dr. Rivière to select the best instruments that any country or maker could supply. He is himself an inventor of a series of apparatus, which employed with his own methods, give him good results in the treatment of obesity.

The establishment comprises the following departments :—

Electrotherapy.—All the known models of high frequency apparatus; many grand solenoids of d'Arsonval; condensers; every kind of Oudin resonator; bipolar resonator; new d'Arsonval transformers; magnificent static machines; Morton currents; continuous, faradic, sinusoidal, undulatory, and polyphased currents; hydro-electric baths and douches.

Hydrotherapy.—Complete horizontal douche; massage under water (apparatus Rivière); Nauheim baths; oxygen baths; carbonic acid baths (apparatus Rivière).

Thermotherapy.—Apparatus Rivière.

Vibrotherapy.—All the best forms of vibrator; apparatus Seiston[1]; apparatus Gaiffe; apparatus Rivière; vibrating helmet, and vibrating chair of Charcot.

Mecanotherapy.—Apparatus Rivière.

Hydro-massotherapy.—Obesity (apparatus Rivière).

Auto-massotherapy.—Obesity (apparatus Rivière).

Aero-massotherapy.—Apparatus and method Rivière.

Phototherapy.—Finsen apparatus; electric light baths (Rivière); reflecting apparatus (Rivière) (treatment of pulmonary tuberculosis by means of very intense luminous clusters).

Aerotherapy.—Compressed air; rarefied air; ozone; oxygen; pulverisations; balsamic and antiseptic ozonising apparatus for inhalation.

Radiography and radioscopy.—The most modern and perfect apparatus.

Kinesitherapy.—All kinds of apparatus for the treatment of scoliosis, &c.

A special room is set apart for gynæcological electrotherapy.

Rooms are set apart for the treatment of obesity.

Dr. Rivière's method of treating obesity consists in increasing the activity of the oxidations, and the exchanges in the organism, by the following treatment :—

[1] Made by Göransson's Mekaniska Verkstad in Stockholm.

(1) The patient is placed for half-an-hour in the electro-thermo luminous apparatus (Rivière).

(2) He then passes into a room where he undergoes soaping, with general mechanical massage under moving water (Rivière).

(3) Putting on some underclothing he passes on to another room. He is placed for half-an-hour under the electric vibratory masseur (Rivière). He is thus massaged mechanically from head to foot, for half-an-hour.

From the beginning to the end of his treatment the patient breathes ozone, chemically pure, furnished by a powerful machine. The *séance* finishes by an application of high frequency (grand solenoid or bipolar *effluve*). This complete treatment, carried out every second day, alternates with oxygen baths, carbonic acid baths, and hydro-electric baths.

This method, besides being effective, allows the patient his ordinary diet, and his usual mode of life.

New Inventions.

TREATMENT OF OBESITY.

(System of Dr. RIVIÈRE.)

1. ROLLER TABLE FOR MECHANICAL AUTO-MASSAGE.

THIS new apparatus is for the purpose of carrying out mechanical massage, on a person lying upon a suitably arranged table.

It consists essentially of two movable cross-bars supported by four upright feet fixed to a table. These two cross-bars permit of a to-and-fro movement through a system of connecting rods, belts, or other gearing, by means of a motor, electric or otherwise, placed under the table, or any other suitable position. The above named cross-bars carry a certain number of axes, whose position can be regulated, and these axes carry in their turn massage rollers, the number of the latter varying with the nature of the massage to be carried out. To enable the patient to be placed conveniently on the table, the frame, consisting of one of the cross-bars or the axes of the rollers, is made movable round the other cross-bar. By raising this frame the table is completely detached and the person to undergo treatment can be arranged without difficulty.

It will be seen that the arrangement of these massage rollers permits of a slight vertical displacement by means of springs in the form of a parallelogram, in order to allow them to follow exactly and without too much pressure, the irregularities of the surface of the body. By depressing or raising the shaft of the rollers, pressure more or less energetic is secured.

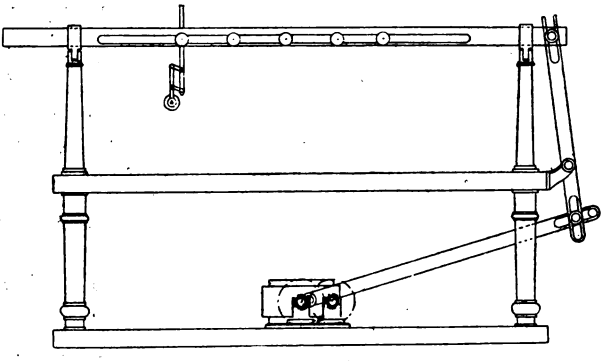


FIG. 1—(*a*).

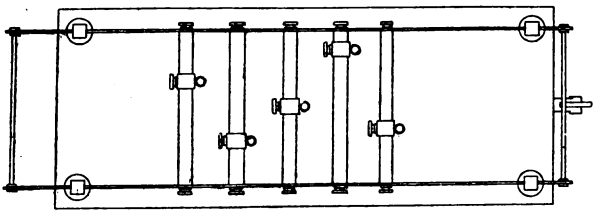


FIG. 1—(*b*).

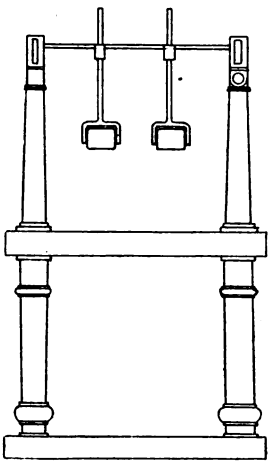


FIG. 1—(*c*).

2. VIBRATORY ELECTRIC AUTO-MASSEUR.

The apparatus shown below consists essentially of a frame of iron or hard wood, which serves as a support for the various mechanical and electric arrangements used.

In connection with one of the axes of this frame, two fixed vertical grooves are arranged (GG), in which two slides (MM) in copper or bronze is moving in a vertical to-and-fro direction. This movement is obtained by means of connecting rods and pulleys (PP^1, P2-P^{1}2), commanded by a small dynamo (X). Upon the two movable slides one or more circles (A) are fixed, which can be regulated by means of a screw (V) and to which are attached a certain number of massage rollers (D). These rollers can be varied in position by moving upon the circle (A) where a screw (V) fixes them, or being advanced upon the centre or drawn back towards the circumference by means of the handle (T) and screw (V).

Upon the various circles (A) there can be arranged the number of rollers suitable for the kind of massage it is wished to carry out. These rollers (D) can be electrised from any electric source.

At any point that may be desired of the slide (C) there is placed a plate (B) which carries four balls (E) analogous to the rollers (D) already referred to. These balls are mounted on an axis whose length is varied by means of a screw; the plate (B) is moved in a rotatory direction by means of the dynamo (X) and by means of the wheels (P3 P^{1}3). The plate can, like the axis of the rollers (D), be traversed by an electric current. At its upper part, the general frame carries a fixed axis (L) around which can oscillate "palettes" (C). These tend to be brought from above downwards by two strong springs which are joined by means of a lever (B) fixed upon the groove (G).

It will be remarked that the position of this lever, and also the tension of the spring, can be easily regulated. Like the rollers, the lever (B) can also be electrised.

The apparatus works as follows:—

The patient who is to undergo either a localised or general massage is placed in the interior of the circles. The circles (A) are placed in front of the organ to be massaged, then arranging the rollers (D) and the handle (T) the dynamo is started and a to-and-fro movement of the grooves (GG) is obtained; and consequently a movement of the circle and wheels (D), which move over the parts to be massaged. By putting the patient's feet in water in which the negative pole is immersed and the positive pole to such of the rollers as it is desired to electrise, electro-mechanical massage is obtained, which is very effective in the treatment of obesity.

By placing the plates upon the abdomen and arranging the position of the balls (E), abdominal massage is carried out. By arranging the "palettes" (C) over the shoulders massage is obtained by "tapotements," whose amplitude and force are regulated by the tension of the spring.

One or two vibrators will be added to the apparatus at the level of the pelvis, or of the vertebral column.

When all the apparatus is in action the patient is massaged automatically from head to foot, and no manipulation is found to be more effective than this.

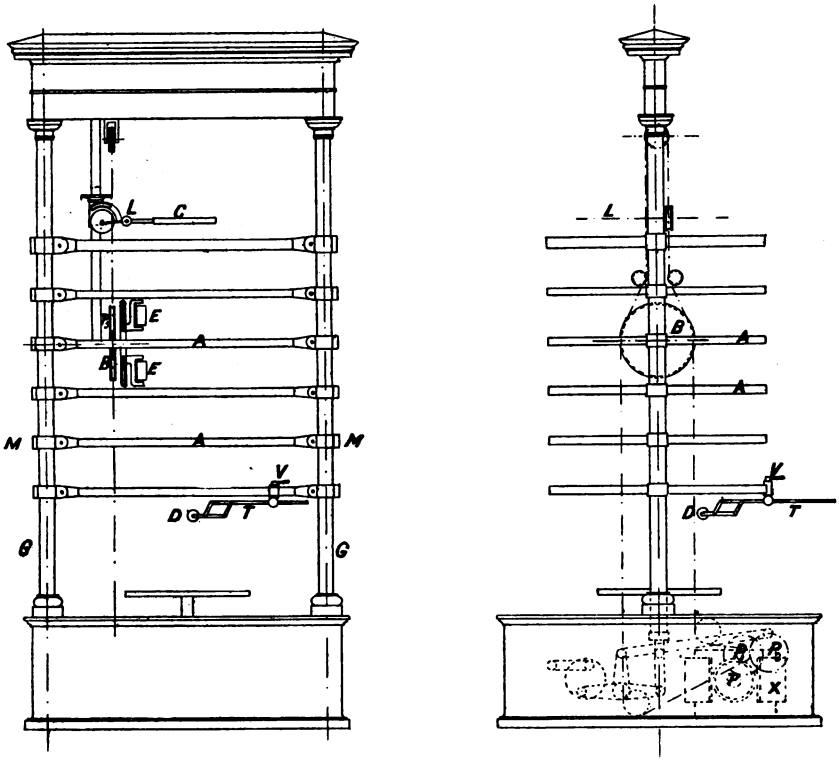


FIG. 2—(*a*).

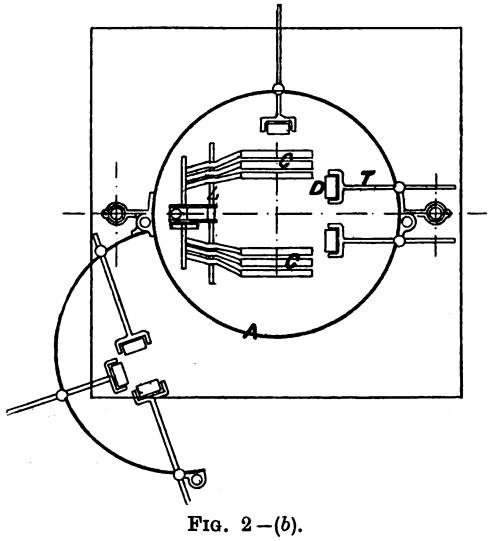


FIG. 2—(*b*).

3. APPARATUS FOR AUTO-MASSAGE BY MECHANICALLY-MOVED BRUSHES.

This new apparatus, the invention of Dr. Rivière, is intended to carry out auto-massage, mechanical and electric, by means of the friction of brushes, moving either by rotation movement or rectilinear to-and-fro movements.

It consists essentially of two horizontal arms fixed in a bath of any form, one of the arms, which carries a certain number of cylindrical brushes, having a rotatory movement from a dynamo by means of a slide and friction plate, or by any other analogous mode of transmission. The other arm, which carries a certain number of brushes either vertical, horizontal, or at any angle, is moved in a to-and-fro direction, by the same dynamo, by means of a lever and a handle plate, or otherwise.

The person to undergo treatment being placed in the bath, filled or not by any liquid suitable to the nature of the case, the dynamo is started, which puts the brushes into action. By moving to the right, or to the left, the patient can

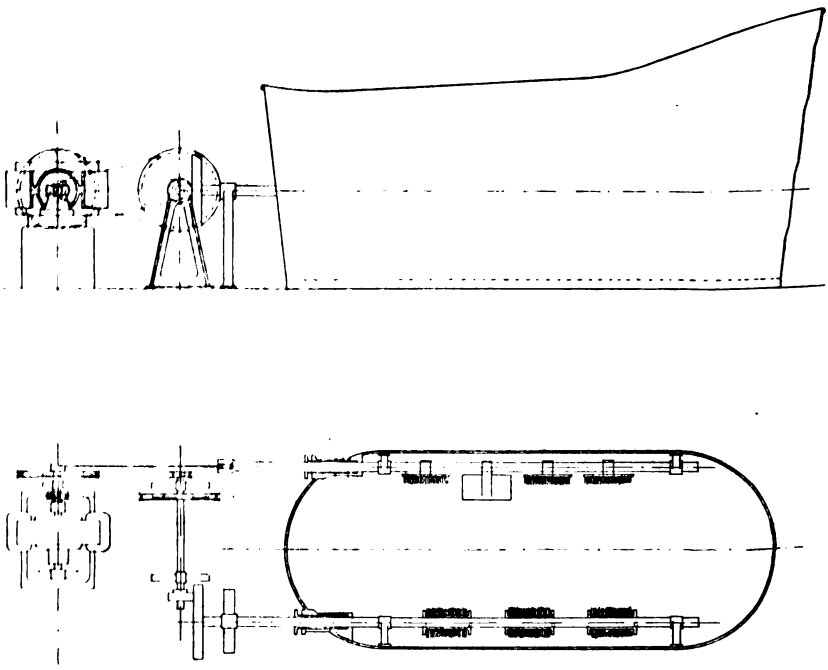


FIG. 3.

increase the pressure of the brushes, and therefore the energy of the friction. If the rheostat which regulates the dynamo is placed near him, he can stop or start, or quicken or slow the action of the motor.

Further, if an electric current be passed through the liquid in the bath, mechanical and electrical treatment can be thus combined, and by this means powerful curative effects can be obtained.

Dr. D'ARSONVAL'S NEW BI-POLAR COIL FOR HIGH TENSION CURRENTS.

The advantage of these new coils for currents of great frequency and high potential is that they furnish, without the impedimenta of a double resonator, single or double *effluvations*. Another advantage of this novel coil is that it permits of a great range of effects, from very powerful to comparatively slight, by varying the length of spark of the static condenser; again it requires no regulation, the inducing and secondary being always in accord. It is sufficient to place the movable coil in the middle of the induced to have two poles or two *effluves*, or on the contrary to place the movable coil at one end, putting the pole of the corresponding induced pole to earth; or what is better, attaching it to the patient by an inactive electrode. One single large and regular effluve is thus obtained without any disagreeable sparking. Dr. Oudin thus speaks of bi-polar resonators: "I believe that this bi-polar character is a matter of great interest, inasmuch as it creates a zone of greater density of current between the two poles when it is desired to make a local application." Dr. Oudin gives four cases treated with the bi-polar apparatus—two of them being very rebellious cases of pruritus of old standing, and two of them cases of pulmonary tuberculosis.

Notes.

An Advocate for the more Extensive Employment of Physical Agents.—Dr. A. H. Carter, in an address on some aspects of modern medical theory and practice,[1] delivered before the Staffordshire Branch of the British Medical Association, has the following judicious remarks on the subject of the methods of treatment which are dealt with in the JOURNAL OF PHYSICAL THERAPEUTICS:—"The principles which have thus far occupied our attention need to be brought into working relation with actual practice by a knowledge of the effects and mode of action of the remedial measures at our disposal. This amounts to something much more than mere pharmacology. It includes also a knowledge of the physiological action of those powerful agents which, for the sake of convenience, we call 'natural remedies'—namely, diet, heat, cold, rest, exercise, masssge, electricity, and climate. The nineteenth century which is now closing has been marked by notable changes in our therapeutic armamentarium, occasioned by dropping some things, by adding others, and by readjustment of the whole, with the general result that at no time in the history of our art have our methods been more efficient and yet at the same time simpler than they are to-day.

"In the first place, we have come to see that, rightly and intelligently used, the natural remedies, which I have already enumerated, are entitled to a first place in the rank of therapeutic agents. For example, we now recognise that fresh air and good food afford the best means of dealing with the scourge of tuberculosis; that baths and selected exercises may work wonders in refractory cases of heart disease, dyspepsia, and many pelvic disorders of

[1] Reported in the *British Medical Journal*.

women; that obstinate neurasthenia often yields to Weir-Mitchell methods; that wild nervous excitement may be subdued by judicious use of water applications, and no doubt the list is capable of great extension. This is only what we might expect when we reflect that agents of this class represent the influences under which the body has grown to be what it is, and under which its activities are habitually maintained.

"In a general sense the importance of such remedial agents is widely recognised, and in some degree every practitioner nowadays makes use of them. But the great advances which have taken place in our knowledge of their modes of action, the immense improvements which have been made in the methods of their employment, and the extraordinary potency of their influence upon the nutritive processes of the body, are still, in my opinion, far from being adequately realised. Nor is this to be wondered at. In none of our hospitals is the necessary equipment for this kind of treatment adequately provided for, and therefore neither teachers nor students have reasonable opportunities for familiarising themselves with the subject. Added to which, there are serious practical difficulties in securing such treatment when it is required and asked for. In a few favoured health resorts, it is true, there are limited facilities for one or more branches of general treatment; but besides being only available to the few, it too often suffers from the disadvantages of indiscriminating specialism. It is in connection with the treatment of chronic disease that the want of such provision is especially felt.

"There is only one way, I believe, in which the difficulty can be overcome, and that is by the establishment of sanatoria in various parts of the country, provided with all the aids that scientific medicine can devise for the thorough investigation and treatment of chronic disease. In America the experiment has been tried on a commercial basis, and is already at work in various centres on a large scale, with astounding results. They are more than self-supporting, and the surplus earnings are expended on the treatment of those who cannot afford to pay the ordinary fees. The principle has already been accepted and acted upon in this country in connection with the treatment of tuberculosis, and there is no reason why it should not be extended to other diseases. It, of course, does not follow that all cases of chronic disease should be treated in a sanatorium. On the contrary, all minor cases could be perfectly well treated at home when once the principle of sanatorium treatment comes to be thoroughly grasped and appreciated by the profession at large. The great value of natural treatment lies in the fact, that while it invariably strengthens the powers of resistance and recovery in the most effective way known to us, it in many cases deals directly with the external factors of disease at the same time."

The Effect of Different Colours upon the Nervous System.—According to the *Pharmaceutical Journal*, careful experiments have been made on this point. It has long been a matter of common observation that different colours produce definite effects upon the senses and feelings. Red is spoken of as a "warm" colour, blue as a "cold" colour, yellow as a "cheerful" colour, &c. Any observant person has daily opportunities of noticing that a certain colour acts upon one person in an agreeable way, upon another in a way quite the reverse; and this fact points to a reflex effect upon the nerves.

The physiologist, de Parville, has shown by numerous convincing experi-

ments that the red part of the spectrum excites the nerves, whilst the opposite end has a calming effect; the latter in virtue of the green, blue and violet colours.

Dr. Bonza goes further still, in proposing to treat certain nervous diseases by the employment of definite colours. Hypochondriasis he treats by red light, and mania by blue, nervous depression by violet light. Another physiologist has artificially produced sensations of faintness by red light, and afterwards by the red and green rays he has removed the symptom. In a large photographic-plate manufactory it was noticed that a change of colour in the light of the workrooms from red to green materially improved the temper of the workmen.

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I. B. S.

THE

Journal of Physical Therapeutics

No. 1. JANUARY 15, 1901. Vol. II.

Editorial.

Certain changes foreshadowed in a former number have now taken definite shape. With great regret the present Editor finds that owing to pressure of other work it is impossible for him to attend to the monthly issue of such a publication. It is therefore that The Journal of Physical Therapeutics becomes "a Quarterly."

The general lines upon which the Journal is conducted will not be altered; but in view of the fact that many of the subjects dealt with have little or no antecedent literature, an attempt will be made to treat them more fully and systematically than has hitherto been done; that is to say, assuming no previous knowledge upon the part of the reader, the subject will be dealt with *ab initio*, and thus a foundation laid for the superstructure that contemporary and future work is gradually to build up. That work must consist of experiment and observation. Whilst the practical aspect of a subject, and the question of technique will always be prominent, speculative articles will by no means be excluded. Theory—scientific imagination—can never be legitimately separated from the medical art. Each observer moving along his own narrow path of inquiry may assist in the collection of a vast aggregate of disjointed facts, but these await the inspiration that is to give them life and coherence,—the *theory* that is to deduce from them some far-reaching generalisation, some abiding principle, some general law. It is true that theories come and go, as shadows flit across the landscape; it is true that the medical philosopher of a not distant future will probably dismiss with a pitying smile the Erlich theory of "side-chains," and make short work of certain dogmatic little present day "views" about uric acid; still such imaginations will have had a certain usefulness in their day—they will at least have helped to swell the mass of chaos from which order is eventually to be evolved.

As stated in the standing announcement of previous numbers, the aim of this Journal is, not only to furnish a record of current progress and contemporary work, but to provide a detailed and critical account of what has already been accomplished in the field of Physical Therapeutics.

Owing to recent progress in physical and biological science, the *modus operandi* of such methods is now, in some measure, beginning to be understood; further, their successful employment requires a carefully executed technique, and such information as is available on this point exists at present only in a scattered and fragmentary form. It is therefore considered that such a journal as this need offer no apology for its existence; it is hoped that it will fill a gap—that it will supply a want.

A knowledge of the effects and mode of action of the remedial measures at our disposal, says Dr. Carter,[1] "amounts to something more than mere pharmacology. It includes also a knowledge of the physiological action of those powerful agents which for the sake of convenience we may call natural remedies, diet, heat, cold, rest, exercise, massage, baths, electricity, climate." After expressing the opinion that these deserve "a place in the front rank of therapeutic agents," Dr. Carter continues: "In a general sense the importance of such remedial agents is widely recognised, and in a general way every practitioner nowadays makes use of them; but the great advances which have taken place in our knowledge of their modes of action, the improvements that have been made in the method of their employment, and the extraordinary potency of their influence upon the nutritive processes of the body are still, in my opinion, far from being adequately realised."

It cannot be necessary to remind the reader that to devote the pages of a journal exclusively to the consideration of the agencies in question, is by no means to deal with them as something apart from general medical practice, still less to assign to them any predominant *rôle* in the treatment of disease. They represent only one class of weapon in the varied armoury of medicine. Medical men are appealed to to rescue such weapons from the incompetent and unworthy hands into which they sometimes fall.

Although its limits are not ill-defined, Physical Therapeutics is a widely comprehensive term; embracing, as it does, Electro-therapeutics, Hydro-therapeutics, Vibro-therapeutics, or treatment by vibration, Photo-therapeutics, or treatment by light, Radio-therapeutics, or treatment by the radiations of an X-ray tube, Balneo-therapeutics, or treatment by baths, Aëro-therapeutics, or treatment by compressed or rarefied air. Therapeutic and Hygienic Exercises, Massage and Manipulations, Dietetics, Climatology, and last, but not least, the valuable agencies of Heat and Cold, all come within its scope.

[1] *British Medical Journal*, Nov. 3, 1900.

METALLIC INTERSTITIAL ELECTROLYSIS.

By Dr. G. Gautier (Paris).

[In former numbers (pp. 63 and 109), the author has explained terms, and dealt with the theory of the subject. He has pointed out that oxychloride of copper is non-toxic, and referred to its penetrating and healing action in the tissues. He now, after briefly referring to the microbicidal effects of the procedure, details its technique.—Ed.]

The microbicidal action of metallic interstitial electrolysis is evident; it is proved by its effects upon infectious metritis, and upon ozœna, as well as by laboratory experiment.

To demonstrate this microbicidal action my experiments with the pyocyanic bacillus undertaken eight years ago may be referred to. Producing as it does, a fluorescent green, this bacillus strikingly lends itself to the demonstration of a microbicidal agent. The point to be ascertained is whether the oxychloride of copper retards or suppresses the appearance of the colouration.

The pyocyanic bacillus which resists the action of many antiseptics seems to be more resistant than is the case with anthrax to the effects of electrolytic action. It appears from the researches of MM. Apostoli and Laguerriere, that a current of 170 to 180 ma. attenuates a culture of B. anthracis; that two guinea-pigs inoculated *before* the passage of the current through the culture, died in forty-eight hours; that three guinea-pigs inoculated *after* the attenuating effects of the current upon the culture, proved resistant.[1] Now according to the same authors a current of 200 ma. applied for five minutes to cultures of blue pus were not followed by any appreciable result.[2]

From a series of researches made with oxychloride of copper I have been able with a weak current to show the effect of this nascent salt in arresting the evolution of the pyocyanic bacillus. The oxychloride of copper which, owing to the electrode being of copper, appears at the positive pole (even with a current of 40 ma. for five minutes) has a powerful effect upon the bacillus in its power of secreting pigment, and a slight effect in its power of multiplication; with the same current prolonged to a quarter of an hour, the latter function is entirely destroyed. The culture is, in fact, dead.

The instrumentation for metallic electrolysis is of the very simplest. It is a matter of importance that the operator assure himself that the copper employed for the active electrode is chemically pure, red copper, electrolytic copper.

In the case of the uterus cylindrical stem electrodes in four or five sizes are indispensable. They must be furnished with a

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[1] Charrin, *Traité de Medecine*, vol. i., p. 237.

[2] *Revue Inter. d'Elect.*, vol. ii., p. 8.

movable celluloid sheath to secure the effect, and limit the extent of the electrolytic action. These stems may be connected with the battery by a flexible wire capable of being securely attached to the free extremity when the stem is placed in the cervico-uterine cavity. All apparatus of a more or less ingenious kind for the purpose of attaching this electrode to the battery by means of any kind of rheophore are usually troublesome, and only serve to complicate the operation.

For applications to the cervix long needles may be necessary, smaller ones are also useful, as we shall see. For the urethra my conical electrolyser is indicated. It is composed of a gum elastic bougie of a thickness variable according to the case, fitted at the end with a copper piece one centimetre and a half long, with rounded edges to facilitate introduction. The same apparatus is used for urethral strictures; in this case, as we know, the bases which are set free at the negative pole, have no action upon the metal.

The following is the description of this bougie for urethral electrolysis given by the present writer and Larat in March, 1897, in the *Rev. Int. d'Electro.*:—"Many years ago we had constructed for us a long olive-shaped electrode, mounted upon a gum elastic sound. This olive has recently been made of red copper for the purpose of treating, by means of the same instrument, strictures and chronic inflammatory conditions of the urethra, both in the male and female. . . ." In the same article we add,[1] "Rigid electrolysers, with long thread-like conductors, are for the most part difficult to manage, therefore, for several years we have used an instrument which in every case replaces them with advantage. It is composed of a urethral bougie of gum elastic or catgut, of a diameter varying according to the case; it can be made to meet the requirements of any accessible stricture, whether of the œsophagus, or the urethra, or the lachrymal canal, or rectum. This bougie is divided six centimetres from the bladder end and fitted with a metallic extremity about one and a half centimetres long, and having a diameter slightly greater than that of the bougie. This attachment is connected to the negative pole of the battery by means of a flexible wire fixed in the interior of the bougie when it is made. The introduction of this electrolyser is easy and painless and accommodates itself to sinuosities of the canal, and permits of the operation being carried out slowly and gradually.

M. Bordier, in his report read at Boulogne in 1899, before the Association for the Advancement of Science, has dealt in a masterly way with the general considerations affecting the cure of strictures of the urethra by electrolysis, and he especially rejects all the ordinary arrangements employed, in favour of a

[1] *Rev. d'Elect.*, vol. vii., p. 239.

new one with which the electrolytic operation is carried out with great ease. "This new arrangement," says M. Bordier, "consists of a set of gum elastic bougies, each of them furnished with an active or electrolysing portion which is thus arranged, *à six centimetres de l'extremité antérieure de la bougie a été sertie une petite bague metallique, ayant neuf millimètres de hauteur. . . . Les bords de la bague ont été emoussés.* . . . The advantages are great. Thanks to the short length of the metallic portion the flexibility of the bougie is not diminished, so that it is as easily introduced into the urethra as an ordinary bougie. In sinuous canals, therefore, in which the olive apparatus cannot be introduced either primarily or by means of a conductor, the bougie in question can be used, and the electrolysing surface can be brought into contact with any part of the canal."

It is interesting to recall this description, which corresponds so closely with ours, made two years previously. It proves at least that the same ideas sometimes originate independently, and that the urethral electrolyser of Drs. Gautier and Larat is the same as that of Dr. Bordier. Our electrolyser has appeared in Chardin's catalogue for the past eight years.

Schall, in the treatment of essential ozœna, replaced the needles ordinarily inserted into the mucous membrane by pledgets of cotton wool thus prepared. These pledgets, fixed upon copper stems are "metallised" by immersion in a warm solution of nitrate of silver and tartaric acid; then upon the deposited silver there is added a layer of galvano-plastic copper. This cotton wool thus metallised is of great flexibility. It is introduced into the affected nostril, and a pledget of cotton wool is placed in the other nostril. The two poles are near each other.

We are now familiar with the positive electrode, which is the active pole—let us shortly examine the rest of the instrumentation. It is exceedingly simple:—(1) a battery of cells, dry or otherwise (12 elements is sufficient); (2) a galvanometer registering from 0 to 50 ma.; (3) a series of flat electrodes according to the nature of the application.

Large batteries giving 100 to 300 ma., electrodes in potters' clay, in order to avoid the vesication which is apt to be caused by strong currents, are quite unnecessary. With metallic interstitial electrolysis we must employ (1) prolonged sittings, extending even to twenty minutes; (2) feeble currents (10 to 40 ma.). This makes the apparatus very simple and portable. We may now briefly glance at the necessary preparations and the technique of an operation of metallic electrolysis: suppose one of the most frequent cases,—an intra-uterine operation:—

(*a*) The copper electrode is first boiled or placed in a flame; after having been carefully washed and polished with emery paper O, then cooled in a weak solution of formaline or camphorated ether. The celluloid sheath is treated in the same way, excepting, of course, that it is not placed in the flame.

(*b*) The stem electrode can be introduced by means of the (aseptic) index finger, the vagina having also been carefully rendered aseptic; or the introduction may be effected by means of an ordinary bivalve speculum. This copper electrode, of size and dimensions suitable to the cervix and uterine cavity, is slowly pushed through the whole extent of the cervix and then drawn back about a centimetre.

(*c*) A flat electrode covered by agaric and chamois leather is well moistened with warm water, and placed at the level of the umbilicus. The ordinary dimensions of this electrode are 10 cm. by 14 cm., and it is attached to the negative pole of the battery.

(*d*) The handle of the cell collector being arranged for no current, and the galvanometer also being at zero, the positive pole is attached by a light flexible wire to the external end of the copper electrode.

These preliminaries being arranged the operation can commence. The patient is warned that she will not feel any pain beyond that of a slight mustard plaster over the stomach, and a feeling of weight in the uterus. The current is then slowly turned on, with rests of thirty seconds, by 5 ma. at a time, until the galvanometer marks 25 ma. for the first sitting; 30 to 40 ma. for the succeeding ones.

To prevent the mucous membrane adhering to the copper electrode, a slight rotary movement of the latter alternately to the right and left, is necessary. This facilitates the withdrawal of the electrode at the end of the sitting. The results obtained by this method will be considered in a further communication.

NEW RESEARCHES CONCERNING THE ACTION OF LIGHT UPON THE SKIN.[1]

By Niels R. Finsen.

In several earlier papers[2] I have dealt with the influence of light upon the skin, partly describing the work of other writers (Charcot, Widmark, Hammer, Unna, Maklakoff, Defountain, Wedding), and partly detailing my own investigations. Therefore I do not now propose to return to the general question of the action of light on cutaneous surfaces, but rather to confine myself to my more recent experiments, which not only corroborate earlier investigations, but furnish, in addition, certain new facts.

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[1] *Meddelelser fra Finsen's Med. Lys. Institut.*

[2] Finsen: *Omlysets indverkningen opaa huden, Haspitals Tidende*, July 5, 1893. *Om the chemiske straalers skadelize Virkning paa den dzriski organisme, Haspitalstidende*, November 1, 1893. *Les rayonys chimiques et la variole, La semaine médicale*, June 30, 1894.

At *The Light Institute* we began in December, 1896, to work with a very powerful arc lamp (of 80 ampères). The light-power may be estimated as over 40,000 candle-power, and the intensity of such a light will be appreciated when it is remembered that the arc lamps used for street lighting seldom exceed a light-power of 2,000 to 4,000 candles.

Until experience had taught us to take precautions, the effects of light were painfully brought home to us when (especially on the day following the experiments) our skin and eyes became much affected; the former was red, tender, and swollen; the eyes felt full of sand, were excessively sensitive to light, and the conjunctiva highly injected. The use of darkened glasses prevented further mischief.

To further examine this light-inflammation of the skin, and especially with a view to find out what share the different kinds of rays had in its production, I made the following tests upon my own left forearm. The object in selecting my own arm as the subject of experiment was to enable me to have it under constant observation.

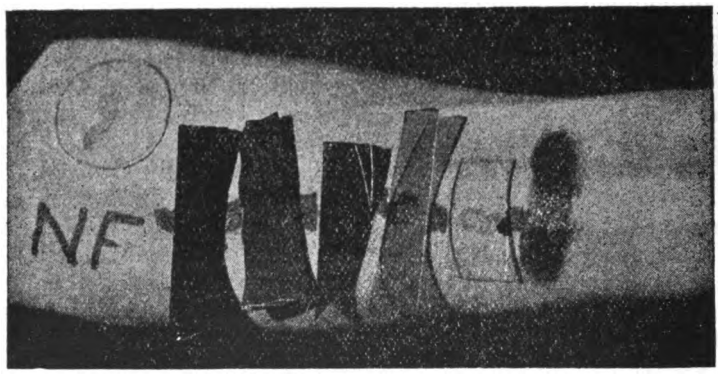
It may be mentioned that the arm, to begin with, was white and unpigmented, and covered by my clothes all day long, except during the actual time of the experiment. When it is added that these experiments were carried out on the inner side of the forearm where the skin is thin, it is evident that a site had been selected sensitive to light, and therefore suitable for the experiment.

The point was now to expose this skin to the strong light of the 80-ampère lamp, in such a way that certain parts were acted upon by all the rays, while other parts were under the action of certain special parts of the spectrum only. With this intention I placed upon the arm a plate of quartz, a series of different coloured glasses, some letters, strips painted in indian-ink, and an ointment the protective action of which I wanted to investigate. The quartz, paints, &c., were placed upon the arm in such a way that the skin round them was freely exposed to all the light-rays, as in this way it was easiest to observe, by comparison, the protection rendered by each of the coverings. After these dispositions were made upon the arm, the quartz slab and the glasses were fixed with isinglass, and the whole was photographed before it was exposed to the light. Annexed is a reproduction of the photograph which shows highest up on the arm, nearest the bend of the elbow, the round plate of quartz (1½ mm. thick), then in succession five long pieces of glass (2 mm. thick), that nearest the quartz being red, the next yellow, the third green, the fourth blue, and the fifth common clear glass. There are also seen two letters, N F, which were painted with indian-ink; further, there is a strip (a bridge) painted with indian-ink between the different glasses.

The arm thus prepared was now exposed to the light from the

80-ampère lamp, the power of which was registered by an ampèremeter. The experiment took place on May 11, 1897, in the evening between 8.14 and 8.34. The arm was placed at a distance of 50 cm. from the light in the most advantageous position to the light, at an angle of 45° to 50° to the long axis of the carbons, so that the rays should strike it as nearly as possible perpendicularly.

As, however, the heat from the lamp was too great and the experiment would have been spoilt had the arm been burnt, I moved the arm at the end of ten minutes to a distance of 75 cm. from the light, and kept it at that distance for another ten minutes; then the glasses were removed, and the indian-ink washed off. The skin showed at once some reddening even upon the places where it had been covered, and was uniformly red. At 10.30 the same evening the colour was a little paler, but still red all over. An hour later, 11.30, the reddening had increased, *but only on those places which had not been covered.* Still the difference was very slight, and in my test-book it is only mentioned that the two letters could be traced, but very faintly and indistinctly.



Next morning, again, the result could be read in strong tracing on the skin. The latter was now quite dark red and hot, and somewhat tender to touch, but wherever the skin had been covered with indian-ink it was now quite white and normal, and presented a marked contrast to the surrounding red. The two letters stood out very strongly, white upon red ground. Where the ointment had been the skin was white; also where the five glasses had been there were now five white strips of the same form as the glasses. The skin was all equally normal on all these five spots. *Where the quartz slab had been the skin had just the same colour, and was as hot and tender as on the places where there had been no cover at all.* The spot where it had been was clearly marked with a white ring; the crystal plate not having been polished round the edge; this rough edge had dispersed the light and

prevented its action on the skin. Further, there were two white spots in the middle of the place where the quartz had been. This I did not understand at first, but on comparing with the photograph taken before the exposure to the light I saw that they were from the isinglass with which the plate was fixed, this material, having perhaps been put on thickly; at any rate, it seemed to have protected the skin from any evident action of the light. So far as the glass plates are concerned the isinglass did not show any action. The skin was quite the same where the isinglass dots had been placed and where it was covered with glass only.

The reddening of the skin remained well marked for some days, and then gradually receded. The annexed photograph,

which clearly shows the effects produced, was taken on May 13 at 3 p.m., that is to say, two days after the experiment. The photograph is taken upon an orthochromatic plate, as the colour shades did not appear so clearly on a common plate.

When the redness had nearly disappeared the skin commenced to peel off in small scales like bran. This scaling lasted several days (from May 20 to 26). The skin was now seen to be strongly pigmented, and the figures shown by the photograph came, if possible, into still stronger contrast, white upon brown ground.

I have noted that still in the early days of August (two and a half months later) the two letters could be clearly read on the arm. In October the letters could not be seen, but the white marks where the glasses had been were still faintly perceptible.

The experiment just described coincided in a few points with two earlier tests, namely, one by Widmark[1] in Stockholm, and one by myself. Widmark's splendid series of experiments, which I have repeatedly referred to, and which for the first time afforded scientific proof that it is the ultra-violet rays that produce light erythema, show the great difference in light action

[1] Widmark: Hygiea, Jubilee Volume, No. 3.

when the rays have passed through glass and when they have passed through quartz, as he does not get any photo-chemical action in any of his numerous tests if the light had traversed a glass plate; that is to say, a glass plate absorbs, as is well known, the greater part of the ultra-violet rays, whilst quartz allows such rays to pass. My experiment therefore fully confirms the correctness of Widmark's results.

Next, this experiment is in accordance with a test[1] made by me at an earlier date. I had painted a belt on my arm in Indian ink, and exposed it to sunlight for three hours; the skin became red and inflamed all over, and only where the belt had been was it white and normal. After some days the redness disappeared, and the skin was now pigmented all over, where in the first instance it had been red and inflamed. I again exposed the same arm to the sunlight, but without the Indian ink belt, and now the white belt became inflamed, whilst the pigmented skin surrounding it remained unaffected. This experiment proves the importance of the skin pigment as protective against light rays, and at the same time also affords an explanation of the much disputed point as to the reason of the colour of the negro's skin. I have related this earlier experiment at length, as it appears interesting to me to compare the action on the skin in the two cases. The comparison is justifiable, inasmuch as it was the same skin, and the same arm, that were exposed to the different kinds of light; and in pointing out this, I may at the same time remark that there are such great individual differences in the reaction of the skin to light that it would be quite misleading to compare results from different individuals.

But to come back to the point more immediately under consideration. The inflammation appearing upon my skin after three hours' exposure to sunlight (the experiment took place from 12 to 3 p.m. in the early part of August) was not so intense as that which appeared after twenty minutes' exposure to electric light (80 ampère lamp, at 50 and 75 cm. distance). This superiority of the electric light is from a practical point of view, so far as light therapy is concerned, of great importance. Still it is necessary to remember that the conclusion is not therefore justifiable that the electric light was over nine times as strong as sunlight; it can only be said that it was more than nine times as rich in ultra-violet rays.

My experiment further points, in a striking manner, to the different action upon the skin of heat rays and chemical rays. Heat rays immediately bring about more or less redness, which attains its maximum *at once* and then abates. The chemical rays give next to no colour at first; this appears only after a few hours, and it reaches its maximum twelve to twenty-four hours

[1] Finsen: Hospitalsvidende, July 5, 1893.

after exposure. In my experiment the heat was, as mentioned, very strong during the first ten minutes, whereby the skin at once became red, and equally red under the blackened spots as upon the surrounding parts; but at the end of two hours it had become much paler. This redness therefore depended upon the heat rays. An hour later, three hours after the experiment, the redness had again increased, but the spots covered with ink, with glass, and with the ointment, were now less red than the surrounding skin, and continuing to grow paler, showed next day perfectly white skin, whilst at the same time the surrounding skin kept increasing in redness and reached its maximum during the next day. This redness therefore proceeds from the action of the chemical rays upon the skin.

The test with the letters shows how absolutely local and sharply defined the inflammation is that is caused by the action of the chemical rays.

It is further very interesting to learn that twenty minutes' exposure to the light could produce a pigmentation so deep and lasting that it could still be observed even after the lapse of half a year.

Lastly we have the test with the ointment. This latter was ordered for a patient whose skin was very tender to the light's action. It was intended to protect the skin by its brown colour, which it did. The ointment did not serve any further purpose, and any interest that it presented in the experiment is much the same as that of the Indian ink paint.

I did not succeed in my intention with the different coloured glasses, as the skin under all of them, even under the clear glass, appeared equally uninfluenced. This result points out in a very striking manner, as already mentioned, that the redness of my skin exclusively depended upon the action of the ultra-violet rays, and that the *visible chemical* rays had not produced any effect whatever.

The conclusion to draw from this, however, is not that the visible chemical rays cannot produce any photo-chemical inflammation; it can only be said either, that the light used was not powerful enough, or that the test was not continued long enough. That the visible chemical rays, or rather that light even filtered through such thick glass lenses, can produce a photo-chemical inflammation is a daily experience in the treatment of skin diseases with concentrated light, and occurs with electric light as well as with sunlight. Even when the light, besides the four thick glass lenses, in the concentrating apparatus, has to pass through a solution of methylene blue, or an ammoniacal solution of copper sulphate, which solutions absorb the greatest part of the ultra-violet rays, there frequently appears an evident and sometimes pronounced photo-chemical inflammation, followed by pigmentation.

To investigate this latter point I have made some tests upon

my own arm. I concentrated the light with a quartz collector, which consisted of a metal box, one end of which was closed by a quartz lens 10 cm. in diameter and of 22·5 cm. focal distance; the other end was closed by a plain quartz plate of 7 cm. diameter; the water space between was 33 cm. deep. With this apparatus the light was collected upon the skin, and by interposing different coloured glasses, light of various colours was projected upon the arm. First, quartz was tried alone, and successively, clear glass, blue, green, orange, and red, each colour during five minutes.[1] At the same time the part of the arm upon which the light was falling was sprinkled with cold water. In consideration of the difficulty, not to say the impossibility, of getting all conditions equal (for instance, the percentage strength of light, &c., for all colours), I adopted the device of making the light spot just so large that I did not feel the heat. This caused the spots to be widely different in size (from 2 to 7 mm. in diameter).

The result of these tests was that the skin reacted with the usual photochemical inflammation upon those three spots where the light had acted through quartz, clear, and blue glass; while for the other colours there was no action whatever. The strength of the skin reaction followed the same order, strongest for quartz and weakest for the blue glass, green, and further increasing to about 40 per cent. in the violet. The diameter of the light spot was for these three as follows:—For quartz 7 mm., for clear glass 4 mm., and for blue glass 2 mm.[2] For the remaining colours the spots were 2 to 3 mm. The observation was repeated on another day, with exactly the same result.

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[1] Photometry carried out during the test gave, with Vogel's photometer, in one minute's action, No. 12. The absorptive power has been determined by our physical collaborator, Mr. Absalon Larsen, with this result:—Clear glass allowed about 90 per cent. of all visible rays to pass through. A thin piece of red lost decidedly more, as only 80 per cent. were recorded. This accounts for the bluish-green tint of transmitted light. Red glass let 28 per cent. of the outer red pass, 23 per cent. of the middle rays, and 4 per cent. of those next the yellow. All other rays were totally absorbed. The yellow red glass let about 13 per cent. red, 2 per cent. yellow, and 2 per cent. green pass. The green allowed a trace of yellow, about 13 per cent. to 15 per cent. green, and a small amount of blue light to pass. The blue glass let a small part of the upper red, 33 per cent., through, of the remaining red about 3 per cent., yellow, 7 per cent. to 8 per cent.

[2] The procedure I selected, viz., to make the spots so small that I could not feel the heat, would seem hardly so good as if I had made all spots equal; but in reality this last would have been more incorrect, in consequence of the different absorptive power of the glasses. The results showed some very interesting points. The reaction was strongest where the circumstances look unfavourable. (When an equal quantity of light is distributed over a large spot it is clearly more unfavourable than if on a small spot.) With quartz the spot was 7 mm. in diameter, and the reaction strongest for green, orange, and red. The spot was 2 to 3 mm., and there was no reaction. However, I may mention that I gave no special value to these tests, excepting as bearing on the question whether it is exclusively the ultra-violet rays that produce the photochemical action on the skin.

In these tests I observed that the red spots which appeared on the skin were raised above the level of the surface, like flat hyperæmic spots, with the border raised sharply over the normal skin. I may add that there were formed no blisters, so that the elevation did not depend upon loosening of the epidermis. These experiments not only corroborate, but extend, Widmark's observations.

(To be continued.)

THE OSCILLATING BED AS A THERAPEUTIC AGENT.

By William Johnson Smyth, M.D.Edin.

Resident Physician, Bournemouth Hydropathic Establishment.

The soothing effects of voyaging have prompted a well known poet to give to the world the familiar line "Rocked in the cradle of the deep," and most of us perhaps have had the mental irritability and sorrows of infancy curtailed and sleep induced by the rocking of a cradle, or the to and fro motion to which our nurse has subjected us.

A Scotch gentleman, a dyspeptic and a sufferer from insomnia, was ordered abroad some time ago for his health's sake. His condition rapidly improved, his insomnia being one of the first symptoms to disappear. Struck by the good effects following so soon upon a life at sea, and believing that these were chiefly due to the pleasant motion of the ship, he proceeded to think out a mechanism whereby he could obtain the same motion ashore, and, after infinite pains, he succeeded in perfecting what is now known as Walker's Hygienic Bed.[1] It was exhibited at the Royal Infirmary, Edinburgh, in 1898, during the time of meeting of the British Medical Association there. The bed exactly reproduces the easy fore and aft motion of an Atlantic liner on a tolerably smooth sea. There is no noise, jerk, or any unpleasant effect whatever felt. The warm praise accorded to the invention by my teacher and friend, the late Sir Thomas Grainger Stewart, of Edinburgh, prompted me to give the bed a trial, which I have done.

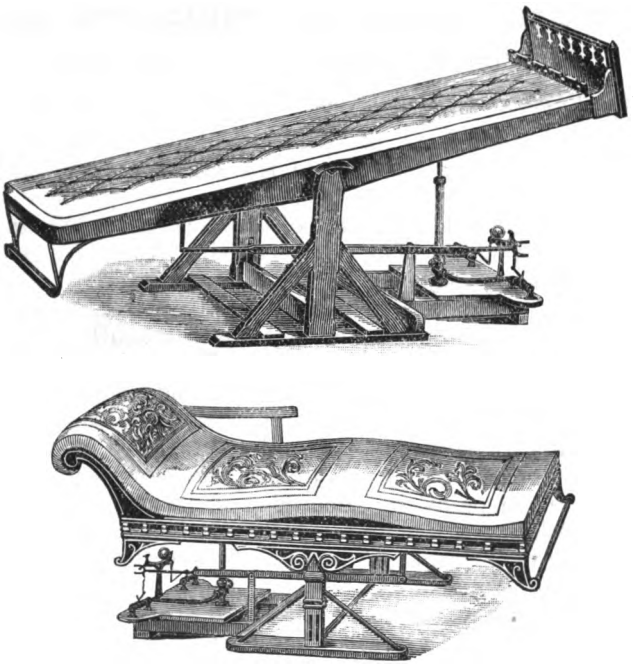
I shall give a brief outline of the bed, its action on the human organism, and indications for its use.

From the accompanying sketches it will be seen that the bed is made in two styles, the ordinary rectangular bed, and one of a couch shaped pattern; the latter makes a most comfortable couch, but the following account refers only to the former.

It consists of three parts, the bed proper on which one rests,

[1] Obtainable at 62, Buchanan Street, Glasgow.

the supports—one on either side, with cups to receive knife-edge axle, on which the bed oscillates, and the "interrupter," which acts by letting on and cutting off the water supply to the piston. The interrupter is essentially a bar of iron, about ten inches long, one inch in thickness and depth, grooved on the upper surface for the purpose of permitting a two inch steel ball to move freely. It is balanced and supported on a pivot at the centre of its lower surface. Its ends are connected with levers; one, a long lever, running back to the lower end of the bed, and others, short levers, controlling the water inlet and outlet. The interrupter is placed beneath the head of the bed on a stage of



its own. The motor power is water pressure, and the device by which this is applied is highly ingenious. When at rest in the horizontal position, the bed rests on the supports and the piston; the latter is placed centrally at the junction of the upper with the adjacent fourth of the bottom. The water is conveyed from the main to the piston, and when the latter is forced to its highest limit, the head of the bed has been thrust upwards through an angle of about 22·5 degrees. At this stage the long lever, shown running parallel with the bed, tilts up one arm of the interrupter, whereupon the ball rolls down to the opposite limit of the groove, and, on its arrival there, forces the short levers into action, with the result that the outlet is slowly

opened for the water below the piston to escape and the inlet supply is slowly shut off. When these events are completed the bed gains the horizontal, and synchronously with this, the long lever tilts the arm of the interrupter downwards, whereby the action is reversed, and the head of the bed ascends. In this way the oscillation goes on as long as the water pressure is maintained; but the patient can stop the oscillations by slightly shifting his position on the bed. Thirty gallons suffice to keep the action going for eight hours, the pressure being 30 lbs. to the square inch. There are three oscillations per minute, but these can be increased or diminished; also the rapidity of ascent and descent can be varied. So gradual is the movement, that it is quite impossible to say when the ascent ends and the descent begins. Any plumber can put the bed into working order, and the working is very simple.

Action on the human organism.

(*a*) The sensation of movement blunts the acuteness of cerebral action and promotes mental rest.

(*b*) It tends towards the equalisation of blood pressure throughout the body. (The effects of oscillation are readily seen in the living blood stream, in a frog's web on the stage of the microscope.)

(*c*) It promotes movement in the abdominal and pelvic viscera.

Indications for its use.

I.—Insomnia, when caused by or associated with—

(*a*) Continuous mental activity of recent origin.

(*b*) Cases of long standing, where there is vaso-motor paresis of cerebral vessels, permitting of a semi-stagnant condition of the cerebral blood supply.

(*c*) Cases where defective hepatic or gastro-intestinal action becomes a contributory factor in maintaining the sleepless state through auto-intoxication or otherwise.

II.—Dyspeptic conditions, especially those associated with—

(*a*) Stagnation of the circulation in any of the abdominal or pelvic organs, as in neurasthenia, cardiac disease and other conditions.

(*b*) Pyloric spasm or contraction with temporary or permanent dilatation of the stomach.

(*c*) Defective peristalsis of stomach or intestines due to atony or other cause leading to constipation, the production and retention of flatus, toxins, and a well known train of dyspeptic troubles.

The above is fairly descriptive of some of the cases I have treated with the oscillating bed, and I can report favourably on the results. Having only one bed, and as each case requires a period of treatment extending from one to six weeks, the number of cases so treated is as yet limited. But I hope later on to give a full account of the practical results achieved.

HIGH FREQUENCY CURRENTS.

By M. Paul Renaud (Paris).

I.

What are currents of high frequency? What is this new manifestation of electric current which has occupied the attention of the scientific world for the last few years, and the introduction of which into electro-therapeutics, by Dr. d'Arsonval, has so materially added to the remedial resources of the medical man?

It consists of very rapid isochronous oscillations, which are obtained when a condenser previously charged to a high potential is discharged, in a conductor having a certain amount of self-induction and little resistance. The charge of the condenser passes alternately from one armature to the other, and gradually decreasing in extent is eventually extinguished, instead of disappearing as a single direct current between the terminals.

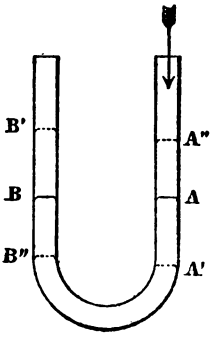


Fig. 1.

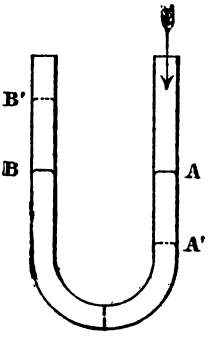


Fig. 2.

A consideration of two mechanical analogies will elucidate this. If a thin sheet of metal fixed at one end be thrown into vibrations at the other end, this latter free end will continue to vibrate for a certain length of time, whether in the air or in any slightly resistant medium (water, alcohol). If, on the contrary, the medium be a very viscous liquid, there will not be oscillations, but simply an aperiodic return to equilibrium.

If we shake a tube filled with liquid, and suddenly cease to do so, the liquid undergoes a certain movement in order to effect the restoration of equilibrium.

If there is little resistance to the flow, the liquid will oscillate during a certain time before regaining an equal level in the two tubes; if, on the contrary, there is a considerable resistance to the movement of the fluid, an equal level will be re-established by simple aperiodic flow (fig. 1 and 2).

These three phenomena, discharge of a condenser, vibration of a thin metal sheet, and restoration of equilibrium in a fluid

contained in communicating vessels, have still further points of analogy. In all three, whether there be oscillation or not, the final result is that owing to the stopping of the movement, a dissipation of energy occurs, in the form of heat, equal to the work done in producing the original displacement. In all three, one portion of the heat is produced by the friction of the moving body against the substance which surrounds it, and the other part is lost in the undulations, which travelling further and further afield gradually disappear. Thus the vibrating metal sheet produces waves in the air, and we hear the sound at a distance; currents of high frequency emit radiations whose existence can be proved by means of a conductor moved in the neighbourhood of the circuit of high frequency; such a conductor becomes the seat of induced currents visible by the small sparks which can be drawn from it. Lastly, in the case of mechanical oscillations,—at the middle of the movement the speed is greatest,—all the energy is in an active form, for the work of interior displacement has disappeared; whilst at the beginning and end of the movement the speed is *nil*, the energy being represented by the work of displacement from equilibrium or level; the energy is then potential.

In electric oscillations the energy is sometimes in the state of electro-static potential energy, when the charge is maximum and the current *nil* (speed *nil*, with work of displacement); sometimes it is entirely in the condition of electro-magnetic energy when the current is maximum in the discharging conductor, and the charge *nil* (maximum speed and body in the natural state).

The phenomena which we have been comparing with the oscillating discharge of condensers are phenomena of slow period, and visible movements. The duration of their period is, as in pendulum movements, a function of the relationship of the moment of inertia with the couple which successively resists the movement and produces it.

The most rapid mechanical movements with which we are acquainted are those of sound; the highest-toned sounds which we can perceive scarcely exceed 36,000 periods in the second; in the case of electric oscillations 100,000,000 oscillations are reached (experiments of Hertz), and hence the name of high frequency.

Leaving analogies aside, we now pass to the consideration of the phenomena due to electricity.

The period of oscillation is given by the formula (of Lord Kelvin):—

$$T = 2\pi\sqrt{LC},$$

where T = time, L = self-induction of the system, and C = inverse of the capacity of the condenser.

The condition necessary for oscillations is that the resis-

tance of the circuit (conductor and spark) has the following relationship:—

$$R < \sqrt{\frac{4L}{C}}$$

The period T represents the double oscillation; it is the time required for the charge to return to the armature whence it proceeded. Frequency is the inverse of the period; it is therefore the number of periods per second. Lastly, we often speak, especially in electro-therapeutics, of the number of alternations. The number of alternations is double the frequency, since in any period there are two waves of current in an opposite direction (see fig. 3).

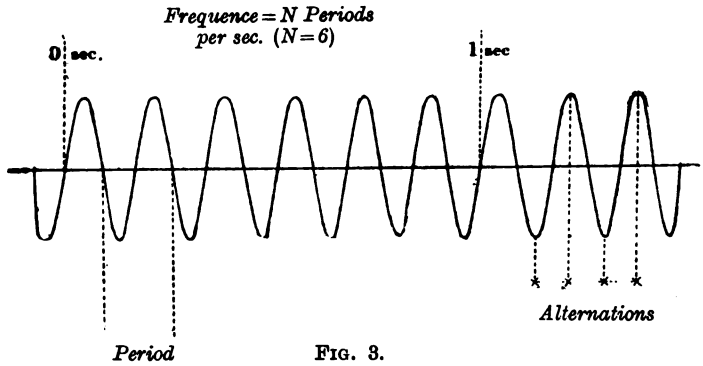


FIG. 3.

It is, moreover, rational to speak of alternations, since there is an excitation by each alternation, that is to say, two for each period.

It may be said that these phenomena first became known when it was shown that in certain cases the discharge of a condenser is an oscillating one.

These facts, already established by physicists, such as Henry, Bernstein, Becquerel, &c., were more clearly demonstrated by Feddersen about forty years ago. These experiments showed the successive discharges by means of a rapidly rotating mirror. Lord Kelvin had already explained the theory of these phenomena in 1855. Nevertheless, electric oscillations had not been made the subject of any very interesting communication until the moment that Herz commenced his memorable series of experiments. He showed how oscillations can be obtained by means of an induction coil, and how the electrical effects of these oscillations are propagated to a distance in the same way as light. One form of apparatus employed by Herz is diagrammatically represented by fig. 4.

B is an induction coil, C and D two balls, 15 cm. in diameter, supplying capacity, and attached to two cylindrical rods, 5 mm. in diameter, and 1 m. 50 long, terminating in two small spherical surfaces, *a* and *b*, which act as dischargers. The spark passing between *a* and *b* was about 15 mm. The capacities and the conductors were of such small dimensions that the frequencies obtained reached 100,000,000 in the second.

In 1889, M. Joubert, repeating these experiments in Paris, remarked, as Herz had already done, that the galvanoscopic limb did not respond to this kind of electrical excitation. This is also the first point remarked upon, regarding the physiological effects of these currents by Dr. d'Arsonval, who about the same time made a very complete study of them. (*Cours du Collège de France*, 1890; *Société de Biologie, Avril et Mai*, 1891; *Bulletin de l'Académie de Médecine*, 22 *Mars*, 1892.)

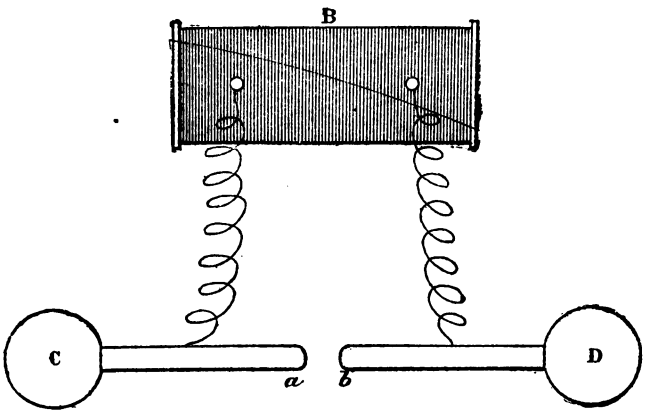


FIG. 4

This experimenter, who for long had studied the physiological effects of alternating currents, showed that the currents above referred to were not singular in this respect, inasmuch as the currents produced by electro-magnetic apparatus no longer acted upon motor and sensory nerves when their frequency exceeded 4,000 to 5,000, or about 10,000 alternations in the second.

A little after this (May, 1891) M. Tesla made a memorable communication before the Association of Electrical Engineers in America, upon the physical effects of currents of great frequency and high potential. He saw in this new agent the future source of electric lighting. He recognised the harmlessness of these currents upon the living organism, and in conditions under which no one had hitherto been placed: the currents which traversed his body represented, in point of fact, an amount of energy

sufficient to incandesce a considerable number of his special lamps. To produce high frequency currents M. Tesla employed two procedures: with the first, consisting of the employment of multipolar alternators, no greater frequency than 10,000 can be obtained. By means of transformers the potential was raised to many tens of thousands of volts, the experimenter touching without danger one or other of the poles.

The second arrangement is simply the method of Herz, but modified so as to transform the energy of many electrical horse-power, and enormously increase the pressure. An alternator S (fig. 5) sends its current into the primary of a high potential

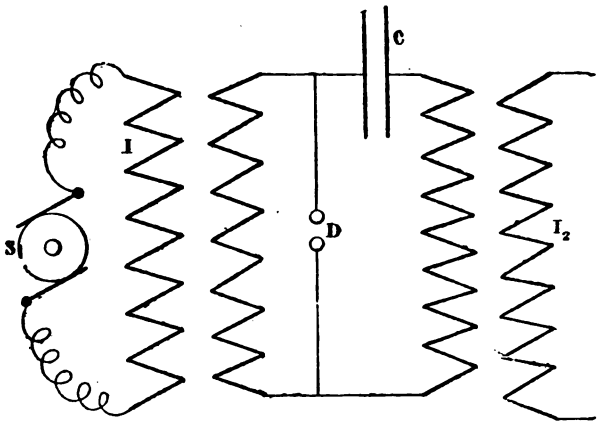


FIG. 5.

transformer, I, the secondary of this transformer charges the condenser C, which discharges itself with great frequency through the primary of the second transformer and the discharger at the knobs, D; at the secondary, I_2, there are obtained currents of great frequency and high potential. Unfortunately, there is a tendency to the production of an arc at the discharger D, so that the condenser C can only charge and discharge itself at the frequency of the alternator S, and at feeble potential. In order to get rid of this arc and obtain discharges of great frequency and high potential, Tesla used a continuous-current magnet which, blowing by electro-magnetic action upon the spark, extinguished it and only allowed to pass high frequency sparks produced by the condenser.

Lastly, Elihu Thompson took up these experiments upon a larger scale, considerably simplified the apparatus, and especially replaced the electro-magnet by a simple air-bellows.

III.

In possession of new and powerful methods, M. d'Arsonval again took up his former work, and carried out his beautiful researches upon the physiological effects of high frequency currents. One of the most remarkable of these results was the discovery of *auto-conduction*, a simple and effective way of producing powerful induced currents capable of deeply penetrating the living organism, as will presently be shown, and yet without any application of the electrodes upon the patient, or any direct relationship of the latter with the electrical apparatus.

In the course of these researches Dr. d'Arsonval, in combination with M. Gaiffe,[1] produced an apparatus whose principle may be described by the following schema (fig. 6).

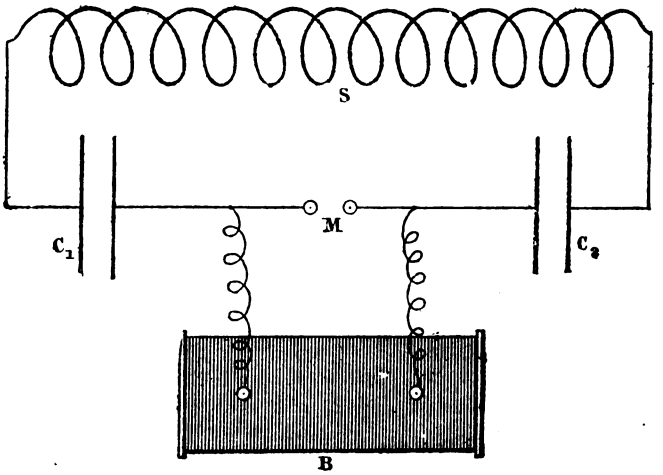


FIG. 6.

B (fig. 6) is a transformer of high potential whose secondary is attached to the internal armatures of two condensers, C_1, C_2, which in their turn are connected with the discharger at the terminals, M. The external armatures of these condensers are joined in parallel with a solenoid S. The frequency is, as in all these arrangements a function of the capacity of the two condensers, C_1, C_2, and of the self-induction of the solenoid S. This solenoid S is of variable size. It may be even so large as to completely enclose the patient's body, and this method of treatment is known as *auto-conduction*.

We now proceed to study more closely the phenomena which present themselves in d'Arsonval's apparatus, according as the high potential generator employed may be an induction coil, or an alternating current transformer.

[1] Of 40, Rue St. André des Arts, Paris, who has exclusive rights in Dr. d'Arsonval's high frequency apparatus.

Induction coil.—As we know, at each break of a primary circuit there arises an induced electromotive force. This electromotive force charges the condensers, owing to their being joined by the solenoid S, which is itself traversed by the charging current. As the charge increases the difference of potential at the terminals of the condensers increases; when it reaches the limit which corresponds to the distance apart of the discharging knobs, M, perhaps reaching thousands of volts, the spark leaps across. This spark forms a kind of bridge of feeble resistance by which the condenser charge passes. The discharge oscillates, leaping from one knob to the other, whilst the solenoid which connects the external armature of the condensers is traversed by an alternating current of high frequency.

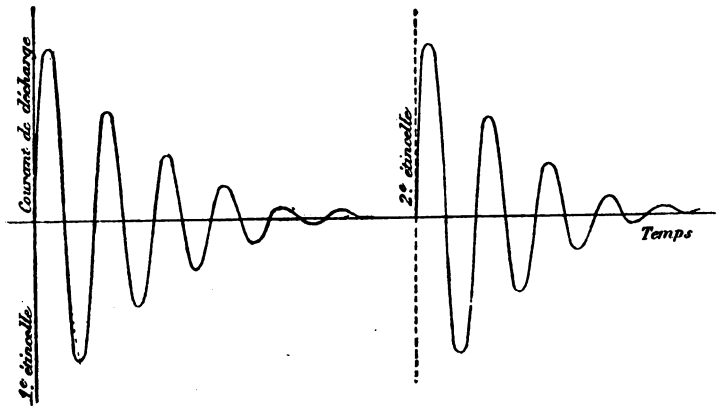


FIG. 7.

The small spark gap is thus traversed at the same time by the spark, always in one direction, due to the induction coil, and by the oscillations of the condenser discharge; whilst the solenoid is only traversed by the charging currents of the condensers, and the oscillations of discharge. But the former being relatively slow, cannot give in this conductor of low resistance any appreciable potential, so that the only differences of potential which can exist are those due to the oscillations, which are harmless. Unfortunately the difference of alternating potential at the armatures, and the currents in the solenoid which result from it, rapidly grows less by damping (see above), and it is necessary to renew the phenomena by new charges in order that the effect may be continuous.

Alternating Current Transformer. — When we charge the coil (which, in this case becomes a simple transformer) with alternating current it is necessary, as already stated, to cut the

arc as soon as it tends to establish itself, either by a magnetic field or by an air jet. With this current and under this arrangement the effects are the same, that is, the positive and negative waves produce the same inductive effects. We renew the oscillations from 80 to 100 times a second according to the frequency of the current employed (40 to 80). In short, currents of high frequency are composed of a series of oscillations, each one of which lasts a fraction of a hundred millionth of a second, the series being separated by intervals of the order of a hundredth of a second, the latter intervals being due to the contact breaker of the induction coil, or to the reversals of the alternating current (fig. 7). In each series we can count, according to the various causes of disappearance, some dozens of complete oscillations whose maximum ordinate is more than half the maximum of the first oscillation.

There is no means of producing oscillations which are quite continuous and regular. What we observe therefore (whether current or difference of potential) is always a *mean* effect, not only because it is a question of alternating currents, but because this current is discontinuous.

IV.

From the point of view of physics, currents of high frequency are distinguished from ordinary alternating currents by three essential properties, which are due not only to the great frequency but also to the high pressure: (1) they produce induction phenomena of a very intense kind; (2) currents of high frequency, immediately that the least capacity comes into play, move on open circuit as well as in a closed one, so that contact with a single pole is sufficient to produce current; (3) they produce remarkable resonance effects.

Examining these points in detail: (1) the electro-motive force induced in a conductor by a neighbouring conductor is proportional to the product of the current by the frequency; one ampère at a frequency of 600,000 will, other things being equal, produce in a spiral the same induced electro-motive force as 100 ampères with a frequency of 60 circulating in 100 turns of wire. Hence it comes to pass that with high frequency the induced E.M.F. in a single turn, whether by self-induction or by mutual induction, is very considerable. In a large solenoid one turn is sufficient to light, by mutual induction, a lamp of 8 volts and 1 ampère. The beautiful method of auto-conduction consists in the application of this principle. Here we utilise currents induced in the circuits formed by the mass of the human body, or certain better conducting parts. Certain powerful E.M.F.'s of self-induction are also observed upon the solenoid itself, as is evident by the fact that a spark of some millimetres in length may be drawn by an exciter in derivation upon a single turn.

(2) High frequency also permits a current to pass on open circuit as soon as the bodies concerned present a certain surface. In fact, however small the capacity, charge and discharge, repeated hundreds of thousands of times in the second under a high potential, represent a very considerable mean current. Thus are explained the unipolar currents and sparks which occur on touching a single point of the solenoid. In this case the body constitutes an insulated surface which at each oscillation receives

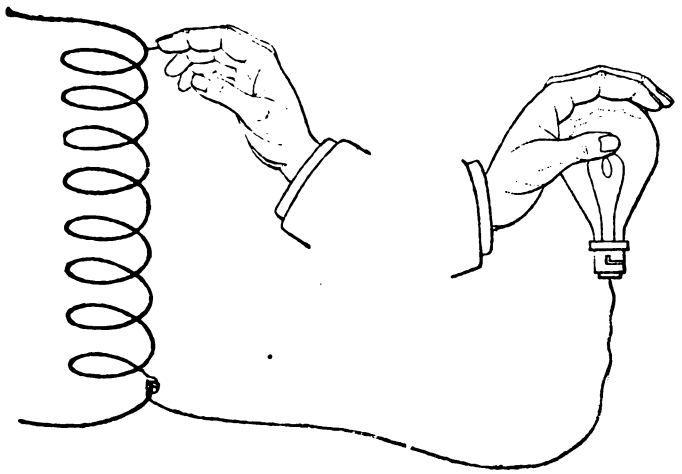


FIG. 8.

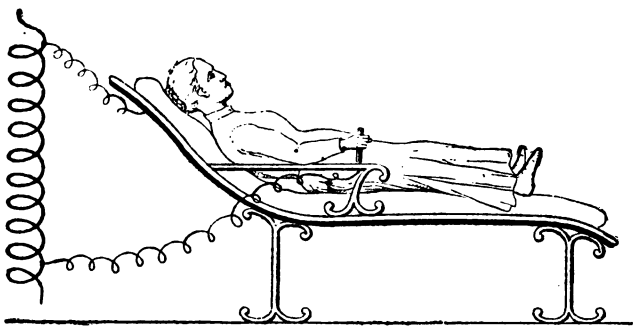


FIG. 9.—The method of *condensation*.

a charge which is almost constant in quantity, when the distance from the solenoid is suitable. The corresponding charge of opposite sign is found upon those parts of the solenoid which are at the particular moment at a different potential. Thus is explained the fact that the sparks which we draw from a solenoid are maximum at the extremities and minimum at the middle; these effects are complicated by derivations due to the imperfect insulation of the solenoid.

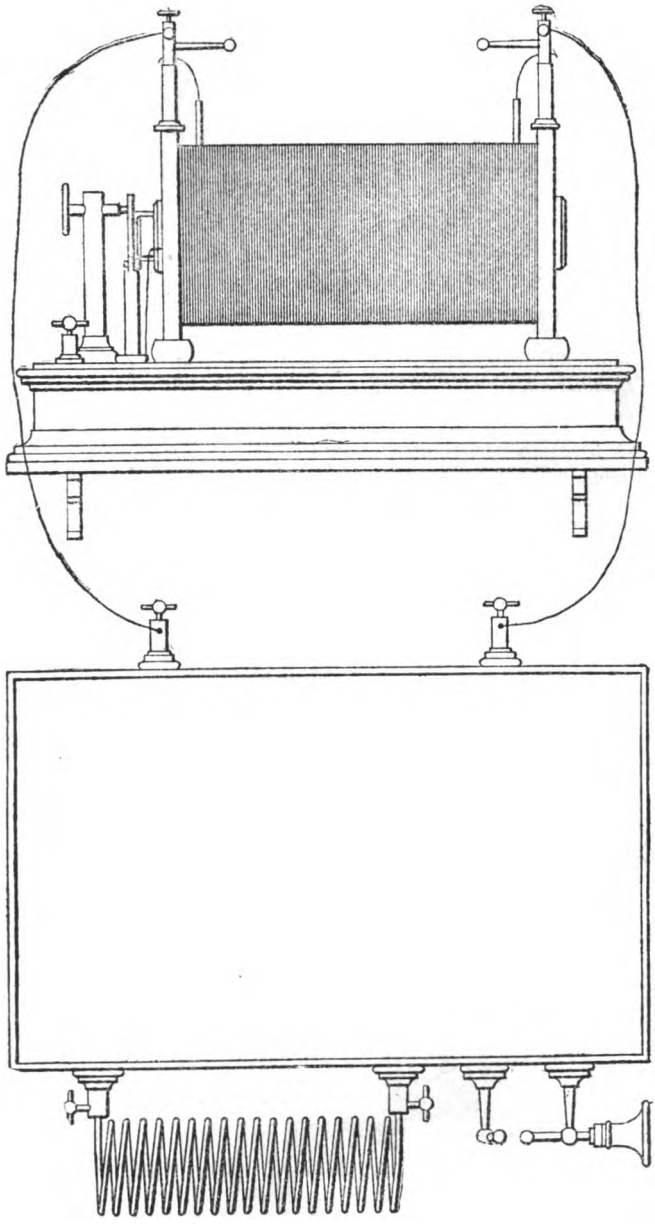


FIG. 10.—Schema of the coil with its static condenser (Dr. d'Arsonval).

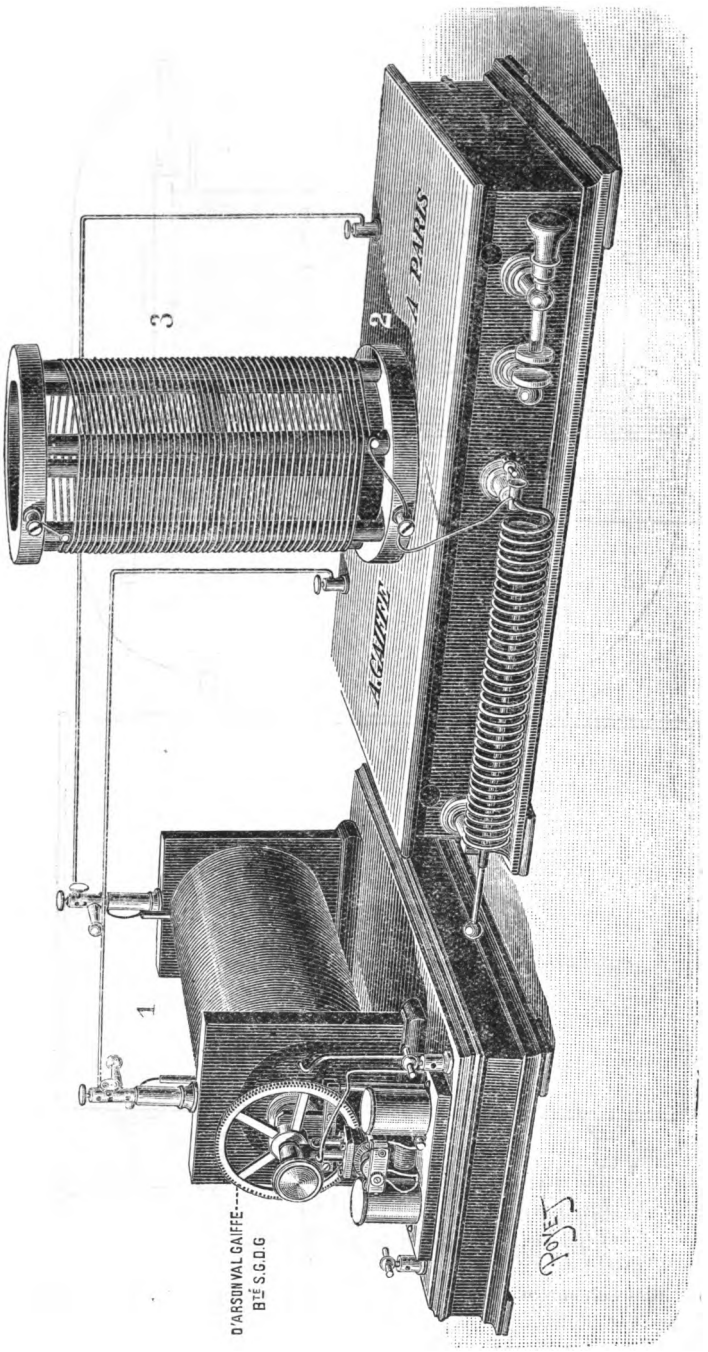


FIG. 11.—1, coil; 2, condenser; 3, resonator of Oudin (small model).

The lighting of lamps in the experiment shown in fig. 8 is explained by condensation effects. In this case it is the glass which plays the part of dielectric, the vacuum and the filament forming one of the electrodes and the moist skin the other. From these phenomena two other of d'Arsonval's methods are deduced: *local unipolar applications* which require no special apparatus, and which are sufficiently explained by their name, and *application by condensation*, whose principle is explained by fig. 9.

The subject in this case constitutes one armature of a condenser, and thus a mean current of more than 100 milliampères can easily be made to traverse the body.

(3) The phenomena of resonance (see the works of Dr. Oudin) have resulted not only in interesting experiments, but also in practical applications.

These phenomena occur whenever a circuit presenting self-induction and capacity has the same period as the generating system.

Fig. 11 shows the arrangement of the resonator (3), with a means of regulating the primary circuit. The primary solenoid (capable of regulation) is attached by a single wire to the resonator (the position of which is not of much consequence), and the frequency is thus modified until the periods of the whole being in unison, there are seen to appear at the free end extremity of the resonator high tension *aigrettes*. This is the arrangement which ought to be called resonator.

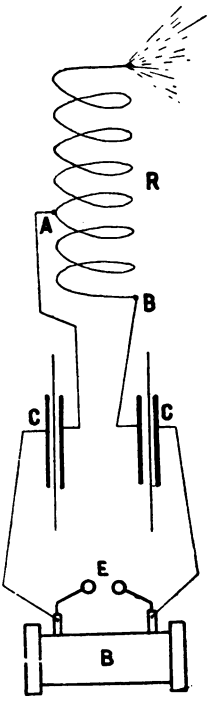


FIG. 12.—B, coil; E, spark gap; CC, condensers; R, resonator; A, movable arm for leading in the current; (D, Effluve).

The new model devised by Dr Oudin, represented by figs. 12 and 13, ought to be called *inducto-resonator*. In point of fact the two solenoids being superposed, the primary forming the lower part of the column, and constituting a prolongation of the solenoid of resonance, there thus becomes added to the phenomena of resonance a phenomenon of induction. That this is the case is fully proved by the fact that with the new inducto-resonator of Dr. Oudin we obtain, according to circumstances, (1) aigrettes (the only phenomenon obtained with the resonator), (2) *effluve* (the phenomenon obtained by induction with the new induction coils of d'Arsonval, fig. 14).

The advantage of the new d'Arsonval induction coil is that, without the impedimenta of a double resonator, simple or double

effluvations may be obtained according as one or both poles of the coil are employed.

Another advantage of this novel coil is that it permits of a great range of effects, from very powerful to comparatively slight,

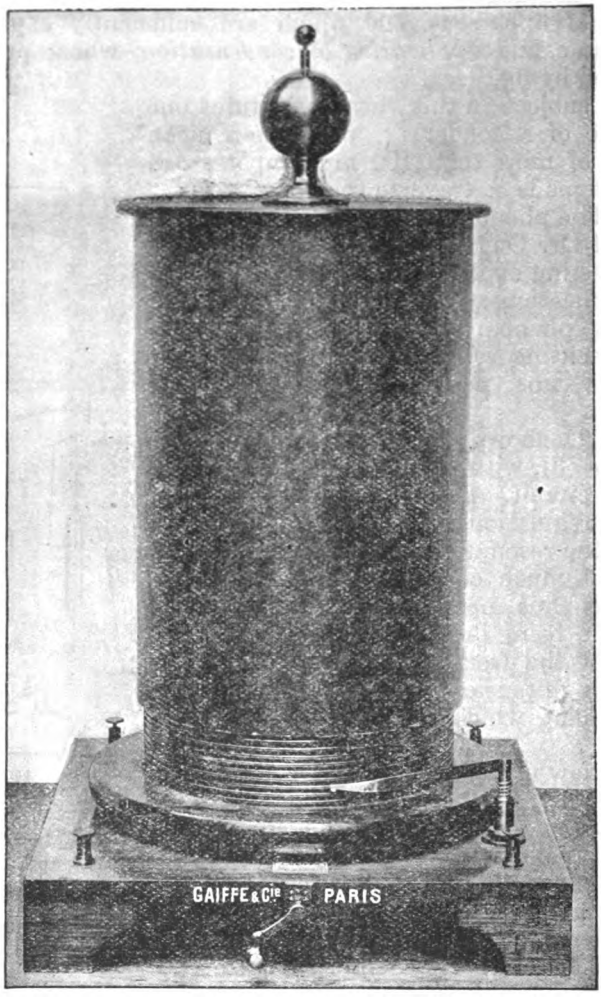


FIG. 13.—New Oudin resonator.

by varying the length of spark of the static condenser; again it requires no regulation, the inducing and secondary being always in accord. It is sufficient to place the movable coil in the middle of the induced to have two poles or two *effluves;* or on the contrary to place the movable coil at one end, putting the

pole of the corresponding induced pole to earth; or what is better, attaching it to the patient by an inactive electrode. One single large and regular effluve is thus attained without any disagreeable sparking. Dr. Oudin thus speaks of bi-polar resonators: "I believe that this bi-polar character is a matter of great interest, inasmuch as it creates a zone of greater density of current between the two poles when it is desired to make a

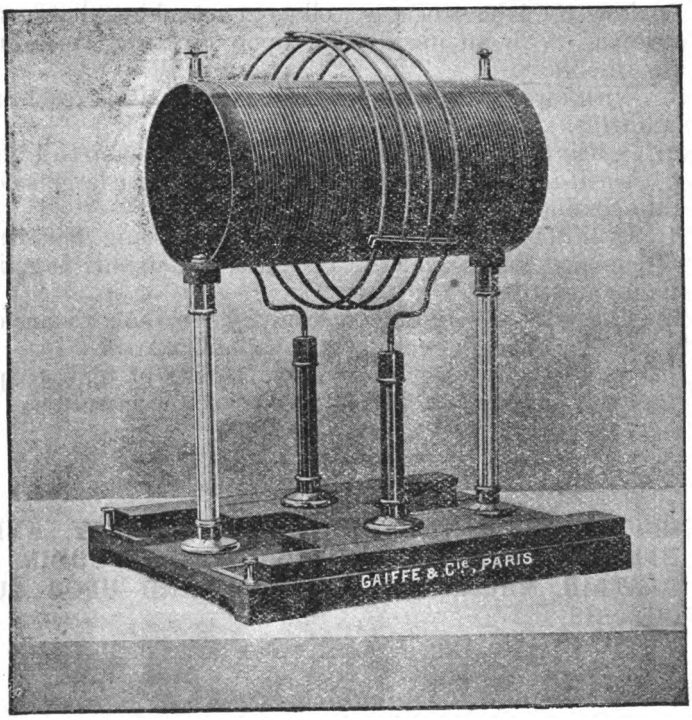


FIG. 14.—New d'Arsonval bi-polar high tension coil.

local application." Dr. Oudin gives four cases treated with the bi-polar apparatus, two of them being very rebellious cases of pruritus of old standing, and two of them cases of pulmonary tuberculosis.

The universal galvanometer, which enables us to measure either the volts induced in the secondary circuit, or the mean electromotive force of self induction upon one or many turns, or even the current passing through the body by uni-polar or bi-polar applications, need not be specially described, but is quite necessary in treatment. It is sufficient to say that it is based upon the expansion of a fine wire of high resistance in

such a way that *the energy absorbed is small* in relation to the total power.

Finally, we have even succeeded in estimating the effective intensity in the solenoid itself by comparing two pieces of the same platinum wire brought to incandescence, the one by continuous current, the other in circuit with the solenoid. But in this case, as the filament absorbs a notable portion of the total energy, it is found that the corresponding current varies according to the resistance of the wire employed.

Trials in the laboratory, as well as in actual installations, have proved that, with an installation upon an alternating current circuit we obtain :—

(1) With direct bi-polar applications, intensities reaching 500 milliampères.

(2) In using the condensing couch, intensities up to 1 ampère.

(3) A self-induction of 25 to 30 v. per turn in large solenoids for auto-conduction.

(4) An intensity of 300 milliampères passing between the high frequency circuit and the resonator, when this is giving its maximum aigrette.

(5) A mean intensity of 3 to 4 ampères in the primary circuit of the new high tension coil (system of Dr. d'Arsonval).

The physiological and therapeutic results of high frequency currents will form the subject of another communication.

ACTION OF CURRENTS OF HIGH FREQUENCY, AND OF EFFLUVE FROM THE RESONATOR OF OUDIN UPON CERTAIN MALIGNANT TUMOURS, AND UPON TUBERCULOSIS.

By Dr. J. A. Rivière (Paris).

Malignant Tumours.

First Case.—A medical man suffering from epithelioma of the face, placed himself under my care in April, 1899. He was aware of the discoveries of Professor d'Arsonval with reference to the action of high frequency currents, and he was very averse to a surgical operation. Trusting to the modifying power of the effluve of the Oudin resonator upon phagædenic and infected wounds, I began treatment at once. The affection had first shown itself by a small wart situated upon the left cheek, and it subsequently disappeared. Some time afterwards there appeared at the same place a brown incrustation, which the patient always kept removing. The crusts had been succeeded by an excoriated surface, and at the time I first saw the case the ulcer measured two centimetres in diameter. It involved the entire thickness of the skin, as well as a certain amount of subcutaneous cellular tissue.

It was covered by deep yellow incrustation. Its margin was perpendicular and indurated, the surrounding tissue being infiltrated and vascular. The glands were not much involved. The patient was aged 62; two of his ancestors had died of cancer. His general condition was fairly good.

I applied at the first sitting short thick sparks and effluves, produced by a coil giving a 25 cm. spark, and the small resonator (first model of Gaiffe). The excitor consisted of a small sponge moistened with Van Swieten's fluid, and carried on the end of an insulating handle. The sparks caused a good deal of pain at first, but were better borne towards the end of the sitting, which lasted one minute.

The patient experienced great relief at the time he left me, and told me the next day that he had suffered much less from the ulcer during the first few hours that followed the treatment. The serous discharge was more abundant, the crusts had fallen off leaving a smooth red surface. The indurated margin was less apparent. The swelling of neighbouring tissues was much diminished. Like all patients after high frequency treatment he had slept better and felt stronger.

I made another application; and to render it less painful I used an electrode made of a glass handle, the interior of which was traversed by a metal stem (condenser electrode). The end of the tube, cleansed in the first instance by Van Swieten's fluid, was applied to the base of the ulcer before putting the apparatus into action. The very small sparks which passed between the metal and the glass enclosing it produced no pain, and I made an application lasting three minutes. Under the influence of the current the ulcer became blanched, but after a little time regained its red appearance. Next day the patient felt relatively well, the pain and feeling of tension of the ulcer and neighbouring tissues were diminished, the serous discharge had become very abundant, and an eschar had appeared instead of the incrustation. I advised a rest for three days, and I then resumed daily treatment of one minute duration.

At the end of ten days the eschar had separated, leaving a healthy granulating surface, but the size of the ulcer had increased. The surrounding tissues were no longer infiltrated, the indurated margin had disappeared and the ulcer presented the appearance of an ordinary healing sore. I continued a one minute application every three days; as new crusts formed from time to time, it was necessary to remove them, and this delayed the healing. After a month's treatment the ulcer affected only a small portion of the skin and did not measure more than 1 cm. in diameter.

The patient was obliged to leave for Belgium. There he heard of a doctor who cured cancer by means of a special process. He underwent this new treatment and got well in eight days. Two months afterwards the affection reappeared, and got rapidly

worse in spite of the treatment in Belgium. Death resulted recently, after the patient had undergone two operations.

On comparing this case with those which I am about to relate, I feel inclined to attribute the first disappearance of the affection to the electrical treatment. The failure of the second method of treatment which is evident by the relapse which occurred, seems to prove that such treatment was of no avail when acting alone.

Second Case.—The patient was a man of 65, brought to me by a *confrère*. He suffered from a small cancroid about the size of a pea, like a wart, with indurated edges, upon the ala of the nose. I simply touched the tumour for one minute with a small steel rod attached to the Oudin resonator, and carried upon an insulating handle (the spark of the coil being 30 cm.).

The point touched became blanched and then resumed its normal colour. Next day the small growth presented a brown colour. I repeated the applications of one minute duration upon four days in succession. Twelve days afterwards the small desiccated tumour fell off, leaving no trace behind it.

Third Case.—The patient was the wife of a medical man, and I had attended her for a month without any apparent result, excepting perhaps an improvement in her general condition. She had undergone an operation two years before for an adeno-sarcoma of the left breast. All the glands of the thorax and neck were involved; radiography had shown that the lungs were infiltrated at certain points. Daily applications of effluves from the large Oudin resonator, employed simultaneously with injections of cacodylate of soda, had not apparently produced any change in the local condition. It is necessary here to note the difference in the result; this seemed to bear a relationship with the difference in the nature of the affection, this adeno-sarcoma being of a very different nature anatomically, and doubtless etiologically, with the above-named epithelial tumours.

Fourth Case.—I have also had under my care two epitheliomas of the uterus, not admitting of surgical operation. The first was treated by means of platinum needles thrust into the growth and attached to the end of the small solenoid. In the second a *tampon* impregnated with salol or Van Swieten's fluid was applied upon the tumour, the tampon having previously been attached to the resonator.

The result was the same in both cases; abundant sero-sanguinolent discharge during and after the operation. After a few sittings the fungating growths fell off as a dead tissue, the sores seemed to be improving, when the patients, who hitherto had shown no appreciable results, suddenly ceased to attend. The pains had not diminished, and the sanguinolent discharge had increased, but the *malodeur* had improved.

Fifth Case.—A female patient, operated on for carcinoma of the breast a year ago, noticed that the infiltrated and swollen

edges of the cicatrix took on a normal colour, and the appearance of healthy tissue after forty localised high frequency applications carried out every second day, by means of a large moist roller electrode. When I commenced the treatment a relapse had seemed exceedingly probable.

Sixth Case.—A patient sent to me by a *confrère*. Has been under my care for four months. On arrival she presented a sarcoma (which had returned after operation) as thick as the wrist in the utero-rectal region. She was unable to defæcate without mechanical procedures. Under the influence of daily treatment, lasting a quarter of an hour, the tumour diminished more than two-thirds. The stools are regular and her general condition is considerably improved. She says that she feels fifteen years younger. In this case I used a glass cone filled with metallic filings attached to the Oudin resonator.

Conclusions.

It would appear from the foregoing that high frequency currents cure small epitheliomas of the face, and in certain cases influence for the better the evolution of malignant tumours.

They produce in the first instance a thermo-electro-chemical action, which has the effect of eliminating the neoplastic tissues and (admitting the parasitic theory), of destroying the micro-organisms and their tissues. In the second place their action is tropho-neurotic and curative, restoring the vital processes to their normal condition.

There is no question of employing this thermo-electro-chemical action for the purpose of dealing with large tumours; for such—complete ablation remains the only treatment; but even in these cases the procedures above indicated ought to be employed with a view of preventing the return of the disease.

High frequency currents, and especially the effluve of the Oudin resonator, seem to produce the effect just mentioned by modifying the vitality of the new regions contaminated by the operative lesion.

This special application of electricity certainly appears to be at the present moment one of the few therapeutic measures available in the case of tumours that do not permit of operation.

The treatment of tuberculosis by high frequency currents will be the subject of a future communication.

Technique.

Brand Treatment of Typhoid Fever.—A bath (preferably one mounted on wheels), of sufficient length and breadth to comfortably accommodate the patient in the lying posture, and filled with water of the desired temperature, is placed near the patient's bed and protected by a screen, which prevents his being excited by the preparations. The proper temperature of the Brand bath is 65° F., but in certain cases it may be advisable to begin with baths of 90° F., and reduce the temperature of each successive bath by, say, 5° F., until the minimum temperature (65° F.) is reached. The temperature of the patient should be taken *in recto* every three hours, and whenever it exceeds 102·5° a bath should at once be administered.

A stimulant is given to the patient. He is undressed, and a light napkin is applied to cover the sexual organs. His face is now bathed with cold (iced) water, and if too weak to step into the bath he is lifted into it by two assistants. All friends and relatives, save those whose help is needed, should first be asked to leave the room, as their presence may increase the anxiety of the patient. Care should be taken to avoid the appearance of haste or excitement, and all unnecessary fuss or argument. An air cushion or a large sponge may be hung at the head of the bath to support the occiput, and a circular water-cushion may be placed under the nates. In the absence of a support for the head a nurse or attendant should support it with her left hand, while with the right, friction is employed to successive parts of the body. A second attendant, if available, should assist in carrying on this work of friction, which should be applied to the whole surface of the body, with the exception, of course, of the abdomen. This constant and thorough chafing process is *essential* to the success of the bath, which may otherwise prove not beneficial but distinctly injurious. Complaints of chilliness must not be regarded as an indication for removal from the bath unless accompanied by decided chattering of the teeth. Cyanosis *of the face* is an indication for removal, because being manifested in a part not submerged, can only be due to enfeebled heart-action. Several times during the bath, water at 50° F. is poured over the head, or if coma or delirium exist, over both head and shoulders. The usual duration of the bath is fifteen minutes ; but may be somewhat less at first if necessary.

A double blanket is previously spread upon the side of the bed to be occupied by the patient after the bath, a pillow covered by a towel being placed *under* its upper portion. Upon the blanket is spread an old linen sheet. Hot water bottles for the feet should also be at hand. The patient is gently lifted out, the loin-cloth removed, and he is placed on the sheet so that its upper edge is at the level of the occiput. The sheet is then brought round so as to cover the patient, a fold being pressed in between the lower extremities, and also between the arms and body. The blanket is now wrapped around the patient, and if the temperature before the bath was above 103° in the rectum, he is allowed to rest for ten minutes. Otherwise he is dried at once, at first with the sheet as he lies in it, afterwards with soft towels. Hot bottles are now placed to the feet, and the patient, perhaps after shivering for a short time, usually falls asleep. Prolonged shivering after a bath points to some defect, either as regards temperature, duration, or the employment of friction to the body surface.

The same water may be used for several baths, with the addition of

sufficient hot or cold to restore the proper temperature, after withdrawal of an equal quantity, but the water should be emptied at least once in the twenty-four hours.

Electrical Treatment of Neuralgia.— Professor S. Leduc, in a paper addressed to the International Congress of Medical Electricity and Radiology, gives a systematic account of the various methods of electrical treatment of essential and symptomatic neuralgia. Therapeutic effects may be produced (1) by stimulating sensory nerves; (2) by the modification of sensibility; (3) by electrical action on cellular metabolism; (4) by modification of general nutrition.

(1) Revulsive action on superficial nerves, generally those overlying the painful part. Electricity affords the most perfect revulsive agency, the one most exempt from ill effects, and the one most easy to regulate. The actual cautery, apart from its injurious effects upon the tissues, is not easily graduated, and its good effects are transient. Before using electricity as a revulsive, the skin must be thoroughly dried, and the cutaneous orifices closed by the application of powdered starch or lycopodium; and the application of a thin coat of vaseline is a further aid in diminishing conductivity. The induced current may be used, the indifferent pole being formed by a damp electrode, the excitant by a metal point, moved over the surface; the latter should be the negative pole, that being the better excitant, and the current should be a fairly strong one. After a sitting of some minutes, pain will be relieved for twelve hours, and a cure may be expected after four to eight applications. The discharge from a Leyden jar may be used instead of a coil current, with similar electrodes.

Dr. Oudin has obtained good results by the use of high frequency currents. He uses a slightly damp electrode, but Leduc recommends a metal one, applied outside the clothes, with a large indifferent pole. A transient urticaria may ensue, and the analgesic effect is fairly lasting, and is usually complete after an application of six to ten minutes. One other revulsive agency is the employment of the discharge-sparks of the static machine. The skin must be dried and powdered. At the point of application, ivory-white anæmic spots, succeeded by redness due to vasomotor paresis, may be seen. The excitant or negative pole should be formed by a metal sphere. Applications may be daily or three times weekly, and should last about ten minutes. Inveterate neuralgias, sciaticas, &c., can be cured thus, in the course of six to ten applications.

Magendie and Becquerel recommend a treatment which, by passing a rapidly intermittent current along the affected nerve, exhausts its sensibility. The higher the tension of the current the more rapid the diminution of sensibility. If an induced current be used it must therefore be one developed by a coil of fine wire. The anode is more efficient than the cathode in reducing sensibility. Leduc has shown that currents of high potential, act only superficially, and are therefore unsuitable for this purpose, except when the seat of the affected nerve is near the surface of the body. For the treatment of deep-seated neuralgias, a rapidly interrupted voltaic current (low-tension current) is preferable, and in both cases the anode should be employed. The sittings must be somewhat prolonged.

(2) The employment of the positive pole of a continuous current for the reduction of sensibility by an electrotonus has been practised for a considerable time. Drs. Waterville and Wallis assert that the phenomena of electrotonus follow in the sensory nerve a parallel course to that which they follow in the motor nerve. Professor Leduc recommends for experimental purposes the use

of a battery and a coil current opposed in the same circuit; a large epigastric electrode represents the faradaic anode and the voltaic cathode; the other two poles are comprised in a positive electrode. For therapeutic purposes the constant current should be used of a strength of $\frac{1}{20}$ ma. per sq. centimetre to the face and $\frac{1}{10}$ ma. in less sensitive parts. The positive electrode should be pliable, somewhat large, so as to act upon as many of the terminal fibres as possible, and should be damped (as well as the skin itself) with saline solution. Treatment should last from two to ten minutes, be repeated daily or oftener, and should, if the results are promising, be continued for a considerable period. Treatment with the continuous current anode is particularly efficacious in essential neuralgias, above all in rheumatic neuralgia. Leduc recommends the treatment proposed by Ciniselli and others, by means of a permanent weak voltaic current. Small dry cells should be constructed for this purpose, and the electrodes must be pliable and capable of fixation to the surface. Care must be taken to guard against electrolytic destruction of the skin.

Becquerel recommends the treatment of neuralgia by descending continuous currents. The positive pole is applied to the nearest point of the cerebro-spinal axis, and the negative pole to the distal termination of the nerve. Erb also speaks favourably of this method.

(3) Catalytic effects. Cataphoresis. The anode is saturated with 5 per cent. solution of cocaine with chloroform, or a 5 to 10 per cent. solution of chloride of zinc. A current of 6 to 20 ma. is then passed through the affected part for five to fifteen minutes, thus producing a temporary local analgesia.

Neuralgias consecutive to local traumatisms may be treated by the stabile application of the cathode, and the good effects are probably in part due to catalytic action on the tissues. A large indifferent (positive) pole is applied to the chest, back or elsewhere, and the cathode should also be fairly large. The sittings should last about six minutes. Treatment with the cathode labile and with the combined galvanic and faradaic current are modifications of this method.

(4) General nutritive effects. Monell recommends the application of the positive souffle of a powerful electro-static machine. Hydro-electric baths, both voltaic and more especially faradaic, may give good results, as also general electrisation and currents of high frequency.

Notes.

Improvements in Photo-Therapeutics.—In the *Deutsche Medicinische Wochenschrift*, Dr. H. Strebel publishes the following preliminary statements as to the bactericidal effects caused by the invisible rays of an induction spark. "Kindly assisted by Dr. H. Ghent, Professor of Physics at the Munich Polytechnic, I have succeeded in proving that the *invisible rays* of a powerful sparking coil are capable, even through a dense medium of quartz, of completely destroying, at some distance and within a short time, say twenty minutes, *strong growths of bacilli*, as, for instance, *Micrococcus prodigiosus*. The inductive spark being in itself very rich in ultra-violet rays, the proportion of these may be enormously increased by employing certain substances as

electrodes, and by making use of a Leyden jar as the regulator and accumulator of electricity. For myself I utilised electrodes of aluminium and cadmium, with the result that the invisible part of the spectrum, rendered apparent to the eye by a projection on a barium platinocyanide screen, overlapped its visible part by more than four times its length. My experiments with Finsen's lens-filter have shown that, after the passage of the luminous rays through the system, the real ultra-violet rays had been completely absorbed in the apparatus, and further that the chemical-bactericidal action of the apparatus is due to the chemical-bactericidal force of blue-violet in particular. Inasmuch as the latter are comparatively weaker in their chemical action than the invisible ultra-violet rays, the success of my experiments points very clearly to an improvement of the photo-therapeutic method, to wit, the increased bactericidal influence of the light, the simplification, and, above all, the cheapening of the process. For whereas the Finsen apparatus requires eighty ampères, considerably weaker currents are necessary for the working of the induction spark. Anyone provided with a radiographic installation is able to verify my results at a small expense, and, finding them conclusive, to undertake treatment by light. I am at present engaged in testing the permeability of various media by ultra-violet rays, and the action thereof on sundry bacilli. In addition I am examining whether the Becquerel rays, those of uranium and cadmium, which like the Roentgen rays act through media impervious to light, do not lend themselves to bactericidal purposes. This might be of considerable therapeutic value in many skin diseases. Full particulars of these researches will follow in due course."

Deodorisers, Antiseptics and Disinfectants.—It is not always easy to make the average user of chemical compounds advertised as "powerful germicides" apprehend the difference between a deodoriser, an antiseptic and a disinfectant. Many of the fluids which give a false sense of security to the people who sprinkle them about their apartments, when their friends or relations are suffering from contagious disease, are merely deodorisers. "What a refreshing smell!" is a frequent exclamation made by persons who, with no better authority than the advertiser's testimony, vaunt the wonderful germ-destroying property of their favourite "disinfectant."

A deodoriser merely masks an offensive smell with another odour. An antiseptic renders inert the bacteria of putrefactive or pathogenic microbes for a time, just as salt, vinegar, or ice, will prevent bacterial activity. A disinfectant kills germ life, and a disinfectant that can be used for domestic purposes is as scarce as a satisfactory filter. Now that carbolic acid comes under the "Poisons Act," the uninformed section of the public are not unlikely to spend money on articles useless as germicides, and naturally begins to look about for light and leading in their search for a non-poisonous disinfectant with germicidal properties as powerful as carbolic acid.

Dr. Klein finds that all bacilli are destroyed by Izal in the proportion of 1 part of the disinfectant in 200 parts of water, and the highly resisting spores of Bacillus anthracis by 10 parts in 100 of water in ten minutes; the spores of Bacillus subtilis and Bacillus mesentericus by 20 parts in 100 of water in thirty minutes, and typhoid stools were disinfected by 1 in 200 in ten minutes. This is the disinfectant supplied to the troops in South Africa.

Dr. Klein's report is confirmed by Delépine and others. A very interesting paper on the pharmacology of the substance in question appeared in the

Pharmaceutical Journal, giving the results of experiments made by Dr. T. W. Tunnicliffe, of St. Bartholomew's.

Thoracic Radioscopy.—In the November issue of the *Archives d'Électricité Médicale*, Dr. A. Béclère has an interesting report on the use of the Roentgen rays as an aid to the diagnosis of thoracic affections. The principal use of the method is the revelation of profound lesions that a too great thickness of intervening tissues renders inaccessible to older methods of examination. When radiography, like photography, has become instantaneous, the kinematograph may possibly reproduce under our eyes the rhythmic movements of the heart, the aorta, and the diaphragm. Meanwhile the kinematoradiography of Dr. Guilleminot permits of the dissociation of the phases of respiration and of the cardiac movements; it permits of the limitation of the action of the rays on the sensitive plate to the end of inspiration or expiration, to the period of the auricular or ventricular systole. Another sub-division of radiographic work is the process known as stereoscopic radiography, at present applicable chiefly to parts of slight thickness, such as the extremities of the limbs. Of the various processes for which the Roentgen rays may be utilised, simple radioscopy is, however, the easiest, the most rapid, and the most widely applicable, and it is with this method that Dr. Béclère is here chiefly concerned. For the limitation of the illuminated surface of the fluorescent screen, and the rendering of the definition of the shadows as clear as possible, he recommends the use of a special form of lead diaphragm, devised by himself for the purpose, and termed a diaphragm-iris. The examination of the thorax may be anterior, posterior, lateral (right or left), or, especially when the arch of the aorta is the object of inspection, right-anterior-oblique. On anterior inspection (that is with the screen applied to the front of the thorax) the cavity is found to be divided into a central dark zone, formed by the shadows of the vertebral column, the sternum and the mediastinal organs, and two clear lateral (pulmonary) zones crossed by the shadows of the ribs. The central dark zone is merged below in the shadow of the diaphragm, which may be seen ascending and descending as respiration proceeds. The best view of the heart is obtained by means of the anterior position, and particularly towards the end of a deep inspiration, when the shadow of the heart is more or less completely disengaged from that of the diaphragm. The outline of the heart may then be chalked upon the screen, but as the direction of the rays is not parallel this does not give the correct size of the organ. To obtain this the tube whence they emerge must be moved round the heart in such a way that the "normal" or central rays impinge successively on each part of the cardiac periphery. It will be found that the part which shows the greatest amplitude of movement will be at about the middle of the left border, where it crosses the shadow of the fourth rib, or possibly somewhat higher than this. This first sound is exactly synchronous with the end of the movement of the left border towards the left. This lateral movement is therefore presystolic and corresponds to the period of auricular systole. By radioscopic examination it is clearly demonstrable that the so-called "apex-beat," perceptible by external palpation, does not in all cases correspond with the position of the apex of the heart. Change of position from the right lateral recumbent to an upright position, and thence to a left lateral, causes a change in the position of the heart amounting to about two centimetres. The affections which may be more or less certainly detected by radioscopic examination are pericardial effusion or hæmorrhage, pericardial pneumothorax, cardiac atrophy or incom-

plete development, the various forms and degrees of hypertrophy, true and false, partial or complete, and the various forms and degrees of cardiac dilatation. Much aid may also be derived in the determination of the cardiac effects of dyspepsia and valvular disease, and the action of particular drugs, *e.g.*, digitalis or strophanthus. Radioscopic examination supports the view that functional bruits are of cardio-pulmonary origin, being the result of the sharp expansion of the lungs, which is associated with the ventricular contraction. All the large vessels of the cardiac base are accessible to radioscopy, particularly the ascending and descending portions of the arch of the aorta. For the examination of the aorta, the left lateral and the right anterior oblique positions are the best. The points which may thus be determined are the existence or otherwise of prolongation, dilatation, or an actually aneurysmal condition of the vessel. In cases of aneurysm, radioscopy is of special value as an aid to prognosis, and its results tend to prove that the functional disturbances which accompany this disease are sometimes in inverse rather than direct proportion to the gravity of the lesion.

Electrical Treatment of Lead Poisoning.—The *Electrical Review* states that the decision of the Governors of the North Staffordshire Infirmary to introduce into their institution an electrical equipment for the treatment of lead poisoning cases has taken definite shape. Subscriptions have been got together for installing apparatus for electric baths, X-ray apparatus, &c. Certain rooms have now been allocated, and authority given for the work to be done.

Hypnotism in France.—By a recent decision the Cour de Cassation—which is the High Court of Appeal in France—has finally settled a question which has been left open ever since, six or seven years ago, two provincial assize courts gave contradictory decisions upon the question whether the treatment of patients by hypnotism or so-called "magnetism" constituted a breach of the law which forbids the practice of medicine by those who do not possess proper qualifications. The French law is so precise that there was no great difficulty in coming to this conclusion, the only defence being that the treatment of patients by hypnotism did not constitute the practice of medicine; but this contention was promptly set aside, as it cannot be maintained nowadays that medical treatment is limited to the administration of drugs. The French law restricting the practice of medicine to properly-qualified persons is founded upon the principle that for the welfare of society no one should be allowed to exercise such delicate and important functions as are implied in the treatment of disease unless he has passed through as complete a training as the existing state of science can afford in all those branches of learning bearing upon the structure, functions and diseases of the human body, as well as upon the actions of remedies.—*British Medical Journal.*

Kryoscopy.– In the *Gazz. degli Osped.*, November 11, 1900, Ascolo draws attention to the clinical value of kryoscopy (κρύος, frost, cold), that is, an estimation of the osmotic tension of fluids by means of freezing. The law laid down is that the lowering of the freezing point below that of the solvent is proportionate to the osmotic tension. This supports the hypothesis that the function of the renal tubules is the secretion of fixed materials, and the establishment of a positive osmotic disequilibrium between the urine and the blood. The kryoscopic index of the urine falls in diseases of the kidney, and

that of the blood rises. This rule may be applied in estimating the relative functional capacity of each kidney (by catheterising the ureters). In the case of serous effusions the want of osmotic balance between the blood and the effusion was most marked when the effusion was inflammatory. "In primary polydipsia the kryoscopic index of the blood is lowered."

An Electric Theory of Nervous and Muscular Action.—The outcome of the far-reaching hypothesis of Dr. Chunder Bose, in the light of modern discoveries in molecular physics, may be shortly summarised as follows: The substance of muscles and especially of nerves, consists of organic molecules, the chemical bonds of which are delicately suspended like the beam of a chemical balance, so that a deflection from their position of equilibrium is easily brought about by an electric wave. These chemical bonds, as we know from J. J. Thomson's theory, are electrified corpuscles of much smaller mass than the atoms, and are, therefore, practically the only part of the molecule affected by the potential gradient associated with an electric wave. The deflection of the chemical bonds results in the formation of temporary or permanent allotropic molecules, *i.e.*, molecules in which the same atoms are combined in a different way. These allotropic changes bring about changes in the conductivity of the nerve, and hence in the electric nerve currents.

Prof. Perry has said that the future of electricity is in the hands of the chemist and the molecular physicist; it is becoming evident that we shall have to look there also for the future of physiology.—*Electrical Review.*

Radio-Therapeutics in Skin Diseases.—Jutassy (*Wien. klin. Rund.*, August 12, 1900) reports several cases of skin disease treated by the X-rays. Case 1: Lupus vulgaris in a woman aged 24; exposed to an intense current at seven sittings; total duration of exposure four hours. The patch of lupus became a bleeding raw surface, which healed under antiseptic dressings in a month and formed a smooth scar. Case 2: Lupus erythematosus of the nose and face in a woman aged 28; duration of disease eight years; seven exposures were given, of a total duration of five and a half hours. The central skin of the diseased area came off in a thick layer. A second series of six exposures was given; total duration three hours. Soon after this the peripheral disease desquamated, and the face was clear and remained so for eighteen months. Some small recurrences, however, occurred. Case 3: Chronic eczema of the hand in a man aged 29; duration of disease seven years; eight exposures were made, duration two hours and a half altogether. A crust formed on the affected skin; this healed and left the skin healthy. Case 4: Hypertrichosis of the face and neck in a woman aged 25; ten sittings were given with a total exposure of three hours and a half. A fortnight afterwards a brownish erythema appeared, and the hairs were completely shed. Two months later new hairs grew at the angle of the mouth, and a second series of sittings was given, combined with electrolysis of some of the larger hairs. A good result was obtained. Case 5: Nævus flammeus (port-wine mark) in a man aged 22; fourteen hours' exposure at ten sittings, the eyebrows, upper lip, and eyelids being protected. A pustular dermatitis resulted, which healed under simple dressings. Three months later the nævus had disappeared, and was replaced by a smooth whitish scar. Unfortunately pigmentation appeared at the edge which resisted all treatment.

At a meeting of the Chicago Medical Society, held on November 14

(*Medical News*, November 24, 1900), W. A. Pusey demonstrated a case of successful treatment of lupus by the Roentgen rays. The patient was a woman, aged 88, otherwise in fair health, without history of any sort of preceding eruption. Family history tuberculous. The diseased area involved the left cheek, the left side and front of the neck, the lips at the left angle of the mouth, and the chin, and extended up on the right cheek beyond the angle of the mouth. The disease was of four years' duration, and had steadily progressed. At the time treatment was begun there was an active lupus area, with characteristic ulcers covered with reddish crusts and thick band-like scars, in which there were at many points recurrent ulcers and lupus nodules; characteristic tubercles were to be seen at many points. Tubercle bacilli were found in sections of tissue taken from the border of an ulcer. The patient was put under treatment with Roentgen rays on May 8, and, with the exception of six weeks, when there was no treatment, had almost daily exposures until November 14. The only other local treatment was the use of boric acid vaseline while the surface was freely ulcerating. Internally the patient took a pill of reduced iron, arsenious acid and strychnine, three times a day, during the month of October. Beginning May 8, the exposures were made daily until May 26. After May 26 daily exposures were interrupted by intervals during which there was no treatment, the exposures always being temporarily stopped on the development of slight dermatitis. Within two weeks after the beginning of treatment the ulcers were cleaning up, and improvement after that time was continuous. The last lesions had entirely disappeared by October 8. An interesting observation was that lesions which did not receive the full effects of the rays required extra exposures for their healing. No new lesions have appeared, and at the present time it is impossible to find active trace of the disease. The scars resulting are soft, flexible and white, confirming the claims of other observers. The thick scars which existed when treatment began have shown under the exposures great improvement in flexibility, softness, and colour. The case was presented as one healed by exposures to Roentgen rays. It was admitted that whether it is a complete cure or not can only be determined by the lapse of time. It was pointed out that there were at least no evidences of disease remaining, and that even should more or less recurrence of the lupus take place the result might still be called extraordinary. —Abst., *Brit. Med. Journ.*

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I. B. S.

THE

Journal of Physical Therapeutics

No. 2. APRIL 15, 1901. VOL. II.

Editorials.

(STANDING ANNOUNCEMENT.)

THE aim of this Journal is not only to furnish a record of current progress and contemporary work, but to provide a detailed and critical account of what has already been accomplished in the field of Physical Therapeutics.

Owing to recent progress in physical and biological science, the *modus operandi* of such methods is now, in some measure, beginning to be understood; further, their successful employment requires a carefully executed technique, and such information as is available on this point exists at present only in a scattered and fragmentary form. It is therefore considered that such a journal as this need offer no apology for its existence; it is hoped that it will fill a gap—that it will supply a want.

A knowledge of the effects and mode of action of the remedial measures at our disposal, says Dr. Carter,[1] "amounts to something more than mere pharmacology. It includes also a knowledge of the physiological action of those powerful agents which for the sake of convenience we may call natural remedies, diet, heat, cold, rest, exercise, massage, baths, electricity, climate." After expressing the opinion that these deserve "a place in the front rank of therapeutic agents," Dr. Carter continues: "In a general sense the importance of such remedial agents is widely recognised, and in a general way every practitioner nowadays makes use of them; but the great advances which have taken place in our knowledge of their modes of action, the improvements that have been made in the method of their employment, and the extraordinary potency of their influence upon the nutritive processes of the body, are still, in my opinion, far from being adequately realised."

In view of the fact that many of the subjects to be dealt with have little or no antecedent literature, an attempt will be made to treat them fully and systematically; that is to say, assuming no previous knowledge upon the part of the reader, the subject will be dealt with *ab initio*, and thus a foundation laid for the

[1] *British Medical Journal*, November 3, 1900.

superstructure that contemporary and future work is gradually to build up. That work must consist of experiment and observation. Whilst the practical aspect of a subject and the question of technique will always be prominent, speculative articles will by no means be excluded. Theory—scientific imagination—can never be legitimately separated from the medical art. Each observer moving along his own narrow path of inquiry may assist in the collection of a vast aggregate of disjointed facts, but these await the inspiration that is to give them life and coherence—the *theory* that is to deduce from them some abiding principle, some general law.

It cannot be necessary to remind the reader that to devote the pages of a journal exclusively to the consideration of the agencies in question is by no means to deal with them as something apart from general medical practice, still less to assign to them any predominant *rôle* in the treatment of disease. They represent only one class of weapon in the varied armoury of medicine. Medical men are appealed to to rescue such weapons from the incompetent and unworthy hands into which they sometimes fall.

Although its limits are not ill-defined, Physical Therapeutics is a widely comprehensive term; embracing, as it does, electro-therapeutics, hydro-therapeutics, vibro-therapeutics, or treatment by vibration, photo-therapeutics, or treatment by light, radio-therapeutics, or treatment by the radiations of an X-ray tube, balneo-therapeutics, or treatment by baths, aëro-therapeutics, or treatment by compressed or rarefied air. Therapeutic and hygienic exercises, massage and manipulations, dietetics, climatology, and last, but not least, the valuable agencies of heat and cold, all come within its scope.

AN INTERNATIONAL PSYCHOLOGICAL INSTITUTE.

It has been said that the progress of the sciences which deal with mind have not kept pace with the physical sciences during the course of the century that has just come to an end. There seems to be truth in this, but the foundation of the above institute will certainly tend to diminish the force of such a reproach, and give a powerful impetus to psychology, psychical research, psycho-physiology, histology, pathology, &c. The Society has its headquarters at the Hôtel des Sociétés Savantes, 28, Rue Serpente, Paris. Dr. Oswald Murray (London) is the International Secretary, and Dr. Edridge-Green, Hatchcroft House, Hendon, N.W., Secretary for England. The International Council of Organisation contains many eminent names—MM. d'Arsonval, Bouchard, Duclaux, Rilot, Lombroso, Dr. Morton Prince (Boston), &c. The Institute will, amongst others, pursue the

following aims:—(1) Collect a library and museum; (2) assist research by gifts, loans, instruments, &c.; (3) encourage study and research; (4) organise lectures, laboratories, clinics, and courses of instruction; (5) publish the Annales de l'Institut Psychique International de Paris. The Journal will be translated and published in several languages according to the support forthcoming. Its first number appeared in England and in English, November, 1900. In the Committee of Patrons we notice the names of Sir William Crooks, F.R.S., Dr. Ferrier, Professor Oliver Lodge, F.R.S., W. T. Stead, and others almost equally well known. The annual subscription for ordinary members is 20 francs.

ARCHIVES DES SCIENCES BIOLOGIQUES.

THE Imperial Institute of Experimental Medicine at St. Petersburg publishes five numbers a year of the *Archives des Sciences Biologiques*. These together form a volume of 500 pp. for each year. There is a French as well as a Russian Edition. Its handsome pages are liberally illustrated, and every article bears the stamp of conscientious research and true scientific thoroughness. Advertisement in every form and shape, and whether direct or indirect, is conspicuous by its absence. Such a publication certainly deserves to be better known in this country and more widely read. The Paris publisher is Reinwald and Co., 15, Rue de Saints-Pères, and the subscription is 8 roubles.

Diseases of Occupations.—During the month of September, 1900, there were reported to the Home Office the following number of cases of lead and arsenic poisoning and of anthrax in factories and workshops. Seventy-four cases of lead poisoning: 24 of these (22 males and 2 females) occurred in white-lead works, being 12 fewer than in the corresponding month of last year. There were 13 cases of arsenic poisoning due to the inhalation of arseniuretted hydrogen gas, 2 of which proved fatal, and 1 of the non-fatal cases occurred in the early part of the year. There were 8 deaths from occupation diseases during September, namely, 4 from lead poisoning, 3 from arsenic, and 1 from anthrax. Under the head of coachmaking, &c., 14 cases of lead poisoning are reported. While during September 74 cases of plumbism were reported, there were 112 for the corresponding month in 1899. Although lead poisoning in house painters and plumbers is not compulsorily notifiable there were yet reported 27 persons as suffering from plumbism in these trades.—*British Medical Journal.*

ADJUNCTS TO SPA TREATMENT. THEIR ADVISABILITY AND VALUE.

By Wm. Armstrong, M.R.C.S., J.P. (Buxton).

The question of using adjuncts to Spa treatment has given rise to much difference of opinion in English resorts, although on the Continent it has long been the custom to add to the use of the particular waters of the place special treatment of various kinds, both physical and dietetic; in some places even the bottled waters of other health resorts being supplied.

The feeling in England, more pronounced at some Spas than at others, has been—and to some extent still is—that the use of any agents except the special water or baths of the particular resort is wrong; that it tends to lower the reputation of the natural resources of the place; that the practitioners using these "alien methods" are guilty of quackery and almost of malpraxis; and certainly are wanting in loyalty to their town and to their local professional brethren.

A somewhat sorry reward for efforts directed towards putting Spa treatment on a scientific basis, and forwarding the best interests of patients; and at the same time making, as one would have supposed, for the enduring prosperity of the resort itself.

For surely no waters, however effective, can be used with advantage in *every* class of case; nor are any so omnipotent that their prescribers can afford to reject the aid of the resources of science and of progress.

All Spas are situated in more or less healthy positions, and usually the air itself has considerable therapeutic value. Therefore many invalids are sent to such places whose cases are not suitable for treatment by the special baths and waters of the resort; and many more, some portion of whose ailments only can be influenced by those same waters. Three courses are therefore open to the physician:—

(1) To let the patient have the benefit of the air and climate only, together with rest and change.

(2) To order the baths and waters as a matter of routine.

(3) To give the sufferer the advantages of the various physical methods likely to be of service, with or without combination with the special treatment of the place.

Formerly it was too much the custom to take either the first or second course, with negative or even ill result to the sufferer; but more recently a broader spirit has prevailed, and consequently the percentage of cured and relieved cases has considerably increased.

What can be done is shown by the manner in which certain Continental health resorts have made a definite position for

themselves. Aachen, whose sulphur waters are no better than those of many other little-used spas, has, thanks to the scientific and painstaking work of Brandis and others, had grafted upon its treatment the adjuncts of thoroughly given mercurial inunction and injection, which, used in combination with its baths, have given it a place by itself in the treatment of syphilitic ailments.

Aix-les-Bains, again, whose sulphur waters are of no extraordinary value, has built up for itself a world-wide reputation entirely through the systematic and scientific method of massage and douching introduced there, and now copied at many other resorts.

Carlsbad stands far ahead of other equally good waters of its class mainly because of the very rigid and excellent system of dietary associated with its treatment.

At Nauheim the undoubted value of the waters in certain cardiac troubles has been greatly enhanced by the introduction of the effective system of resisted exercises, designed and brought into use by the brothers Schott, and by Oërtel's method of graduated hill-climbing.

The value of the treatment in other resorts has been increased by the use of Hydropathic methods, applications of vapour and hot dry air, of heated sand, of peat mud in baths, and by the giving of electric baths and electrical applications of various kinds. In many places Zander institutes have been established where, by means of most ingenious appliances, much valuable treatment is given.

The physician in the foreign health resort, while not allowing his patients to lose sight of the special value of its natural waters, does not disdain the aid of other methods in order to make the cure more successful.

It may be well to give instances of the manner in which adjuncts are used.

A patient, surcharged with gout, comes to a Spa. The natural waters of the place in such cases are apt to bring on an acute attack of the complaint, causing much suffering and loss of valuable time. This risk may be obviated in most cases, and minimised in all, by combining with the first few mineral baths a vapour or hot-air bath, giving the latter first, followed immediately by the former: the free action of the skin giving an outlet for much morbid material. If the patient should, however, be unfortunate enough to have an acute attack of gout, the application twice daily of local vapour or hot air to the affected part relieves much suffering, and greatly shortens the attack.

A gouty subject with cardiac debility or disease may be greatly assisted by adjuncts. If the lesion is not very serious the addition of a few effervescing saline baths on the Nauheim method, or the use of some carefully selected resisted exercises on " Schott " lines, allows the patient to go through the regular bathing cure with advantage and safety.

If the cardiac trouble is more serious, then the local or general application of hot air, on the Greville or Dowsing systems, aided by the saline baths or exercises, is most valuable, and the patient may in most instances have also the advantage of drinking the waters.

If the gouty patient has gastric or hepatic derangement, packs of mustard bran over those organs will assist the cure: if the nervous system is at fault, the needle bath or douche *en cercle* will be found most effective.

If a sufferer comes to a bathing station with acute or sub-acute rheumatism with a rise of temperature, the baths cannot be used; but hot-blanket packs on hydropathic lines will in a short time prepare the way for ordinary bath treatment.

Arthritis in its various forms—often so refractory to treatment—is greatly helped by a combination of mineral baths with electric baths, which latter, charged either with the constant or sinusoidal current, act upon the undoubted neural factor present. In a very large number of cases the use of this adjunct makes all the difference between failure and success.

Many cardiac cases are benefited by the baths and exercises before mentioned.

Various spinal and nervous ailments, partly or wholly independent of gout and rheumatism, will do well if treated by electric baths, electro-massage, general dry faradisation, or hydropathy on the lines laid down by the late Dr. Hunter, of Matlock. Cases of gastric and duodenal atony, of hepatic and intestinal torpor, are frequently helped by similar methods, combined with the various forms of gastric lavage and intestinal douching.

The addition of massage to mineral-water treatment is acknowledged to be of great value, emptying the lymph spaces and lymphatic channels of their morbid contents, and generally stimulating the vital processes, being made more effective by administration in conjunction with the soothing and softening effects of a stream of hot water.

Many obstinate joint cases, which would defy the bath treatment alone, give way before the combined use of the baths and local applications of very hot dry air given by the Greville or Dowsing methods; and in other cases, where the baths would *eventually* be successful, the improvement is much expedited by this combination—an important factor, as so many patients have all too short an amount of time at their command.

In the various rheumatic and gouty nerve-affections, such as sciatica and other forms of neuralgia and neuritis which are apt to be both very painful and very refractory to treatment, hot-air applications in the acute stage, and electric baths when that has passed over, are allies of the greatest value to the mineral baths. Nerve stretching, passive or active, often completes the cure of chronic sciatic trouble.

There is no doubt that the sinusoidal current of D'Arsonval

(200 alternations per second), given in the bath and thus being rendered quite painless, has done more for sufferers from neuritis than any other single method of treatment.

Again, certain mineral waters valuable for drinking may, while acting upon the kidneys, have a constipating effect upon the bowels, or may lead to hepatic inactivity. In these cases the addition of some saline, which in no way interferes with the specific action of the water, is of definite service.

The various forms of Swedish massage, vibrations, and exercises given by competent operators are of no small value in many difficult cases.

Dietary is of the highest importance as an adjunct to spa treatment, and there should certainly be every facility and convenience for carrying this out carefully; and it is only now that English hotel-keepers and other caterers are beginning to give attention to this important factor. Much more may be done, however, if the medical profession will bring steady pressure to bear upon those concerned.

The question of adjuncts in the shape of drugs has been specially omitted, as it seems to the writer that spa treatment should as far as possible be restricted to physical and dietetic methods, and drugs used only when absolutely necessary, as for the relief of pain or to deal with some important symptom which may arise.

Effects of Athletics on the Heart and Circulation.—A. Stengel (*Amer. Journ. of Med. Sciences*, November) discusses this subject in a paper containing the results of six years' observations made upon the student athletes of Pennsylvania University. He gives a series of charts illustrating cardiac conditions before and after athletic exertions. These demonstrate the fact that the "untrained" cardiac dilatation and murmurs (most probably cardio-pulmonary) are very generally developed after severe muscular efforts. In those "trained" and "seasoned" they do not occur. As regards the remote effects, several instances are cited showing marked ventricular hypertrophy, with oppression and dyspnœa occurring early after the cessation of active exercise; and the author has met with many cases of cardiac muscular disorders in middle and later life apparently due to the "remote consequences of over-exertion in early manhood." Allbutt (*System of Med.*, vol. v., p. 849) suggests that in the after-effects of athletics the mean blood-pressure increases as a consequence of the withdrawal of the reducing influence of exercise. Stengel believes that the blood pressure is increased "from the cardiac hypertrophy if for no other reason." He finds over-distension frequent in athletic contests, and hypertrophy and over-action as a result of continued athletics. The obvious conclusions are: a thorough discouragement of long cycle journeys or holiday over-exertion to those not in regular training, the necessity for medical supervision during the "athletic period of life," and a gradual, not sudden, discontinuance of the severer muscular efforts and exercises. (*Abs. Brit. Med. Journal.*)

METALLIC INTERSTITIAL ELECTROLYSIS.

(*Continued from page* 6.)

By Dr. G. Gautier (Paris).

Now that we know the principles of metallic interstitial electrolysis, let us turn to the study of its practical applications. The eight years of practice that I have had in this method, and the vast number of cases that I have treated, and had under observation for considerable lengths of time, enable me to offer an unhesitating opinion as to its value. "This treatment," says Weill,[1] "has a marvellous effect, especially in hæmorrhagic metritis, for which I believe it superior to all medical treatment, and even to *curetting*. One of my most convincing cases was that of a lady whom I had been urgently called to see on two different occasions for metrorrhagia, coming on violently and with such suddenness that she had scarcely time to lie down before her room was literally drenched with blood; and this had occurred notwithstanding medical treatment which she had undergone during a whole year, directed to repeated losses of blood. Electrical treatment by intrauterine galvanisation with the soluble positive electrode stopped these hæmorrhages from the second sitting. The patient, who was extremely weak at the beginning of the treatment, little by little recovered her strength; at the same time the menstrual functions became regular; in about two months and a half, the uterus ceased to be painful, and the periods became normal, regular, and of short duration. In almost all cases the antihæmorrhagic effects of the positive pole are noticeable from the very first; the treatment can even be applied when the hæmorrhage is actually in progress, and it will stop it." The efficacy of the treatment is equally apparent in every kind of metritis: in catarrhal metritis, which is characterised by a thick discharge, but without appreciable virulence; in purulent metritis the discharge of which is more or less abundant and coloured; in fungoid metritis which is complicated with purulent discharge and repeated hæmorrhages, and profound lesions of the mucous surfaces.

These clinical differences are met with both in the neck and in the cavity of the uterus, and of course involve a certain amount of practical experience in the operation. Thus, when the infection remains localised in the mucous membrane (endometritis) the sittings will be fewer and shorter, and a comparatively low intensity will be used (19 ma.); when, on the contrary, the infective process has invaded the uterine parenchyma (parenchymatous metritis) it becomes necessary to produce an abundant oxychloride of copper capable of profoundly penetrating the muscular fibre.

[1] *Electro-Therapie Gynæcologique*, p. 164.

There may at first be expected a series of local reactions, with some congestive attacks, which will disappear after four or five applications. After each treatment a little rest is necessary, and the treatment must not be carried out within four or five days of the menstrual periods. It is for these various reasons that I wrote in 1893 that metallic interstitial electrolysis, on account of the very nature of the process, required but few applications to show its full value, and especially its superiority over positive electrolysis with the insoluble electrode; it is in fact antiseptic, resolvant, and diminishes congestion.

Metallic electrolysis requires the greatest care in carrying out its application; it must be aseptic, both as regards the vulva and vagina. Irrigation and drainage must be carried out according to requirements, and in view of the cause and nature of the case. Neither must we forget that internal treatment and the employment of physical agents must often be used in conjunction with this local treatment. Such adjuvants, by modifying the *terrain* or ground on which we are working, are of undoubted assistance, but are quite unavailing both in chronic cases and in acute cases of a serious nature. The true treatment of metritis, whether the body of the uterus or only the neck be involved, is metallic interstitial electrolysis. I do not offer it as a panacea, I only want to draw the serious attention of *confrères* to a method of real value, which has not the inconvenience of extreme novelty. I would further add that I am of opinion that to cure inflammatory conditions of the uterus is sometimes to prevent the appearance of cancer. Uterine cancer is relatively so frequent, and clinical observation shows that it so often supervenes upon inflammation of the neck of the uterus, that it is necessary to protect women against this malignant degeneration. "Those who have microscopically examined sections of metritis and of cancer at the beginning," says Pichevin, "are struck with the relationship between inflammation and degeneration. In the early stages it is singularly difficult to differentiate between what belongs to inflammation and what is due to cancer." Schroeder is fully persuaded of the great frequency of degeneration consecutive to cervical metritis. "To prevent cancer," wrote Boivin and Dugès, "we must cure inflammatory engorgement." It is especially when we have reason to fear hereditary transmission that every pains ought to be taken to cure radically the least appearance of metritis.

THE TREATMENT OF OBESITY BY DIETARY.

By THOMAS DUTTON, M.D.(Dunelm), M.R.C.P.Ed.

AUTHOR OF "OBESITY: ITS CAUSE AND TREATMENT."

THE physician has during the last ten years paid great attention to the treatment of obesity, looking upon it as a slow insidious disease which soon deprives a man or woman of that energy and activity by which alone they can maintain the body in a healthy state. Until a comparatively recent period neither the average medical man nor the lay public looked upon an extra abundance of adipose tissue as a disease; it was rather regarded as a sign of good health and a *good-natured temperament;* consequently there was no need for treatment of the condition by either drugs or dietary. We find no mention of the disease or its treatment in the old treatises of medicine. This is to us, who have studied carefully the ill effect of obesity on the general health of the body, a very unaccountable lack of medical foresight and knowledge, especially when the following reason is taken into consideration.

Both men and women after the age of forty are apt to become less energetic and active, and to take life more easily, having by that time accumulated sufficient money to allow them to do so; the consequence is that they gradually put on more adipose tissue, which also gradually increases the natural apathy of ease and comfort. This increase of adipose tissue, after it has padded the external parts of the body, soon begins to invade the internal organs and interferes with their natural movement; hence we get embarrassed breathing, congestion of the liver, faulty digestion, general debility and malaise, through accumulation of uric acid in the system. All these symptoms coming in the wake of excess of adipose, anyone would have thought to have been sufficient to awaken the physician to the true cause of the disease; but apparently it did not. I cannot remember a teacher in my student days calling our attention to the disease or its treatment.

The condition not being looked upon in the light of a disease, but rather, as I have said, as a sign of good health, no treatment was advocated or prescribed for it; those who suffered from corpulency and looked upon it as a disfigurement were merely netted by a large army of quacks who professed to have certain and *safe* anti-fat remedies, and who never were slow in placing a very heavy price on the worth of their infallible cures—the poor victims going through a slow process of starvation and losing flesh in that way, or having their digestion so injured that little food could be assimilated. Unfortunately, since the profession have taken the treatment of this disease seriously in hand—and there are now many physicians who devote special care to its

treatment, and the general practitioner also treats it—the prejudice among the public still lingers, and many will rather consult an advertising quack than an orthodox physician for the complaint. In just casually looking down my case book I find that, of every three patients who have consulted me, two have consulted one of these gentlemen or ladies before seeking my advice.

The treatment of obesity opens a large field for scientific study and investigation. I personally, although I have exhibited on myself and patients all the drugs said to have any virtue either in arresting or curing the disease, have come to the conclusion that if they did any good "the cure was worse than the disease."

Speaking of the principal drugs, I find iodide of potassium in large doses will reduce weight, but only at the expense of the patient's strength; when it is left off the adipose tissue will deposit again.

Extract of fucus vesiculosus, which is a drug generally found in the anti-fat remedies of quacks, merely reduces weight by a slow process of starvation, *i.e.*, it prevents the food from being properly digested and assimilated; therefore, if continued for any length of time, must do serious injury to the constitution. Saline salts only produce a temporary effect, and are very weakening.

Thyroid gland substance, which has been lauded by some physicians, has not been of the slightest service when administered by me in true cases of obesity. I can only conclude that these gentlemen's clinical knowledge was not accurate, and they gave it in slight cases of myxœdema aggravated by obesity. In all cases where there are any signs or symptoms of myxœdema it does good. A practitioner only a few weeks ago brought me a case of obesity, where he said he had reduced the weight by giving thyroid extract. I certainly looked upon the case as a very clear case of myxœdema—a disease I have had an unusual opportunity of seeing very frequently for rather a rare disease.

I have clearly stated my opinion concerning the therapeutical use of drugs in the treatment of obesity itself, but when we come to the conditions that usually accompany the disease I have a very different opinion to express with regard to the use of drugs. We frequently get some disease of the liver accompanying obesity—catarrh, congestion, torpidity, &c. Now mercury exhibited in small doses in the form of calomel does wonders. I have an old gentleman now under me who has been under mercury for some weeks, and only with a slightly restricted dietary; he has lost nearly two stones. Then there are all kinds of indigestion to treat, and the usual drugs are of great service, especially creasote in cases of flatulent dyspepsia. Most adipose people suffer from weak hearts, which must be carefully treated with heart tonics, especial care being always taken not to upset the digestive organs. Lithium, piperazine, Vichy and Carlsbad salts are all most useful in eliminating the excess of uric acid which you generally find

to be associated with obesity in the majority of cases that seek advice. It is as well that all the organs of the body should be thoroughly examined and put in order, which may often be done at the same time the patient is undergoing dietetic treatment.

There are many what I may call physical treatments advocated for obesity, such as massage, electricity, Turkish baths, Swedish gymnasium—all certainly very useful as adjuncts to treatment by dietary, but none of the slightest use unless the patient is placed at the same time upon a proper restricted diet.

The reader will have drawn the conclusion from the short discussion of the disease that I do not regard any other treatment than dietary to be of any use; if we wish to cure the disease successfully and without any injury to the constitution, this must be our basis of treatment. The other methods advocated will, if properly prescribed, greatly assist in the cure when we have rendered the metabolic transition of the fat cells certain by restricting the carbonaceous supply.

These views are shared by most specialists who have had to treat a considerable number of cases, and many have worked out a diet card of their own for the general treatment of polysarcia, the name generally used for the disease on the Continent. First we have Oertel's system as follows. Morning: one cup of tea or coffee and about three ounces of bread. Noon: soup 4 ounces, 8 ounces roast or boiled beef, veal, game or not too fat poultry, salad or a light vegetable, a little fish (cooked without fat) if desired, one ounce of bread or farinaceous pudding (never more than three ounces), three to six ounces of fruit, fresh preferred, for dessert. It is desirable at this meal to avoid taking fluids, but in hot weather, or in the absence of fruit, six to eight ounces of light wine may be taken. Afternoon: the same amount of coffee or tea as in the morning, with at most six ounces of water, and an ounce of bread as an exceptional indulgence. Evening: one or two soft-boiled eggs, an ounce of bread, perhaps a small slice of cheese and fruit, six to eight ounces of wine with four to five ounces of water.

I will not give you Salisbury's treatment, or as it is sometimes called, the "Meat and Hot Water Treatment." The patient has to eat three pounds of rump steak, one pound of codfish with six and one-third pints of hot water for a fortnight. The water is gradually reduced to four pints, and lean beef and fresh fish may be eaten with dry toast and a very little green vegetable food. After five or six weeks the hot water is still further reduced to a quart a day, and dry crackers and dry toast and stale breadcrusts, poultry and game, are added to the diet, and the patient may be allowed to drink hock diluted with carbonic or Seltzer water. The hot water, if desired, may be flavoured with fresh lemon-juice, and five to ten grains of bicarbonate of soda are given twice a day.

Another very different diet system is Schleicher's. The patient

has breakfast at 7 a.m.: a mutton or veal cutlet or a portion of sole as big as the palm of the hand; the same quantity of bread without butter, a cup of tea with sugar. 10 a.m.: a sandwich of bread, meat or sausage. Noon: meat, eggs, green vegetables, cheese, an orange, two glasses of white wine (no soup, no potatoes). 4 p.m.: tea with sugar. 7 p.m.: a small quantity of bread and cheese. 9 p.m.: cold meat, eggs, salad, two glasses of wine.

Schweninger's system is very similar when compared. Germain See, Weir Mitchell, Yeo, Bouchard and Chambers have each a different diet system; they vary very much in the amount and kind of food and fluid allowed.

I have tried all these systems at one time or another, and I give it definitely as my opinion that no system of dieting is suitable for every case of obesity. Any one of the systems I have named may bring about a cure in a certain case suitable to that system, but when the physician gives the same diet-card to every patient he is sure to fail in the greater number of his cases.

I have no diet system. I carefully treat every case on its merits, and whereas I find some patients do very badly on large quantities of meat, these patients will do well on fish. When I was dieting myself, and reduced myself from 14 st. 2 lbs. to 11 st. 12 lbs., I found this to be the case with myself. I could always enjoy a dinner composed of strong clear soup, six ounces, boiled white fish, stewed apples, toast, and half-a-pint of boiled water with a tablespoonful of whisky drank at the end of the meal. The satisfactory part of my case is I have never put on weight (except a few pounds now and then), and I can indulge in a pint of beer once or twice a week with impunity. When I tried to take lean meat daily, without vegetables, I soon began to get dyspeptic and felt a loathing for food.

My practical experience teaches me that when you place a patient on a very restricted nitrogenous diet you must allow a fair quantity of ripe fruit in order to keep the digestive organs healthy. There is a large variety of meats, fish, vegetables and fruit which contain little or no carbonaceous matter or sugar for the physician to compile a diet card from, suitable for the various kinds of obesity that he may be called upon to treat, without making the patient's life a misery. It is most important to carefully regulate the amount of fluid taken during the day. In the Salisbury treatment large quantities are prescribed in order to wash out the stomach and kidneys. I consider fluids produce adipose tissue more than solids, so restrict my patient to a quart or three pints during the twenty-four hours. The fluid should never be taken during the meal, but at the end of the meal or upon an empty stomach.

With regard to stimulants, I believe most patients get on better when they only drink pure water, or water boiled and

filtered, at the times I have stated; but should they require stimulants, well matured whisky, white and red wine, can be ordered in moderation. Aërated water should be carefully prescribed—the gas often accumulates and upsets the digestive functions. I never allow more than two small bottles a day at the most. The patient may also have a pint of tea or coffee a day. I have for many years prescribed saccharine in the place of sugar in everything that patient's taste requires to be sweetened. I have read carefully in the medical papers notes by experienced practitioners that a prolonged use often does harm to the system. From a chemical point of view, I cannot see how saccharine can do any harm; at the same time we must thank these practitioners for pointing out a danger which we must not lose sight of.

In concluding this article, I need only remind the reader of the importance of the bowels acting freely daily, but there is no reason to purge your patient.

Lastly, the physician will always come across a few cases of obesity which are incurable.

Living Light.—Prof. Raphael Dubois, of the University of Lyons, has long made a study of phosphorescent bacteria. He points out in this connection that the ideal illuminant ought to be a light composed chiefly of radiations of medium wave length, with a minimum quantity of rays emanating from the extreme ends of the spectrum, that is to say, with as few as possible both of calorific and chemical rays. This requirement is met by such a light as is produced by luminous microbes or photo-bacteria. Here the heat rays are infinitesimal in amount, and this light is so poor in chemical rays that even with a rapid photographic plate prolonged exposure is necessary to obtain a result. It is further claimed that this light possesses a penetrating power so great that its radiations can traverse even cardboard and wood.

Ordinary solid culture media are not suitable—liquid media must be used. The medium with which the most successful experiments have been made consists of water, sea salt, a ternary, an azotised and a phosphoretted substance, and traces of mineral constituents. Thus, amongst the most suitable compounds are glycerine, peptones, nuclein, lecithin, neutral phosphates, &c.

By means of such culture media a luminous liquid is soon obtained, capable of throwing a soft agreeable light over a room, something like moonlight, and strong enough to recognise a person's features some yards off, to read print, or see the hour on the face of a watch. A novel kind of night light may thus be obtained by enclosing such cultures in flat glass receptacles with a certain proportion of air. These will last for several nights without the air being renewed, or even for weeks or months when enclosed only by cotton, so as to allow for the "respiration" of the photo-bacteria. It is also of consequence that the liquid must not too often be thrown into movement or exposed to the light. Even a common clear-glass decanter with a flat bottom, hung by its neck and containing the luminous liquid, supplies a lamp of some power.

"HYDROPATHIC ESTABLISHMENTS"—AS THEY ARE AND AS THEY MIGHT BE.

By Charles J. Whitby, B.A., M.B.Cantab. (Hill Grove, Wells, Somerset).

A Journal such as this can hardly ignore the fact that there exist in Great Britain a considerable number of institutions expressly intended for the treatment of disease by physical methods. Having myself been officially connected with several of the best known "hydros," and having devoted a good many years to the practice of medicine under the conditions implied by such a connection, I propose to say a few words on what I conceive to be the merits and defects of these institutions, the function they have performed and are performing, and their probable future in this country. It was more or less an accident that I first became associated with this therapeutic specialty (for that is what it amounts to), but I found the subject an interesting one, for some reason or another regarded with a certain amount of suspicion by the profession in general, but none the less worthy of the attention of a conscientious practitioner. I was once told by a physiognomist that I liked to get off "the beaten track." However that may be, I hope I have always had a due regard for the ethics of my profession, and nothing but a firm conviction that the methods in question were of substantial value, and must sooner or later win general recognition, would have induced me to have part or lot in them. That I was justified in this conviction the mere fact that it has at last been found possible (even in conservative England) to establish a strictly professional journal for the sole purpose of dealing with physical methods of treatment is, I think, fairly conclusive evidence. In other countries there are a good many such journals, and the subject is taken much more seriously than is yet the case with us. "But that is another story."

In the first place we must recognise the fact that in Great Britain there are two distinct types of institution, both bearing the title of hydropathic (or, if you like, hydro-therapeutic) establishment. There is the establishment which is purely and simply a pleasure resort, a boarding-house, or even a licensed hotel, where the "Baths" are frequented chiefly by rats, and where the very pretence of fulfilling any genuine therapeutic function has, if it ever existed, been generally abandoned. On the other hand, there is the institution, of which Smedley's, Matlock, is the best example to-day, where a serious effort is still made to provide suitable accommodation, medical attendance, nursing, and treatment for sufferers from various chronic ailments. In all the hydros belonging to this latter class there is an attempt to provide the attractions necessary for securing the patronage of

the healthy as well as the infirm. And in a considerable number I believe, it is the mere visitors, as distinguished from the patients, who form the majority of the inmates. The number of patients undergoing methodical treatment may be large; the number of visitors will be larger still.

In the palmy days of "hydropathy,"—in the days of Priessnitzian enthusiasm and the "water-cure," the days of Gully, Wilson, John Smedley, and the rest, this was not so. Nobody, I imagine, dreamed in those days of going to Malvern or Matlock, and staying at a hydro, unless he were suffering from some definite malady and desired relief. The treatment was pretty severe, and was rigidly enforced, the diet plain, the entire surroundings were permeated with an atmosphere of enthusiasm and propagandism. Those who were sceptical remained away, and criticised the "system" without knowing anything about it. Only the faithful congregated around the shrine, and by all accounts they had a pretty hard time of it, though they seem to have enjoyed the thing immensely.

But now, of course, all this is changed. No medical man believes nowadays that the external and internal application of water is in any sense a universal remedy. Sectarian hydropathy is dead; and hydro-therapeutics, as an almost accredited branch of medicine, reigns, or will reign, in its stead. This, of course, is as it should be; but the effect on the conduct of the institutions I am dealing with has been, in some ways, unfortunate. The fact that the proprietors of a modern hydropathic establishment have to cater for two distinct classes of clients is not without influence upon the conduct of the place. The fact that of these two classes the one which consists of genuine invalids is only a minority is one of still graver import. It is really impossible to combine under one roof the requisites of a first-rate hotel or boarding-house and a *bonâ fide* medical institution. The intention may be, and sometimes is, thoroughly good, but the thing cannot be done. Those who come to a place to enjoy a little rest and innocent relaxation must be amused; and the presence of a number of pleasure-seekers is a source of disturbance to the minds of those whose health does not permit them to indulge in dances, drives, picnics, and theatricals. The inevitable result of this attempt to discharge a twofold function is that the less remunerative one is gradually fulfilled with less and less thoroughness, and that sooner or later the presence of really serious cases comes to be tacitly discouraged. In the old days it was the cases which had baffled the attempts of practitioners confined to the use of ordinary methods, who flocked to the consulting-rooms of the "Water Doctor," and often their perseverance and fortitude were rewarded by success, when success appeared more than doubtful. Now, it is the patient who is a little "run down," who has been living or working too hard, who has not quite shaken off an attack of influenza or acute rheumatism, and whose

need is rest, change of air, and good, plain, wholesome food, rather than any sort of active treatment, who comes, not for three, six, or twelve months, but for a week or a fortnight, to Matlock Bank, Malvern, or Bishop's Teignton. I do not say that the restoration of this class of invalid to comparative health is not a useful or desirable thing, but I do say that it is one which makes no very serious claim on the skill of the medical man who has to supervise it, and affords him little opportunity for the investigation of any therapeutic methods which he may have at command. If we are desirous that the potency of physical agents shall be thoroughly tested and explored, we must use them under far more crucial conditions, and apply them to a class of patient presenting much more definite and objective symptoms than those who frequent the modern hydropathic establishments.

If now we turn to the consideration of the question of reform, the first suggestion that I have to make is that the title "hydropathic establishment," or, as it is generally written, "hydro," is an obvious misnomer, and should be dropped. The treatment provided nowadays at these institutions is not merely hydrotherapeutic, it is also thermal, mechanical, electrical, dietetic, climatic.

The word sanatorium would be far more appropriate, and would have the further advantage of committing the management to a serious medical aim and function, dissociating the institution from an undesirable and exploded sectarian tradition, and suggesting an affinity to the new institutions for the hygienic treatment of pulmonary tuberculosis. In many ways the latter treatment is doubtless applicable to almost all varieties of chronic disease, and the routine of establishments devised for the application of physical methods of treatment, might, with advantage, be modelled pretty closely upon that of the "open-air" sanatoria. The next point, and I think one of vital importance, is that each new sanatorium should be designed with a view not to the provision of a particular kind of treatment (electrical, hydriatic, mechanical, or whatever it might be), but for the treatment of a particular malady or class of maladies, *e.g.*, nervous, gastro-enteric, cardiac, &c. Arthritic diseases are already pretty well provided for by the municipal installations in such places as Bath, Harrogate, and Buxton; and although a considerable number of gouty and rheumatic or rheumatoid patients now find their way to hydropathic establishments, and there may be room for the provision of a few sanatoria for the accommodation of exceptional cases of the kind, I am inclined to think that, generally speaking, there are other diseases which stand more in need of institutional treatment. Sanatoria for the treatment of non-mental nervous diseases, for the treatment of dyspepsia and allied maladies, or for the treatment of cardiac affections, would certainly fulfil a useful function, and, properly equipped and

organised, could hardly fail to meet with due recognition and patronage. The advantages of specialisation of this kind are so obvious, and are so well illustrated by the case of the sanatoria for consumptives, that they hardly require specification. Climate, surroundings, elevation, equipment—all would be adapted to the purpose in view, and the taint of sectarianism, which necessarily attaches to an institution where all diseases are treated, but only with certain specially favoured therapeutic methods, would be finally eliminated. I, myself, not long ago, conceived the plan of starting a sanatorium for the treatment of neurasthenia and allied maladies. Circumstances compelled me to relinquish it, but not because I was in any way convinced of its inutility or essential impracticability.

The next point which occurs to me is the desirability of relinquishing the attempt to combine a medical function with that of a mere boarding-house or holiday resort. This could be done either by simply refusing to admit any persons save those who came expressly to undergo treatment, or, failing this, by the abolition of separate optional fees for medical attendance, and the substitution of an inclusive charge *entitling* every visitor to full advice and treatment. The former policy would be the wiser to adopt at the outset in starting a new sanatorium of the kind I have in view; the latter would probably be preferred in the reformation of already-existing establishments.

As regards the choice of situation a good deal might be said, but I will confine myself to pointing out that the principle governing this choice at present is, from the medical standpoint, essentially a wrong one. New hydros are seldom built anywhere save in the neighbourhood, or within the actual borders of an established pleasure or health resort. The motive is obviously a commercial one, the supply of a presupposed demand for accommodation at the place in question. No doubt a well-conducted establishment may fulfil a useful function in such places as Eastbourne, Clifton, Bournemouth, or Southport, but it is a social rather than a genuinely medical function. A curative institution may be properly located in any quiet and salubrious district, but a fashionable health resort is about the last spot that should be chosen. Most of such towns owe their popularity to other than truly hygienic reasons—to the existence of thermal springs, the neighbourhood of large industrial centres, and so forth, and from the modern point of view, cannot be regarded as exceptionally healthy places. I believe that the exercise of a little more independence in this matter would prove advantageous, even in a pecuniary sense, to the promoters of new sanatoria, for the expenses of keeping up an institution in highly-rented and rated towns are so formidable as to render it almost impossible to obtain a sufficient return for the needful outlay. In a country district everything is cheaper, and there are suitable sites to be had by the score, almost for the asking. No more

striking illustration of the decadence of "hydropathic" enthusiasm could be adduced than the contrast presented by the sites chosen for new institutions now, as compared with those chosen a generation ago. When "Smedley's" was opened Matlock Bank was a mere hamlet. The establishments at Limpley Stoke, and Bishop's Teignton belong to about the same era, and neither is placed in what could be termed a fashionable centre.

One word on the subject of advertisement. So long as an establishment depends chiefly on the patronage of others than invalids, it is inevitable that measures will be taken to keep its attractions in the eye of the general public. An institution devoted solely to the fulfilment of a medical function will naturally rely chiefly, if not exclusively, upon professional support.

I trust that in these few remarks I have said nothing that can be interpreted as a reflection upon the motives or practice of those medical men who are officially connected with existing institutions. Probably they would be the first to agree with me as to the defects of these establishments; but men have to take things as they find them, and may find themselves unable to modify them however desirous of so doing. It is, at any rate, undeniably true that hydropathic establishments have done much to foster a belief in the value of physical methods, both on the part of the profession and on that of the public, and that the final adoption of these methods and their incorporation into the class of accredited remedies, will be largely due to the courage and perseverance of those who were the first to recognise and proclaim their importance.

Doctors and Railways Seventy Years Ago.—Karl Schambach, writing in Westermann's *Illustrirte Deutsche Monatshefte*, says that when the new means of locomotion was mooted in Germany in 1827, popular prejudices ran strong against it. The Bavarian College of Medicine expressed the opinion that locomotion by means of steam carriages must be rigidly prohibited in the interest of public health. The quick movement would, they said, affect the brains of passengers. Even the sight of vehicles travelling at such high velocity might be detrimental, and if railway trains were permitted they must be hidden from view by means of a fence 5 ft. high on each side. Even when the line from Dresden to Leipzig was opened in 1837, the Saxon doctors advised elderly people not to travel by it as the suddenness of the change of air caused by the trains entering and leaving tunnels would probably result in their having a fit. (Abs., *Observer*.)

NEW RESEARCHES CONCERNING THE ACTION OF LIGHT UPON THE SKIN.[1]

By Dr. Niels R. Finsen.

(In the last number of this Journal Dr. Finsen's article dealt chiefly with the 80-ampère lamp experiments upon his arm, and one of the most interesting and practical results of this was that it showed him the remarkably powerful action of the ultra-violet rays, and led up to the advantage that would accrue in light-therapeutics if concentration were effected with quartz instead of with glass lenses.—Ed.)

Besides its bactericidal power the capability of light to cause inflammation must be regarded as very important from a therapeutic point of view. By observing the very considerable inflammation of the skin under the quartz plate (where the inflammatory action was not less marked than upon the uncovered skin) it occurred to me that it was important to ascertain the effect of the ultra-violet rays upon bacteria.[2] I made some tests with a quartz apparatus upon a culture of prodigiosus sowed upon a quartz plate. The result proved that these rays possess a marked bactericidal power. A closer investigation of this matter has been carried out by Dr. Bie and I refer to his dissertation thereon.

There is yet another observation that I was able to make in connection with this simple twenty minutes' experiment upon my arm. I have mentioned that the skin still continued pigmented even two months after the experiment, to such an extent that the markings under the glasses, &c., could be perceived. A few months later, however, they could not be seen and the colour of the skin was uniform throughout. But one morning when I as usual rubbed my skin, I observed that the marks upon my arm again appeared, inasmuch as the spots which had been covered by the glass plates did not get so red by the rubbing as the surrounding parts. This can only be explained by the dilatation of the skin capillaries, &c., which is a consequence of the action of the chemical rays and which I have on a former occasion investigated by microscopic observation upon the tail of tadpoles.[3] Even five or six months after the skin pigment had disappeared, this capillary dilatation could still be shown. Whether it be called pathological or normal, it occurs, although in a less marked manner than in my experiment, whenever there has been any considerable exposure to strong light; and that it has a certain advantageous influence, scarcely admits of doubt. It may be presumed that there will flow, at least that there *can*

[1] *Meddelelser fra Finsen's Med. Lys. Institut.*

[2] Opinions upon this point have been very divergent as mentioned in "Use of Concentrated Chemical Rays in Medicine."

[3] Finsen, *Hospitalstidende*, November 1, 1893.

flow, more blood to the skin when the capillaries are distended, and that this improves the nutrition of the skin and makes it more able to perform its functions.[4]

If it be the case as it no doubt is, that a more frequent but less intense illumination than that just spoken of has the same influence upon the skin capillaries, we must expect to find more blood, or capacity for more blood, in those parts of the skin that are daily exposed to the light than in those that are covered by the clothes and not thus exposed, and this is in fact the case.

Most people have, as is well known, a far higher colour in the face, neck and hands, than on other parts and there is frequently a very well defined line of demarcation between the exposed and the covered skin. That this is not anything special to the face, neck and hands, but is a feature common to the whole cutaneous surface, can be observed in children or others who go with bare arms and knees; the skin colour always changes at the point where the clothes commence to protect it. This strong colour depends of course in a great measure upon the skin pigment. But it is not difficult to observe that it is also largely dependent upon the more ample supply of blood. In albinism it relates exclusively to the blood, and in very blonde persons almost exclusively.

In autumn and towards the winter, when the pigment commences to disappear, it becomes evident that the blood supply has a great influence upon the colour of the skin; and the same occurs in the case of more strongly pigmented people. As a rule it can be seen whether the skin colour depends upon pigment altogether, or whether it also has its origin in blood supply even in strongly pigmented persons. When there, besides pigment, is an ample distribution of blood in the skin, it presents a warm reddish-brown hue. If its colour depends chiefly upon pigment, it looks grayish-brown and cold. This may frequently be observed in the same individual at different times.

This ruddy colour of the skin just described may be considered as so constant a phenomenon that I may be permitted to start with the fact, *that that part of the skin which is not covered, and which daily* (especially during summer) *is ordinarily exposed to the action of light and air will become a stronger red colour than that portion which is covered.* So far as the cheeks are concerned they are exceptions; they are often red when the remainder of the face is pale, although the whole of it has been exposed

[4] In this connection I may call attention to some older and very interesting observations of Berthold. He found that the nails grow quicker during summer than during winter. The same nail that during summer was renewed in 116 days wants 152 days for renewal in winter. The hair grows quicker in summer and during the daytime than in winter or during the night (Müller's *Archive für Anatomie und Physiologie*, 1850, S. 1569). This is the case with the beard also, as I have had corroborated by barbers, who say it is a general experience that you must shave oftener in summer than in winter.

to the same influences. The ruddiness of the cheeks must therefore be considered as something specific, as a race peculiarity.

It does not, however, follow—even although my experiments seem to point to such a conclusion—that this skin redness is derived from light. It is a matter of general observation that the high colour in seamen, coachmen, farmers, and others who dwell much in the open air, is due to wind and weather. But an analysis of "wind and weather" is not very easy; for even if light be counted as one factor therein it is reckoned as heat (compare the expression "sunburnt"); the conception of wind and weather embraces also air and water as represented by storm, rain and snow.

Rain and storm must be reckoned to act by the cold or heat they carry with them, and also, but to a less extent, by the mechanical force of their impact upon the skin.

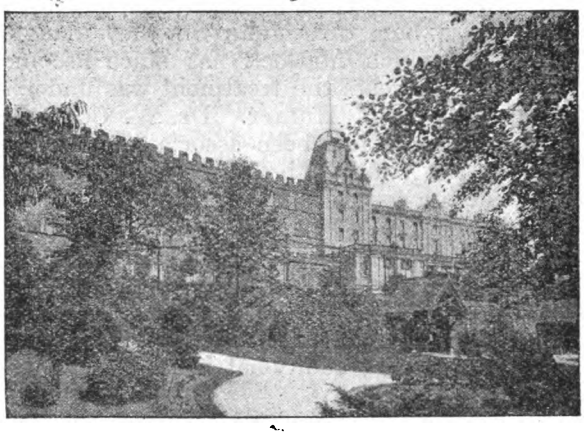
The powerful influence of heat and cold upon the expansion and contraction of vessels and capillaries have long been known, and their importance is not likely to be under-estimated, but the part played by light in these phenomena is not so fully appreciated. Pigment formation has hitherto been attributed to "wind and weather," and sun-erythema to heat; now we know that both are produced by the action of the chemical rays of light.

According to my observations the chemical rays are able not only to produce the marked redness of the skin just referred to, but also to bring about a more permanent dilatation of the skin capillaries. On the other hand there scarcely exists any wider known phenomena than the marked redness which appears on the skin after the influence of either strong heat or cold. But just what part one or other of these three independent agents takes in producing skin redness,[5] will be very difficult to ascertain since an isolated action of any one of them is impracticable. When later on I attempt an analysis of this question, I do not underrate its difficulties. It must be borne in mind that many other agents than the three mentioned may have some influence; but I bring forward the question with a view of securing the experience and help of other observers.

[5] Mentioning the physiological skin redness we must not forget the high colour produced by psychical circumstances. In Darwin's "The expression of the emotions, 1872, where 'blush' is the object of examination," there are many points of interest for us. Darwin says (page 315): "It is an interesting question why in most cases only the face, ears and neck get red, notwithstanding that the impression and sensation of heat frequently are extended to the whole surface of the body. This seems principally to depend upon the fact that the face and neighbouring parts are habitually exposed to air, light and temperature changes, whereby the small arteries not only are accustomed to dilate and contract, but also seem more strongly developed than in other parts. This explanation is supported by the fact that certain races that go nearly naked frequently blush upon the arms, chest and abdomen."

Health Resorts and Sanatoria.

SMEDLEY'S HYDROPATHIC ESTABLISHMENT.



On the western slope of a range of hills overlooking the valley of the Derwent, commanding a view of rare beauty which embraces the High Tor, Masson, and Riber Hills, stands this famous hydropathic establishment. Beyond the pine-clad hills which shelter it on the north and east there stretches many a mile of moorland and forest. A south-west aspect and an altitude of 500 feet above the sea-level secure for it a dry and rather bracing air, while at the same time the woody heights behind (1,035 feet) afford shelter from the more rigorous winds. The district is mainly pastoral, and being remote from any great town, the atmosphere is very free from contamination.

The water supply, drawn from the moorland reaches above, is both soft and pure. A porous subsoil of sandstone grit, a moderate rainfall, and a fair average in respect of mean temperature, all combine to afford an intermediate order of climate, neither too warm in summer, nor in winter unduly cold. The mean average rainfall, as observed for the last seven years, was 32·21 inches per annum, and the mean temperature for the same period was—summer, 62°; winter, 45°; annual, 53·25° (at 9 a.m in shade).

Within a mile and a half lie the well-known High Tor and the beautiful Vale of Matlock—an easy walk. The celebrated palace of Chatsworth and Haddon Hall, Hardwick Hall, Dove Dale, and Castleton with its castle and cavern of

the Peak; the towns of Bakewell and Buxton, with the lovely Lathkil, Miller's and Monsal Dales, are all easy of access; and within driving distance are Lea Hurst, the home of Florence Nightingale, and Wingfield Manor, a picturesque ruin associated with the memory of Mary, Queen of Scots.

History of the Establishment.

It is now upwards of fifty years since this establishment was founded, and it was here that John Smedley inaugurated the "Water Cure" for which Matlock has since become famous. For more than twenty years the treatment was under the direction of the late Dr. W. B. Hunter. Dr. W. Cecil Sharpe, the present senior physician, has been associated with the Institution for the past ten years. There is always a junior resident doctor; at present the post is held by Dr. G. C. R. Harbinson.

Since the death of Mr. Smedley in 1874, the building has been added to greatly, and the older portions completely reconstructed. A new suite of baths gives, among other advantages, a separate Turkish bath for ladies, and a complete electric installation for medical purposes. The establishment has over 200 bedrooms, and a large additional block is now in course of construction.

A lounge corridor, one hundred yards long, forms the approach to a new winter garden and fernery, which provides ample space for exercise and recreation in all kinds of weather.

A farm of 160 acres is worked in connection with the establishment, to ensure a constant supply of pure fresh milk, poultry, eggs, and other produce.

The public rooms all have a southern exposure, and are well lighted, carefully warmed, and amply ventilated. In one long frontage are drawing-room, ladies' drawing-room, reading-room, billiard-room and smoking-room—all spacious, airy, and provided with electric light. The corridors are well warmed and well lighted, and the bedroom flights have access by an American elevator.

In front of the building are covered verandahs and open balconies, affording well-sheltered promenades and accommodation for invalids confined more or less to their couches. These latter can be used almost daily throughout the winter months by many who, otherwise, had been prisoners to the house for most of the time. There are gravelled walks and terraces in abundance, with covered alcoves here and there.

The regulation of the daily life of the establishment is based first of all on the well-being of the invalid; but this is done with as much regard for the interests of the ordinary visitor as is compatible with the chief end in view.

Early hours, a table which comprises all invalid necessaries over and above the customary fare of the hotel table d'hôte,

quietness after hours in the corridors, freedom from preventable annoyances of every kind, and a scrupulous habit of regularity in the general direction, give to a life in such a place as this, for the delicate, a decided advantage over that of an ordinary hotel or boarding house. For the invalid the advantages peculiar to staying in such a place as this over going abroad are very considerable. The long and fatiguing journey by land or sea, or both, and the many risks of mischance by the way, are avoided. The manifold difficulties in getting favourably settled abroad, the numerous drawbacks of ordinary hotel life, a foreign cuisine, inadequate provision against the inclement weather which sometimes surprises the seeker after sunshine, the inevitable extremes of temperature to be encountered almost daily, indoors as well as out, the lack of English comforts, and the remoteness from family and friends in case of severe sickness, are all avoided in great measure by the choice of such a residence as this in England.

With a bathing staff of fifty skilled attendants at call; with a Turkish bath of mild temperature, well adapted for the delicate, its chambers better ventilated than ordinary rooms; with a Russian bath carefully managed, and general bath rooms, warm and airy, and all these under one roof, the invalid is well placed for the treatment of his maladies.

The Baths, &c.

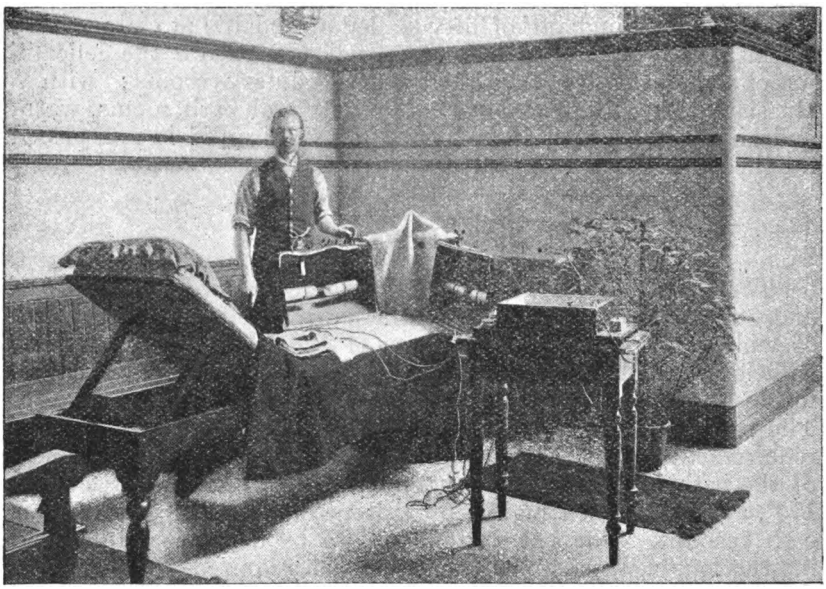
The Turkish Baths.—Each bath (there are two—one for men and one for women) consists of three heated chambers, the first of which is kept at a temperature of 120° only, as being quite sufficient for realising the full effect of the bath for the more feeble and sensitive, while practically free from risk of mishap. The second chamber is kept at 135°, as quite adequate to the requirements of the average patient. The more extreme effects of the bath are obtainable in the third chamber, maintained at 170°, and frequented mainly by visitors taking the bath on their own account. The bath attendants go by definite and detailed instructions reduced to writing, and are required, moreover, to exercise due discrimination in carrying them out. They are prepared also with remedies for the minor discomforts of the bath, and are on the alert to meet the first symptoms of distress. Thus safeguarded, and modified to the capacity of the individual case, the Turkish bath can be comfortably employed for the relief of many who had otherwise been deemed ineligible for it—sufferers from weak heart and congested head—and with excellent effect often through the help it affords to the failing circulation and inactive skin which attend on these conditions. The ventilation of the heated chambers is a special feature of this bath, and chief cause of that immunity from bad effects it affords. A constant circulation of air is carried on through the

forced *indraught* of an air chamber over the furnace, and an *outdraught* through a flue passing from the floor-level into the great chimney. Another great advantage is the exemption from fatigue enjoyed by the patient quartered under the same roof with the bath. There is provision for the careful handling of those who are much crippled by gout and rheumatism, the passage to and fro from every floor being made without difficulty in a wheel-chair by means of the hydraulic passage lift.

A *Swimming Bath*, 35 feet by 6 feet, is attached to the Turkish baths.

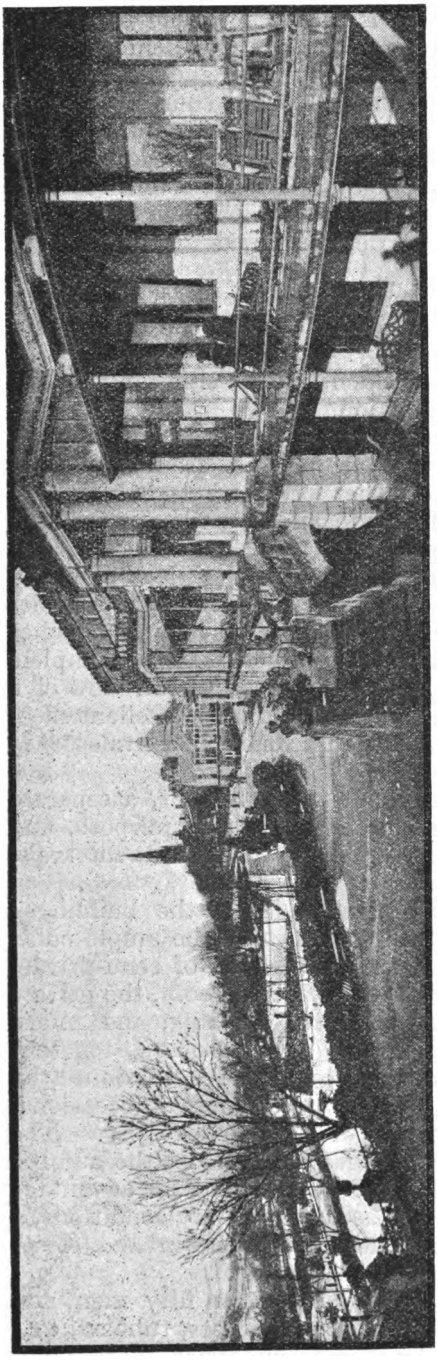
The *Russian Baths* are under the same roof with the Turkish, and are not less carefully administered. They are kept at a temperature of 110°, with more or less of free vapour in the atmosphere.

The *Hydropathic Baths* have recently undergone reconstruc-



DOWSING HEAT AND LIGHT BATH.

tion and extension at a cost of upwards of £20,000, and include a suite of Electric Baths. They comprise:—Rain or Needle Baths; Spray Baths, general and local; Sponge or Hip Baths; Shallow or Long Baths; Sitz Baths, hot, cold and flowing, &c.; Foot Baths, the same; Head, Eye, Ear, and Nose Baths; Ascending Douches and Sprays; Rectal and Vaginal Douches; Douches, Vertical and Horizontal, hot and cold; Douches, Local and Spinal, hot and cold, successive and alternate; The Aix Douche; Wave Baths; Steam Box or Vapour Baths, both for general and



local purposes; Domestic Plunge Baths, in private suites; Swimming Bath.

There are sixteen separate installations or sets of baths, constituting that number of bathrooms, with four packing or dressing rooms attached to each; and each suite thus constituted is under the charge of one bath attendant. This arrangement affords perfect privacy to each patient, and freedom from exposure to chill while passing through the various processes. In these packing rooms are administered the various kinds of packs, general and local, to be followed or not, as the case may be, by a full bath in the bathroom adjoining. The bathrooms are tiled from floor to ceiling, and all the floor space is laid in Mosaic, and furnished with mats for the feet. A couple of suites have been provided for those visitors who may prefer the ordinary or domestic plunge bath, and a suite is reserved for cases under suspicion of having anything infectious about them.

The *Electric Baths* are fitted up in similar fashion to the rest, and are provided with full installations for both the constant and induced varieties of bath, with the apparatus required for local electricity in the dry form, and for the various applications of static or Franklinic electricity.

Medicated Baths of any kind can be given.

Medical Rubbing or Massage is amply provided for, a staff of from three to six trained rubbers of each sex being engaged in the various forms of medical rubbing, local and general, and largely in carrying out the Weir-Mitchell course. This is practised in its fullest development, or modified according to the requirements of the individual case, some patients doing better on half a course than on the full, and *vice-versa*. When complete isolation and absolute rest in conjunction with high feeding are necessary, the same can be carried out, and all under close medical supervision.

The Dowsing Radiant Heat and Light Bath.—An installation of these baths has recently been added, and the result obtained have hitherto been very satisfactory. The heat is produced by *Electricity*, and there is consequently no vitiation of the atmosphere by products of combustion.

These local and general baths are especially useful in cases where the patient is enfeebled or crippled, or from any cause unfit for the ordinary Turkish or other form of hot-air bath. In the incandescent light bath ordinary incandescent lamps are used instead of the special heat lamps.

The Verandahs and Balconies, in which the place abounds, enable patients to spend the entire day out of doors, weather permitting, without fatigue. From forty to fifty spinal couches are in constant use, and meals can be had *al fresco*. Complete rest in the recumbent posture, the day passed in full view of a wide extent of beautiful scenery, has sometimes an excellent effect in extreme debility and anæmia, and in promoting convalescence from acute disease.

Special Dieting can be carried out to any extent, a separate department in the kitchen being devoted to the purpose, and special nurses bringing particular foods at stated intervals, according to medical instructions.

As a *Residence for Invalids* the great size of the building—able to accommodate from 250 to 300 visitors—the ample cubic capacity of the public rooms, and the multiplicity of semi-private apartments, such as the ladies' private drawing-room, the private dining-room, reception, reading, billiard, smoking, and music rooms, the various halls, ante-rooms, and corridors, together with the spacious recreation rooms, all combine to minimise the drawbacks to mind and body attendant more or less on occasional deprivations, through bad weather, of outdoor exercise. The sense of monotony can never be very great in a house the number of residents in which rarely falls below 200, while the advantage is incontestable in respect of better assured sanitary conditions, a table more conformable to the requirements of the invalid, closer medical attendance, and an efficient nursing staff.

The Bathing Staff numbers not less than fifty men and women, comprising bath attendants, special nurses, rubbers, &c., with a head bathman and head nurse to supervise every detail of the medical treatment.

Night Watchmen are at call in case of need, furnishing food if required at any hour of the night, and calling up further assistance if necessary. Care is taken to preserve quiet in the corridors after hours, and to keep disturbing influences at a distance at all times, the interests of the patients being the ruling consideration in all the arrangements of the establishment.

As one-fourth at least of those residing in the place are other than invalids, the social atmosphere is not by any means depressing.

Patients may be sent as visitors simply, or they may be placed under medical supervision merely, no active measures being necessary; and where hydro-therapeutic treatment is deemed desirable, the practitioner may count on full weight being accorded such suggestions as he may see fit to send with his patient.

RELATIONSHIP BETWEEN PULSE AND TEMPERATURE IN THE LIGHT BATH.

Communication from the "Red Cross" Medical Light Institution.

DR. BOKEMEYER.[1]

IN continuation of former experiments I have made some further observations regarding the influence of different kinds of light baths upon the pulse and temperature in the same person, and I here give a tabular synopsis of my results in the case of three healthy persons. The baths used were: white incandescent, blue incandescent, and blue arc light. The persons experimented upon remained in the bath until it attained a temperature of 144·50° F.

Special care was taken that the tests should be carried out under exactly similar conditions; the same hour of the day was selected, and the same food given; the baths commenced at 77° F. to 79·25° F. Experiments show that there is a decided difference in the actions of the different kinds of bath. The white incandescent light raises both pulse and temperature to a much higher degree than any of the other kinds of light. In Sub. I.*a* in the Table, we find at 144·50° F., 115 beats per minute, and a temperature of 100·58° F. Sub. III.*a* has 144 pulsations, and only 99·86° F. mouth temperature. That is, Sub. I.*a* shows an increase of 25 beats per minute and an increase in temperature of 3·30° F. Sub. III.*a* an increase of 59 beats and an increase of only 1·80° F. in temperature. This proves that pulse and temperature do not increase proportionally, and that individual differences and differences in procedure must be carefully taken into account.

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[1] *Archiv für Lichttherapie.*

I am able to state that all the three persons experimented upon were quite healthy, so that illness had no influence whatever upon the observed results. In Sub. II.*a*, where the pulse was relatively the least increased, the increase was 42 with 1·80° F. increase in temperature.

How does this relationship stand under the use of blue incandescent light? We observe first that pulse and temperature are influenced within a narrower range than by the use of white light. True enough, the space of time during which the bath reaches 144·50° F. is only 12 min. against 18 min. in the case of the white incandescent bath, but notwithstanding the quicker heating, the action of this bath is much milder. This depends upon the fact that the red rays are as much as possible eliminated by the blue light-bulbs, or just those rays which are especially strong exciters of the whole nervous system. Still we find in Sub. I.*b*, a total increase of four pulsations at 144·50° F. in the bath, and also an increase of 0·56° F. in mouth temperature. Sub. II.*b* the pulse is increased by 20 beats and the mouth temperature by 0·36° F. Sub. III.*b*, there is an increase of 39 pulsations to a rise of 1·26° F. in temperature, but nevertheless it is clear that the blue incandescent light has an influence upon pulse and temperature very different to that of the white incandescent light. Its use will be indicated when it is desired to produce quick perspiration without great excitement of the nerves.

The third kind of light bath, the blue arc light baths are used for a different purpose than those already examined, viz., the white and blue incandescent. The last named are principally intended for producing perspiration in a healthy and hygienic form; but the blue arc light baths are called into play when it is desired to subject the patient for therapeutic purposes to the chemical rays of the voltaic arc, and where the sudorific effect is only of secondary importance. The sensation which the patient experiences from the light and heat rays of the arc-light is extremely mild, whereas with the white incandescent light a strong skin irritation is often produced.

Consequently pulse and temperature are liable to only small fluctuations in an arc-light bath. Sub. I.*c* the pulse of 85 remains nearly the same as the original 84 at 144·50° F. bath temperature, with a mouth temperature of 0·54° F. increase. In Sub. II.*c* there is a difference in pulse frequency of 28 beats, and of 0·72° F. mouth temperature. In Sub. III.*c* the pulse difference is 32 beats, while the mouth temperature has not increased. The several persons experimented upon also show an individual difference in the relationship of pulse and temperature.

Besides these facts it is interesting to observe at what temperature in the bath the perspiration appears, and how it influences the action of the heart and the body temperature.

We find that perspiration generally commences at about 3·60° F. to 5·40° F. above the body temperature, but in some cases even at a lower degree than that of the body; on one occasion it commenced at 83·75° F., and another time at 92·78° F. This depends simply upon the fact that the incandescent lamp radiations act direct upon the sudorific nerves, therefore the irritation is greatest with white incandescent light, which gives the strongest radiation, and induces perspiration even at 83·75° F. bath temperature; whereas the less freely radiating blue incandescent light only brought it on at 92·75° F. With the arc light in the case of Sub. I.*c*, perspiration began at 99·50° F. bath temperature. We find this repeated with the other subjects of the two experiments; the numbers for the several baths are: Sub. II.*a*, perspiration at 99·50° F.; Sub. II.*b*, at 104·00° F.; Sub. II.*c*, at 106·25° F.; Sub. III.*a*, at 97·70° F.; Sub. III.*b*, at 101·75° F.; Sub. III.*c*, at 110·75° F. We always find the white incandescent light the most powerful sudorific, the blue incandescent light less so, and still less again is the blue arc-light.

Now comes the question—has the appearance of perspiration any influence upon the action of the heart and upon body temperature?

We find the answer in the columns under 99·75° F. and 122·0° F., Sub. I.*a* and *b*, where the perspiration appeared at 83·75° F. and 92·75 F., we find a decrease in the frequency of the pulsations at I.*a* from 90 to 82, at I.*b* from 82 to 72; at I.*c*, with perspiration 99·50° F., we find instead of 84 pulsations at the commencement of the bath, now only 68, and in the column under 122·0° F. 80 pulsations, which increased to 85 at 144·50° F. when the bath terminated.

Sub. II.*c*, with perspiration at 106·25° F., we find the mouth-temperature falls from 98·42° F. to 98·27° F. in the column under 122·00° F., during which the perspiration steadily increased.

Also Sub. III.*c*, in the column under 122·00° F. we see a lowering of the body temperature from 99·50° F. to 99·32° F. We always find that the perspiration has a decided influence upon pulse and temperature, and therefore the subjective well-being of the bather is never disturbed. Anguish, oppression, palpitation of the heart and difficulty of breathing, do not occur in connection with light baths.

Besides the above, also the difference in weight was determined after each bath; this difference varied from ½ lb. to 1 lb. I must here remark that the difference generally is greater, 1 to 1½ lb., corresponding to the longer duration of the white and blue incandescent light baths, which as a rule are carried on to a temperature of 155·75° F. to 167·00° F. But in these experiments the results had to be compared with those of the arc-light baths, and therefore the white and blue incandescent were stopped at 144·50° F., as the arc-light baths are seldom carried higher than this temperature.

No.	Kind of Bath.	Before the Bath.	99·50° F.	122·00° F.	133·25° F.	144·50° F.	Weight lbs. before the	Weight lbs. after Bath.	Observations.
I.	(*a*) White incandescent light	P. 90 T. 97·52° F.	P. 82 98·24° F.	P. 102 98·60° F.	P. 104 99·14° F.	P. 115 100·58° F.	168·6	167·6	Perspiration commenced at 83·75° F. Duration of bath—18 minutes. Body temperature taken in mouth.
	(*b*) Blue incandescent light	P. 82 T. 97·88° F.	P. 72 97·88° F.	P. 82 98·06° F.	P. 84 98·06° F.	P. 86 98·24° F.	166	165½	Perspiration at 92·75° F. Duration of bath—12 minutes.
	(*c*) Blue arc light	P. 84 T. 97·76° F.	P. 68 98·06° F.	P. 80 98·06° F.	P. 85 98·06° F.	P. 85 98·24° F.	166	165½	Perspiration at 99·50° F. Duration of bath—20 minutes.
II.	(*a*) White incandescent light	P. 66 T. 97·70° F.	P. 80 97·88° F.	P. 98 98·42° F.	P. 105 99·14° F.	P. 108 99·50° F.	192	191	Perspiration at 101·75° F. Duration of bath—18 minutes.
	(*b*) Blue incandescent light	P. 80 T. 97·88° F.	P. 80 98·42° F.	P. 86 98·42° F.	P. 90 98·60° F.	P. 100 98·60° F.	193	192½	Perspiration at 104·00° F. Duration of bath—12 minutes.
	(*c*) Blue arc light	P. 72 T. 98·06° F.	P. 72 98·42° F.	P. 84 98·24° F.	P. 92 98·24° F.	P. 100 98·78° F.	191	190	Perspiration at 106·25° F. Duration of bath—20 minutes.
III.	(*a*) White incandescent light	P. 85 T. 98·06° F.	P. 100 98·78° F.	P. 118 98·96° F.	P. 132 99·68° F.	P. 144 99·86° F.	81½	80½	Perspiration at 97·25° F. Duration of bath—12 minutes.
	(*b*) Blue incandescent light	P. 85 T. 98·24° F.	P. 102 99·14° F.	P. 112 99·32° F.	P. 120 99·32° F.	P. 124 99·50° F.	81	80½	Perspiration at 101·75° F. Duration of bath—12 minutes.
	(*c*) Blue arc light	P. 72 T. 99·50° F.	P. 75 99·50° F.	P. 86 99·32° F.	P. 100 99·50° F.	P. 104 99·50° F.	82	81¾	Perspiration at 110·75° F. Duration of bath—18 minutes.

Technique.

The Physical Treatment of Insomnia.—From a clinical point of view, cases of insomnia may be divided into four main groups, and though it will often happen that a case presents features common to several groups, those of one or the other will usually predominate.

(1) *Reflex Type.*—Insomnia is often due to dyspepsia, resulting in the fermentative decomposition of the ingesta. The patient sleeps well for an hour or two and then wakes suddenly to find himself the subject of an attack of palpitation. In milder cases the failure to sleep may be due to morbid nerve influences of gastric or enteric origin, though the patient may not be conscious of the existence of indigestion as such. In these cases dietetic measures should be reinforced by the administration at bedtime of a well-applied hot abdominal fomentation, replaced in twenty minutes by a swansdown calico compress, fourfold, measuring 8 inches by 6 inches, wrung out of very hot water and applied to the epigastrium, covered by a piece of waterproof and secured by a flannel waist-bandage. This is worn all night, and frequently has a marked sedative effect in such cases.

Fæcal accumulations are another possible cause of reflex insomnia, and may best be relieved by the administration of large hot enemata. Uterine irritation also calls for mention, and may be allayed by sitz baths of from ten to fifteen minutes' duration at a temperature of 80° F.

(2) *Circulatory Type.*—Insomnia is often the result of irregular or defective circulation, of cardiac or vaso-motor origin. The first rule in treating this type of insomnia is to ensure the continuous vital, not merely passive, warmth of the feet during the night. The patient should keep his feet in water as hot as he can bear it for ten minutes. He should then put on a pair of thin cotton socks wrung out of cold water, and over them a larger pair of woollen ones. A hot-water jar is rarely necessary, and may induce overheating, and so prevent sleep. A more powerful derivative effect is producible by a mustard sitz-bath which is well worthy of a trial in obstinate cases. The temperature of the water should be 105°F., and its depth sufficient to cover the groins of the patient. A breakfast-cupful of mustard bran should be added to each gallon of hot water. Duration, twenty minutes, or less if felt too acutely. Dr. Lewis Jones recommends a faradaic footbath for the treatment of coldness of the feet, and I have frequently found this procedure of distinct service in cases of circulatory insomnia.

(3) *Toxæmic Type.*—This group consists of cases characterised by cutaneous hyperæsthesia, frequently of lithæmic or alcoholic origin, resulting in restlessness and general irritability. The pulse-tension is usually high, and the urine may contain an excess of urates or a deposit of uric-acid crystals. Wet packing (hot or cold), warm reclining baths, and massage are the three forms of physical procedure which will prove most useful in such cases. For maniacal insomnia, Peterson strongly recommends the full hot pack. The calming effect of a cold wet pack of an hour's duration is often remarkable. In cases where there is deficient reactive power the cold pack may be preceded by half-an-hour's general massage.

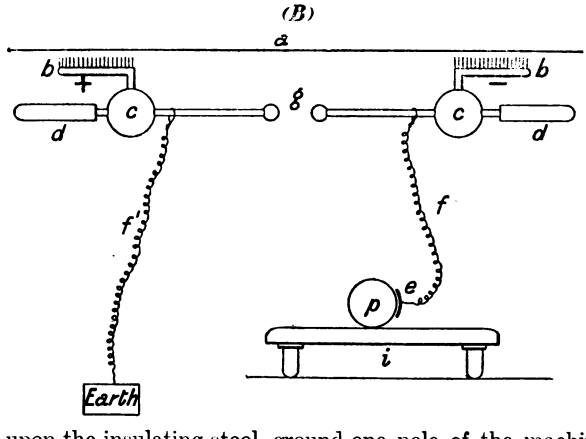
Massage alone at or near bedtime is often prescribed for sleeplessness, sometimes with success, but it often has an exciting effect. The narcotic effect

of reclining baths of fifteen to twenty minutes' duration and of indifferent temperature (98° to 100° F.) is pretty generally recognised, and is probably due to the "damping" of sensory-nerve endings by imbibed or retained moisture. In cases where a high-tension pulse (not due to atheroma) is a marked feature, a course of hot-air baths, or the Aix douche-massage, may be serviceable.

(4) *Neurotic Type.*—In some cases the sleeplessness seems to be due to a primary defect of cerebral function. There is usually a neurotic family history and phosphaturia is commonly present. Dyspeptic and cardiac symptoms are frequent complications and may be treated on the lines suggested for groups 1 and 2. Hedley reports a successful result in such a case by the administration of a course of constant-current baths of gradually increasing strength (50 to 150 ma.) alternating with the direct application of weak currents to the head and spine, and varied by general faradaic baths. Electrical treatment of some kind presents perhaps the best chance of restoration, but it must be admitted that these cases are peculiarly obstinate. Even in such cases resort to hypnotic drugs is to be avoided if possible, for it is surprising with how little sleep patients may subsist for years without appreciable injury to health and sanity.

C. J. WHITBY.

The Morton Wave Current.—Mode of administration. It will be seen from this diagram[1] that the patient is not directly included in the sparking circuit of the machine, but is indirectly connected with that part of it which constitutes one side of a spark gap whose other side is preferably connected to the ground. When sparks are made to pass at G, painless muscular contractions are produced. The technique is therefore as follows: After placing



the patient upon the insulating stool, ground one pole of the machine to a gas or water pipe, or other good ground connection; use either a bare metal or very wet electrode. Good apposition to the skin may be secured by using a couple of sheets of ordinary tinfoil, which is sold in sheets 13 in. by 11 in., folded on itself three or four times. This can be pushed down the back by a thin ruler without removal of the clothes. This electrode must be connected by a conducting cord (a piece of telegraph wire answers the purpose) to the pole (it matters not

[1] This fig. (which is from "Therapeutic Electricity)" is kindly lent by Messrs. Churchill.

which pole) which is not grounded. Reduce the spark gap to its smallest size, or bring the discharging rods altogether into contact, and put the machine into action. The discharging rods are then very gradually separated until the patient complains of a feeling of discomfort due to the strength of the muscular contraction and stop short of pain beneath the electrode. A long spark can be secured by taking care that nothing that can draw off the current is near the patient or platform. Duration 5 to 15 minutes. This method is found to be useful in rheumatism, lumbago and other conditions, and Dr. Morton gives eighty cases of sciatica and brachial neuritis, in which it had been successfully employed. It is applied to the "most acute cases and with immediate relief from pain." At the last meeting of the American Electro-Therapeutic Association Dr. Morton made some remarks on this current, expressing the belief that it embodies all that is to be obtained from the static machine in current form. The treatment is more agreeable than with the static induced current, it is just as easily localised, and its action is more widely distributed in the body. It produces marked analgesic effects.

Notices of Current Literature.

L'ÉLECTRICITÉ À LA PORTÉE DE TOUT LE MONDE. By Georges Claude, *Mois Scientifique et Industriel*, 33, Boulevard des Batignolles, Paris.

M. Claude's book fitly ushers in this "century of electricity." In its 350 pages, illustrated, with a profusion of diagrams, and usefully assisted with an excellent *résumé* at the end of each chapter, it deals with the whole subject clearly and completely, and without too much mathematics. The author's aim is to arouse the interest of the reader and at the same time to drive home to his mind the principles of electrical science, by dwelling upon, explaining, and making practically intelligible, the many useful applications of electrical energy which meet us at every turn and minister to our social life.

Not only are continuous and variable currents, whether simple, alternating, or polyphased fully treated of, but electric lighting, electro-plating, electric bells, the telegraph and the telephone and telegraphone, &c., are thoroughly explained by the way.

Yet the writer expressly disclaims any idea of making his book a formulary or practical treatise for the electrical engineer. It may be added that the medical man who uses electricity, and wishes to use it intelligently, could have no pleasanter or safer guide than this book.

MISTAKES WHICH ARE COMMITTED IN THE USE OF LIGHT THERAPY.[1]

By Dr. Below.

[The author commences an interesting paper by saying that it often happens that patients who have been successfully treated by the methods which he employs in Berlin, fearing a relapse, or wishing to be again "braced up," and yet anxious to avoid a journey to the capital, naturally turn to the nearest

[1] *Archiv. für Licht Therapie.*

place that they find a light cabinet established, and that these persons are almost invariably disappointed in the results which, from their former experience, they had expected to follow the treatment. This he traces to the want of professional supervision and insufficient apparatus, &c. It usually turns out in these cases that the only appliance available is the primitive incandescent cabinet; the arc-light and "double-light" baths being conspicuous by their absence. Improper treatment after the bath with reference to hygiene, massage, gymnastics, rest, diet and hydro-therapeutic measures—in fact, incompetence and insufficient epuipment on the part of the persons who carry out the treatment—has also much to answer for. The writer then proceeds as follows.—ED.]

. . . A mistake which, I am sorry to say, is still so frequently made is not to distinguish between arc-light and incandescent-light baths. It has happened that patients with old knee-joint effusions, which had been cured or approximately cured in our Institution, and then, after the lapse of some months, or in consequence of excessive exertion had relapsed, have, after taking a series of light baths at other institutions, been disappointed in not seeing the "brown mottling," the reddish-brown string-like colourations which they had been accustomed to observe on the spot which is specially under radiation, and which is the first sign of lymph-cell activity and commencing resorption. On inquiry it has been found that these patients had really only had incandescent-light baths, as no arc-light baths with reflectors existed in the institution to which they had resorted; or, perhaps, there was an arc-light bath, but the reflector was not there to concentrate the light upon a special spot, and, therefore, it was impossible that the combined treatment could have been carried out. These patients had, in fact, had nothing more than a course of transpiration baths producing little or no local effect. Yet it was precisely the above-named local effect that they expected to see, inasmuch as in the experience of their former treatment they had learnt to look upon those signs as a proof that resorption had set in.

. . . . Regarding the fatal confusion of incandescent light with blue-arc light which rests upon the primitive opinion of the hydropaths, that all kinds of light were equal and that light baths are merely sweating baths, I can here again point to what I have formerly written on the subject, and also to my assistant, Dr. Kauenbracker's, publication, "Indications for Light Therapy."

These points cannot be repeated here. Suffice it to say that the experimental proofs of the different action of rays of the spectrum have been given by Finsen. The clinical proofs we have brought forward in an extract from statistics of observations which now include 4,000 cases, with observations of pulse, temperature, breathing analyses, &c.

I refrain from naming the institutions where such defects as those I have mentioned exist, but I do hope that, in the interests of the invalid public and for the credit of light therapy, they will soon be remedied.

I at present content myself with pointing out:—

(1) That no light-bath institution should be without a directing physician; temperature, pulse, general health, lungs, heart, spleen, liver, kidney and urine tests, are all points that must be investigated in carrying out this treatment.

(2) No light bath without subsequent douching of a special kind, and of a proper temperature.

(3) No light bath without due regard to diet and the condition of stomach and intestines before and after the light bath.

It is the duty of the physician to utilise to the best advantage the hunger, thirst, and inclination for movement that must follow the secretion of 1 kilo. of sweat excreted in a quarter of an hour. It is in this stage that more lasting effects can be obtained in cases of obesity, &c., than with the Carlsbad cure. And here can well-timed rest and special diet be more successfully brought to bear upon the condition under treatment than in the usual methods with other kinds of baths.

(4) No light bath without careful discrimination between the use of arc and incandescent light, and only the newest and best modifications of bath cabinet, such as have had success in the Red Cross Institution.

(5) No light bath should have mercury mirrors, but only tinfoil. Only in this way can there be any security, in the chemical quantitative sweat tests, that the mercury does not originate in an inhalation of mercury in the bath.

Notes.

"The Natural History of Fibroids and recent Improvements in their Treatment."—Under this heading an important and interesting controversy is proceeding in the columns of the *British Medical Journal*. Mr. Stanmore Bishop, F.R.C.S., is the advocate of surgical operation, or at least "protests against waiting in any given case until dangerous complications have come into action," and Dr. Shaw Mackenzie makes a plea for medicinal treatment, whilst Dr. Gerald Garry strongly urges the use of "Apostoli treatment," having employed it with great success in sixty patients during the last eleven years. The latest contribution to the discussion is the following letter, which may serve to clear up certain points before going further:—

"Without entering into the above controversy, I beg attention to one point about which it is well that there should be clear ideas. In his letter, published February 23, Mr. Stanmore Bishop writes as follows:

"'Dr. Garry claims that in no instance had any untoward accident followed his use of the current. That at least is more than Apostoli ever did, for he admitted two deaths, and that in ten cases he had either excited or aggravated periuterine phlegmonous inflammation.'

"Here it becomes necessary to define terms. What is Apostoli's treatment? Its chief feature is the employment of very strong currents: 50 to 200 milliampères were used by Apostoli. His aim was to destroy or materially reduce the size of the tumour, and so, by removal of the cause, cure the hæmorrhage, pain, or pressure which are its symptoms. Rarely, indeed, has this aim been fully accomplished. In scarcely 14 per cent. of the cases so treated has there been any reduction in size, and such diminution as has occurred has often been too slight to be worth notice (Doumer).

"And so the method has fallen into the position it now occupies: It ranks only as a symptomatic treatment directed to the hæmorrhage and the pain. But, for these purposes, moderate currents (intensities seldom exceeding 30 milliampères, and never more than 50) are found to be quite as effective, whilst free from the risk of the heroic measures of Apostoli. I do not know Dr. Garry, or the currents he employs, but it may be suggested that possibly his immunity from untoward results is to be explained by his using these

weaker currents, although he may speak of them in a general way as the method of Apostoli.

"However this may be, I feel sure that those interested in the question cannot do better than impartially try the method of 'moderate intensity.' It offers a *via media* between drugs and the use of the knife; it affords a safe, easy, and usually effective means of bringing about the arrest of hæmorrhage and (to a less extent) the relief of pain. More than this no one need at present expect from the electrical treatment of uterine fibroids.—I am, &c.,

"*Mansfield Street, W.*, "W. S. HEDLEY.

"*February* 24."

Treatment of Rodent Ulcer by the X-rays.—The following is an abstract of a "Preliminary Communication"[1] by Dr. James H. Sequeira, Dermatological Assistant at the London Hospital. A very severe case of rodent ulcer having presented itself for treatment, where one eye and part of the nose had been destroyed, and the antrum of Highmore opened, it was found that the pressure of the apparatus used in the Finsen method to render the parts anæmic could not be borne, and the writer determined to try X-rays. After a fortnight the progress of the ulceration was arrested, and some parts began to heal. The result being so encouraging the same method was tried in other cases. Twelve cases altogether have been dealt with in this way, eight are still under treatment and four under observation, the ulcers having healed. In no instance has there been a disappointing result. The treatment is painless, and nothing further is required but to cover the part with a simple antiseptic dressing. It is of course too early to say anything about the permanence of the cure, but the author feels justified in recommending the use of the X-rays, at least in the cases in which complete removal by the knife is impracticable. The possibility of extending this treatment to other forms of malignant disease is beyond the scope of the communication, but the rapidity of the growth of true carcinomata is referred to, and it is pointed out that this fact and the early involvement of the glands place this class of malignant growth in an entirely different category to rodent ulcer, in which the disease is very slow, local in its manifestations, and without infections of the glands. The following is one of the cases detailed. G. J., aged 56, came under observation October 15. There was an irregularly ulcerated area by the side of the nose and adjacent part of the right cheek, extending up to the inner canthus; microscopical examination proved the case to be rodent ulcer. Disease first appeared nine years ago. The patient was admitted for Finsen treatment, but the parts were so tender after two applications that it was suspended, and, on October 20, X-ray treatment began. Daily sittings, ten minutes. Current used in the primary 3 to 4 ampères, coil gave 10-inch spark, tube about 6 inches from the ulcer. In three days there was evident improvement, and by November 10 the whole ulcer was soundly healed. By November 20 the rolled edge had disappeared, and the scar was still perfectly sound, January 28. The only other treatment in any of the cases seems to have been the application of a boric-acid lotion.

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[1] *British Medical Journal*, February 9, 1901.

Finsen's Light Treatment of Lupus and Rodent Ulcer.—A paper[1] by Mr. Malcolm Morris, F.R.C.S.Edin., and S. Ernest Dore, M.B., begins with the remark that this treatment may fairly claim to rank as second to none in importance and utility, and the authors are confident in hoping that light used in this way will not only give better results in lupus and other intractable diseases of the skin, "but more permanent benefit than any form of treatment hitherto employed." Referring to some points in technique they state that they have used electric light only, inasmuch as sunlight is less efficacious on account of the relatively smaller proportion of violet and ultra-violet rays, and is almost impracticable in this country.

Current.—Seventy-five ampères and about sixty volts was the average current suitable, and they "have preferred to lessen the time of exposure rather than diminish the strength of the current and the intensity of the light."

Intensity of Light.—(1) The lenses, especially the bottom one, must be clean and bright; (2) the water must be clear and changed every day. Ordinary tap-water gives as good results as distilled.

The Focus.—The area treated is usually kept well within the focus of the light, but a smaller focus if it can be borne has a greater effect. The authors have found it convenient to use thumb screws instead of the ordinary ones for focusing. By means of a new adjustment they have been able to keep the tubes in a straight line with the rays of light, so that none of the latter are lost by impinging on the sides of the telescope.

Screens.—The rays should fall perpendicularly upon the compressing glass by the use of cardboard or metal screens fixed to the end of the tube. "The slightest deviation of the glass will throw light upon the screen, and this can then be rectified."

Pressure.—Elastics are used to fix on the compressors when possible; for, although somewhat more painful for the patient, they ensure through the whole time of the operation firm and consistent pressure, which is difficult to keep up with the fingers.

The Reaction largely depends upon the intensity of the light at the time of exposure, and this in its turn depends upon many factors, such as the exactness and size of the focus, the clearness of the water and lenses, the quality of the carbons, &c. The reaction will further depend upon the depth of the disease, the amount of scarring, pigmentation, and vascularity.

Time of Onset of Reaction.—Varies from five to twenty-four hours; is generally noticed the following morning. Is usually slight for the first few days, and then becomes more marked. It does not appear to diminish in intensity after continual treatment, but if anything to increase. After a preliminary hyperæmia with slight redness a bleb forms, bursts, and dries, to form a thick yellow crust at about the end of a week, and in ten days or a fortnight the sore has completely healed. When situated over loose tissues, for example over the eye, there is often great swelling of neighbouring parts.

The experience of the authors is that the effect produced, that is the benefit derived, varies directly with the intensity of the reaction. And the same principle seems to apply in the case of an ulcer. When the epidermis is absent there is no blistering and crusting as when the skin is intact, and many more consecutive applications can be borne to a single spot. The reaction then

[1] *British Medical Journal*, February 9, 1901.

shows itself by redness and soreness, with perhaps some swelling of the surrounding parts and great tenderness on pressure. This supervenes about the fourth or fifth day, and if the treatment be continued the skin around the ulcer becomes inflamed. Of all the diseases amenable to light treatment, lupus vulgaris is most benefited, but the treatment cannot be regarded as a specific, and the authors cannot go so far as Dr. Bie, who regards the diagnosis as doubtful of cases which do not respond to it. That it has a marked effect upon rodent ulcer and other diseases does not disprove the bactericidal theory of its mode of action, although it negatives the supposition that it is specific for the tubercle bacillus alone; apparently there is some chemical or nutritional effect upon the tissues also to be taken into account. In all the cases the authors have treated, the improvement has been marked and uniform, though in some cases very slow.

Effect in Lupus Vulgaris.—In several cases a small isolated superficial nodule had disappeared after one application. As a general rule, and speaking broadly, it may be said that in an extensive case a single spot is treated daily, and the parts first treated are sufficiently healed in a few days to permit of treatment being renewed. If the area to be treated is only a small one the applications are continued as "long as possible until the soreness of the parts and the crusts formed necessitate cessation of treatment for a few days. In an extensive case a year with intervals of rest may be given as a rough indication of the duration of the treatment."

In cases where there is much thickening of the skin the use of pyrogallic ointment will considerably lessen the duration of the treatment. The authors have used a five-per-cent. ointment in a few cases for about a week, and then after allowing the part to heal the light applications have begun.

Effect in Rodent Ulcer.—In a case of extensive disease, where the typical hard edge was in places absent, the effect of a single application was apparently to stimulate healing of the part. In cases where there was no ulceration, reddening and perhaps slight excoriation of the skin resulted from a few applications, and the growth gradually becoming softer gradually disappeared. In small ulcers entirely surrounded by an indurated rolled edge there was no visible effect at first, but after several continuous applications the discharge increased and an inflammatory reaction occurred; at the same time the induration gradually disappeared until a simple "punched out" ulcer with soft edges remained. On cessation of the treatment healing took place with great rapidity. The stimulating effect upon the tissues is marked in the ulcerations both of rodent ulcer and lupus vulgaris.

Effects in Lupus Erythematosus.—The effect has been marked, but not so certain as in lupus vulgaris. In the more chronic cases, with much scarring it is difficult to get a good reaction.

Constitutional Effects of the Treatment.—Practically *nil.*

Effect on the Eyes.—The eyes are carefully covered with protecting wool or paper, but the light can still be seen by the patient. There have been no deleterious effects upon the eye itself, but slight "running of the eyes" has been experienced.

Effect on Mucous Membrane of Nose by Penetration.—In one case in which the skin of the nose was treated, improvement took place in the mucous membrane, and the sensation of smell was said to have improved.

Preparation of the Patient.—The crusts are removed with forceps, then the area to be treated is bathed with boracic lotion, and if there is any grease on

the part, with ether. The skin is then marked with a blue pencil so as to insure the light being applied to the same spot. After treatment the compressors are cleaned with spirit and carbolic acid. The diseased surface treated is dressed, if necessary, with a simple zinc lanoline ointment, or a paste with zinc vaseline and starch and a little boric acid.

Unfavourable Conditions.—(A) Those which hinder the penetration of light. (1) Scarring; (2) pigmentation; (3) great vascularity; (4) great depth below the surface, thickness and induration of the nodules, surrounding inflammation and induration, confluence of the nodules.

(B) Difficulties of position. (1) On the skin, for example, when the disease is situated near the eye, special compressors may be necessary, or on the eyelid where it is impossible to apply adequate pressure; (2) on the mucous membrane. The interior of the nose and mouth is inaccessible, but the gums and lips can be treated, the latter by eversion. In these cases the combination of X-rays with Finsen's treatment has been found successful.

(C) Extent of the disease.

Favourable Conditions.—Where the area of disease is limited, is superficial, is not spreading, and has not undergone previous treatment, especially operative.

Advantages of the Method.—Reliability, painlessness, excellent cosmetic results, less liability to relapse, avoidance of surgical measures.

Disadvantages.—Long time required, the small area treated at the time, and the expense.

Solar Biology.—An interesting lecture on an unfamiliar subject was recently delivered by Mr. John T. Dales, at St. Albans.

It is not too much to say, as Sir Robert Ball has shown, that in a certain sense we are indebted to the sun for our necessities, our comforts, our luxuries, and even for life itself. The object of Mr. Dales' address was to show that the influence of the sun is plainly manifested in the character of individuals born in particular months. He adduces innumerable instances in support of this view.

Recent Literature.

AËROTHERAPY, CLIMATOLOGY, SANATORIA, BALNEOLOGY, HYDROTHERAPY, ELECTROTHERAPY, KINESITHERAPY, VIBROTHERAPY, PHOTOTHERAPY, THERAPEUTICS OF HEAT AND COLD.

L'Ellettricita Statica in Medicina. Dott Auguste di Suzenberger. (*Giornale Inter. delle Sc. Med.*, Feb. 15, 1901.)

Galvanisation. Dr. A. Tripier. (*Ann. d'Electrobiol.*, 1900.)

Des bruits normaux et pathologiques résultant de la contraction des muscles. M. le Dr. M. Herz. (*Semaine méd.*, n. 51, 1900.)

Cure de la fièvre thyphoide par la balnéation. Le docteur Lyon. (*Mois médical*, n. 8, 1900.)

Action curative de l'oxigène et de l'ozone sur les blessures et les ulcères. M. le Dr. Andreoli. (*Revue internationale d'électrothéra pie*, Décembre, 1900.)

De l'air chaud pour le traitement du rhumatisme chronique. M. le Dr. THOMAS E. SATTERTHWAITE. (*Revue intern. d'électrothérapie*, Décembre, 1900.)

Le traitement de la tuberculose par la chaleur. M. le D. JACOBY. (*Journ. de méd. de Paris.*)

Photothérapie de la rougeole. M. le Dr. CHATINIÈRE. (*Presse médicale*, 1900.)

La lumière comme agent thérapeutique. M. le Dr. KIME. (*Med. Record*, 13 Octobre, 1900.)

Du massage dans la phlèbite. M. le Dr. HIRTZ. (*Sem. Méd.*, n. 49, 1900.)

Note sur un cas d'impuissance sexuèlle traité par le courant continu de haute intensité. MM. APOSTOLI et LAQUERRIÈRE. (*Annales d'électrobiologie*, n. 5.)

Treatment of Lupus and Diseases of the Skin by Roentgen Rays. MM. les Drs. R. HAHN et ALBERS-SCHONBERS. (*Münchener Medicinischen Wochenschrift*, Nos. 9, 10, et 11, 1900.)

Des applications d'air chaud dans le traitement de certaines affections articulaires et des plaies infectieuses et chroniques. M. le Dr. ULLMANN. (*Semaine médicale*, n. 53, 1900.)

What are necessary and desirable data upon Health Resorts. E. O. OTIS. (*New York Med. Record*, lviii, 8, p. 292, Aug.)

Paddling in the Sea. WM. KNIGHT TREVES. (*Lancet*, July 21, p. 222.)

Die neuve Alfredsquelle in Marienbad. (*Prag. med. Wochenschr.*, xxv, 36.)

L'acqua di Sciafani nella terapia delle affezioni croniche dell' apparato digerente. G. TARTARO. (*Gazz. degli Osp.*, xxi, 108.)

Einiges über d. Riviera als Aufenthalt f. Lungenkranke. H. NAUMANN. (*Ztschr. f. prakt. Aertze.*, ix, 14, p. 531.)

En sommarmänad vid Rindoebrunn. V. MOSSBERG. (*Eira*, xxiv, 16.)

Indikationen zur Behandlung chronischer Dermatosen u Syphilisformen mit d. Thermalquellen von Ilidze. R. MATZENAUER. (*Wien med. Wochenschr.*, l, 40.)

Die physical.-chem Analyse d. Mineralwässer. H. KÖPPE. (*Deutsche med. Wchnschr.*, xxvi, 32.)

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Ueber Luftbäder. F. KELLER. (*Zschr. f. diätet. und physik. Ther.* v, 4 Leipzig., G. Thieme. 8, 8 S.)

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Ueber einige poliklin, häufige Krankheitsformen u. ihre hydriat. Behandlung. H. Rosin. (*Ztschr. f. Klin. Med.*, xli, 1—4, p. 212.)

Heisse Sandbäder. P. Teuscher. (*Deutsche med. Wochenschr.*, xxvi, 31 Ther. Beil. 4.)

Ueber allgem. concentrische Franklinisation in d. ärztl. Praxis. Breitung. (*Wien. Klin. Wochenschr.*, xiii, 37.)

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Das Faraday'sche Gesetz in d. Elektrotherapie. F. Frankenhäuser. (*Ztschr. f. Klin. Med.*, xli, 1—4, p. 62.)

Apparatbord for elektrisk diagnostik och. terap. C. H. Hildebrand. *Hygiea*, lxii, 6.)

Ueber d. Wirkung d. Teslastroeme auf d. Stoffweehsel. A. Loewy u. T. Cohn. (*Berl. Klin. Wochenschr.*, xxxvii, 34.)

Therapeutic Value of Electricity. L. C. Lowder. (*Amer. Pract. and News*, xxx, 5, p. 165, Sept.)

Ueber den Leitungswidersland d. Koerpers. L. Schuyder. (*Schweiz. Corr. Bl.*, xxx, 15, p. 472.)

Ueber objektive Veränderungen des Herzens unter d. Einflusse lokales u. allgem. Elektrisation, Zugleich ein Beitrag zur Loesung der Frage: Beruht die Wirkung d. Elektricität. b. Menschen auf suggestion oder nicht. A. Smith. (Verh. d. 18. Cong. f. innere Med., p. 608.)

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THE

Journal of Physical Therapeutics

No. 3. JULY 15, 1901. VOL. II.

Editorial.

(STANDING ANNOUNCEMENT.)

IT is the aim of this Journal to furnish a record of current progress and contemporary work and to provide a detailed and critical account of what has already been accomplished in the field of Physical Therapeutics.

Owing to recent progress in physical and biological science, the *modus operandi* of such methods is now, in some measure, beginning to be understood; but there is pressing need for further work in this direction. Moreover, the successful employment of these agents usually requires a carefully executed technique, and such information as is available on these points is not always easily accessible. It is therefore considered that such a journal as this need offer no apology for its existence; it is hoped that it will fill a gap—that it will supply a want.

A knowledge of the effects and mode of action of the remedial measures at our disposal, says Dr. Carter,[1] "amounts to something more than mere pharmacology. It includes also a knowledge of the physiological action of those powerful agents which for the sake of convenience we may call natural remedies, diet, heat, cold, rest, exercise, massage, baths, electricity, climate." After expressing the opinion that these deserve "a place in the front rank of therapeutic agents," Dr. Carter continues: "In a general sense the importance of such remedial agents is widely recognised, and in a general way every practitioner nowadays makes use of them; but the great advances which have taken place in our knowledge of their modes of action, the improvements that have been made in the method of their employment, and the extraordinary potency of their influence upon the nutritive processes of the body, are still, in my opinion, far from being adequately realised."

It cannot be necessary to remind the reader that to devote the pages of a journal exclusively to the consideration of the agencies in question is by no means to deal with them as some-

[1] *British Medical Journal*, November 3, 1900.

thing apart from general medical practice, still less to assign to them any predominant *rôle* in the treatment of disease. They represent only one class of weapon in the varied armoury of medicine. Medical men are appealed to to rescue such weapons from the incompetent and unworthy hands into which they sometimes fall.

Although its limits are not ill-defined, Physical Therapeutics is a widely comprehensive term; embracing, as it does, electro-therapeutics, hydro-therapeutics, vibro-therapeutics, or treatment by vibration, photo-therapeutics, or treatment by light, radio-therapeutics, or treatment by the radiations of an X-ray tube, balneo-therapeutics, or treatment by baths, aëro-therapeutics, or treatment by compressed or rarefied air. Therapeutic and hygienic exercises, massage and manipulations, dietetics, climatology, and last, but not least, the valuable agencies of heat and cold, all come within the scope of Physical Therapeutics.

Dr. W. S. HEDLEY undertakes the Editorship of this Journal as a temporary measure.

IT is considered that, in accordance with its international character, THE JOURNAL OF PHYSICAL THERAPEUTICS should have an American editor, and it is therefore with great satisfaction that the announcement can now be made that Dr. M. Cleaves, of New York, has consented to act in that capacity. For earnest and successful work in the cause of Physical Therapeutics no name is better known either in America or Europe. Dr. Cleaves is a fellow of the Medical Society of the County of New York, of the New York Academy of Medicine, of the American Medical Association, of the American Electro-therapeutic Association; member of the Women's Medical Association of New York City; member of the Société Française d'Electrothérapie, of the New York Electrical Association, and of the Society of American Authors. Having pursued general and special practice for some years, Dr. Cleaves went, for purposes of study and investigation, to New York in 1887 and to Paris in the following summer, and there became much impressed with the work of Apostoli. In 1892, Dr. Cleaves was unanimously elected Secretary of the American Electro-therapeutic Association, holding the office for two years, and has also served, either as Chairman or Member, on the Committees on Standard Meters, Static Machines and Condensers, and Electric Light Apparatus for diagnosis and Treatment. During the past ten years Dr. Cleaves has lectured in the post-graduate school New York, having in 1895 founded the New York Electro-therapeutic Clinic, Laboratory and Dispensary, the first clinic devoted exclusively to teaching electro-therapeutics. Thoroughly equipped with all the best modern electrical appliances used in medicine, and serving, as it does, the three-fold purpose of aiding the advance of Electro-therapeutics by

original research, the instruction of practitioners and students in therapeutic electricity, and the electrical treatment of the poor, this clinic has attracted by its teaching medical men and women from every part of America. Dr. Cleaves' various contributions to literature, chiefly in the form of papers read before Societies, are well known on both sides of the Atlantic. Amongst those published are the following :—

"Mental Responsibility in the Commission of Crime," Scott Co. Medical Society, Davenport, Iowa, 1876; "Insanity, a Physical Disease and the Necessity for its Early Recognition by the General Physician," *ibid.*, 1877; "Medical and Moral Care of the Female Patients in the Hospitals for the Insane," read before the National Conference of Charities, Chicago, June, 1879; "Nervous and Mental Phenomena associated with Pelvic Disease," Iowa State Med. Society, 1879; "Neurasthenia and its Relation to the Diseases of Women," *ibid.*, 1880; "Treatment of Uterine Fibroids by Electrolysis," *ibid.*, 1887; "Women's Dress, its Influence on the Body," Med. Society Missouri Valley, Council Bluffs, Iowa, 1888, Omaha Clinic; "Vesical Hæmorrhage in Pregnancy, with Report of a Case," Kings Co. Med. Asso., Brooklyn, New York; *Medical Record*, New York, 1890; "The Colony of Insane at Gheel," Belgium, Medico-Legal Soc., 1896; *Journal of Mental Diseases*, Lond., Eng., April, 1891; "The Chemistry of Food and Nutrition," Brooklyn Woman's Club; "The Franklinic Current in the Treatment of Disease," Alumni Asso. of the Woman's Med. College of the New York Infirmary, 1892; "Franklinization in Mental Diseases," *Journal of Nervous and Mental Diseases*, March, 1892; "The Use of the Galvanic Current in Articular Inflammatory Exudates," Electro-Therapeutic Asso., Phila., Sept., 1892; *Times and Register*, 1892; "Metallic Electrolysis," Am. Electro-Therapeutic Asso., Chicago, Sept., 1893. *Journal of Am. Medical Asso.*, 1893, and in the *Trans. Am. Electro-Therapeutic Asso.*, 1893; "A New Electrode for Hydro-Electric Applications of the Continuous Current," *Med. Record, N.Y.*, 1894; "Special Hydro-Electric Applications," Electro-Therapeutic Asso., N.Y., Sept., 1894, *Journal Am. Med. Asso.*, 1894, and in *Trans. Am. Electro-Therapeutic Asso.*, 1894; "Means of Controlling the So-called Static Induced," *ibid.*; "Electric Light as a Diagnostic and Therapeutic Agent," presented to the Am. Electro-Therapeutic Asso., N.Y., Sept., 1894; "Treatment of Neurasthenia by Franklinization," Am. Med. Asso., Atlanta, Ga., 1896; *Journal Am. Med. Asso.*, 1896; "The Expenditure of Electrical Energy," Am. Electro-Therapeutic Asso., Harrisburg, *Trans. Am. Electro-Therapeutic Asso.*, 1897, *Med. Magazine, Phil.*, 1900; "Phlebitis, a Clinical Study," *Trans. Am. Electro-Therapeutic Asso.*, *and N.Y. Med. Record*, 1898; "The Electric Arc Bath," *Trans. Am. Electro-Therapeutic Asso.*, April, 1898, *N.Y. Med. Journal*, Jan. 1899; "Franklinic Electricity and its Method of Application," *International Med. Magazine, Phil.*, March, 1900.

THE almost simultaneous appearance of three important works on Physical Therapeutics is a very significant fact. Two of these, viz., *Handbuch der Physikalischen Therapie*, and *Physiological Therapeutics*, the early volumes of which have already appeared, are noticed upon another page. The third, *Traité complet de Thérapeutique par les Agents Physiques*, by Dr. H. Colombo, is on the point of publication. That three such treatises should appear, and appear almost together, can only mean that professional interest has been thoroughly and suddenly aroused, and that the subjects in question are now beginning to receive a due though tardy scientific recognition. It is no longer only to a

small band of exclusive specialists that such volumes appeal, they address themselves to a wide and fast widening circle of medical practitioners anxious for information about a class of remedies which they now begin to recognise as indispensable additions to their ordinary therapeutic resources.

Such books certainly mark an epoch. They do for the whole subject of Physical Therapeutics what Erb's work in the eighties of last century did for Therapeutic Electricity;—like it, these treatises will compel the attention of medical men in England, and wake them up to take their part in a productive field of work in which hitherto they have been strangely behindhand.

ANXIOUS to make his forthcoming book a really complete and representative work, Dr. C. Colombo, of Rome, invites *confrères* of every country to send him such of their publications as have a bearing upon any of the subjects included under the widely comprehensive term "Physical Therapeutics." We doubt not that a considerable number of writers will readily respond to such an invitation, assured as they are that by so doing they will be of some assistance to Dr. Colombo in his undertaking, and contribute to the success it will undoubtedly deserve.

IN the Electrical and Radiographic Department of the London Hospital, there are daily treated by X-rays about three or four dozen cases of skin disease, of which about half are rodent ulcer and the other half lupus.

In the Finsen Light Department of the same hospital, the number of cases treated each day amounts to about 100. These are chiefly lupus. The opinion is held by many that, whilst concentrated light is the best treatment for lupus, the emanations from the X-ray tube are the more effective in rodent ulcer. This remains for the present an open question. The last-named treatment has at least the advantage that it makes much less exacting demands on time and patience, inasmuch as each sitting occupies only ten minutes, and a much larger area is capable of being acted upon at one exposure.

THE forthcoming Congress on "Tuberculosis," to be held at St. James's Hall, London, commences on Monday, the 22nd inst., and terminates on Friday, the 26th.

In addition to the work of the sections, public addresses will be given in the Queen's Hall to the whole Congress: on Tuesday afternoon (the 23rd) by Professor Koch, of Berlin; on Wednesday afternoon by Professor Brouardel, of Paris; on Thursday afternoon by Professor McFadyean, of the Royal Veterinary College; and on Friday afternoon there will be a final meeting to pass resolutions arising out of the work of the Congress.

THE ELECTRIC ARC: ITS PHYSICS, PHYSIOLOGIC ACTION, THERAPEUTICS, AND ARRANGEMENT OF MECHANISMS.

By Margaret A. Cleaves, M.D., New York City, U.S.A.

An experience extending over a period of seven and a-half years with the electric arc as a therapeutic agent, both in private and clinical practice, has established beyond question the writer's confidence in its value.

A description of the apparatus and some of the results obtained have been embodied in a report on "Electric Light as a Diagnostic and Therapeutic Agent,"[1] and "The Electric Arc Bath, a Clinical Report."[2]

The results obtained in the beginning with a somewhat crude arrangement of an electric arc led to a further elaboration of the apparatus for its application, consisting of the "Cabinet" or "Bath" described in the writer's papers above alluded to, and also by Imbert de la Touche in the *Revue d'Electrothérapie*, April and May, 1896.

In view of the interest in phototherapy at this time, a description not only of this cabinet, but of the various arrangements of arc lamps springing into use, considered in connection with the fundamental physical principles involved, may help an elucidation of the question as to the simplest and most advantageous arrangement of electric arc mechanisms for therapeutic purposes, capable of securing the best results and, at the same time, of being operated at a minimum of time, energy, and expense.

In discussing the subject of light-baths, too great care cannot be taken to discriminate as to the character of light used. Only in this way can scientific progress be made and accurate conclusions reached. The electric arc by reason of its physical properties offers, as will be seen, advantages not possessed in the same degree by any other source of light.

The cabinet used by the writer is 6 feet long, 2½ feet wide, and 7 feet high, built in the corner of one of the office rooms. It is entirely closed in, save for an observation window, which can also be utilised for the admission of fresh air if desired; and it is lined with zinc throughout in order to prevent any danger of fire from a fragment of burning carbon. The lamps, two in number, are suspended one at each end of the cabinet, with a shield of glass directly underneath to prevent particles of carbon falling upon the patient. These do not cut off the

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[1] *Transactions American Electro-Therapeutic Association*, 1894; *Journal American Medical Association*, 1895.

[2] *Transactions American Electro-Therapeutic Association*, 1898; *New York Medical Journal*, March 28, February 4, 1896.

rays of light projected towards the patient's body by means of reflectors attached to the lamps, which enable the operator to direct the beams at will upon the part of the body where the greatest intensity of the light activities is desired.

The cabinet contains an ordinary wire-mattress cot, which is made up as a bed, and upon which the patient reclines.

In the writer's office the current is taken from the Edison incandescent mains at 120 volts pressure, and each lamp takes about 10 ampères at 50 volts, the remainder being consumed in the rheostat.

At the New York Electro-Therapeutic Clinic the lamps were on the Thomson-Houston alternating current mains of 104 volts, and each lamp took 9 ampères at 48 volts, the remaining 8 volts being consumed in a rheostat.

Both equipments have given satisfaction, but the continuous-current arc lamps have been less difficult of adjustment and therefore have required less care.

The zinc lining is painted white in order to facilitate the reflection of light, and as the patient lies at rest in the bath he is bathed in a flood of light emanating from sources of 4,000 total nominal candle-power (the arcs of 2,000 candle-power each).

The patient is preferably nude, although applications are sometimes made with only a partial undressing. The eyes are protected by means of coloured glasses, and, if desired, the hands may also be protected to avoid any chances of sun-burn.

All patients, but especially phthisical and bronchial patients, are directed to breathe in fully and deeply while lying in the bath.

Practically the same arrangement, copied from the writer's, is in use by physicians in various parts of the United States. In this cabinet but one patient can be treated at a time, and it is not therefore so desirable in dispensary practice, where it is necessary to care for a number of patients simultaneously, as a room arranged with one or more powerful arcs, 80 to 100 ampères, suspended from the ceiling, and at the same distance from the floor as in the cabinet just described, *i.e.*, 6½ feet.

The size of the room may vary according to the number of patients to be treated, or the facilities at the operator's command. It may be divided by screens or partitions as is necessary, and the beds can be placed radially from the centre and in an inclined position. This is the arrangement used by Finsen in the administration of electric arc baths. His lamps are 6½ feet (2 metres) from the floor. With cots of ordinary height, the distance of the patient from the arc would be the same as in the writer's cabinet, *i.e.*, 4 feet. Given lamps of the same electric power, and therefore capable of producing the same quantity of light, there will be approximately the same total radiant energy emitted in each instance, *i.e.*, in the small cabinet or the large room, but the energy for each square inch of surface

exposed to the light activities will be very much greater in the smaller space, owing to the reflection of light from the walls. Therefore, if the greater expenditure of energy is not desired, lamps of smaller ampèrage can be used which will minimise the expense for current. On the other hand, if indicated by the pathologic condition, the greater intensity per square inch of surface exposed would produce better therapeutic results. The results obtained with two 10-ampère lamps in series would seem to indicate that a lamp of from 20 to 25 ampères would produce sufficient energy for so limited a space.

Marine search-lights, taking from 20 to 80 ampères, and each provided with a large reflecting mirror projecting the beam upon the patient's body at a distance of from 7 to 15 feet, according to the ampèrage of the lamps, are also used to some extent in America.

An arrangement of a focusing arc carrying from 30 to 50 ampères of current, with two plano-convex lenses of glass, 8 inches in diameter, supplemented at will by a double convex glass lens of from 6 to 8 inches in diameter, are also in use.

With this arrangement the beam of from 6 to 10 inches in diameter is projected upon the part of the body in which a localisation is desired ; for example, the chest walls in tuberculosis pulmonalis.

In the use of these various arrangements the patient occupies a recumbent or sitting position, and is either wholly or partially divested of clothing.

In the writer's cabinet, and also in the room used by Finsen, beds are provided which make it possible for the patient by reason of the reclining position and protection from currents of air underneath, to be entirely nude without chill or discomfort. This is not possible in the use of a marine search-light (unless it be with a lamp of small ampèrage, arranged on a swivel joint, or a focusing arc used with condensing lenses of glass), as only a partial exposure can be made, and the patient occupies a sitting position.

It is only necessary to keep in mind the condition of patients, for whom treatment by means of an electric arc bath is indicated, to appreciate how essential it is, first, that the entire body be exposed to the action of light, and second, that it be administered so as to minimise the patient's discomfort, and avoid any danger of chill.

But while no better reasons exist than the well-being of the patient and the exposure of the entire body to the beneficent influence of this bath of radiant energy, there are reasons dependent upon the physical laws governing light why one method of application is better than the other. Scientific progress will be much more rapid and sure if at the outset there can be secured to the physician, who may desire to avail himself of light as a therapeutic measure, an arrangement of lamp

mechanisms capable of securing the maximum benefit with the minimum expenditure of time and electric energy.

To determine this intelligently there should be considered :—

(1) The physical properties of light and the laws governing its action.

(2) Its physiological effect.

(3) The pathological condition to be treated.

(4) The method of application.

Objectively, light and heat are vibrations of the all-pervading ether, and these vibrations are now universally believed to be of an electro-magnetic nature in their mechanism ; *i.e.*, that the vibrational activity in this ether is both electric and magnetic.

Whatever the source of light, whether the sun, a candle, the incandescent lamp or electric arc, the light produced is transmitted to the observer and surrounding bodies by means of these wave disturbances in the ether. A very great range of these vibrations exist, the limits of which are not yet known.

Physiologically, only those frequencies between 390 and 760 trillions per second are recognised by the eye as light.[3] Above the 760 trillions are the ultra-violet vibrations which produce no effect on the eye, nor, on the other hand, is the eye affected by frequencies below 390 trillions. Thus it is seen that, comparatively speaking, but a limited range of these vibrations or waves is evident to the human sense of vision. All frequencies, however, whether capable of producing physiological effect upon the eye or not, are capable of affecting our senses in a greater or less degree as heat. These ether waves not only produce the sensation of light in their physiological action upon the eye and the phenomena of heat, but also possess the power of effecting chemical decomposition in many substances. It is this latter property which by reason of its physiological action renders light valuable as a therapeutic measure.

While for convenience the varying frequencies or rates of vibration may be divided into heat rays, luminous rays, and chemical rays, it must be borne in mind that all sources of artificial light deliver light composed of a wide range of frequencies in varying degrees ; in other words, each source of light emits in varying degrees all frequencies of vibration within or beyond the physiological limits. All, for example, have in greater or less degree high frequency or chemical waves and all are transformable into heat.

That the low frequencies of light or visible rays, as well as the high frequencies, are not without influence is clearly established ; and doubtless this is because these frequencies possess to a limited degree the chemical properties of the high frequencies. The velocity of light in free space approximates 186,000 miles per second, and so far as known this velocity is the same for all

[3] " Electric Arc Lighting," Houston and Kennelly, p. 240.

frequencies. In travelling through the ether that fills the inter-atomic and inter-molecular spaces of transparent substances such as glass, the velocity, however, is not only reduced, but the intensity of the vibration is also reduced, differently for different frequencies, high frequencies being generally reduced more than low frequencies [4]

Because of this physical law, the use of screens of coloured, or lenses of clear glass is to be avoided in the arrangement of the electric arc for therapeutic purposes. The passage of the high frequency waves are thereby cut off to such an extent as greatly to reduce the beneficial results to be obtained.

On the other hand, in its passage through quartz, the high frequency waves readily pass without much absorption; so that quartz is much more transparent than glass to the high frequency or ultra-violet or strongly chemical rays. In this physical fact, therefore, is to be found the reason why condensing lenses of quartz instead of glass should be used, when it is desired to use the maximum of high frequency waves or chemical rays of light, as distinguished from the lower frequencies or heat rays.

As the intensity of illumination on a given surface is inversely as the square of the distance from the source of light, it follows that to secure the deepest penetration and action of light vibrations the mechanism producing it should be so arranged as to bring their concentrated activities as near the surface of the body as is possible, without producing burning or a too marked erythema. Only in this way can the full therapeutic value be obtained.

In sunlight, as it approaches the earth, there must be waves of much higher frequency than violet, but they are nearly all absorbed in transit through the air. What reaches the earth's surface is therefore an association of red or low frequency waves with large amplitude, and a smaller number of increasing frequency waves diminishing in amplitude towards the violet and ultra-violet. It is because of this loss in transit of the short high frequency waves from the sun that the electric arc with a crater of but a small fraction of one square inch is so much richer in high frequency waves, and therefore possesses greater value, when localisation of great intensity of these waves is desired for therapeutic purposes, as, for example, in the treatment of lupus vulgaris.

The arc as a source of light, in common with the sun, loses its high frequency waves in transit through substances transparent to lower frequencies and visible rays. These ultra-violet rays, even though of feeble intensity or amplitude, are very precious, owing to their intrinsic energy, due to high rate of vibration. This law holds true, not only in the localisations of

[4] "Electric Arc Lighting," Houston and Kennelly, p. 242.

the chemical rays, as with the Finsen tube, but in general applications also.

Therefore the best arrangement of light mechanisms for general applications is that which brings the patient as near to the source of light as the calorific rays will permit, where the intensity of the radiant energy, or incident energy per square inch, is great; as well as an arrangement that will permit of entire disrobing, and a position in the bath compatible with perfect repose and comfort, and further, which will also allow the fullest influence of the ozone generated during the action of the arcs, and with which the air becomes charged. A focusing arc should always be used in preference to a non-focusing arc, for when the diverging rays of light are condensed in a parallel beam the intensity is constant along the beam, instead of continually diminishing with the square of the distance, as when radiating into space. To the writer's mind, these conditions are best met by a cabinet, such as has been described, when it is only desired to treat a single patient at a time. Where, however, a number are to be treated simultaneously, a room such as is used by Finsen becomes necessary.

As to the mechanisms for localisation of high frequency waves of radiant energy in skin diseases, two forms of apparatus are in use which meet the conditions. For the first, both as to arrangement and method, all honour belongs to Finsen. As is well known, his apparatus consists of a tube containing four condensing lenses of quartz, and a jacket through which water circulates, in order that the heat rays may be eliminated, and is used in connection with a powerful arc, 80 ampères, in the writer's office. While, in most respects, it meets the conditions admirably, it is open to very serious objections from a practical point of view, at least in the United States. Quartz lenses can only be obtained with the greatest difficulty, and only by importing them at very great expense. Even so, it is difficult to get them of such size as to give a beam in any sense proportional to the areas to be treated. This renders progress very slow, exhausting both the patience and pocket of the patient. The matter of expense, both to the physician for the original outlay and the current consumed, comes to be one of considerable moment, for, as a rule, patients in America suffering from lupus are of the less well-to-do classes, and are therefore unable adequately to compensate for the actual outlay, apart from the time spent in making the applications.

No better device has been offered, however, unless it be that of MM. Lortet and Genoud, of Lyons, France. This the writer has not yet had an opportunity of testing, but its simplicity of construction, as well as comparative inexpensiveness, make strong appeal for its practical value.

The continuous-current electric arc is produced between two carbons forming an angle sufficient to allow the crater of the

positive carbon to project the greater part of the light in a cone, whose axis passes through the centre of an orifice, which is situated in the centre of a sort of vertical basis with a double bottom, the walls of which, about a quarter of an inch apart, leave a space for the constant circulation of water. This water prevents the heating of the basin, which acts merely as a screen, and is provided with an orifice through which the light passes. A system of jointed arms and screws permits of the regulation of the arc, which may be brought within variable distances from the screen. In operation the arc is brought to a distance of from one-half to three-quarters of an inch from the orifice. The carbons are concealed by the flanges of the screen, and a small mirror prevents any projection of light to the rear. In front of the orifice there is fixed a sort of hollow shutter, limited upon its two faces by discs of rock crystal in the interior of which circulates a current of water. The electric arc may be brought to within two and a-half inches of the shutter without the latter becoming heated. The apparatus is mounted upon a rod movable in all directions, so that the manipulation of it is rendered very easy.[5]

With this apparatus it is possible to utilise the full energy of the high frequency waves of the arc, for by the absence of condensing lenses, and the nearness of approach to the patient, little, if any, opportunity is offered for their dispersion. This is most important, for, as has been noted, the chemical rays have short wave lengths and high frequencies, and can agitate little things in their path, such as molecules, and as this agitation is what is supposed to effect chemical change, it is most important that every opportunity of dispersion of activity in transit from the source to the patient should be minimised. With this apparatus Lortet and Genoud find that an exposure of from fifteen to twenty minutes suffices against an hour and a quarter with the Finsen tube. If this be true, it is due to the securing a residual beam of much greater total energy than is obtained from a tube with condensing lenses of quartz. This residual beam, to be properly effective, must possess the greatest possible number of high frequency waves of considerable amplitude, a beam not only of high intrinsic energy, but greater total energy. As the amount of work accomplished always depends upon the amount of energy expended, it follows that a shorter exposure should give equally, if not better results.

The effect desired in lupus and carcinoma, for example, must be produced by the maximum of chemical activity, which means a maximum intensity of the very high frequencies. In less resistant pathological conditions, if we may so speak, as in the stimulation of a simple ulcerating surface, a chemical effect produced by a less intensity would be sufficient.

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[5] *Scientific American Supplement*, May 18, 1901.

The apparatus of Lortet and Genoud is commendable also from the practical point of expense. It can be constructed at one-third the cost of a Finsen tube, and as the length of exposure is reduced by reason of the greater total energy, the cost of current is proportionately reduced, a point which cannot fail to be of much moment in influencing the use of light by the profession in localised skin affections.

In presenting the different arrangements of light mechanisms in use, and in formulating the physical laws governing the action of light, in so far as it relates to therapeutic applications, the purpose thus far has been to clearly define the best arrangement of light mechanisms for therapeutic work.

The indication for the form of apparatus to be selected depends upon whether the chemical rays alone are required. If so, then the apparatus of Lortet and Genoud, or a Finsen tube, is used. But if it is desired to use the electric arc in general applications, where not only the chemical rays but the lower frequencies and the ozone are indicated, then a small cabinet or large room, as has been described.

In considering the physiologic effect and therapeutic action of light as light (not the physiologic effect of low frequency waves as heat rays, or the inhalation of ozone generated during the activity of the arc), it must be recognised that the characteristic results obtained are produced by the action of the high frequency or chemical rays alone. The result of experimentation, as well as clinical work, demonstrates that it is the chemical rays which have the power to destroy, for example the tubercle bacilli,[6] and to cause dilatation of the capillaries with corresponding circulatory changes and increased nutritive activity. It is only necessary to observe the dilatation of the capillaries in the treatment of lupus, for example, to be satisfied of this. It has been made, however, the subject of experiment by Finsen, who exposed the skin of his arm to the action of the high frequency waves from an 80-ampère arc for twenty minutes. The capillary dilatation thus established maintained itself for six months, while the skin continued pigmented for two months.[7]

The rationale of the action of an agent capable of producing so decided an effect is at once apparent in its application to such pathologies as lupus, rodent ulcer, &c.

Blood supply of a part or the whole must be improved in order to establish nutritive changes. The persistence of the dilatation, on the other hand, points to a possible danger from too long or too frequently repeated applications. The experiments of Finsen as to the ability of light to kill bacteria, cause inflammation, produce pigmentation in the skin, as well as its excitant

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[6] Finsen's experiment reported by Dr. Bie, *Philadelphia Medical Journal*, October 7, 1899.

[7] *The Journal of Physical Therapeutics*, January and April, 1901.

action, show that these effects are due to the high frequency waves. These rays are useful in chemical changes because of their short lengths and high frequency, and their relatively increased capability of agitating little things in their path, such as molecules. In so doing, they give up their energy in non-thermal mechanical agitation to the molecules, partly in atomic agitation or chemical change, and the rest as heat or vibration of molecules. By their profound agitation of bacteria, for example, the death of the germ is assumed to result. The ultimate energy is converted into heat, except what may have gone into metabolism.

If the same energy of red light or low frequency waves were used, it would only heat, as it could not penetrate so far without absorption; or, if it did so penetrate, it would fail to secure the result, because its physical characteristics are such, namely, long and low frequency, that it would not be able to shake up bacteria. The effect of red light in the treatment of small-pox, for example, is not due to any specific physiologic effect of low frequency waves as such, but seems rather to be due to an absence of the high frequency waves concerned in chemical change.

That an arc light (provided that the patient is near enough to the concentrated energies of the source of light) produces some physiologic effect by reason of the heat rays cannot be gainsaid in view of the well-established action of heat upon nutrition. In the class of cases for which the electric-arc bath is indicated, heat is extremely grateful as well as beneficial.

The writer, therefore, has made no effort to eliminate the action of heat rays by diffusing the light into large areas. Nor should the value of the ozone generated be lost sight of. Its physiologic action is to increase the number of red blood corpuscles, the hæmoglobin, the urea, and to establish nutritive changes. Therefore, it cannot be concluded that, in the use of an electric-arc bath, the physiologic action is confined to the action of high frequency waves alone, but that some action from low frequencies as well as ozone is obtained. From the administration of an electric-arc bath there has been noted in the writer's experience the establishment of circulatory changes with a uniform regulation of the heart's action as shown by improved volume and slower rate of pulse, a temporary augmentation of the temperature, increased activity of skin, improved respiration, fuller and slower with gradually increasing respiratory capacity, with (in tubercular, bronchial, and asthmatic patients, and in catarrhal conditions of the nasal passages) diminished irritability of the mucous membranes and lessened discharge.

The stimulus imparted results in a more active dis-assimilation, as evidenced by increased output of urea and CO_2, but is balanced by an equal assimilation, shown by improved nutrition and function. Patients subjected to the influence of an electric-arc bath have uniformly presented an appearance of being rested and refreshed, and not infrequently they fall asleep during its administration.

In diseases of the respiratory system, a soothing effect upon the mucous membranes is always experienced, while in all such cases there has been noted a marked effect from the administration of the first bath upon the cough and expectoration, *i.e.*, a diminution in both. This has been uniform in every case of tuberculosis pulmonalis, but has not been maintained in incurable cases. The same diminution of cough and expectoration has characterised also every case of bronchitis subjected to the influence of the electric-arc bath.

In patients convalescing from acute bronchitis, broncho-pneumonia, and of grippe, with constant harassing cough, inability to sleep, great physical weakness, lowered nerve-tone, relief has obtained from the first treatment, characterised after a few moments in the bath by fuller and freer respiration, lessening of the irritability of both nasal and bronchial mucous membrane with diminished cough and expectoration. Upon the conclusion of treatment, they have invariably presented an appearance of increased vitality, which has been evidenced by improved respiration and pulse, as well as by a sense of well-being which, without exception, they have themselves remarked upon.

These improved conditions seem to point to something which acts directly upon the mucous membrane as a powerful oxidising agent. Even in cases where the cough was incessant there has been complete relief during the twenty to forty minutes spent in the bath.

From the well-known physiologic action of ozone, it is felt that it is a vital factor in general applications of the electric-arc light for diseases of the respiratory passages. In none of the arrangements of arc-lamp mechanisms in use for therapeutic purposes is it entirely eliminated, but it exists in greatest abundance in the "Cabinet" because of its limited and enclosed area. It would be interesting to know whether the elimination of the ozone would alter the results.

In profound anæmics, in the various manifestations of disturbed nutrition, in neuritis, rheumatism, and in such skin affections as acne, eczema, and psoriasis, the results obtained are primarily due to the physiologic action of the high frequency waves or chemical rays of light. Their influence upon the capillary circulation initiates the circulatory and resultant nutritive changes, followed by the disappearance of the special manifestations of the disease characterising the individual case.

That the same physiologic action takes place when the condition is one in which the respiratory passages are involved, goes without saying, but the speedy relief obtained from difficult respiration and harassing cough would seem to point to an agent acting directly upon the mucous membrane, rather than indirectly through its influence upon the peripheral circulation.

It is unnecessary to recapitulate here the various pathologic

conditions in which the electric light is valuable. The therapeutic indications are as broad as those for sunlight and pure air. In crowded centres, where neither the one nor the other is available in the abundance which nature intended, the electric-arc bath is found to be an agent of the greatest value. On the other hand, there is found in the electric-arc light a greater efficiency or total energy of the high frequency waves of light (in which lie first, the bactericidal property; second, the power to produce inflammation of the skin (erythema solare); and third, the ability to penetrate the skin) than from the sun or other known source of light. When an artificial source of light superior to the arc lamp is found, which means something hotter than boiling carbon, then will there be at command a light richer in high frequency waves, and not only of higher intrinsic energy but of greater total energy, capable of profounder chemical action, the therapy of which is yet unknown.

Can Vegetarianism be Supported on Scientific Grounds?—Professor Hueppe states that the anthropoid stock from which man evolved fed on nuts fruit, eggs, small birds, and insects. Such is still the mixed diet of the ape, as well as of the Arabs of this age. Through the struggle for existence man has become a flesh eater, a mixed feeder, and lastly a vegetarian; but vegetarianism became possible to him only by the introduction of fire and cooking. He has neither the teeth nor the intestines of an herbivorous animal. It has been proved in the breeding of pigs and other animals that the best proportion of albumen to carbohydrate in the diet is 1:5. There is no advantage in vegetarianism as a working diet. No vegetarian animal, not even the horse, ox, camel or elephant, can carry the weight of his own body. The carnivorous lion, on the other hand, gripping a calf equal to himself in weight, can jump a hurdle six feet high. The lifting powers of man, the mixed feeder, exceeds that of any other animal. Louis Cyr is recorded to have lifted 1,669 kg. The vegetarian is like an over-heated steam engine, which is in danger of explosion owing to the use of a wrong kind of fuel. His digestive system is forced to deal with a far greater bulk of food, and energy is wasted which might be used for purposes of mental activity. Only in the condition of hard manual labour in the open air can a purely vegetarian diet be borne. Of course, the person who consumes eggs, butter, milk and cheese, cannot be considered a vegetarian. (Abs. *B. M. Journal*).

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ON THE VALUE OF HEALTH RESORTS IN ADVANCED LIFE —WITH ESPECIAL REFERENCE TO THE USE OF WATERS AND BATHS.

By R. Fortescue Fox, M.D.

Among the more welcome changes in medical practice at the Health Resorts is the increased attention now paid to chronic ailments. "Weak constitution," "delicacy," "debility," "depressed health," "want of tone," are no longer mere helpless or hopeless diagnoses, but are recognised as popular terms covering real conditions of slight perhaps, but definite chronic disorder, which it is the business particularly of our health resorts, if not to cure, at least to alleviate. A large proportion of such cases occur at an early adult age, up to say thirty years. Considerable numbers of them are met with in the middle period of life, both in men and women. But in the senile period there also occur very many cases. They are essentially recurring or chronic failures of function, comparatively slight, it may be, but sufficiently well marked to depress the active powers and destroy the sense of well-being in life.

Added to these numerous cases of mere disorder, there are, of course, in this period of life the various degenerative or commencing organic maladies which belong to age; which are often, however, very gradual in their onset, and which may be by appropriate treatment long held at bay.

How is this good object to be accomplished? How can not only life itself be prolonged to its normal limit, but the powers and pleasure of life—a reasonable degree of health and vigour—be maintained and preserved? The problem belongs to a somewhat advanced period of civilisation. It is a daily recurring question in the medical practice of our time.

The increasing distrust and disuse of powerful drugs in advanced life, and the general adoption of artificial teeth, are both obviously beneficial from this point of view. The return to mild and simple remedies for the ailments of declining years, greater care in hygiene and regimen, the power conferred by the dentists of continuing to take a stimulating and supporting diet, and lastly, the growing habit of locomotion, the result of improving travelling facilities, are all factors of modern life favourable to length of days and preservation of health.

All of them, happily, do much to *prevent* the disorders of advancing age and to *postpone* inevitable decay. But what if the disordered process has been already set up, or the premature degeneration has commenced? On what agencies can we then rely for treatment? What therapeutic methods afford us the best hope of restoring healthy action to disordered functions or tissues?

The answer to these questions depends on our view of the

chief characteristics of senile change. Is it not marked by an absence of inflammatory reaction? Is not the process, to use an old expression, an asthenic one? Above all, is there not a proneness to degenerative change, to obliteration of vascular supply, to diminished oxidation in the tissues, and to a slow and languid condition of circulation, of digestion and of elimination? Does not this promote faults of metabolism, as well as retention and deposit of waste product, especially in areas of defective blood supply?

It is obvious that a treatment applicable to acute congestive or inflammatory disorders would be inappropriate to conditions such as these. They demand, on the contrary, a gentle, a prolonged, and in a certain degree, a stimulating treatment. It must be *gentle*, for very "active" treatment in the old commonly causes more disorder than it cures; *prolonged*, because the morbid conditions to be met are of a slow and progressive character; and *stimulating* because these senile changes imply states of depression.

Such a treatment belongs *par excellence* to the Health Resort, to the Climatic Station, and especially to the well-appointed Spa. In the discriminating use of waters and baths, with appropriate dietetic and hygienic measures, are included all its needful requirements. What may, for brevity's sake, be termed *Spa treatment* is gentle, prolonged and stimulating in its action. At the same time, as we shall presently see, it brings to bear very powerful influences upon the body; and it has as necessary accessories absence from home surroundings, change both of scene and climate, and a comparatively open-air life.

What, then, are the principal characteristics of the ideal Spa or Health Resort for the old? There is first the practical question of *accessibility*. For many elderly persons long journeys are impossible or inadvisable. On the other hand, mere distance is of little consequence if the journey can be taken in comfort. In that case even night travelling is not usually objectionable. Indeed, with the present railway facilities night travelling is preferable to breaking a long journey, on the principle that for the elderly invalid *one* setting out is preferable to *two*. Many old people travel very well, if care is taken to provide their usual meals. The incessant change of air stimulates them, and they are often refreshed by long journeys. Sea passages are to be deprecated from their obvious risks of cold and exposure. The same applies to all railway journeys involving long delays, change of carriages, or unsatisfactory arrangements for meals.

As regards climate, the ideal is best described by the word *temperate*. The present writer ventures to think that elderly persons in quest of health are too often exposed to excessive heat and to sudden changes of temperature, and that climatic conditions of that kind should be especially avoided. Summer heat may often be as trying for the old as winter cold. The

winter resort should, of course, afford a fair proportion of warmth and sunshine, although the lower range of temperature in winter is favourable, not only to healthy, but to many invalid persons. The sequence of the seasons should not be shunned overmuch. It may indeed be questioned whether it is wise to exchange our own country for a warmer one *for the entire winter*, unless perhaps in some respiratory affections. The summer resort, on the other hand, had better be comparatively cool, with a small daily range of temperature. High winds, dust, and a dry atmosphere are also to be avoided, because by embarrassing the breathing they check the processes of exchange. High elevations as well as close ill-ventilated valleys are also to be rejected.

More old people are sent by medical men to the French and Italian Riviera than to any other portion of the earth. They resort thither, no doubt, chiefly in quest of warmth and sunshine. The experience of many years has certainly justified the choice, so far as a large number of cases is concerned. But it may, nevertheless, be doubted whether the Riviera quite satisfies the ideal character above sketched. This coast region has, moreover, one cardinal drawback. It nowhere affords facilities for treatment by mineral waters and baths, from which (if the experience of the Spas may be accepted) a large proportion of the cases resorting thither would eminently benefit.

If the above imperfect outline may represent the requisite characters of a Health Resort for those in declining life, what, we may next enquire, are the principles that should guide their treatment by the health-resort practitioner? Let it be assumed that the patient has arrived at some suitable climatic station equipped with an adequate establishment of baths and mineral waters. The first of all requisites is one, or it may be many, days of complete *rest*, for the natural adjustment to change of climate and surroundings. If waters are then prescribed, no large or strong doses are admissible; no disturbance of digestion is to be risked. No sudden changes must be made in diet or in the principal meal hours, although it will usually be found that less alcoholic stimulant is required than was the case at home. A moderate and cautious *change of diet* is usually beneficial, as well as a gradual lengthening of the intervals between meals. No exertion must be permitted when fasting, and therefore care is necessary in adopting the usual early hours for "taking the waters." A first dose taken hot in the bedroom often enables the patient to rise and take a second in the open air. It is sometimes very cheering to an elderly invalid to find himself able after a while to join the throng at the springs before breakfast. The fresh morning air and the mental exhilaration are a good beginning for his day, and often worth the trouble of a subsequent rest.

The case may be of a kind to require treatment by baths. Baths of various kinds are indeed remarkably well borne in

advanced life, and in many conditions of debility; and when properly adapted to the case and skilfully administered are productive of much benefit. It needs not to insist that of course great care is always indispensable. An accurate prescription must be accurately followed. There must be no haste or bustle or excitement. It is obviously needful that the Spa practitioner should himself regulate treatment of this kind in its every particular, and only resign its actual administration to well-trained and competent attendants. The latter must not quit the patient until he has left the bath, and is comfortably resting in a cool dressing-room. It is often advisable to give the patient, wrapped in a blanket, a similar brief rest *before* entering the bath.

Certain practical rules for the use of baths in elderly and debilitated subjects will be borne in mind by the experienced practitioner. He will remember that neither *hot* nor *cold* baths are ever applicable to the old; that no sudden alterations of temperature are admissible, nor any mechanical shocks. Transitions of temperature must be gradual and not exceed about 20° F., and mechanical stimulation, whether with the douche or the hand, must be with water at low pressures, and gentle and continuous rather than abrupt. Manipulation baths, such as the various forms of massage-douche, are very often used with advantage. The same applies to the immersion bath at a temperature slightly below that of the blood. It may be doubted whether *prolonged immersion baths* are sufficiently used in this country. It is sometimes helpful to the patient, even in advanced years, to place him, for one or more hours every day, in an atmosphere of water. In this case the temperature should be indifferent, say 90° to 93° F. Thermal baths (temperature above 95°) should, on the other hand, always be brief, and more and more brief, with increasing temperature, as well as with advancing years.

Prolonged baths are only admissible when thermal stimulation is reduced to the vanishing point by lowering the temperature to indifference. These baths, acting for a considerable period of time on the entire surface of the body, affect primarily the nervous system through its nerve endings, but directly influence the skin and cutaneous circulation as well.

Speaking generally, the object of bath treatment in later life may be stated to be to regulate and equalise the circulation, to act upon the nervous centres both as sedative and stimulant, and to stimulate also the glandular and eliminative functions, including those of the skin.

The following are some of the chronic disorders frequently met with after the middle period of life, which may be particularly mentioned as amenable to treatment by waters and baths at appropriate resorts.

(1) *Chronic renal disease.*—Muriated, chalybeate, or mild sulphurous waters may here be combined with such baths as promote the action of the skin.

(2) *Nervous disorders.*—Conditions of irritability are, as a rule, relieved by immersion baths at indifferent temperatures, the effect being sedative and prolonged. This applies both to spinal and cerebral centres. Conditions of depression and languor require a more stimulating bath treatment, especially gentle douching, with or without manipulation. It is probable that, since such nervous disorders, of either kind, appear to arise to a great extent from states of the circulation in the nervous areas, so the treatment by baths may exert its influence upon them largely through the circulatory mechanism.

(3) *Obvious disorders of the circulation.*—These disorders as a class are common in the middle and later periods of life. They include dilatation and debility of the heart, high tension, tachycardia, irregular distribution of the circulating blood, from undue constriction and relaxation of vaso-motor areas. Among these conditions may be especially mentioned the state of *chronic chill*, with contracted cutaneous arterioles and low surface temperature, accompanied by deep-seated congestions, which constantly prove themselves a serious source of danger. The neglect of this menacing condition is, in the writer's opinion, the cause of many fatal illnesses.

(4) *Myalgias, neuralgias, and other painful congestive or sub-inflammatory disorders.*

(5) *Cutaneous inadequacy, dry surface and prurigo.*—These conditions, which may, in their turn, depend on nervous or circulatory disorder, can be usually controlled by bath treatment.

(6) *Failure of nutrition.*—Experience has shown that wasting, decline of oxidation, failure of the vegetative functions, may, in an early stage of the downward career, respond in a remarkable manner to the massive stimulation of appropriate bath treatment. Here, also, the favourable results obtained must be attributed to the effect produced at the periphery on the circulation and nervous system.

Treatment of Hæmorrhoids by Position.—G. Oeder (*Zeitsch für Diat. u. Physik. Therap.*, n. 8, 1901) recommends the following procedure: Two wedge-shaped pillows or bolsters with their bases towards the foot-end about 20 inches from the head-end of the bed. The two wedges lie on the top of one another, producing an elevation of about 16 or 18 inches. The patient lies on his back with his buttocks at the highest point of the wedges, the elevation being reduced by the weight of the body about 10 inches or so; the head must be placed against the head-end of the bedstead. Ordinarily it is enough to employ this position at night time only, and to repeat it for two or three nights. In severe cases the patient must be kept in this position for some days; local applications can be used at the same time. As a rule the position is a comfortable one, but it may be varied by a half abdominal or half right-sided one. It is asserted that the patient can usually be kept free from distressing symptoms by this means, but it is not claimed that it will do away with the necessity for an operation.

CHRISTIAN SCIENCE AND MEDICAL TREATMENT.

By Charles Lloyd Tuckey, M.D.(Aberd.).

This remarkable movement has been described sometimes as the latest fashionable craze and unworthy of scientific discussion; sometimes as an interesting psychological study which has a signification deeper than simple quackery. As a student and practitioner of hypnotism I have had occasion to look at it from many aspects.

"Christian Science," so called, is a system of metaphysics, and its arch-priestess is an American lady known by her followers as the Reverend Mary Baker Glover Patterson Eddy.[1] The estimation she is held in by her disciples appears in the following extract from the official organ of the movement:—"Surely the people of the coming centuries will vie with each other in doing homage to the Rev. Mary Baker Eddy, the greatest character since the advent of Jesus the Christ, and her book, 'Science and Health, with Key to the Scriptures,' will go down in history as a part of the Sacred writings of the Ages."[2]

Mrs. Eddy, by her own account, was a chronic nervous invalid until 1863, when she began to undergo a mental revolution with corresponding improvement in health which induced her to give her new philosophy to the world. She claims it as the outcome of study and divine revelation, but her detractors and professional rivals, of whom there are many, allege that she appropriated without acknowledgment the doctrines of a certain Dr. Quinby who treated and cured her by mesmerism about that time.

Judged by her *magnum opus*, Mrs. Eddy is a person of indifferent education and entirely lacking in sense of proportion, or of what constitutes evidence. I will quote a few paragraphs from "Science and Health" which are not unfair samples of its style and teaching:

"The metaphysics of Christian Science, like the rules of mathematics, prove the truth by inversion. For example: There is no pain in Truth, and no truth in pain; no nerve in Mind and no mind in nerve; no matter in Mind and no mind in matter; no matter in Good, and no good in matter" (p. 7).

"What is termed disease does not exist. It is not mind nor matter. The belief of Sin, which has grown terrible in strength and influence, is an unconscious error in the beginning—an embryotic thought without motion; but afterwards it governs the so-called man" (p. 81).

The book abounds in such passages, and their effect on the reader's mind is bewildering. If the student is impressed with

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[1] I believe her maiden name was Baker and that the other names are derived from three marriages.

[2] *Christian Science Journal*, October, 1895.

the idea that the language and teaching are sublime, and that failure to understand them depends upon his stupidity and unworthiness, a state of mind is produced similar to that seen in hypnosis, and he accepts the interpretation of the teacher. If he is intellectual and wishes to believe, he attributes a meaning to the words in accordance with his own temperament and aspirations. It is again a case of the blessed word Mesopotamia and its comforting effect on the old lady. This influence of meaningless formulas is well understood by Buddhist priests and oriental mystics, who utilise it in their worship and ceremonies. It amounts to auto-hypnosis and self-suggestion.

Mrs. Eddy says the truth of "Christian Science" is demonstrated by its power to cure the sick; and treatment of disease forms a large part of her teaching. She is very "down" on the medical profession, and declares that doctors create and keep alive disease by giving it a name and local habitation. She has a profound dislike for anatomy and physiology, and her opinion of autopsies may be judged from the following extract: "Many a hopeless case of disease is induced by a single *post-mortem* examination—not from infection, or contact with material virus, but from fear of the disease and from the image before the mind" (p. 92).

She admits that surgery is still sometimes necessary, though she evidently regards that craft, like medicine, as ultimately doomed: "Until the advancing age admits the efficacy and supremacy of Mind, it is better to leave the adjustment of broken bones and dislocations to the fingers of a surgeon. . . . Christian Science is always the most skilful surgeon, but Surgery is the branch of its healing which will be last demonstrated" (p. 400).

She adds that she has seen cases cured, through mental surgery alone, of "dislocated joints and spinal vertebræ."

But Mrs. Eddy realises the fact that "a man cannot raise himself by his own bootstraps," so she substitutes for doctors professional healers who take their "degrees" in "colleges" with high-sounding names. Such was the Massachusetts Metaphysical College of Boston founded by her in 1881.

Christian Science "churches" are to be counted by the hundred in the States, and healers by the thousand, as will be seen by referring to the journals published by the sect. It is computed that the movement has a following of nearly a million souls in America alone, and many of the States have passed laws forbidding its practice in cases of sickness, and some of the leading insurance offices are reported to have refused to insure the lives of Christian Scientists on account of the risks run.

In this country attention was drawn to it by the deaths of two well-known people in 1899. One of these was Mr. Harold Frederic, the distinguished novelist. I understand that the publicity caused by the inquests and magisterial inquiries gave a great impetus to the movement.

Every student and pupil must purchase a copy of "Science and Health," the price of which varies from twelve to twenty shillings according to the binding. This book has gone through a hundred and sixty editions of a thousand copies each since 1875, and brings in an income to the authoress that must excite the envy of the literary man. No wonder Mrs. Eddy makes the curt announcement in her preface that she "takes no patients and declines medical consultations."

Christian Scientists, with their deep insight into human nature, know that people value most what they acquire with expense and difficulty; they therefore charge high fees for tuition, and insist on the patient paying for treatment, even when the healer is a wealthy amateur.

Some healers give what they term "absent treatment," for they argue that thought is not conditioned by time or space; and others profess to cure without the knowledge of the patient. But Mrs. Eddy wisely insists upon the patient's consent and co-operation, thus ensuring the expectant attention and mental receptivity which are such important factors in all forms of psychical treatment.

The "First Church of Christ Scientist," and the head-quarters of the movement in England, is in Bryanston Street, Portman Square, and a visit to one of its services is an interesting experience. The congregation is largely composed of "smart" ladies, but there is a good sprinkling of men. The late Sir Douglas Galton, F.R.S., was a constant attendant.

The service is largely taken up with reading extracts from the Bible and "Science and Health," the two books being bracketed together as text-books. A string of formulas denying the power of matter and "mortal mind," and affirming the force and omnipresence of Divine Mind, takes the place of The Apostles' Creed, and is recited by the whole assembly. Afterwards individuals stand up and relate their experience, testifying to the benefit they have received from Christian Science in "mind, body and estate."

Most of the congregation are evidently very much in earnest. I asked one lady, whom I know well, what she would do if her child got diphtheria, pointing out to her that the timely injection of antitoxin is curative in nearly all cases. She replied that she would not have a doctor but would call in a Christian Science healer, and I have no doubt but that she would act up to her profession.

Christian Scientists are extremely indignant when one suggests that their method is only successful in hysterical and functional disorders. Christ, they say, did not ask whether a disease was functional or organic before curing it, and they claim to have acquired His power through Mrs. Eddy's teaching. It is said that a text may be made to mean almost anything and to support any doctrine. Mrs. Eddy's book is full of her

interpretation of biblical texts, and this, it appears to me, in some instances verges on the blasphemous. It certainly shows the authoress to be wanting in a sense of humour or proportion. For instance, speaking of old age being the result of wrong thinking, she quotes the following story, she says from "the London medical magazine called *The Lancet*," but she gives no date:—"Disappointed in love, a young lady became insane and lost all account of time. Having no consciousness of time she literally grew no older. Some American travellers who saw her when she was seventy-four supposed her to be a young lady, guessing her age at under twenty" (p. 141). Hence she argues, "Never record ages. Minute chronological data are no part of the vast foran. Time tables of birth and death are so many conspiracies against manhood and womanhood."

One hears of marvellous cures achieved by Christian Science,—phthisis, paralysis, cancer, for instance; and I am told of a blind man who has recovered his sight, and of a deaf woman who has regained her hearing. But the result in those cases where I have known it tried has generally been failure. For instance, a lady suffering from indigestion and pain after food was taken to a healer who proceeded to treat her. The patient was told that the stomach was only matter, and that matter couldn't feel; that the stomach was but an appendage of mortal mind, and that mortal mind was error and must be subdued. Therefore she should go home and eat a beef-steak without fear and without pain.

The lady did as she was told, but the result was disappointing, for the subsequent pain was worse than usual. When at last a doctor was consulted, he found that the food was not masticated owing to an entire absence of molar teeth. A visit to the dentist and provision of artificial teeth, of course, soon cured this patient.

No great harm was done in this case, but if it had been one of gastric ulcer the result might have been more serious. The danger of Christian Science lies in the indiscriminate treatment of serious as well as trivial disorders by persons ignorant of diagnosis and contemptuous of medical training.

What, then, is the explanation of Mrs. Eddy's success? I believe it is due to her knowledge of human nature, which is not materially changed by time or education.

She is absolutely dogmatic and admits of no questioning of the infallibility of herself and her system. While exalting herself she flatters her followers by assuring them, "Ye are gods," possessing good and evil, and having control over matter and its phenomena.

There are thousands of people who always imagine themselves ill, and often think bad health interesting. Christian Science offers an antidote to this frame of mind, and makes the *malade imaginaire* pretend to be well rather than ill.

Then it provides a religion and philosophy for the future, so that the nervous patient has something to occupy his mind and keep it away from thoughts of disease. Very likely he becomes an active propagandist of the new philosophy.

It has been said that any religion is better than none at all, and so this system, which is made up of a jumble of metaphysics supported by all sorts of true and false analogies, is not without its useful side.

Some valuable and philosophic truths have been popularised by Mrs. Eddy, and it is possible that some good may remain when the chaff has been got rid of.

Mark Twain, in his latest volume, "The Man who corrupted Hadleyburg," has an amusing essay on Christian Science, which however, possesses its serious side. He gravely affirms his belief that Mrs. Eddy will on her death be canonised by her followers and that her memory will be held sacred by them as is that of Mahomet by Moslems.

The reader will be struck by the points of resemblance between Mormonism and Christian Science. Both cults come from America, and each has its inspired prophet and system of ethics. But Mormonism appeals to man's material side, and finds its converts among the uneducated and working classes; Christian Science professes to appeal to the intellect, and insists on Spiritual development.

The objection Christian Scientists have to ordinary medical treatment reminds one of the "Peculiar People," whose tenets often land them in the police courts, for neglecting to provide medical attendance for their children. But the Peculiar People base their objection on different grounds, and they are found, I believe, only among the poorer classes.

The inquirer who wishes to learn more of this movement will find it discussed in a very able paper by the late Mr. F. W. H. Myers and his brother Dr. A. T. Myers in the *Proceedings of the Society for Psychical Research* for 1894,[3] and in a volume by Miss Alice Feilding, published in 1899.[4]

I will close this very short and inadequate *résumé* of the subject by quoting from Miss Feilding's book the "Prayer for a Dyspeptic," as drawn up by Mr. Hazzard, President of the New York School of Primitive and Practical Christian Science.

"Holy Reality! We BELIEVE in Thee that Thou art EVERYWHERE present. We *really* believe it. Blessed Reality, we do not pretend to believe, think we believe, believe that we believe. WE BELIEVE. Believing that Thou art everywhere present, we believe that Thou art in this patient's stomach, in every fibre, in every cell, in every atom, that Thou art the sole, only Reality of that stomach. Heavenly, Holy

[3] "Mind-cure, Faith-cure, and the Miracles of Lourdes."

[4] "Faith Healing and Christian Science," pp. 214. London: Duckworth & Co.

Reality, we *will* try not to be such hypocrites and infidels as every day of our lives to affirm our faith in Thee and then immediately begin to tell how sick we are, forgetting that Thou art everything and that Thou art not sick, and therefore that nothing in this universe was ever sick, is now sick, or can be sick. Forgive us our sins in that we have this day talked about our backaches, that we have told our neighbours that our food hurts us, that we mentioned to a visitor that there was a lump in our stomach, that we have wasted our valuable time, which should have been spent in Thy service, in worrying for fear that our stomach would grow worse, in that we have disobeyed Thy blessed law in thinking that some kind of medicine would help us. We know, Father and Mother of us all, that there is no such thing as a really diseased stomach; that the disease is the Carnal Mortal Mind given over to the World, the Flesh, and the Devil; that the mortal mind is a twist, a distortion, a false attitude, the HARMATIA of Thought. Shining and Glorious Verity, we recognise the great and splendid FACT that the moment we really believe the Truth, Disease ceases to trouble us; that the Truth is that there is no Disease in either *real* Body or Mind; that in the Mind what *seems* to be a *disease* is a False Belief, a Parasite, a hateful Excrescence, and that what happens in the Body is the shadow of the LIE in the Soul. Lord, help us to believe that ALL Evil is Utterly Unreal; that it is silly to be sick, absurd to be ailing, wicked to be wailing, atheism and denial of God to say, 'I am sick.' Help us to stoutly affirm with our hand in Your hand, with our eyes fixed on Thee, that we have no Dyspepsia, that we never had Dyspepsia, that we will never have Dyspepsia, that there is no such thing, that there never was any such thing, that there never will be any such thing. Amen."

The capitals and italics are in the original.

Preserving Eggs.—An American journal gives results of experiments made on preserving eggs. Eggs preserved in salt water all become bad; wrapped in paper, 80 per cent. bad; plunged in a solution of salicylic acid and glycerine, 80 per cent. bad; rubbed with salt or coated with paraffin, 70 per cent. bad; plunged in a solution of alum or of salicylic acid, 50 per cent. bad; boiled for fifteen seconds, 50 per cent. bad; coated with soluble glass, or with collodion, or with varnish, 40 per cent. bad; coated with mixed varnish, 20 per cent. bad; treated with boric acid and soluble glass, or with permanganate of potash, 20 per cent. bad; coated with vaseline, all good; plunged in lime water, or in a solution of soluble glass (silicate of soda), all good.—*Globe.*

NOTES OF CASES TREATED BY RADIANT HEAT AND LIGHT.

By W. Knowsley Sibley, M.A., M.D., B.C., M.R.C.P.,
Senior Physician to Out-Patients at the North-West London Hospital.

The utility of heat, with or without the addition of light, has now become so generally recognised by the medical profession that all well-equipped hospitals and hydro-therapeutic establishments in Great Britain and on the continent are at the present time using apparatus of various designs for administering this treatment. As a rule the more simple the mechanism of the apparatus, the better the results obtained; and naturally, for purposes of general utility the same apparatus must be adaptable to the treatment of any part of the body, and it should not be necessary to have an apparatus of a different shape or size for the application of the therapeutic agent to different regions.[1]

Of recent years physicians have shown a marked tendency to treat many complaints by local or external methods, in contradistinction to treatment by the administration of drugs and internal remedies. Cases of heart disease are now much improved, if not cured, by regulated exercises and baths. In many cases this improvement has taken place without the assistance of drugs of any kind. And again, many cases of heart disease which had failed to show any benefit by a carefully regulated course of internal medicines have been greatly improved by treatment by regulated exercises or resistance movements, combined with saline effervescing baths. It is not intended in any way to depreciate the value of internal remedies, which often prove of real use when combined with external methods, but the object of this article is to emphasise the fact that the external method is often the more powerful and effective means of dealing with disease.

Rheumatism in its various varieties has from times of old been treated by external applications, such as blisters, cupping, leeches, sun baths, hot sand, friction, warmth, cold, passive movements, massage, electricity, and many others. A great many baths and various moist hot-air methods have been in use for some time, but what prevented the attainment of best results in all of the older forms was that they supplied a moist and not a dry heat for application to the affected part.

Many more diseased conditions than might at first sight be imagined are benefited by local radiant heat. My rule at the hospital for some years has been, when a patient suffering from any complaint does not improve after a course of routine drug-treatment, to order radiant heat, and I must say that in the

[1] The apparatus used in all these cases was "The Dowsing Radiant Heat Apparatus."

majority of cases improvement very quickly shows itself, often to a marked degree.

The following cases are notes of a few selected from a large number of diseases treated by myself at the North-West London Hospital:—

Rheumatoid Arthritis.

R. W., a girl aged 18. Her mother once had an attack of rheumatic fever. The patient had always been a delicate child, and grew rather rapidly between the age of 11 and 12. Soon after this she lost strength and became thinner, and then her left ankle became painful and swollen, in the course of a month or two the right one also, then the right wrist became affected. At this time she entered University College Hospital for a course of sulphur baths, which seemed to do the feet good, but not the arms; then she went into the Temperance Hospital, where she underwent electrical treatment. After eleven weeks of this she was sent to Bath, and there had some baths and massage. After being three months at Bath the right elbow became affected and she went to Brighton, where she became much worse, and then four and a-half years ago she was admitted into the Highgate Infirmary, where she has remained ever since. She has been quite crippled and unable to walk for four years, and confined absolutely to bed for the last three years, and was now almost helpless.

She was admitted into the North-West London Hospital on December 31, 1900, when she was very pale, with a pained anxious expression; much wasted, especially her limbs. Practically all the joints, except the hips, were considerably affected, she lay in bed on her back with her legs drawn up, both knee-joints were much enlarged—the left one was dislocated outwards and backwards, the right backwards, all attempt at movement caused great pain. The upper extremities were also considerably affected, and all movements were very limited, the finger joints were all enlarged and typically spindle-shaped. The patient was unable to raise herself in bed, and could not touch any part of her face or head with her left hand, she was just able to feed herself with her right. There was considerable pain about the shoulders and back of the neck. The palms of the hands were always moist and clammy, the internal viscera were apparently normal, there was no albumen. The temperature was normal.

Radiant-heat treatment was prescribed, which after a very few applications gave much relief, and patient soon felt much more comfortable. There was soon improvement in the position of the legs, especially of the left, and marked diminution in the swelling about the knees. Then she was able to sit up in bed, and there was a general increase of movement about the shoulders and arms, and by February 12 she was able to touch her mouth with her left thumb, and patient was out of bed in a chair for a short time daily.

On March 18, there being by that time considerable improvement in the tissues about the joints, my surgical colleague, Mr. Jackson Clarke, divided the tendons behind the knee joints and the tendo Achilles; the legs were manipulated into as good a position as possible and put up in splints, which position was still further improved from day to day. The radiant-heat treatment was continued all through, about twice a week. By the beginning of May she was up again in a chair

each day, except on the days she had the baths. By the first week in June patient was able to wheel herself about the ward in a chair.

Internally the patient had syrup of the iodide of iron, cod-liver oil, and afterwards guaiacum.

Vaso-motor Disease.

E. P., a shop girl, aged 21, was the subject of considerable vascular disturbance. She was in the North-West London Hospital from March 19 to July 11, 1900, and was re-admitted on November 13, 1900, in a worse condition.

There was nothing of importance in the family history, and beyond palpitation of the heart, the patient has not herself had much illness. Her hands and feet had always been cold, and about January, 1900, they became swollen and painful, and two or three small blebs appeared on the back. She had never suffered from chilblains. She was a dull, heavy-featured, rather phlegmatic girl, with thin, rather scanty brown hair and ruddy complexion. Both hands were large, swollen, blue and cold, with small trophic lesions on the dorsum, and some superficial scars from old sores and deeper ones of the finger tips from whitlows; the hands were heavy and painful. There was at this time a well-marked erythematous rash over the front of the left leg; this was very hot, burning and painful. Both ankles pitted slightly on pressure. No obvious visceral lesion was discernible. The heart sounds were somewhat feeble and the rate rather erratic, but no bruit was to be heard; the pulse was of a poor tension. The menstrual periods were irregular; before and immediately after each one her hands became more swollen, hot, red and painful—so also one or both ears (vaso-motor dilatation)—at other times they were blue and cold. No albumen was found on repeated examination. The tongue was large, flabby, but not furred.

The erythematous rash appeared at one time on the chest, at another on the front of one or both legs or the arms, and occasionally the ears, each attack lasted a week or more.

She was treated with radiant-heat baths from November 15 to January 31, 1901, and during this period she had twenty-six treatments. The skin generally acted very well and patient felt much warmer and more comfortable after each treatment, the pain from the intense erythema of the extremities was also greatly relieved.

At times she suffered from general tremors, especially of the hands, and abrasions of the skin on dorsum of hands and feet. Most of the time patient was in the hospital her pulse varied from 80 to 120 or 140.

From her admission on November 13, 1900, to December 14, her temperature was practically normal; from December 15 to Febuary 19, with only one or two exceptions, both morning and evening temperatures were a little over 100°, and with a four-hour chart for several days it was found that the temperatures at 10 p.m. and 2 a.m. were subnormal, 96 to 97°, and all other times were raised to about 100°. She had no symptoms to account for this. Internally patient had thyroid tabloids from November 13, gradually increased to December 20, when she had a bismuth salicylate mixture for four days owing to some diarrhœa, and the thyroids were repeated till January 2, when all drugs were stopped for eight days, without any apparent effect on the tempera-

ture, and on January 10 thyroid was again given, sometimes with small doses of arsenic. On January 26 strychnia and iron were substituted. She was made an out-patient on February 21. The feet were still swollen. She had marked general tremors. Pulse was about 130. The radiant-heat treatment was continued once or twice a week and arsenic was prescribed. About the middle of March she had another whitlow, but by the 18th this was healed and patient was much better and stronger, the pulse now was only 76, and the tremors had nearly disappeared.

Epilepsy.

F. F., a girl aged 12. Her mother had suffered from epileptic fits during each of her pregnancies; they commenced in the early stage, and she suffered also from severe vomiting during pregnancy. She very occasionally had a fit when not pregnant, and then only if very much over-worked or worried. Patient had six brothers and sisters living and none of them suffered from fits. She had had fits ever since she was six months old, with tongue bite, and involuntary micturition and sometimes defecation. She had a fit almost daily and each one usually lasted for several hours. The patient had attended the North-West London Hospital for the last five years, and the fits were as frequent as formerly but perhaps not quite so severe. The first radiant-heat bath was given on March 21, 1899; the second a week later, there having been no fit in the interval; the third on April 13, when she had had three fits; the fourth on April 20, there being no fits in the interval; treatment was repeated on May 7, 11, 18, with no return of fits; on May 18 she had a fit while in the bath, and from this time a fit every day till June 12, sometimes two a day, but now each one only lasted a few minutes and she was not nearly so convulsed as formerly. Treatment was repeated on June 19, 22; July 6, 13, 26; on 23rd and 24th she had a slight fit each day. On August 3, 13, baths were given, there having been no fits in the interval. Baths were continued at intervals till March 26, 1900. By this date she had gone many weeks without fits. Catamenia came on for the first time last week; a few days before this fits returned rather stronger, lasting about five minutes, and she passed urine in them. There had been no fits since the period, but patient had felt "funny," but without any loss of consciousness. On April 19 she had severe epistaxis; on May 7 it is noted that "last week she had as many as nineteen fits, each lasting three or four minutes." She had a severe headache after the last one on May 4. Baths were recommenced on May 8, 1900, and it was then noted "that since the baths were discontinued seven months ago patient had recently had a fit almost every day, some being severe, others lasting three or four minutes only." Baths were given on May 8, 15, 22, 29, June 19, 26, July 3, there being no recurrence of the fits. Catamenia remained absent. Treatment was repeated.

On October 1 and 8 there had been two fits since last bath; 15, 22, 29, two more fits; November 5, one fit; 12, had had a fit most days; November 29, fit on the day of last bath, 26; December 17, two fits since. Treatment was continued at intervals. On May 13, 1901, it was noted there had been no fits since end of April, and treatment had been continued all the year once or twice a week.

She took bromide at bedtime for a time and some syrup of iron uring the day.

Chronic Rheumatism.

S. B., a railway-ticket examiner, aged 50, was admitted into the North-West London Hospital on September 24, 1900. There was nothing of importance in his family history. He had good health till May, 1898, when he was laid up for ten weeks with an attack of subacute rheumatism affecting the neck, chest and left arm, and afterwards his legs. He recovered from this and went to work, and continued till May, 1899, when having become gradually worse he was compelled to give up all work, and he has been more or less crippled ever since.

On admission he was sparely nourished, with a good deal of acne rosacea on face; complained of great pain in both arms and knees. Both knee-joints were considerably swollen and semiflexed, and the range of movement was very limited. Both elbow-joints were also much degenerated, he was also unable to raise the right hand to his head.

The internal organs were apparently healthy. He commenced radiant-heat treatment on September 26, 1900, and felt much easier after the first bath. He continued this treatment from this date till January 9, 1901, during which time he had thirty-two baths.

On October 11 it is noted that "patient is now able to raise his right arm well above the head." Various local remedies were also applied to some of the joints, such as Scott's dressing, thermogen wool, lint soaked in 2 per cent. formaline solution, calamine lotion, ichthyol ointment, all of which for a time gave relief.

On December 3 he was feeling much better and stronger, and was up in a wheel chair for a short time, and the legs were becoming a little less flexed, but all attempt at movement was very painful. Having previously been on ordinary diet, on December 13 he was put on a restricted diet consisting of under-done minced lean meat, baked apples and hot water. On December 17 the pain was a good deal easier and he was sleeping much better.

On January 21, 1901, patient was put under ether, and Mr. Mayo Collier performed tenotomy of biceps and semitendinosus tendons about left knee-joint and then forcibly extended the joint and put the limb on a back splint.

On February 14 Mr. Jackson Clarke performed the same operation on the right knee. There was no rise of temperature after either operation and patient made a good recovery, both legs maintained their improved position, and on March 14 he was up again with both the legs in metal splints.

On April 23 he left the hospital able to walk about with a pair of crutches and with his legs in specially devised instruments. The internal treatment consisted of drugs given one at a time in the following order: salicylate of soda, syrup ferr. iodidi, bismuth and salicylates, guaiacum.

Chronic Bright's Disease—Asthma and Bronchitis.

G. C., a stableman, aged 60, had suffered from asthma and bronchitis on and off for eight years; the pulse was hard, of very high tension, and there was albumen present in the urine, with a few hyaline and granular casts. His chief trouble was inability to sleep at night

on account of shortness of breath and excessive cough and expectoration. He was treated for some months by radiant-heat baths as an out-patient, and felt greatly relieved by them; in fact, after the first bath he had a better night than he had had for many months.

Chorea.

M. B., a little girl aged 6. There was no family history of rheumatism, both parents, six brothers and sisters, were alive and well. Patient had chorea badly in November, 1899; she was to have been admitted into the hospital, but developed measles; after she recovered from this all symptoms of chorea had left her. In January of the present year chorea recurred, but movements now were (January 16) not quite so severe as in the former attack. There was no cardiac bruit.

Radiant-heat baths were prescribed, and patient was very restless during the first three treatments, and movements were getting worse, so much so that there was now some difficulty in swallowing, and the speech was very indistinct. During the fourth bath, on February 4, the movements became much less marked, and after the seventh treatment, on February 25, had practically ceased. Internally the patient took some syrup of iron.

Peripheral Neuritis.

M. S., a married woman, who for the last eighteen months has been troubled with pains in hands and slightly in feet. There was considerable numbness of the fingers, she was able to do housework with difficulty, but quite unable to sew—says she "cannot grip anything," "and that she has no feeling in the hands."

After two radiant-heat applications, she said "the hands felt much better, have lost the bad aching pain, though they are still rather numb, and she could do some sewing."

Spinal Disease.

February 12, 1900.—T. W., a boy aged 10, who has been delicate from birth, suffered from cough and bronchitis every winter. Stated to have had "rickets" when 3 years old, and had the right knee-joint in plaster at that time. The last twelve months he had been getting thinner, and had complained of pain in the lower part of the back. There were severe night sweats. There was some irregularity and great tenderness about the dorso-lumbar region of the spine, and pain on movement or pressure and general bronchial râles over chest. Radiant-heat baths were prescribed. After seven treatments, by March 19, the patient appeared very much better; the appetite was now good, and the cough nearly gone, and he did not complain nearly so much of his back. By April 30 the bronchitis had quite cleared up, and his general condition much improved. There was no pain in the back now. Treatment was discontinued on May 28, and a note on June 20 is to the effect that "he has been quite well, feels nothing of his back now." Internally, cod-liver oil and iron were prescribed.

Injury to Shoulder—Fracture.

April 30, 1901.—A. S., a man aged 61, who had suffered slightly from rheumatic gout. Three months ago he fractured the neck of the right humerus. The whole shoulder had been stiff and painful ever since, and he had great difficulty in using this arm. After three radiant-heat applications the shoulder was very much easier and movements were considerably increased.

Ulcers of Legs (Strumous).

May 4, 1899.—E. W., a delicate little girl, aged 15, who had suffered from ulcers of the left leg for six months or more. Last October some small pimples appeared on the left leg, which soon became ulcers, and these have continued ever since. She complained of pains in her arms, which prevented her carrying ordinary things. There were two indurated chronic ulcers on the anterior surface of left leg about 1½ inch diameter. After five radiant-heat applications the ulcers were quite healed and patient appeared much better in herself.

In addition to the above, if space would have permitted, notes of cases of the following diseases having been successfully treated by radiant heat might have been added, such as all forms of arthritis—rheumatic, gouty, neurotic, tubercular, traumatic, also synovitis, bursitis, periostitis, adhesions, hysterical joints, various forms of neuritis, paralyses, cases of general or local malnutrition, many skin diseases, &c.

The Treatment of Obesity.—M. W. Ebstein (*Deutsche Medicinische Wochenschrift*, Nos. 16, 17, 1900) does not advise thyroid treatment nor too extreme an abstinence from liquids; he also condemns treatment by mineral waters, by pharmaco-therapeutic remedies, and especially by purgatives.

He considers that the best *régime* is as follows:—Meals not too frequent (three in the day), eat slowly, masticating the food thoroughly; finish the meal immediately hunger is assuaged; limit the ingestion of albumens, giving a preference to albumenoid vegetables, but adding thereto a considerable quantity of fat; abstain from sleep after food; avoid beer and alcoholic liquors. Exercise and occupation must depend upon the condition of the heart.

Tendo Achillis Reflex.—At the Neurological Society (Paris), M. Babinsky recently stated that, from thirty cases observed by him, he found that the examination of the tendo-Achillis reflex was often of greater importance than that of the patellar reflex in the early diagnosis of locomotor ataxia. In a large number of these cases the tendo-Achillis reflex was abolished long before the knee-jerk, and the disease was thus diagnosed as tabes dorsalis while the patellar reflex was still present.

ACTION OF CURRENTS OF HIGH FREQUENCY UPON TUBERCULOSIS.

By Dr. J. A. Rivière, Paris.

Since the memorable experiments of Prof. d'Arsonval and Dr. Charrin with regard to the effects produced by high-frequency currents upon bacilli and their toxines, I have been fully persuaded that tubercular patients would derive great benefit from these agents. Since then I have had the opportunity of treating many cases of pulmonary tuberculosis by means of the grand solenoid of d'Arsonval. The patients were submitted to treatment of twenty minutes' duration every second day, and I have invariably been able to verify the results announced by Prof. Doumer of Lille, in his very interesting communication read before the Academy of Sciences, February 26, 1900, and by our learned *confrère*, Dr. Oudin. I ought to say that, as the procedure employed by these authorities seemed superior to mine, I have used it ever since.

Patients undergoing the treatment have felt their general health improve from day to day, and in certain cases the physical signs of the pulmonary lesions have completely cleared up. I ought to add that my patients followed at the same time the "classic" treatment of tuberculosis, and that I alternated my high-frequency seances with applications of Röntgen rays and inhalations of ozone. It has seemed to me advisable to discontinue treatment during congestive or febrile exacerbations. Chronic cases have appeared to answer best to electrical treatment.

I now wish to call attention to two convincing results which I have obtained in localised tuberculosis. The first was the case of a patient, aged 55, suffering from a tubercular ulcer situated two centimetres below the middle portion of the left clavicle. It was of an elongated shape and measured three centimetres in its long diameter and two centimetres across; it was a centimetre and a-half deep and filled with cheesy-looking purulent matter of a yellowish-green colour; the edges were somewhat indurated, and two of the axillary glands were as large as a pigeon's egg. It had commenced by a painless infiltration of the skin, which, after having taken on a nodular appearance, broke down and ulcerated.

I commenced by applications of the effluve of the resonator of Oudin; the ulcer became less painful; instead of being purulent the discharge became serous; the pallid appearance of the base of the ulcer was succeeded by copious red granulations, and in less than a month it completely healed. It was covered with a white membrane, soft and fine in appearance; this process of healing presented a great contrast to what had occurred on the opposite side three years previously in the case of an ulcer of

the same nature, which required a whole year's treatment by means of iodoform, ignipuncture, and scraping, before it healed, and even then had left a hard-looking cicatrix (kéloïdienne). The daughter of this patient, affected with pulmonary tuberculosis in the first stage, recovered under the combined influence of high frequency of the grand solenoid of d'Arsonval, and Röntgen rays. Her age was 30, and her treatment lasted three months.

Two years ago I had under my care a young man suffering from arthritis of the knee of a suspicious nature. The epiphyses were first attacked and the joint was much enlarged; there was thickening of the articular surfaces of the bones; the peri-articular structures were swollen; the limb was a little bent upon the thigh, and there was pain from time to time. After eighty sittings of localised high frequency the articulation had recovered its functions, the knee was diminished in size, the swelling of the soft parts, as well as the pain, had completely disappeared; the general health seemed excellent. The patient left for the country. Two months afterwards he wrote to me saying that his health had been completely re-established, but he attributed his cure to the country air. I am persuaded that this patient was suffering at the beginning from tubercular arthritis. The applications were made by means of one or two dampened plates attached to one or both extremities of the small solenoid.

But the most convincing case of the favourable action of high-frequency currents in localised tuberculosis is the following:—

M. X., a Scotch gentleman of gigantic stature, had been sent to me by a *confrère* two months previously. He had been operated upon a year before for tubercular glands of the neck. The disease had clearly broken out again. He had five cervical glands rather smaller than a hen's egg, and there were four fistulous openings freely discharging. I gave him a daily application of long effluve from the resonator of Oudin, of five or six minutes' duration. From the following day the discharge was changed in character. It became serous instead of purulent, and at the end of the tenth application the fistulas had dried up. The swelling of the neck steadily disappeared, and on the thirtieth application, at the end of a month's treatment, there remained only one sublingual gland enlarged; it was the size of a pigeon's egg. Business obliged the patient to discontinue treatment for a month. He then came back to me with a fistulous discharge which seemed to proceed from the gland in question. After four fresh applications of the effluve the fistula dried up and the gland of the neck considerably diminished in size, when the patient left for the country. On his return I hope to effect a complete cure. This patient, like all the others who have been similarly treated, always told me that under the influence of high-frequency currents his strength increased, and sleep and appetite were equally improved.

Since the interesting communication of Professor Doumer

with reference to the cure of anal fissure and fistula, I have had the opportunity of trying the procedure in such cases on six occasions. The cases of fissure got quickly well; two fistulas disappeared after a treatment of one or two months. In the first instance I introduced a small stylet into the fistulous track; this stylet being attached to the Oudin resonator. After four applications of this kind I used a glass cone filled with metallic filings, and attached to the resonator (condensing electrode). Two other patients who suffered from complete fistula did not complete the treatment. But in every case the purulent and fœtid discharge of the first day gave place to a comparatively slight serous discharge with a less offensive odour; the pain rapidly disappeared. In the last two cases, to accelerate the treatment, I had also used creosoted suppositories.

I might add that at present I have an English lady under my care who has an osseous fistula in the heel. Radiography showed a small opaque cone-shaped excrescence half a centimetre in length at the lower end of the os calcis. After three weeks' treatment by localised high frequency the fistulous opening seemed to have dried up, pain had disappeared and walking was much easier. During the last few days she has benefited by the bi-polar effluve of the new d'Arsonval transformer. The discharge, although it had disappeared, has unfortunately become re-established, and therefore I am not able to affirm that there will be an eventual cure. But the three radiographs which I have taken show that the osseous changes have gradually but completely disappeared.

Conclusions.

It follows from the foregoing that high-frequency currents exercise a certain curative action upon tuberculosis, pulmonary and localised. The microbe cannot resist the repeated application of these currents; its reproductive power and the virulence of its toxines become attenuated, a fact which had already been proved by the laboratory experiments of Professor d'Arsonval. It appears that, at the same time, the human organism under the influence of these currents gets stronger, its enemy, the microbe, grows weaker. It is also probable that under the influence of this form of electrisation the beneficent action of the phagocytes increases in activity. It thus appears evident that in these conditions the attacked organism recovers its strength and (aided by phagocytes) finally prevails against the bacillus whose vitality the electric concussions had already imperilled. It is, therefore, sufficient to place the patient in the best conditions of food and hygiene to avoid the return of the disease. It is in this way that some of my patients sent south after the treatment are now completely recovered. I regret that I have never had the opportunity of treating true white swelling, or Pott's disease. I am under the impression

that these two localisations of tuberculosis ought to be materially influenced for the better by the effluve, mono-polar or bi-polar of the Oudin resonator (Rochefort model), or of the new d'Arsonval transformer (Gaiffe model).

Notices of Current Literature.

HANDBUCH DER PHYSIKALISCHEN THERAPIE. Dr. A. Goldscheider and Dr. Paul Jacob. (Thieme, Leipzig.)

This is a book by many writers, each of them master of his subject. It forms the first volume of what already proves to be the most important work on Physical Therapeutics that has yet appeared in Europe. But the American work on "Physiological Therapeutics" and the forthcoming work of Dr. Colombo must at the same time be mentioned. The Editors explain in their introduction that, although there is no lack of books dealing with the subject, there are none sufficiently scientific, precise, and abreast of modern science. They contend that the methods in question are daily acquiring a wider field of usefulness, and a more scientific method of application; and that if a medical man fail to avail himself of them his practice is out of date. Yet there is no comprehensive treatise that deals with such subjects collectively. With the exception of standard works on electro-therapeutics, there has hitherto been only a scattered literature to which the medical man could turn for information. It is the object of this book to look into the whole question with strict impartiality and under the following headings: (1) Technique and dosage; (2) The scientific principles that underlie these procedures; (3) Their indications and contra-indications; (4) Their relationship to other forms of treatment; (5) A critical examination of results and experience hitherto obtained; (6) Lastly, to discuss the employment of these methods of treatment in special diseases.

In pursuance of this plan, the first article, from the pen of Prof. Pagel, is introductory to the first and second chapters, which deal with Climatology and High Altitudes, written respectively by Dr. Max Rubner and Prof. A. Loewy, with Dr. H. Eichorst. The third chapter treats of Pneumatotherapy. The fourth of Inhalation (Prof. J. Lazarus of Berlin.) The fifth is Balneotherapy, by Prof. von Liebermeister of Tubingen; the physical and chemical arrangements of baths and their indications and contra-indications being by Prof. J. Glax. The sixth chapter is devoted to Thalassotherapy. The historical survey of marine treatment is by Dr. Julian Marceuse. The various factors in sea climate are then examined. Sir Hermann Weber explains the technique and use of sea baths and sea voyages. Lastly, special marine climates and sanatoria are considered. Then comes Hydrotherapy (seventh chapter), with an historical introduction by Dr. Marceuse; the physiological principles of its employment being dealt with by Dr. W. Winternitz. Technique and methods, with the indications for different procedures, are by Dr. Strasser. The third division of this subject is a survey of the general medical experiences about Hydrotherapy and its relation to other physical methods (Dr. W. Winternitz). Thermotherapy forms the last, or eighth, chapter; the historical survey, the

physiology and the technique being respectively by Dr. Marceuse, Dr. A. Goldschieder and Dr. Friedlander (Wiesbaden).

La Chaleur Radiante Lumineuse. Agent Therapeutique. Par le Docteur Guyenot, Aix-les-Bains. (Malvine, Paris.)

At some length and with great lucidity, this *brochure* deals with the therapeutic use of high temperatures obtained from a luminous source. The incandescent light-bath has, of course, for some time been well known and assiduously employed on the continent, as well as in America, whence it came. Its great usefulness as a sudatory agent no one doubts; but the combination of light with a high temperature, as first introduced by Dr. W. S. Hedley, in 1896,[1] or 1897, has not hitherto received quite full recognition. This method claims that by the powerful peripheral stimulation of heat at a very high temperature, and absolutely dry, there is produced not only an active diaphoresis, but something which may be described as a counter irritant or mustard-plaster effect (only much more widely distributed than the latter), which influences internal parts and organs. The apparatus by which the process is carried out is devised by Mr. Dowsing, an electrical engineer, and is commonly known as the Dowsing Radiant Heat Bath. It is this method and apparatus which Dr. Guyenot, having carefully studied in this country, now describes in the pamphlet under notice, and which he has adopted, not only in his own practice, but in the Zander Institute under his direction. It must be added that not only does this treatise set forth the results that have been obtained up to the time of his visit to England, but carries the subject forward with a considerable amount of new and original matter.

Having described the object of his visit and the circumstances under which his observations were made, a short historical survey is given of the therapeutic use of heat; moist heat, dry heat and luminous radiant heat being respectively considered. The physics of luminous heat is briefly referred to, and then follows a full description of the Dowsing apparatus, as adaptable to either general or local applications. The physiology of the question is next examined and therapeutic indications dealt with in detail. Gout, rheumatism, contusions, sprain, the sequelæ of fractures and dislocations, rheumatoid arthritis, sciatica, and nephritis, are all conditions in which good results may be expected. General conditions, such as obesity, anæmia, general debility, the arthritic diathesis, all furnish indications for the marked excitant action of luminous heat upon the functions of nutrition and elimination by the skin and lungs. Lastly, it is pointed out that luminous rays are believed in some measure to augment the red globules of the blood in their power of oxygenation.

A System of Physiologic Therapeutics. Edited by Solomon Solis Cohen, A.M., M.D. Vols. i. and ii., Electrotherapy, Dr. Jacoby. (Rebman and Co., London.)

The sub-title of this series of volumes describes them as "a practical exposition of the methods, other than drug giving, useful in the treatment of the sick." In his preface, or "foreword," the editor, after announcing his preference for "compact books by single writers to bulky tomes of composite authorship," proceeds to explain that all successful treatment depends upon the evocation, stimulation, and control of the natural recuperative power—

[1] Apparatus shown before the Balneological Society of London.

"the recuperative reactions"—together with the "suppression, diminution, or neutralisation of antagonistic reactions likewise occurring automatically as the result of extraneous morbific influences, or of internal failures or disturbances. The means of accomplishing these therapeutic ends fall into two great categories, which might be termed "artificial" and "natural" were it not that both of these terms have "certain misleading connotations." The former class is made up of "the great and serviceable group of therapeutic means termed 'drugs'." The second group comprises those remedial agents that may be called "natural" or "physiologic." "By natural or physiologic therapeutics, then, is meant the utilisation, in the management of the sick, of agencies similar to those constantly acting on the human body in health, but because of some departure from health, needing to be specially exaggerated or localised in their action." In other words, the agencies in question constitute that group of remedies which this Journal deals with under the name of Physical Therapeutics—physical as distinguished from, but in no sense antagonistic with, pharmacological. The chief of these are enumerated upon the second page of this number.

The two volumes already issued cover the whole ground of electrotherapeutics, and are from the pen of Dr. Jacoby, supplemented by special articles by Drs. Da Costa, Scheppegrell, Martin, and Ohmann Dumesnil. They are reserved for a further notice in our next issue.

NEW RESEARCHES CONCERNING THE ACTION OF LIGHT UPON THE SKIN.[1]

By Dr. Niels R. Finsen.

Let us first consider the cutaneous redness produced by heat. Of this there are two kinds: one direct and one indirect.

The first—the direct—is the "heat erythema," which appears on the local application of strong heat, and depends upon a paralysis of the muscular coat of the cutaneous vessels, and (differently from light erythema) occurs immediately after the exposure, and disappears in a time proportionate to the intensity of the heat action, sometimes after some minutes, and sometimes after some hours.

A heat that is strong enough to bring on such an erythema does not exist in our climate, so that we can safely neglect this form, when we speak about the natural red colour of the skin.

The other kind of skin redness caused by heat—the indirect—of greater importance to us, is that which occurs when the body-heat, either on account of the surrounding air or by an increase of heat production in the body, becomes abnormally increased and the blood is determined to the skin. It might have been expected that if this exposure were frequently repeated there would result a permanent reddening of the skin. This is, how-

[1] *Meddelelser fra Finsen's Med. Lys. Institut.*

ever, not the case. On the contrary, we find that bakers, stokers, metal-founders, and others who are frequently exposed to a strong heat, show a face remarkable for its pallor. Europeans who go to the tropics are as a rule pallid in appearance,[2] in spite of the stronger pigmentation of their skin.

It would appear, therefore, that heat in relation to skin redness plays a negative part.

It seems to be different with cold. The first occurrence is a contraction of the muscles and vessels of the skin, so that the latter becomes white; but later, especially after a long exposure to severe cold, there is a strong reaction, and redness of the surface sets in, of a duration corresponding to that of the heat erythema, as both can be counted in minutes or hours, whereas the appearance of light erythema must be counted in days. While this reaction of skin redness from cold in each different application soon disappears, it seems as if a frequent repetition of this process—different to the effect of heat—causes a permanent reddening of the skin. As examples of this I may refer to the colour of coachmen's and seamen's faces during winter. But the same parts of the skin which are exposed to the cold are also exposed to the light, and therefore it is difficult to decide how much is due to the one factor and how much to the other.

We know that strong light without the conjoined influence of cold can produce a permanent redness (light erythema); but that also a frequent exposure to less powerful light, without inducing erythema, can produce, in addition to the pigmentation, a redness of the skin, as I have repeatedly had opportunity of observing at the sun-baths and electric (photo-chemical) baths, which we use in the Light Institute. Whether cold without help of light can cause a lasting, normal, skin redness is a point more difficult to determine.

As it might be considered a matter of indifference whether cold acts in the form of cold air or cold water, we may get some information on this point by observing the action of frequent cold baths, for instance, cold douches, or especially cold foot-baths (as these are of longer duration). Now it is well known that the skin does not acquire any lasting redness by the use of these baths, at any rate, not a colour comparable with that of the uncovered skin.

Information regarding the uncovered skin may be obtained by inquiring into the experience of the North Pole travellers, who are exposed to a severe cold and at the same time for several months in winter are obliged to live in the darkness of the polar night. It fortunately happens that there are observations, during polar voyages, of the colour of the skin after wintering in these latitudes.[3]

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[2] C. Lange, *Almind. patologisk anatomie*, 1896, p. 60.

[3] Several such reports are quoted at considerable length.

The report of the physician in charge of one of these expeditions is thus quoted by Kjellman :—"The climate of Spitzbergen during winter, which is by far less severe than that of the North American[4] archipelago, or that of Siberia, should nevertheless be considered less healthy in consequence of the long continuance of low temperature, the frequent snow-storms, the very abrupt changes of weather, and most of all the unbearable darkness. The influence of this was somewhat different in different individuals. In some it showed itself as drowsiness, in others as listlessness, others were strikingly irritable with a general severe depression of mind; some complained of sleeplessness during the nights and great tiredness in the day; and all without exception were in a more or less marked chloro-anæmic condition. When the sun returned, the prevailing face-colour was pale yellow-green as in plants nursed up in dark rooms, or with insufficient light. Another influence of the long arctic winter, which indirectly must be attributed to the darkness, but which more directly relates to the general anæmic condition, was a general dyspeptic condition, a kind of atony of the digestive organs, &c."

From this it appears that an altered colour of the skin is a constant result of wintering under the conditions named; and, according to the opinions cited, this is directly and without doubt attributable to the influence of the absence of light. These investigations certainly show that cold alone has no great influence in producing redness of the skin. But knowing as we do that people who are exposed to both cold and light acquire a very marked reddening of the skin, a reddening much more pronounced than in those who are exposed to heat, it seems reasonable to suppose *that cold assists in the production of the red colour in the skin.*

In conclusion, I give a short recapitulation of the points that have been established by these investigations :—

(1) I have confirmed the results of Wiedmark's researches on the action of light upon the skin, and further proved that the visible chemical rays also have the power to produce specific photo-chemical inflammation of the skin.

(2) I have shown that in the electric light the strongest bactericidal power resides in the ultra-violet rays, and as a practical conclusion, it follows that quartz lenses ought exclusively to be used in electric light concentrating apparatus; and this alteration (from glass lenses) has immensely advanced the treatment with concentrated light.

(3) I have pointed out that the dilatation of the cutaneous vessels produced by the chemical (ultra-violet) rays is of considerable duration, and it has even been possible to show this about half a year after the light's action.

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[4] F. R. Kjellman: *Livenska Expeditionen*, 1872-1873.

(4) Comparison of the different factors acting on the skin has shown that the normal reddish colour which the skin acquires, when uncovered, seems if not exclusively, certainly for the most part, to be produced by the chemical rays; its occurrence seems to be retarded by heat and promoted by cold.

Observations 3 and 4 indicate a great advance in the study of the physiological action of light upon the skin. Whereas formerly it was only a question of acute skin reddening, the pigmentation being considered the principal or sole chronic result of the effect of light, there is now the phenomenon of chronic skin redness also to be attributed to the influence of light.

The reason that this effect has been overlooked is no doubt this—that the pigmentation being the more conspicuous phenomenon has exclusively attracted attention, and also that this pigmentation has partly concealed the red colour of the skin. On the other hand, in cases where there has been little pigment, and therefore conspicuous skin redness, or where the pigment has disappeared and the skin redness has thus become more evident, the cause was generally attributed to factors other than the chemical rays of light.

We have, therefore, taken a step forward; but the step is not a complete one, as we do not thoroughly know the importance or exact signification of an abundant blood supply to the skin. We are entitled to presume that the skin is better nourished and more able to perform its functions; but what these functions are we do not fully know as yet. Only when we come to have a definite knowledge of these will the importance of the action of light upon the skin be clear, and we will then, without doubt, arrive at the conviction that we have in the chemical rays of light a resource—perhaps the most powerful known to us—whereby (in the form of light baths) we can enhance the functions of the skin.

At the Light Institute we have for some time past, but principally with other objects in view, tried the therapeutic use of such photo-chemical light baths (sun baths, electric-light baths). Our experience has, however, been very limited up to the present time, and we are not yet out of the experimental stage.

Is Ozone a Practical Disinfectant?—In a paper read a few months ago before the Royal Society, Dr. A. Ransome and Mr. A. G. Fullerton described certain experiments which they undertook in order to test the value of ozone as a disinfectant. They arrived at the conclusion that in the dry state ozone is incapable of exerting an injurious action on bacteria, and that any purifying action which ozone may have in the economy of nature is due to the direct chemical oxydation of putrescible organic matter. The experiments with milk, however, would appear to show that a bactericidal property may belong to ozone, provided the gas be passed through a fluid medium which contains the bacteria in suspension.

New Instruments, &c.

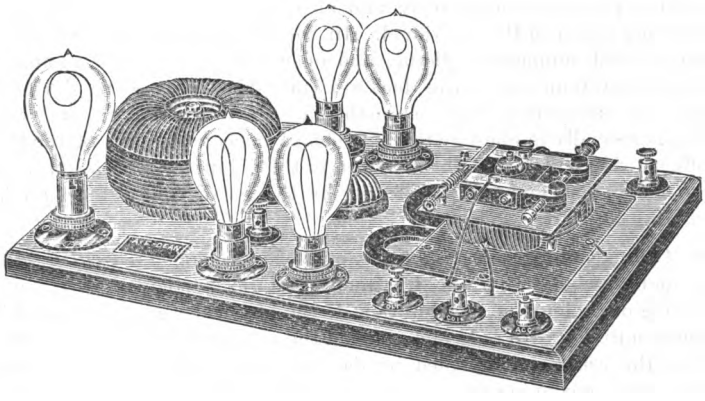
BATTEN'S RECTIFIER.

THIS apparatus, invented by Dr. Batten and Mr. Sutton, furnishes a much-needed device for obtaining direct currents to those having at disposal only alternating supply mains.

It claims that accumulators may be charged and coils worked direct from it. It also furnishes a current of therapeutic value.

Being vibratory in its only mechanical movement, no running up to speed is necessary; it starts automatically, responding instantly to the switch, working equally well on circuits of all frequencies.

Owing to transforming down to the voltage required, greater economy of electrical energy is obtained than is possible in charging accumulators on a direct current circuit through lamp resistance.



Consider the charging of a 10 volt accumulator:—On a 100 volt direct current circuit, taking 5 ampères at a voltage at the accumulator terminals of 15 volts, 75 watts of this energy would be utilised in charging the cell, the remaining 425 watts dissipated in heat.

With the Batten rectifier the voltage is transformed down to 15 volts, and, with the addition of 10 per cent. for transformation and other losses (a liberal allowance in this case), 82·5 watts would be the total rate of consumption of energy.

It will thus be seen that instead of dissipating $5\frac{1}{2}$ units in order to obtain one, only $\frac{1}{10}$ of a unit is needed beyond that necessary for the work to be done, which on comparison shows a ratio of 5 to 1 in the two cases, that is to say, it is five times cheaper to charge from the rectifier than from lamps in circuit.[1]

[1] The instrument is made by Mr. Dean, of 73, Hatton Garden.

Digest of Current American Literature.

HYDROTHERAPY.

At a meeting of the Philadelphia County Medical Society, Dr. Simon Baruch, of New York, read a paper upon *Lessons of a Decade in Hydrotherapy*. Dr. Baruch said that water was used for the purpose of conveying temperature and thus to produce temperature changes. The idea that cold water produces shock is erroneous. It is the contrary effect that takes place when judiciously used. In deciding upon the dosage three elements must be considered, duration, temperature and pressure. Experiments upon animals, when portions of the brain were exposed, have proved that the circulation is under the control of water. The desired effect of cold water is the enhancement of the resisting powers of the individual. In typhoid fever the peripheral resistance and the circulation in general is increased by the stimulation of the peripheral nerve filaments. The ice coil should never be applied to the abdomen. In chronic diseases, cold baths deepen inspiration and increase the heart's action, thus sending an increased amount of hæmoglobin and blood cells to the periphery of the body, and also to the lungs. This increases the oxygenating power of the individual. In the treatment of tuberculosis, hydrotherapy should supplement dieting and open-air life. Cold is a stimulant to the nervous system, and to this fact are traceable the good results of hydrotherapy in tuberculosis and neurasthenia. Hydrotherapy is of value in diabetes, especially in obese patients. The glycogenic function of the liver can be influenced but little, but the glycogen in the voluntary muscles plays a large part in the disease, and this is affected by the use of cold water.—*Phil. Med. Jour.*, May 18, 1901.

Dr. Collins summarises *Nine Cases of Lobar Pneumonia treated by the Ice Pack*, and concludes that the treatment had no particular effect in either shortening or prolonging the duration of the physical signs, these clearing up the fourteenth day. In only one case did the pack cause discomfort, and in no case was the crisis accompanied by dangerous collapse. The pack has been used to abort beginning cases, in cases with well-marked signs, and in cases showing resolution. Contemporary signs of bronchitis were not considered contra-indicatory. High temperature and not physical signs was the indication for application, and lowered temperature for removal. The white count invariably fell with the temperature but reached normal in no less than one week after the temperature was normal.—*Boston Med. and Surg. Jour.*, March 28, 1901.

Dr. Charles E. Woodruff recommends the *Treatment of Gonorrhœa with Frequent Irrigations of Hot Decinormal Salt Solution*. He employs a simple short glass tube and has seen no harm come from using as much as a quart of hot salt-solution every hour. He has found that if the discharge keeps up for more than ten days under this treatment, the irrigations are not properly done. In a study of ninety-eight cases, the average time of cure was twelve and a-half days. The actual duration of symptoms was less than this, as each case remained in the hospital two or more days after the symptoms disappeared. In 5 per cent. all symptoms disappeared in two days. Woodruff gives each patient an astringent injection to use for two or three weeks after leaving the hospital.—*New York Med. Rec.*, March 16, 1901.

ELECTRICITY.

Dr. Arthur B. Duel, in an article upon *The Value of Electrolytic Dilatation of the Eustachian Tubes in Chronic Tubal Catarrh and Chronic Catarrhal Otitis Media*, presents the following conclusions: It is our duty wherever there is a stenosis of the Eustachian tube to remove the obstruction as rapidly as possible. In every instance where the obstruction is due to an organised exudate the best method for its removal is electrolysis, for the following reasons: (*a*) it is more rapid. In several instances one application of the electrolytic bougie has been sufficient to cause the re-absorption of the deposit, and in the majority of cases only a few applications have been necessary to secure a patent tube. (*b*) It is more efficient. There is less danger of trauma. (*c*) The results are more permanent. The removal of obstructions in the Eustachian tube is only a large factor in, and not the whole treatment of, chronic tubal catarrh and chronic catarrhal otitis media. The prognosis in any case depends largely upon the amount of injury to tympanic structure. Finally, the author emphasises the points, that, (1) all narrow tubes should be restored to their normal calibre; and (2) when the narrowing is due to an organised inflammatory exudate, the best means of accomplishing this is by the characteristic action of the negative pole in such products.—*Am. Jour. of the Med. Sc.*, April, 1900.

Dr. W. W. Johnston, of Washington, reports a case of *Aneurism of the Ascending Aorta, treated by Gelatine and Electrolysis*, with the result of coagulating most of the blood. The question of electrolysis for aneurism had been discussed for some time and was finally employed by Dr. Finney, of John Hopkins Hospital. Three unsuccessful attempts were made to reach fluid blood with a canular needle, four inches long, passed directly into the tumour. The fourth insertion, at a point near the shoulder, was successful. Ten feet of silver wire was passed through the tube of the needle. A current of 10 milliampères from a dry cell battery was turned on and continued for one hour. A few weeks after this operation the patient suffered from an attack of intermittent fever. The patient died suddenly from a sudden hæmorrhage of a pint or more from the point of successful puncture. On autopsy it was found that there were evidences of recent coagulation about the silver wire; and that death resulted from the blood current making channels between the clot and the sac, and finally forcing an exit through the puncture.—*American Medicine*, May 11, 1901.

EXERCISE.

Dr. J. M. Taylor has studied the effects of systematic exercises and massage in various cases of paralysis agitans. He embodies his observations in a paper upon *The Amelioration of Paralysis Agitans and other Forms of Tremor by Systematic Exercise*, in which he reports a case. Taylor believes that the points to be observed in this form of treatment are the re-establishment of the largest degree of elasticity in the tissues which have suffered contractures. This should be obtained by passive extensions and flexions, followed by active movements. As far as possible the normal attitude and carriage should be restored.—*Jour. of Nerv. and Mental Dis.*, March, 1901.

FOOD AND DRINK.

Dr. Reid, discussing the question, *When should patients be advised to eat and drink everything?* says that a large proportion of chronic ailments are due directly or indirectly to wrong eating and drinking. The normal food

requirements are about $\frac{1}{5}$ part each of proteids and fats, and $\frac{3}{5}$ carbohydrates. In the average *table d'hôte* dinners, as well as breakfast and luncheon, the albuminoids are rarely brought as low as $\frac{1}{5}$, and the carbohydrates come at the end of the meal when there is too much HCl to permit further salivary digestion, and in hyperchloridies often enough to impair the action of the pancreatic juice.

The sharp condiments used over-stimulate the glands, causing premature exhaustion, and the alcohol, even when taken moderately, retards digestion and impairs the motor function of the stomach. Under the guidance of our ignorant French cooks, says the author, it is not safe to advise even the well to "eat everything," and still less others.—*Jour. Am. Med. Asso.*, April 27, 1901.

Dr. A. C. Baides cites the *Value of Rectal Feeding in Throat Diseases.* He reports three cases when it was used to advantage, one of diphtheria, one of tuberculosis, and one of hay-fever and asthma. He sums up the advantages of rectal feeding as follows: The throat being at rest, is not irritated, struggling in children is obviated, the progress of the disease is shortened, there is no danger of food entering the larynx, the physician is able to give such food and stimulation as he wishes to give, and the food is not bolted as it is when swallowing is painful.—*N.Y. Med. Jour.*, April 6, 1901.

SOIL.

Dr. Arthur Newsholme, in a paper on *The Influence of Soil on the Prevalence of Pulmonary Phthisis*, has made an exhaustive study of statistics of death-rates in various parts of the world. A comparative study of the death-rate before and after proper sewerage facilities were introduced suggests that much of the benefit ascribed to the drying of the soil has really been due to other factors of improvement. Buchanan's results showed that mortality from phthisis was less in higher altitudes, even when permeability is the same at the two levels. As dry soils are usually higher than the wet, altitude may be as important a factor as dryness of site of house. Dr. Newsholme concludes that personal infection is the main cause of the spread of phthisis, and that this occurs chiefly where people are most closely agglomerated and live an indoor life. He adds that deficient nutrition is an important favoring cause of phthisis, and that wetness of soil operates in a minor degree by favouring catarrhal conditions of the respiratory mucous membrane.—*The Practitioner*, February, 1901.

CLIMATE.

Dr. Robert Bell writes of his experience in search of a *Cure for Asthma in the Far South-West; with Observation of the Comparative Value of Different Sections in Respiratory Diseases.* He believes that a high altitude, dry atmosphere and abundant sunshine are best to relieve asthma. Colorado fulfils these conditions, Southern California cannot be recommended, as the climate is not dry, owing to the fogs. Arizona stands first as a climate for all respiratory diseases, nasal and post-nasal catarrh are prevalent and aggravated in Colorado and Southern California. For tubercular patients, Dr. Bell considers Colorado favourable, except for its dust and high winds. Southern California is not condemned, but other places are better. Patients should be sent West in the first stage of their disease; those in the second stage rarely recover. For nervous patients, or those liable to hæmorrhage, select a moderate altitude. He advises every patient to remain in the favourable climate for many months after the cough has ceased.—*Boston Med. and Surg. Jour.*, April 25, 1901.

THE AKOUPHONE OR MICRO-TELEPHONE FOR THE DEAF.

Among the interesting exhibits at the Conversazione of the American Institute of Electrical Engineers, Columbia University, April 12, 1901, was the akouphone or micro-telephone for the deaf, by Mr. M. R. Hutchinson. It is a form of telephone consisting of a combined receiver and transmitter to which current is supplied by a small storage battery concealed on the person. The sounds received are intensified by the transmitter, and the vibrations are conducted to the ear through tubing. They are not only greatly intensified but their quality is preserved as well.

A class of eight of the deafest boys from the New York Institute for the Deaf and Dumb were present for the purpose of demonstrating the apparatus in operation. A boy who was born deaf, dumb and blind, heard distinctly, but only met with partial success in attempting to speak the "hello" with which he was greeted. When a phonograph was attached to the receiver and band music played, he spelled the word music with his fingers to his preceptor. Another boy acquired a vocabulary of thirteen words after five hours of instruction.

AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

The next (eleventh) Annual Meeting of this Association will be held in Buffalo, N.Y., on Tuesday, Wednesday and Thursday, September 24, 25, and 26, 1901.

1900—1901.

OFFICERS.

Dr. Ernest Wende, President, 471, Delaware Avenue, Buffalo, N.Y.
Dr. Frederic H. Morse, 1st Vice-Pres., Melrose, Mass.
Dr. D. R. Brower, 2nd Vice-Pres., Chicago, Ill.
Dr. George E. Bill, Secretary, 255, North Street, Harrisburg, Pa.
Dr. R. J. Nunn, Treasurer, 119½, York Street, Savannah, Ga.

EXECUTIVE COUNCIL.

Dr. Robert Newman (1 year), 148, West 73rd Street, New York City.
Dr. G. Betton Massey (1 year), 1831, Chestnut Street, Philadelphia, Pa.
Dr. Charles R. Dickson (2 years), 296, Sherbourne Street, Toronto, Can.
Dr. Frederic Schavoir (2 years), 8, Atlantic Street, Stamford, Conn.
Dr. F. B. Bishop (3 years), Washington, D.C.
Dr. W. H. White (3 years), Boston, Mass.

COMMITTEES APPOINTED BY THE PRESIDENT FOR THE ENSUING YEAR, 1900-1901.

On Induction Coils and Alternators.

Dr. Margaret A. Cleaves, Chairman, 79, Madison Avenue, New York City.
Mr. A. E. Kennally, F.R.A.S., 1105-06, Betz Building, Philadelphia.
Mr. Burton Kinraide, E.E., 38, Park Avenue, Jamaica Plain, Boston.

On Electrodes.

Dr. Charles R. Dickson, Chairman, 296, Sherbourne Street, Toronto, Can.
Dr. W. H. White, 220, Marlboro Street, Boston, Mass.
Mr. R. G. Brown, E.E., 158, Montague Street, Brooklyn, N.Y.

On Meters.

Dr. Emil Heuel, Chairman, 352, Willis Avenue, New York City.
Mr. Charles T. Scott, M.A.I., E.E., Pittsburg, Pa.
Mr. William J. Jenks, E.E., 120, Broadway, New York City.

On Static Machine and Condensers.

Dr. William J. Morton, Chairman, 17, East 28th Street, New York City.
Dr. Frederick Schavoir, 8, Atlantic Street, Stamford, Conn.
Dr. G. Benton Massey, 1686, Walnut Street, Philadelphia, Pa.

On Electric Light Apparatus for Diagnosis and Therapy and the Roentgen X-Rays.

Dr. C. O. Files, Chairman, Portland, Ore.
Dr. W. Scheppegrell, A.M., 3723, Prytania Street, New Orleans, La.
Dr. Frederick H. Morse, Melrose, Mass.

On Cataphoresis.

Mr. John J. Carty, E.E., Chairman, 18, Cortland Street, New York City.
Dr. Francis B. Bishop, 1913, I Street, N.W., Washington, D.C.
Dr. D. R. Brower, Chicago, Ill.

On Constant Current Generators and Controllers.

Dr. William J. Herdman, Chairman, 48, E. Huron St., Ann Arbor, Mich.
Dr. Robert Newman, 148, West 73rd Street, New York City.
Mr. R. G. Brown, E..E, 158, Montague Street, Brooklyn, N.Y.

On Arrangements.

Dr. Henry R. Hopkins, Chairman, 433, Franklin Street, Buffalo, N.Y.
Dr. W. W. Potter, 284, Franklin Street, Buffalo, N.Y.
Dr. W. D. Greene, 385, Jersey Street, Buffalo, N.Y.
Mr. Newcomb Carlton, E.E., 109, White Building, Buffalo, N.Y.
Mr. Augustus Schneider, 574, West Avenue, Buffalo, N.Y.
Dr. A. W. Bayliss, 592, Spring Street, Buffalo, N.Y.
Dr. Edward Clark, 2268, Main Street, Buffalo, N.Y.
Dr. Willis G. Gregory, 530, Main Street, Buffalo, N.Y.
Dr. Franklin C. Gram, 460, Glenwood Avenue, Buffalo, N.Y.
Dr. Julius Ullman, 400, Franklin Street, Buffalo, N.Y.

Ordinary Fellows.

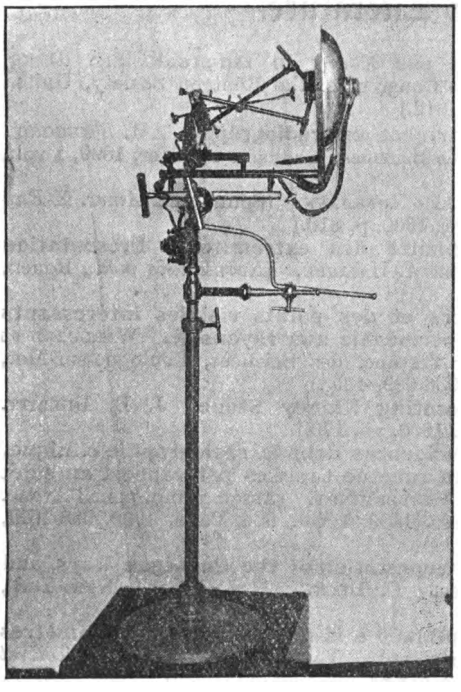
Dr. W. S. Whitwell, 30, West 11th Street, New York City.
Dr. Wm. Miller, Riverside, Cali.
Dr. Daniel T. Millspaugh, Patterson, N.J.
Dr. Franz Koempel, 133, East 57th Street, New York City.
Dr. F. F. Repetti, Washington, D.C.
Dr. James F. Huntley, 10, Broad Street, Oneida, N.Y.
Dr. S. Fairweather Wilson, 947, Dorchester Street, Montreal, Can.
Dr. A. W. Bayliss, 592, Spring Street, Buffalo, N.Y.
Dr. Eden V. Delphey, 400, West 57th Street, New York City.

Resignations.

Dr. Frederick Peterson, New York City.
Dr. Lucien Howe, Buffalo, N.Y.
Dr. R. L. Watkins, New York City.
Dr. J. F. Chauveau, Jun., New York City.
Dr. Caroline A. Cabot, New York City.

Necrology.

Dr. G. Apostoli.
Dr. E. A. Perkins.



BEARING on Dr. Cleaves' article with reference to the therapeutic uses of the electric arc, the Editor thinks it may be of interest to publish the accompanying photograph of the 12-ampère Lupus-lamp which he, himself, has in use, and which with slight modifications is the apparatus to which Dr. Cleaves refers.

Technique.

TREATMENT OF INFANTILE PARALYSIS.—Dr. Larat[1] calls attention to two practical points in the treatment of this disease. First, the evident superiority of the continuous current. Secondly, the best method of applying this current.

He points out that the affected muscles always show reaction of degeneration. In other words, contractility to faradism is lost. He asks, therefore, what useful purpose can be served by the use of a current to which, however strong, the muscles do not respond. It is therefore clear that the continuous current, which has the power of throwing these muscles into action, must be the more efficacious. He points out further that the pain produced by faradisation is a daily terror to the child. Static electricity seems equally ineffective.

On the other hand, electrisation with continuous currents, carried out daily, always brings about more or less improvement in the course of some weeks. His method is as follows: a very large electrode is placed over the cord at the level of the lesion, the affected limbs are immersed in a basin of water so arranged that the density of the current is very slight. By this arrangement it is easy to pass the 8 or 12 necessary milliampères without the child displaying any intolerance. The current is descending, the duration of the treatment 6 to 8 minutes and finishes with about 100 reversals of the current. He adds that he has never observed, if these conditions are carried out, the least ill effect on the general health of the child.

[1] *Annales d'Electrobiologie*, n. 5, 1900.

Recent Literature.

The Electro-chemic Action of the X-ray in Tuberculosis. Rudis-Jicinsky. (Communic. to 1st Congress of the Röntgen Society, United States, vol. vii, No. 6, 1900, p. 812.)

De l'utilité des mesures électriques en radiographie. J. Bergonié. (Assoc. franç. pour l'Avanc. des Sciences, Boulogne-sur-Mer, 1899, 1 vol., 8vo, Paris, 1900, 1036-1044.)

X-Ray in Lupus Vulgaris. Joseph Hoffmann. (Communic. *Amer. X-Ray Journ.*, vol. 7, No. 6, December, 1900, p. 810.)

Ostéo-arthropathie hypertrophiante des extrémités. Présentation des radiographies. Salles et A. Halipré. (*Normandie méd.*, Rouen, 1900, xvi, 349-350.)

Recherches des Corps étrangers et des points visibles intéressants dans l'intérieur des corps perméable aux rayons X. Warluzel et Jolant. (Assoc. franç. pour l'Avanc. des Sciences, Boulogne-sur-Mer, 1899, 1 vol., 8vo, Paris, 1900, 986-989, 4 fig.)

The Use of the X-rays in locating Kidney Stone. J. B. Bullitt. (Louisville Month. J. M. a. S., 1900, vii, 170.)

Rapport sur la définition des incidences dans la radiographie clinique. Définition de la situation du tube de Crookes par rapport au sujet et à la plaque sensible. H. Guilleminot. (Assoc. franç. pour l'Avanc. des Sciences, Boulogne-sur-Mer, 1899, 1 vol., 8vo, Paris, 1900, 998-1017, 6 fig.)

Errors Caused by the False Interpretation of the Roentgen Rays, and their Medico-Legal Aspects. C. Beck. (*Med. Record*, New York, 1900, lviii, 281-285, 3 fig.)

De la radiographie métrique appliquée à la mensuration des diamètres du détroit supérieur (Discussion). Varnier. (*Ann. de gynécol. et d'obst.*, Paris, 1900, lix, 135-142, 5 fig.)

Zur zweckmassigen Untersuchung der Brust mittels Roentgenstrahlen und einige Ergebnisse. Lévy-Dorn. (*Deuts. med. Wochens.*, Leipzig und Berlin, 1900, xxvi, 565-566, 4 fig.)

De la radiographie métrique appliquée à la mensuration des diamètres du détroit supérieur. Fabre. (*Ann. de gynécol. et d'obst.*, Paris, 1900, liv., 131-135.)

Owing to want of space the remainder of this list must be left over until next number.

Notes.

Lupus Treated by Hot Air.—Four cases of lupus are reported by Werther (*Münch. Med. Woch.*) to have been treated by Hollander's hot air method which consists in the application of hot air up to a temperature of 300°. The action of hot air can be better concentrated on the affected part than steam. Of the four cases so treated, three healed with good scars, and one relapsed. The treatment takes three or four weeks and is especially recommended in lupus of the eyelids. A general anæsthetic is necessary.

Lupus Treated with Ethyl Chloride.—A case is reported by Dethlefoen (*Hospitalstidende*, January 16, 1901), in which the treatment consisted of freezing the affected parts without previous scraping. It was done every day during the first week, afterwards every second or third day. Always after the freezing there was serous effusion, afterwards drying into a scab, the latter being removed before the next freezing. At the end of ten weeks ulceration was healed, the lupus nodules had disappeared and the whole was covered with almost normal skin. The ulceration had extensively affected both the nose and cheek. The photographs show remarkably good results.

"Cocaine Sniffing."—"Cocaine sniffing" is on the increase in the Southern States of America. The negroes sniff the drug, which produces an effect on them like that from smoking opium.—*Globe.*

THE

Journal of Physical Therapeutics

No. 4. OCTOBER 15, 1901. Vol. II.

Editorial.

(Standing Announcement.)

It is the aim of this Journal to furnish not only a record of current progress and contemporary work in the field of Physical Therapeutics, but also a detailed and critical account of what has already been accomplished.

Owing to recent progress in physical and biological science, the *modus operandi* of such methods is now, in some measure, beginning to be understood; but there is pressing need for further work in this direction. Moreover, the successful employment of these agents usually requires a carefully executed technique, and such information as is available on these points is not always easily accessible. It is therefore considered that such a journal as this need offer no apology for its existence; it is hoped that it will fill a gap—that it will supply a want.

A knowledge of the effects and mode of action of the remedial measures at our disposal, says Dr. Carter,[1] "amounts to something more than mere pharmacology. It includes also a knowledge of the physiological action of those powerful agents which for the sake of convenience we may call natural remedies, diet, heat, cold, rest, exercise, massage, baths, electricity, climate." After expressing the opinion that these deserve "a place in the front rank of therapeutic agents," Dr. Carter continues: "In a general sense the importance of such remedial agents is widely recognised, and in a general way every practitioner nowadays makes use of them; but the great advances which have taken place in our knowledge of their modes of action, the improvements that have been made in the method of their employment, and the extraordinary potency of their influence upon the nutritive processes of the body, are still, in my opinion, far from being adequately realised."

It cannot be necessary to remind the reader that to devote the pages of a journal exclusively to the consideration of the agencies in question is by no means to deal with them as something apart from general medical practice, still less to assign to

[1] *British Medical Journal*, November 3, 1900.

them any predominant *rôle* in the treatment of disease. They represent only one class of weapon in the varied armoury of medicine. Medical men are appealed to to rescue such weapons from the incompetent and unworthy hands into which they sometimes fall.

The almost simultaneous appearance of three important works on Physical Therapeutics is a very significant fact. Two of these, viz., *Handbuch der Physikalischen Therapie*, and *Physiological Therapeutics*, are further noticed on another page; the third, *Traité complet de Thérapeutique par les Agents Physiques*, by Dr. H. Colombo, is on the point of publication. That three such treatises should appear, and appear almost together, can only mean that professional interest has been thoroughly and suddenly aroused, and that the subjects in question are now beginning to receive a due though tardy scientific recognition. It is no longer only to a small band of exclusive specialists that such volumes appeal, they address themselves to a wide and fast widening circle of medical practitioners anxious for information about a class of remedies which they now begin to recognise as indispensable additions to their ordinary therapeutic resources. Such books certainly mark an epoch. They do for the whole subject of Physical Therapeutics what Erb's work in the eighties of last century did for Therapeutic Electricity; like it, these treatises will compel the attention of medical men in England, and wake them up to take their part in a productive field of work in which hitherto they have been strangely behindhand.

Although its limits are not ill-defined, Physical Therapeutics is a widely comprehensive term—embracing, as it does, electro-therapeutics, hydro-therapeutics, vibro-therapeutics, or treatment by vibration, photo-therapeutics, or treatment by light, radio-therapeutics, or treatment by the radiations of an X-ray tube, balneo-therapeutics, or treatment by baths, aëro-therapeutics, or treatment by compressed or rarefied air. Therapeutic and hygienic exercises, massage and manipulations, dietetics, climatology, and last, but not least, the valuable agencies of heat and cold, all come within the scope of Physical Therapeutics.

THE Eleventh Annual Meeting of the American Electro-Therapeutic Association was held at Buffalo, New York, September 24, 25 and 26. President, Dr. Ernest Wende, Buffalo; Secretary, Dr. Geo. E. Bell, Harrisburg, Pa. After the reports of standing committees the following are amongst the communications mentioned in the programme:—

"Ozone in Tuberculosis," by J. D. Gibson, M.D.; "Rectal Stricture treated by Electrolysis," by W. H. White, M.D.; "The Value of Alternating Currents in Diseases of the Rectum," by Margaret A. Cleaves, M.D.; Lecture, "Why I use Electricity in General Practice, with Stereopticon Views," by S. W. Bayliss, M.D.; "The *Modus Operandi* of Interpolar Currents," by S. F. Wilson, M.D.; "Effects of Electro-Static Modalities upon Hyperæmia and

Pain," by Wm. B. Snow, M.D.; "Morton's Wave Currents and Werber's Insulator," by Robt. Newman, M.D.; "The Therapeutics of the Chemical Rays of Light with Presentation of Apparatus," by Margaret A. Cleaves, M.D.; "Methods in Radiography," by Wm. Snow, M.D.; "The Cause and Prevention of Common Errors in Radiography," by L. A. Weigel, M.D.; "Essay on Electricity in Gynæcology," by G. B. Massey; "Problems in Electrotherapeutic Practice," introduced by Chas. R. Dickson, M.D., Toronto, Canada, followed by a general discussion; "On the Use of Electricity in Renal Diseases," by A. D. Rockwell, M.D.; "Easy Method of Testing the Strength of the Galvanic Current," by Robert Reyburn, M.D.; "On the Organisation of the Second International Congress of Electro-Therapeutics, to be held at Berne, Switzerland, next year," by a member of the Committee, Mr. R. G. Brown, E. E., New York. Other papers, some of them by European authors.

A TIMELY announcement reaches us to the effect that the first Egyptian Congress of Medicine, under the patronage of His Highness the Khedive, will be held at Cairo from December 10 to 14, 1902. The President is Dr. Ibrahim Pacha Hassan; the General Secretary, Dr. Voronoff. The Congress will concern itself chiefly with diseases and sanitary questions more or less special to Egypt, such as bilharzia, ankylostomiasis, "bilious fever," abscess of the liver, Egyptian ophthalmia, &c.

IN the current number of *Harper's Magazine*, Professor J. J. Thomson, F.R.S., of Cambridge, gives an acccount of the remarkable discoveries made with the cathode rays. When electricty is sent through the rarefied gases of a Crookes tube the current is said to enter by the anode and leave by the cathode, each of these being the terminal of a wire. A few years ago a peculiar radiation was found to proceed from the cathode. English physicists were of opinion that particles of gas left in the tube carried the electricity, and produced those striking effects shown by Sir William Crookes. In Germany the phenomena were ascribed to electric waves. Further experience has shown that the English view was correct. Professor Thomson has weighed the little corpuscles and measured their velocities, and has come to the conclusion that here we have particles hundreds and even thousands of times smaller than molecules of ordinary matter, and that they travel under the influence of electricity with one-third the speed of light. His conclusions have been confirmed by Wiechert, Kaufmann, and Lenard, distinguished Continental physicists. Moreover, it is found that the cathode emissions carry negative electricity, while positive electricity is conveyed by ordinary gaseous matter. It is these cathode discharges that generate the famous Röntgen rays, and, like them, they can penetrate solids to a certain extent. Whenever cathode rays strike against a solid obstacle X-rays result. These discoveries open up new vistas of research, and Professor Thomson shows that his infinitely little corpuscles would have just suited Newton's theory of light and Franklin's one-fluid theory of electricity. But matter a thousand times less than hydrogen is hardly thinkable !—*Daily Telegraph.*

THE RATIONAL TREATMENT OF LATERAL CURVATURE OF THE SPINE.

By Louis A. Weigel, M.D., Rochester, N.Y.

The successful treatment of lateral curvature of the spine is still an unsolved problem. By successful treatment I mean a perfect restoration to the normal form, even after marked changes in the structures involved have occurred. No plan of treatment yet devised has succeeded in reproducing results that compare favourably with the correction of distortions in other parts of the body. This is, of course, largely due to the complex arrangement of the structures involved and the difficulty of applying mechanical and other methods in the most effective way.

In spite of the vast amount of experimental research, the true etiology of scoliosis is not definitely determined, and hence an ideal treatment is still an unknown quantity. This, however, should not deter us from seeking to obtain the best result by methods of treatment that have at least the merit of being rational.

At the present time various plans of treatment are advocated, such as developmental gymnastics, corrective exercises, forcible correction, mechanical support, &c. All of these methods possess certain advantages and have their place; but since lateral curvature manifests itself in varying degrees and extent, and is so largely influenced by age, habits, surroundings, general conditions, &c., it is apparent that no exclusive plan of treatment is applicable to all cases. Each case is a law unto itself and demands treatment based upon the condition present. It is just as irrational to treat all cases by gymnastics alone as it is to rely exclusively upon mechanical support. The treatment by gymnastics alone is based upon the muscular theory of causation. According to the exponents of this theory the distortion is brought on by unequal muscular action on the two sides of the body. When *all* of the physical conditions that contribute to the upright posture are considered, however, it is apparent that no deviation from the normal can take place without exerting an adverse influence on each and every one of the constituent structures, as no integral part of the trunk has an absolutely independent action. The vertebræ, as the links in the jointed column, are firmly bound together by strong ligaments; the muscles act upon this column either to institute or to inhibit certain movements and positions. Admitting for the moment that loss of muscular balance may be a prime factor in developing a curvature, it is unreasonable to assume that a restoration of normal muscular action is sufficient to overcome the actual structural changes that have taken place, even in the milder forms of curvature. As Adams well says, "If in any case of

lateral curvature all the muscles of the spine could be at once raised to their maximum power, the effect would only be to arrest the curvature at that point,—but in such cases no advance is made towards straightening the crooked spine, which must be considered the main object of treatment."

The gymnastic method has definite limitations and is of positive value only as an exclusive method in a small proportion of selected cases of the milder type, and particularly when noticeable bony changes have not yet occurred.

In the more advanced cases all structures involved have undergone a marked change; bones have become distorted; ligaments and muscles are contracted and shortened to such an extent that an attempt on the part of the patient to assume a normal attitude by voluntary effort is a physical impossibility. So long as the spine is firmly fixed in its distorted position, restoration of form is out of the question. Our first efforts, therefore, must be directed towards increasing the flexibility of the spine in every possible way, and the means to bring this about must be adequate. Manual correction, as ordinarily practised, is decidedly inefficient and of little practical value, except, possibly, in very young subjects or in those whose tissues are excessively pliable. Vastly better results are obtained by the use of properly constructed apparatus and an intelligent application of the corrective force. Ligamentous and muscular shortening yield readily to mechanical force, even in advanced cases, and the first efforts in an attempted correction of the bony distortion should always be directed towards these structures. The special form of apparatus for this purpose may be largely a matter of individual choice. In my own practice I prefer oblique or lateral suspension by the hands on the apparatus devised many years ago by Dr. C. Fayette Taylor, of New York (fig. 1). It consists of a vertical adjustable upright, hinged at its centre; at the lower end of the upper section a padded block is attached. This block makes direct pressure on the convex side, and as the patient is lifted off his feet the concave side is thoroughly stretched because that side of the trunk is compelled to make a wider excursion than the other. The weight of the patient resting against the block may also be utilised to attack the curve of rotation. This apparatus is used daily for at least four weeks. To increase the flexibility of the spine in all directions still more, the patient is put through a series of rotary, side-bending, and other exercises. For this purpose I have devised a frame, which is simple in construction and occupies but little space (fig. 2). It is a combination of peg-ladder, swinging trapeze, head suspension, trapeze bar, &c. The frame is rectangular, about 5 feet wide and 8 feet high. The uprights are 4 inches square and bolted to a cross-piece of the same size. The uprights are slotted throughout nearly their whole length and provided with holes one inch in diameter for receiving the pegs, which are simply inserted into the holes, and

maintain their proper position by a shoulder turned on them. The pegs are removable so that the distance between them may be altered, and also serve for securing any cross-bars in the frame at any height. The cross-piece is provided with a hook for the

FIG. 1.

ordinary head suspension arrangement. On the face of the cross-piece four pullies carry the ropes of the swinging trapeze to the fasteners. The trapeze bar may thus be secured at any height or angle to increase the corrective effect on the side requiring it.

The base of the frame has an arrangement for holding the feet securely during some of the rotary exercises.

As the respiratory capacity is usually below the normal, special attention is given to this feature early in the treatment.

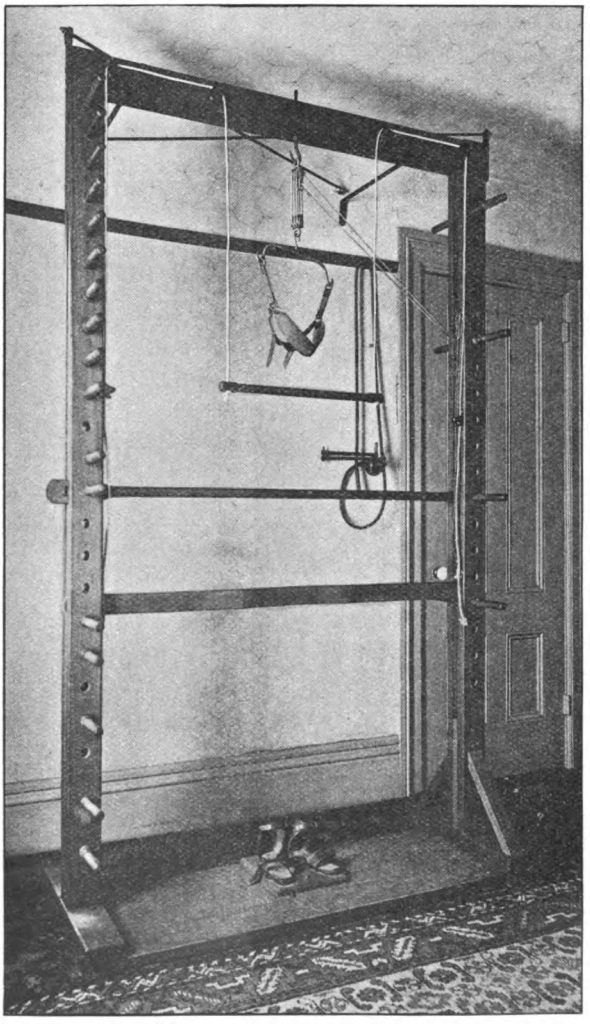


FIG. 2.

Various forms of exercise for developing the respiratory organs are given, and as a rule it is possible to double the chest capacity within a few weeks. The selection of exercise depends on the age, general condition and working capacity of the individual, and can hardly be described in detail.

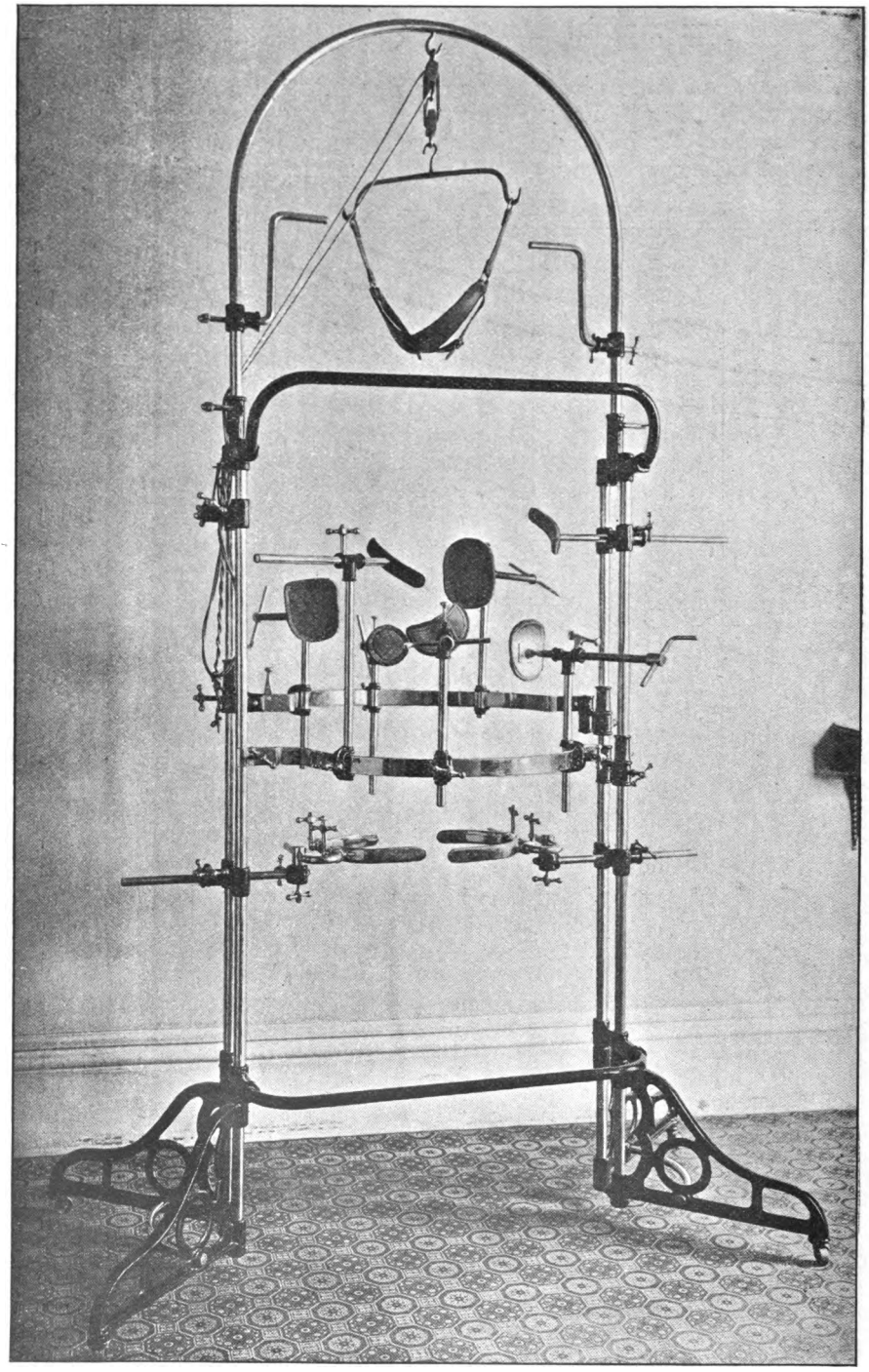


FIG. 3.

In the more advanced or rigid cases a still more powerful method of correction is necessary, particularly to overcome rotation. Screw pressure is best adapted, as the amount of force applied may be nicely regulated and gradually increased up to the point of endurance. The machine illustrated in fig. 3 is my perfected pressure apparatus and is a decided modification of those devised by Schede, of Hamburg, and Bradford and Brackett, of Boston. In its present form it is adapted to patients of all sizes and ages (fig. 3). In its construction special attention has been given to mechanism that permits of rapid adjustment of all parts. It requires but two or three minutes to place a patient in the machine under pressure, and but an instant to release him. It consists of a steel frame 8 feet high and 30 inches wide, made of rods $\frac{3}{4}$ of an inch in diameter placed 3 inches apart and connected above and below by tie-pieces. The upper curved segment telescopes into metal sleeves and may be fixed at any point. Upon the vertical parallel rods there are sliding metal blocks, adjustable to any height. The lower blocks carry a mechanism adjustable laterally and antero-posteriorly, for fixing the pelvis. The pelvic pieces also swing on a vertical pivot in case it is desired to twist the pelvis. The counter-pressure bar to be placed in the axilla on the concave side is held in position in one of the upper blocks and may be transferred to either side. Between these blocks there are two semicircular steel bands that carry the pressure screws, &c. The anterior band is pivoted so that it may be swung open to admit the patient. On the steel bands, sliding clips are placed for holding the vertical rods and supporting the pressure screws. The padded pressure-plates of various sizes and shapes are attached to the distal ends of the screws by a modified ball-and-socket joint to facilitate close adaptation to the selected point of pressure. Special attention is called to the mechanism for adjusting and releasing the screws. The nut through which they travel is split, and the upper half pivoted to a lever. This mechanism permits the screws to be pushed directly against the patient, where a few turns only are required to adjust the pressure. By raising the lever the screws are released and may be drawn back to their full length in an instant. The upper part of the apparatus has adjustable hand-pieces and a head-sling.

The manner of placing a patient in the machine will readily be understood by reference to fig. 4. A comparison of figs. 4 and 5 will give some idea of the amount of correction possible. Suspension by the head is used in connection with the apparatus principally to overcome the mechanical disadvantage of superincumbent weight, but may be dispensed with in some cases. The apparatus is used daily, the patient being subjected to pressure for from twenty minutes to half an hour. In the beginning it is usually advisable to make lighter pressure for a shorter time until the patient becomes somewhat accustomed

to it. It is quite remarkable to note the great degree of pressure that may be applied with comparatively little discomfort to the patient after a few weeks' use.

It is a matter of considerable importance to apply the pressure

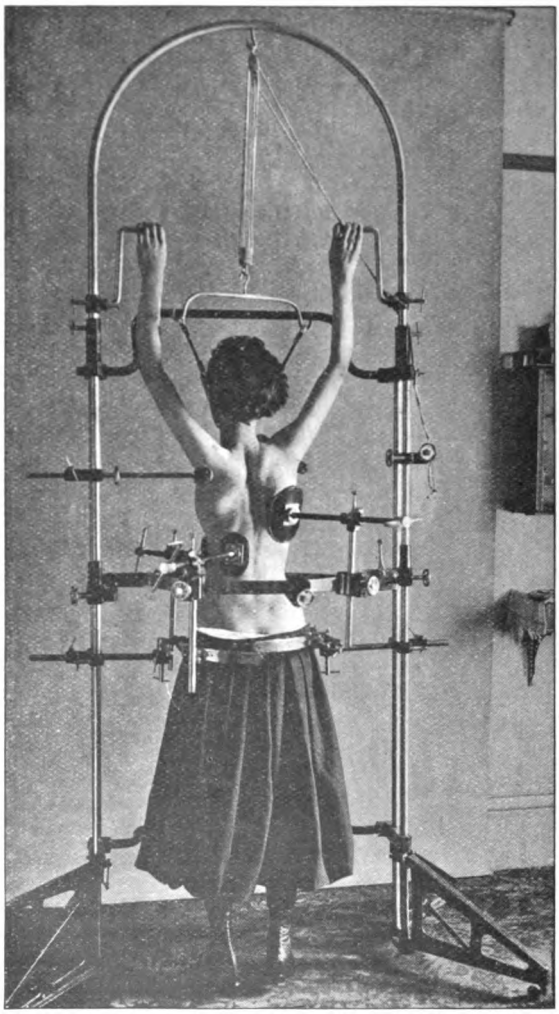


FIG. 4.

in the proper direction, for the degree of correction or over-correction is largely influenced by the angle of pressure. Thus, if the plates are applied so as to make pressure from behind forwards, the side of the trunk is simply pushed out in front and

no corrective effect obtained at all; whereas, when pressure is made in the proper direction a distinct rotary effect is obtained. It is usually advisable to place the posterior pressure-screw directly over the apex of convexity, in a direction corresponding

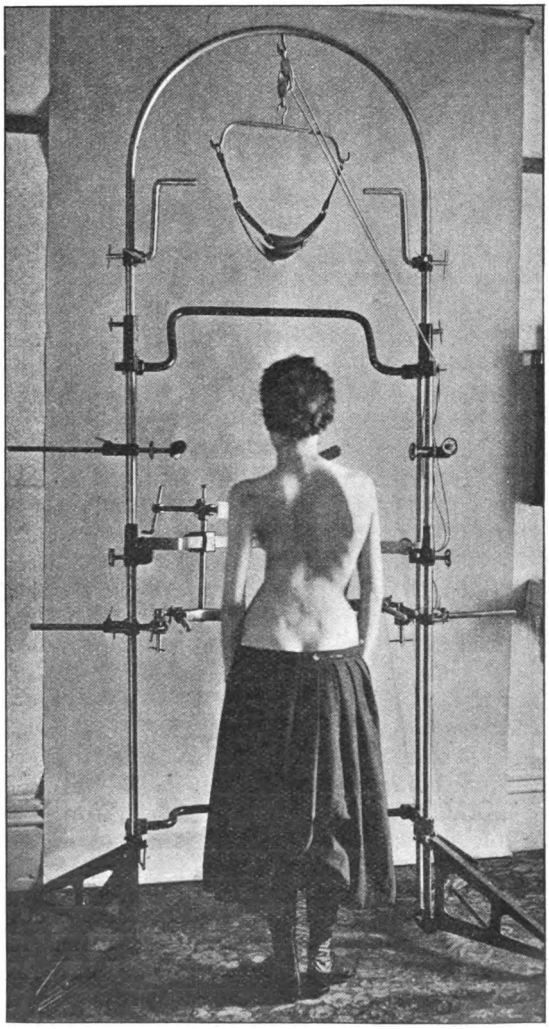


FIG. 5.

to the oblique diameter of the chest, the anterior one being placed at a corresponding opposite point in front. It must be remembered that our aim is not to compress the chest walls simply, but to exert force in such a manner as to antagonise

the primary direction of the distortion. That this may be done with the machine is susceptible of demonstration. When pressure is properly applied the spinous processes will be found to approach their natural position in the median plane of the body (except in old resistant cases), while the lengthened oblique diameter of the thorax is shortened, as shown by measurements with a pair of calipers.

Special rules for the use of the machine cannot well be formulated, as every case demands individual study. Sometimes it is necessary to apply two or more screws behind, especially when there is marked double curve. Some patients feel more comfortable by placing an extra plate against the sternum, after the full amount of pressure has been applied. The pressure is continued according to the patient's endurance. Frequently it may be kept up for a full hour without discomfort. One patient volunteered the information that she was more comfortable while in the machine than at any other time of the day. Her distortion was of very high degree.

After the flexibility of the spine has been restored by the means above described, properly selected exercises are useful in bringing about and maintaining normal static conditions. The patient must be taught to correct his vicious attitudes by his own efforts, and this requires not only special care on the part, of the physician, but also the hearty co-operation of the "subject." It is a matter of daily observation that patients with distorted spines do not appreciate their unnatural positions, because they have become habituated to them, and it is only after long-continued and faithful drill that they succeed in learning how to hold themselves properly.

While it may entail considerable labour upon the physician either to supervise or personally give the treatment, I am satisfied that the personal attention thus given will, in the end, be found the most satisfactory. Prescriptions for gymnastics to be carried out at home are a failure. The multiplicity of the duties of the mother, and the lack of appreciation of the importance of being methodical and persistent in carrying out instructions, on the part of the patient, renders it more than probable that the work at home is systematically neglected. It has been suggested that the gymnastic treatment of scoliotics be entrusted to teachers of physical culture. I do not, as a rule, consider this advisable, particularly when, as often is the case, such patients receive no individual attention, and simply do class work. For several years I have given personal attention to all details of treatment, including gymnastics, believing that the constant supervision possible by this plan enables one to obtain the best ultimate results.

Mechanical support as an *exclusive* method of treatment deserves no consideration, and is practised only by those who have no proper conception of the aims and objects in view.

Personally, I am a firm believer in the value of properly constructed supports in all advanced cases, as an adjunct to other modes of treatment. Since it is impossible to secure such perfect control over the spinal muscles that patients, in whom marked alteration in the shape of the vertebræ has taken place, can overcome or counterbalance the unequal weighting of the two sides of the body by voluntary effort, the necessity of mechanical aid must be admitted. The superincumbent weight falling upon an inclined plane, must of necessity increase the deformity, and anything that relieves the spine of this important adverse factor is of undoubted value. Under any plan of treatment the corrective forces are applied for a comparatively short time only each day, while the action of the deforming factors is continuous, even during recumbency. The side of a vertebra that has been compressed must be relieved from pressure and the weighting transferred to the opposite side and *kept there* before there can be any prospect of transforming the inclined plane of a distorted vertebra into a horizontal one. It seems to me that this is the keynote of the whole mechanical problem. If our mechanical methods could be made absolutely definite in their action, we would undoubtedly succeed in bringing about the desired retrograde change.

The principal objection urged against the use of mechanical support is that it produces or increases muscular atrophy. Theoretically this is undoubtedly true, where sole reliance is placed upon supports. When it is used, however, simply as an adjuvant, and other recognised methods are faithfully carried out, this objection loses its force. I do not hesitate to assert that a mechanical support may be worn for a long time without producing atrophy, and that, in spite of such an appliance, exceedingly good muscular development may be secured.

The plaster of Paris jacket introduced by Dr. Sayre may have done much to excite prejudice against mechanical supports of all kinds, and no doubt much harm has been done, not so much by its use as by its abuse in the hands of incompetent men. The removable plaster of Paris jacket is one of the best and most efficient forms of support, and in my hands has been satisfactory. By using an elastic cord for lacing, it does not interfere with respiration; in fact, it is a question whether it does not tend to increase chest capacity by compelling the wearer to breathe against a resistance and thus give occasion for more vigorous action of the chest muscles. I have so little fear of doing harm with the jacket that I frequently have it worn at night as well as during the day. When we reflect how many hours are spent in sleep and that faulty attitudes are assumed in bed even more readily than during the day, the necessity of securing proper positions during recumbency becomes apparent. Mechanical restraint during the night, however, proves more or less irksome to the patient, whatever plan be adopted, and it is difficult to

select a method that will be tolerated. The use of the jacket at night will usually be found less objectionable than other methods of restraint.

The age of the patient and the length of time that a curvature has existed are of some importance in prognosis, which, however, may be greatly modified by the combined plan of treatment advocated, as marked improvement may be looked for in nearly every case.

The degree of correction possible in any case is largely determined by the length of time that the treatment is faithfully and systematically carried out, and the extent to which the patient conscientiously co-operates with the physician in every particular.

Dr. ALBERT GRAY, of Glasgow, read an interesting paper in the Physiological Section of the British Association meeting on "Some Methods of Preparation of the Inner Ear," with remarks on its functions, in which he demonstrated a new method of preparation of the membranous labyrinth of the ear by first supporting the structure and then destroying the surrounding bone. With these preparations and some microscopic sections as a basis, he investigated and discussed some of the phenomena of giddiness and of the theories of hearing with particular regard to the Helmholtz theory. In support of a modification of this theory, he had made these preparations by new methods which showed an inner ear in all its completeness. The preparations being first imbedded in a firm substance, the surrounding bone was decalcified by nitric acid and the remaining structures were then made transparent by oil of thyme. By this means the delicate structures of the membranous inner ear were preserved in their exact positions, and it became possible to study them in their real relationship one to another. In addition to this, some microscopic preparations were shown to demonstrate the increase in size of the *ligamentum spirale* of the cochlea. These changes, in Dr. Gray's opinion, supported the theory of Helmholtz or a modification thereof.—*The Times.*

A HUNDRED years ago a certain observer at Greenwich was compelled to resign his position, because he recorded times always a fraction of a second later than his chief. Nowadays it is recognised that everyone errs, and the theory of errors is an interesting branch of mathematical study. Hitherto it has been held as an axiom of this theory that the mean of the observations of several persons would be very near the truth. This comfortable hypothesis Professor Karl Pearson has recently shown by actual experiment to be fallacious. For some unknown reason there is often a tendency to error in the same direction. In the simple operation of dividing lines drawn at random into two equal parts, judged by the eye, it was found that the experimenters continually put their estimated point at a certain distance on the same side of the true middle point. It is the old, old moral, "Beware of your assumptions." Here a simple fact upsets a presumption which seemed almost mathematically obvious.—*Daily Telegraph.*

THE LORTET-GENOUD LUPUS LAMP.

Its Construction and the Technique of its Employment.

(Compiled by The Editor.)

It is now beyond doubt that Finsen's method affords the best means of treating lupus; but it presents two drawbacks which have been evident from the first: (1) the length of time necessary to carry out the treatment; (2) the very large amount of current (70 to 80 ampères) required. These difficulties are now practically removed by the apparatus of Lortet and Genoud. It has long been obvious that the use of a condensor (whose object it is to get a maximum concentration of light, whilst at the same time getting rid of the greater part of the heat rays) led to a serious loss of chemical rays, thus materially diminishing the output of the apparatus; the result being that the active element for purposes of treatment is eventually represented by a photo-chemical luminous disc less than a shilling in size. In attempting to dispense with the condensor two objects had to be attained, (1) to make use of the chemical rays as near as possible to their origin before dispersion (the degree of concentration of course increasing in proportion to the proximity to the luminous source); (2) to protect the patient from the action of the heat rays.

The apparatus of Lortet and Genoud[1] attains these ends in the following way. Between the light and the patient there is interposed a screen formed by a kind of metallic vessel, in the interior of which there is kept up a constant circulation of water to obviate heating. This metal vessel, which serves both as a screen and a container for the circulating water, has a central orifice which allows the light to pass through it, this orifice being in its turn closed by a kind of hollow obturator whose two faces consist of quartz lenses. This obturator (one of whose faces is intended to be in close contact with the skin, exercising compression thereon, the obturator being therefore also a compressor) has a constant circulation through it of cold water, and the tissues in contact with it are thus submitted to a constant refrigeration. The luminous rays from the electric arc fall upon the surface to be treated only about three or four centimetres from their source of origin, having undergone no concentration. Thus the available luminous zone is of considerable extent.

These and other points are well explained in a recent publication by Dr. M. Bayle.[2] The whole question of photo-therapeutics is here discussed from the first experiments of Downes and Blunt, in 1877, to the very latest results of Dr. Gaston in the Finsen treatment of lupus with the Lortet-Genoud apparatus at the hospital,

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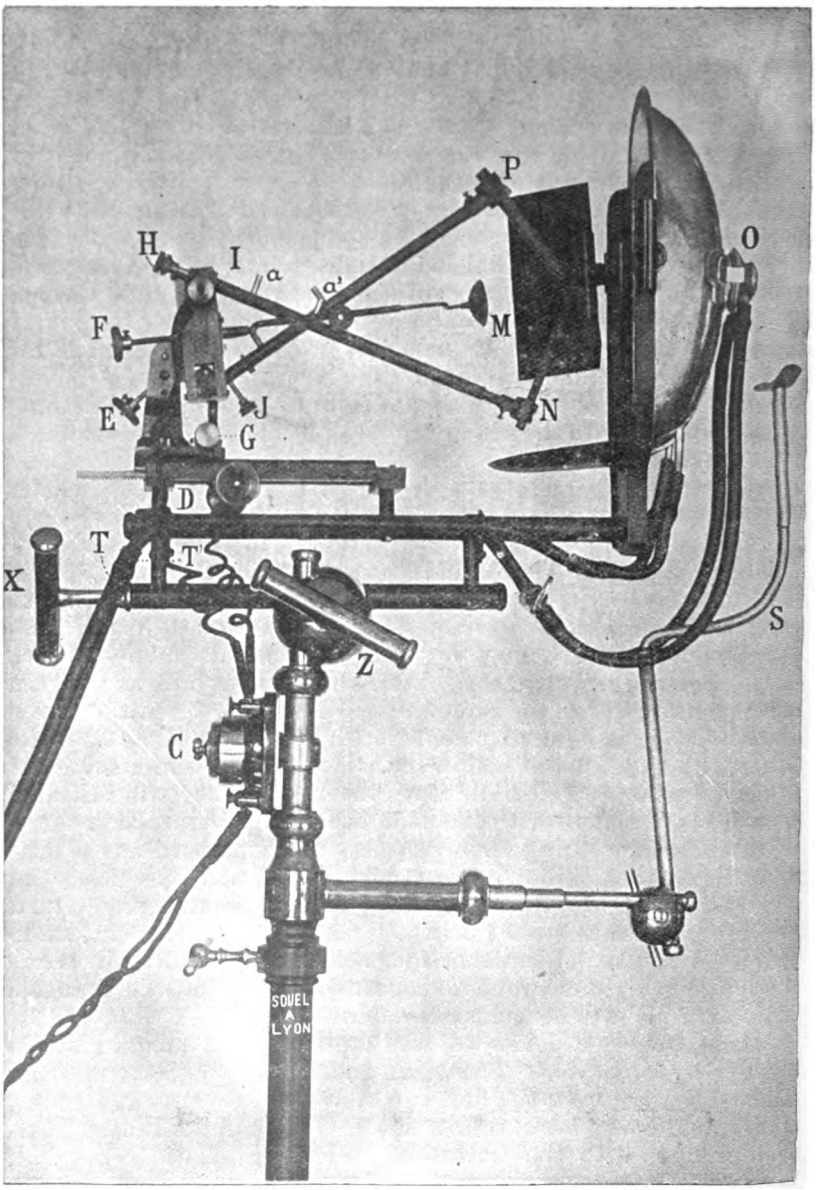
[1] Constructed under patents by Souel, 16, Rue de la Barre, Lyons.

[2] Contributions à l'étude de la photothérapie. By Dr. Maurice Bayle (Rery, Lyons.)



St. Louis. Since the latter communication[1] this apparatus (or certain indifferent imitations of it) has been common in England as well as on the Continent.

A photograph of the apparatus appeared in the July number of PHYSICAL THERAPEUTICS, and a further drawing is here given for descriptive purposes.

The lamp is a continuous current arc taking a current of 12 to 15 ampères and from 55 to 65 volts. The negative carbon is 12 mm. in diameter, positive 8 mm. They are inclined to each other at an acute angle. The carbons last for four or five sittings, and are easily removed and replaced by pressure on the small levers at *a* and *a'*. The arc itself is regulated by a system of screws. The screw F regulates the separation of the carbons; H advances or draws back the negative carbon; J imparts lateral movement to the positive carbon. The arc is movable in every direction. The screw E raises or lowers it; D advances it or draws it back; G gives a lateral movement. The metallic container (screen) is oblong, with sides 6 or 7 mm. apart, thus enclosing a hollow space of small capacity and large surface. The central orifice is circular and has a diameter of 25 mm. The sides of the hollow screen have attachments for small wings of red or green glass to protect the eyes in regulating the arc. A small tray receives the results of combustion. M is a small mirror behind the arc. The obturator or compressor consists of a metallic mounting, closed at its two extremities by a quartz lens. That lens, which is turned towards the orifice of the screen, is a plane surface of the diameter of 4 cm. The lens which is to be applied to the region under treatment is made in several sizes—1½, 2, and 3 cm. For the entry and exit of the water the mounting of the obturator provides two orifices to which pipes are attachable. The obturator or compressor is applied immediately in front of the central orifice of the screen by means of a suitable attachment which makes it easily removable. The circulation of water takes place through two large tubes, T and T', which supply and carry off the water. The tube T is put into connection with any water supply by means of an india-rubber pipe, and bifurcates into two branches to supply the compressor and the screen. The whole apparatus is mounted upon a heavy base. To move it in any direction it is sufficient to grasp the handle X, and to loosen by one turn or a turn and a half of the screw Z, by means of which, the correct position having been obtained, it can be fixed again. The height of the stand can also be adjusted.

Technique.—It is well to commence treatment at the outer margin of the diseased surface in order to prevent it spreading. Avoid suppurating surfaces; these must not be dealt with until after the employment of suitable means to stop the suppuration.

[1] Communication to the "Société de Dermatologie," April 15.

Surfaces covered with crusts will not be treated until after these have been removed by means of an aseptic probe, or better, by the application of luke-warm boric solution. As scaliness hinders the passage of light it is useful to apply to such surfaces a little essence of cloves, which makes the epidermis transparent. The part selected for treatment must be carefully sterilised. If it be the cheeks or the lips that are involved, the pain that might be caused by compression of the jaws will be as far as possible diminished by a pad of wadding. A small pad introduced into the nostril will facilitate the application to the nose. The eyes will be protected, if necessary, by a bandage.

The above preliminaries having been carried out, the patient is placed in a sitting or lying position, preferably the former, opposite the apparatus. The choice of the compressor is a matter of importance. If the surface is of large extent, such as the cheeks, the large (3 cm.) compressor is to be chosen; the medium and small ones are reserved for irregular or small surfaces (chin, nose, ear, &c.). If the part to be treated is smaller than the smallest compressor, or if its shape does not permit complete contact with the lens (finger, or bridge of nose), a thin sheet of tin with an opening, the form and size of the part to be treated, can be applied directly upon the face of the compressor, the aperture made in the tin being placed in the centre of the compressor. (It must be remembered that the whole surface of the compressor must be applied to the part under treatment; it is only such parts as are applied directly to the surface of the compressor that avoid the action of the calorific rays.) The compressor being chosen, it is fixed in front of the orifice of the screen by the slots arranged for the purpose. The operator must then see that the circulation of water both in screen and compressor is working properly. If any air bubbles appear in the compressor nothing is easier than to expel them by raising the exit portion of the tube. Sterilise the compressor before each application.

The carbons are then fixed in their carriers so that their extremities meet; the upper carbon being attached to the positive pole, the lower to the negative.[1] The mirror M is sufficiently far drawn back to prevent contact with the carbons. The apparatus must now be fixed at the proper height and correct position, and the compressor adapted to the surface to be treated in such a way as to insure perfect contact.

Now light the arc by turning on the current and approximating the carbons, having just seen that the resistance is at its proper point (determined experimentally beforehand). In carrying out this stage of the procedure it is well to draw back the arc 6 or 8 cm. from the screen. The carbons now in contact are immediately separated a little, say 5 or 6 mm., allowing the

[1] Alternating currents can be used, but the duration of the sitting is necessarily longer.

crater of the positive carbon to be completely uncovered. By aid of the various screws a suitable arc will be obtained.

The luminous point is then moved forward to a distance of 2 to 4 cm. from the compressor; the usual distance is 2 cm. The arc ought to be upon the prolongation of the axis of the compressor, the crater of the positive carbon being slightly above that axis.

During the whole of the operation the part under treatment must be firmly pressed against the compressor, so as to escape the action of the heat rays, and at the same time to secure the anæmia due to compression of the tissues. Whilst watching the patient it is easy at the same time to attend to the regulation of the arc. The carbons ought to be approximated in proportion to the combustion (about 8 to 10 times for a sitting of quarter of an hour). The duration of the application will be 8 to 10 minutes for the first few applications; afterwards quarter of an hour. The time will further vary with the susceptibility of the patient, and the part under treatment, and of course with the intensity of the arc. After-treatment must be attended to. Immediately after the sitting the surface is smeared with boric vaseline and covered with a small square of boric lint. During the following days an aseptic condition must be kept up in order to avoid suppuration.

Such is the simple technique of the Lortet-Genoud apparatus, and it will be found that both the photo-chemical and photo-therapeutic effect secured is much superior to that obtained by the older method. The former is proved by the fact that a sensitised paper is reduced in two or three seconds, against six seconds required in the case of the apparatus devised by Finsen. The photo-therapeutic effect is shown by the fact that an application of 3 minutes to the forearm is sufficient to produce an intense erythema, followed by desquamation, and 10 to 15 minutes is sufficient to produce the reaction necessary for cure. In certain subjects the reaction is very intense; therefore, great care is necessary in limiting the duration of the sittings, and separating them by sufficiently long intervals.

Most persons have made up their minds as to the crude folly of extreme and especially of prolonged athletic competitions. Strict inquiry tends to confirm the general judgment. Tests were made in America with regard to a six-days' bicycle race, and the results are published by the United States Department of Agriculture. The reports made by Dr. Atwater, Dr. Sherman, and Mr. R. C. Carpenter show that the competitors required a large amount of easily-digested food, much of it being nitrogenous, to supply the excessive waste, and that the work done was enormous. One of the athletes averaged more than ten million foot-pounds per day. This is equal to the effort of lifting 4,464 tons a foot high, and is more than five times the average daily work of a man; equivalent, indeed, to the work of a horse for five hours.—*Standard.*

THE MANAGEMENT OF WEAK FEET.

By Henry Ling Taylor, M.D.(New York).

A WEAK foot is one whose muscular development is imperfect, or inadequate to the work put upon it; deformities due to paralysis, rickets, and other gross organic affections are not included in the term.

Weak foot is exceedingly common in children, youths, and adults, and is often called "weak ankles;" it may be an early stage of flat foot. The commonest causes are shoe wearing, and city life. Shoe wearing, at best, interferes with the mobility, circulation, and ventilation of the foot very frequently, if the shoes are not constructed on anatomical principles; it also produces deformities. It is no exaggeration to say that every shoe-wearing foot is more or less abnormal.

City life is conducive to weak feet because of the lessened vigour of city children, and because of the strain and monotony of walking upon hard, level surfaces. From its mechanical construction the inner side of the foot is the weaker, and when the foot is weakened or over loaded the inner side of the foot sinks, the inner malleolus becomes lower and more prominent, and the weight is shifted from the outer to the inner border of the foot. The foot tends to roll out and turn out, and the arch may be depressed. When the case goes on to flat foot, pain, stiffness and disability are added. Children, in whom weak feet are very common, seldom have pain, but their gait is awkward and inelastic, and they may be unable to walk more than a short distance. The feet of children exhibiting these symptoms should always be examined. If weakness exists attention should be paid to the shoes, which should be heelless, narrow at the back, broad in front, and straight on the inner side. In addition, if the inner ankle projects abnormally, the shoes should be raised the whole length of the inner side by a wedge-shaped piece of sole leather a quarter of an inch thick at the inner edge, according to the method of the late H. O. Thomas. Stiff ankle-shoes accomplish no good purpose and should never be used. In order to combat the tendency to turn out; the child should be trained to walk with the inner edges of the feet parallel or slightly convergent. This, as well as building up the inner edge of the shoe, tends to restore the proper relation of the foot, and to place the weight on the outer edge, where it ought properly to fall; it also protects the inner side of the knee which is often weak in these cases. Knock-knee is often associated with weak feet, even without rickets. Parents are often unnecessarily distressed when their children "toe in." Unless due to some pathological condition, which is comparatively rare, it is a piece of good fortune, and often due to the child's unconscious effort, if one may use the

expression, to protect his weak ankles or knees. Children should be trained in schools and gymnasiums to walk and stand with nearly parallel feet; the whole race of dancing masters, physical trainers, and military experts to the contrary notwithstanding.

The sentiment in favour of toeing out in walking and standing has probably had not a little to do with aggravating and multiplying weak feet. Having provided proper shoes and trained the child to toe straight, or slightly inwards, the next step is to strengthen and train the muscles acting upon the foot, especially the weakest group, the tibials, which invert the foot. This is done by special exercises, taken with the shoes off, night and morning. These consist in movements of adduction and inversion of the feet, the patient being seated. Heel raising, or rising on balls of feet, patient standing toeing in, with hands on table to balance the body, is one of the best exercises for our purpose. If the patient is old enough it is best done in four counts, starting with feet parallel. (1) Raise heels as high as possible; (2) turn heels outwards; (3) turn heels inward; (4) lower heels. All the movements should be done very slowly with straight knees, and repeated ten or twenty times. It is much better to do them a few times correctly, than many times carelessly. The patient should also practise walking and trotting, with heels raised and toes slightly turned in, and also walking on outer borders of the feet. It is astonishing how much may be accomplished by persistence in these simple measures. Moderate cases can usually be entirely corrected, and even severe cases may frequently be cured without the use of special appliances.

In cases of well-marked flat foot, especially in youths or adults, such measures, however, are insufficient, forcible correction under ether, followed by splinting, often being necessary; but even in these cases it is essential to train and strengthen the weakened muscles and mobilise the foot, after correction of the deformity, by manipulation and by exercises similar to those already described.

In closing—two suggestions: first, remember that weak feet is often a cause of awkwardness and disability in children; and second, since shoe-wearing is more or less harmful, let us discard shoes entirely in infancy, when they serve no good purpose, and also encourage barefoot walking as occasion offers, in the country or at the seashore, at least in our children.

The Mechanism of the Electric Arc.—It is the object of a recent paper by Mrs. Hertha Ayrton to show that, by applying the ordinary laws of resistance, of heating and cooling and of burning to the arc, considered as a gap in a circuit furnishing its own conductor by the volatilisation of its own material, all its principal phenomena can be accounted for, without the aid of a large back E.M.F., or of a "negative resistance," or of any other unusual attribute.

A NEW GRADUATING INTERRUPTER FOR RADIOGRAPHY AND CURRENTS OF HIGH FREQUENCY.

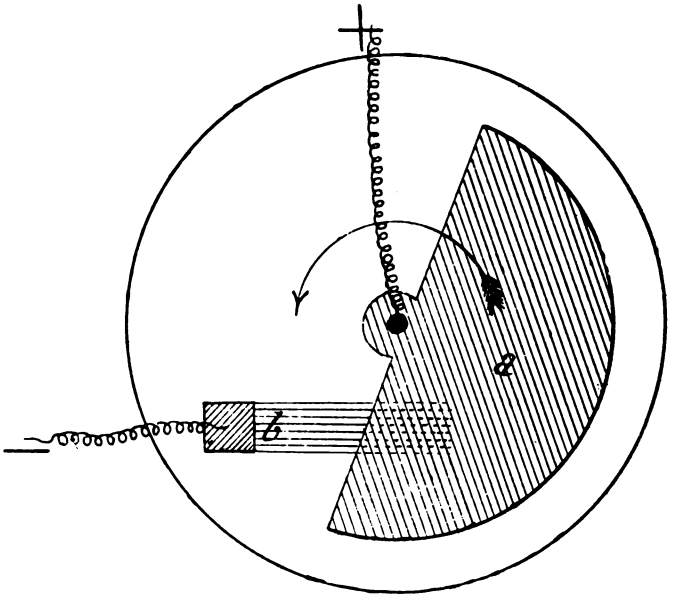
By Dr. Ch. Colombo,

and

M. A. Thouvenet.

Upon the axis of a hollow cylinder, having a capacity of about one litre, is mounted a shaft receiving its rotary movement from any kind of motor. Upon this shaft is fixed a semicircular disc of steel.

The apparatus is represented schematically by the figure.



a, Semicircular disc; *b*, the brush.

The half disc being attached to the shaft, and consequently to the metallic box, that part of the apparatus (the "brush") which conveys the current to them must be carefully insulated.

It is evident that if under these conditions the brush touches the solid or "flush" part the current will pass, whilst if the brush falls into a space the current will not pass.

The most frequent form of contact is the half disc; there will thus be current during one-half of its revolution, and interruption during the other half; the number of interruptions is therefore the direct function of the number of revolutions.

Small electric motors with regulable speed make 500 to 3,000 revolutions a minute; we thus have available any number of interruptions from 500 to 3,000, which gives a fairly wide range. If a greater number are desired, instead of using a half-disc this could be divided into four parts, two solid or "flush" and two spaces. We should thus have from 1,000 to 6,000 interruptions, Dividing the disc into eight parts we should have 12,000 interruptions, and dividing it up still further we should arrive at an incalculable number. The more frequent the interruptions the shorter becomes the time during which the core is excited; for here the phenomena of hysteresis come into play, that is to say, a delay of magnetisation and of demagnetisation. The magnetisation does not arise immediately on the passage of the current, and does not cease immediately the current stops: in the same way as a mill-wheel does not begin to move immediately the water falls on it, nor does it stop immediately the water ceases to flow, on account of the phenomena of inertia. Hysteresis represents magnetic inertia.

Now, as the phenomena of hysteresis have come into play, it may be said that the greater the speed the less the magnetisation, and consequently the less the secondary discharge. Hence high frequencies cannot be obtained by the interrupter, which in reality possesses an action much more limited than might be thought, and which, to work well, ought to work the more slowly the greater the size of the coil.

It is the frequencies of the periods of magnetisation and of demagnetisation which are here spoken of, and not of the currents of d'Arsonval, called also "currents of high frequency," although it would be more accurate to call them currents of short period.

D'Arsonval currents are obtained with a good but not too high speed of the interrupter, and by the oscillations of condenser discharges. A fair speed of the interrupter gives a long, thick spark; too great rapidity extinguishes the spark and produces the *effluve*.

The apparatus described works immersed in petroleum; two tubes permit of the renewal of the liquid when the latter gets warm, and thus enables the apparatus to work continuously for several hours.

This interrupter will do everything that an interrupter can be expected to do, and permits of the magnetisation being long and the rupture short, should such be desired. This can be secured by employing a three-quarter disc, instead of a half disc, so that the current acts during three quarters of a revolution and ceases to act only during one quarter. Such an interrupter defines mathematically the *curve of time*, and allows it to be obtained under all sorts of forms.

Our present aim has been simply to describe the interrupter. We reserve for another article a description of the excellent results obtained by its means in Radiographic and High-frequency Work.

"WYNNSTAY," BURGESS HILL, SUSSEX.

A Modern Sanatorium for the Treatment of Chronic Diseases.

This comparatively new Sanatorium differs in many important respects from the average "Hydro" of less recent origin. It is situated on the outskirts of Burgess Hill, a pretty, modern-looking village on the main line between London and Brighton, about nine or ten miles from the sea. Mr. T. F. Blaker, M.R.C.S., who is well acquainted with the district, describes the air of Burgess Hill as delightful and exhilarating, and the water supply he considers second to none in the kingdom. Wynnstay stands on somewhat elevated ground, commanding fine views of the beautiful range of the South-downs. The country hereabouts is of the most charming character, but as patients are at Wynnstay generally kept pretty fully occupied in or about the establishment, it is fortunate that it possesses delightful and well-wooded grounds of its own, always accessible for purposes of rest and recreation.

The building itself is, as may be seen from the accompanying illustration, of a very ornamental character, the entrance hall, reception rooms and corridors being lofty and spacious. The drawing and dining rooms overlook a picturesque terrace running the entire length of the building. There is a large billiard-room, also a conservatory and a well-stocked library. The baths are, of course, a leading feature, and have been carefully designed with a view to completeness and the fulfilment of modern requirements. Reclining steam-baths, local steam-baths, steam-douches and inhalations, packs, immersion baths, cold and hot-water douches, are all adequately provided for; and there is an interesting novelty in the shape of an incandescent-light bath cabinet, so constructed that, by opening a sliding shutter in the front of it, a powerful arc light, projected from without, and modified, if necessary, by the interposition of coloured glass, may be concentrated upon any part of the body of the patient within. This combination of general and localised treatment cannot fail to be of service in a variety of chronic diseases.

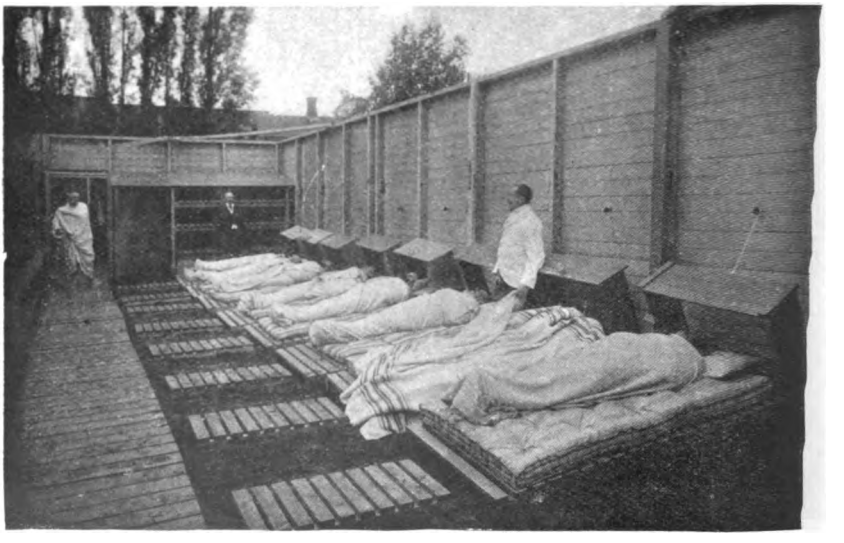
In the grounds of Wynnstay an enclosed area has been set apart for the use of those requiring the celebrated "Rikli light-air" and sun baths, so much in vogue now at the more advanced German sanatoria; and in the warmer months of the year these are in almost daily requisition. It is also not uncommon for patients to spend the night in this enclosure, sleeping under the open sky on the couches provided for the sun-bathers. The writer himself recently indulged in the luxury of a sun bath, and found that, lying naked in the open air, in a temperature slightly exceeding 100° F., and with a fresh breeze blowing, free perspiration

WESTERN ASPECT.

BAREFOOT WALKING.

was induced within about ten minutes. At this stage of the bath a cold shower is taken, and the patient is then packed in blankets (see illustration), the procedure concluding with a second shower bath. Air-baths may be taken in a much lower temperature, as in this case walking and other exercise are taken throughout. At a temperature of 68°, for instance, the writer experienced no sense of chill or discomfort.

Wynnstay possesses a first-rate electric-light installation, and the constant-current supply thus available will shortly be utilised in the provision of continuous-current and alternating baths for therapeutic purposes. Plans have also been adopted for the erection of a row of sleeping-châlets destined for the "open-air" treatment of anæmia, neurasthenia, asthenia, and other non-communicable diseases.



SUN BATHS.

The internal administration of the establishment is under the sole control of the medical superintendent (Dr. C. J. Whitby) and his wife, and the entire *ménage* is therefore ordered in accordance with hygienic and curative requirements. Early rising and retiring are imperative for all, the dietary is simple and wholesome, and the chief meal is taken at midday. Stimulants are, except in cases of genuine necessity, conspicuous by their absence. Thrice a day the patients are assembled on the lawn to undergo a short course of Ling's or Schreber's exercises, and barefoot walking (before breakfast) on the dewy or rain-wetted grass is also freely prescribed and practised. Sandal wearing and the disuse of head covering are encouraged in all suitable cases. There

is also quite a variety of appliances designed for the use of those requiring systematic exercises for the correction of faulty breathing, the enhancement of muscular development, and the establishment of a good circulation. Among these the breathing-chair, invented by Rossbach, deserves particular mention. This ingenious contrivance compels patients, while using it (and this should of course be done in the open air), to thoroughly fill and completely empty the lungs. Modern views assign a large share to defective oxydation in the genesis of disease. The breathing-chair is directly indicated in asthma and emphysema, but will also prove beneficial in chlorosis, gouty or rheumatic conditions, and all chronic diseases associated with, or dependent upon, auto-intoxication.

This brief notice may be concluded by an enumeration of the diseases for which the treatment administered at Wynnstay is chiefly recommended. Acute diseases of all kinds, and bedridden cases, are not admitted. Confirmed phthisis, epilepsy, mental or "borderland" cases, and all infectious diseases, are also excluded. The following groups of chronic maladies are all, however, considered eminently suitable for treatment at this Sanatorium, viz.:—

(1) *Nervous diseases.*—Neurasthenia, hysteria, hypochondriasis, neuralgia, sciatica, neuritis, insomnia, and the early stages of paraplegia.

(2) *Respiratory diseases.*—Chronic bronchitis, laryngitis, asthma, emphysema.

(3) *Gastro-intestinal diseases.*—Dyspepsia, gastric dilatation, constipation, enteritis, hepatic congestion, hæmorrhoids.

(4) *General cachexias* and their local manifestations, *e.g.*, gout, rheumatism, chlorosis, obesity, &c.

(5) *Functional disturbances* of the *heart* and vaso-motor system.

(6) *Functional pelvic derangements.*—Dysmenorrhœa, menorrhagia, &c.

Wynnstay is within easy distance of Victoria or London Bridge, and the medical superintendent will be pleased to welcome any practitioners who may be so far interested in the methods employed there as to wish to pay it a visit of inspection.

It may be added that the bathing arrangements at Wynnstay are in many ways different from those of any other establishment in this country, being in some respects a return to the simplicity of the methods of the original advocates of the "water-cure," and a revolt against the more or less incompatible additions which, in the shape of "mustard packs," Turkish baths, poulticings, &c., have usurped so large a part of the programme of "hydro" treatment. It would appear that for medical purposes the vapour bath is greatly superior to the Turkish bath, and, even in those cases in which dry heat is preferable, some form

of electric-light bath (permitting, as it does, of the breathing of cool air during the process) is far better than the older form of sudatory treatment.

At Wynnstay, again, the full pack, which of late years there has been rather a tendency to neglect in English establishments, and the invaluable "half-bath," have been restored to their due place in the hydro-therapeutic armament, which has been further reinforced by the free employment of the excellent system of general and partial douches introduced by that genial and astute empiric, the late Father Kneipp, of Wörishofen.

REPORT OF FINSEN'S MEDICAL LIGHT INSTITUTE, FROM JANUARY 1, 1898, TO DECEMBER 31, 1899.

By Niels R. Finsen.[1]

During 1898 and 1899, as well as during the previous years, the clinical work has for the most part been the treatment of *lupus vulgaris*, the number of these patients having steadily increased. But experiments in the treatment of other skin diseases have also been continued. Amongst these may be mentioned lupuserythematosus, alopecia areata, epithelioma cutan., acne rosacea and nævus vascularis planus.

In 1898 the average number of daily treatments was 99; in 1899 the average was 127.

The number of fresh cases in 1898 was 219; in 1899, 289. Besides these there were 88 from 1896 and 1897 who continued for further treatment. *This brings the total number of patients during* 1898 *and* 1899 *up to* 596.

Lupus vulgaris.—The total number of cases was 454. Of these 73 were from 1896-7; 162 came in 1898, and 219 in 1899. Of the 381 new arrivals there were :—

	1898.	1899.	Total.
Men	42	56	98
Women ...	120	163	283

The ages of the patients were as follows :—

Age.	1898.	1899.	Total.
0 to 15 ...	15	26	41
15 „ 25 ...	64	66	130
25 „ 40 ...	52	72	124
40 „ 60 ...	23	48	71
60 „ 70 ...	8	7	15

From Denmark there were :—

1898.	1899.	Total.
155 ...	26 ...	181

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[1] *Meddelelser fra Finsen's Lys. Institut.*

From abroad there were :—

1898.		1899.		Total.
7	...	32	...	39

The duration of the disease before commencement of treatment was as follows :—

Age.		1898.		1899.		Total.
0 to 5	...	34	...	67	...	101
5 „ 10	...	45	...	50	...	95
10 „ 15	...	34	...	45	...	79
15 „ 20	...	24	...	21	...	45
20 „ 25	...	13	...	20	...	33
25 „ 30	...	6	...	5	...	11
30 „ 35	...	3	...	5	...	8
35 „ 40	...	1	...	4	...	5
Over 40	...	2	...	2	...	4

Of the total number (454) of patients treated for lupus vulgaris there were at the end of 1899 still 121 under treatment, while 26 had given up the treatment too soon. Of these 26 who had not persevered 10 were dead (7 of tubercul. pulm., 1 of morbus cordis, 1 after a laparatomy, and 1 of another disease); 5 could not continue treatment in consequence of tubercul. pulm. gravis; 5 were compelled to go away by private circumstances which had nothing to do with the illness; 4 left to continue the treatment in their homes, and 2 left without giving any reason for their going.

While during the previous years the lupus patients were treated exclusively by light, there were during 1898 and 1899 some cases which also had other treatment as preparatory for and auxiliary to the light cure. Thus in some few cases scraping or thermo-cauterisation were resorted to, and in other cases corrosive salves, generally ung ac. pyrogallic. comp. (Besnier).

Whilst under treatment with the rays nearly all the patients wore a protective bandage, either Banwater bandage or an indifferent salve bandage.

In the numerous mucous membrane localisations which have proved accessible to treatment the latter has necessarily been of a special kind. M. D. Holger Myyind has been kind enough to examine 200 patients, and to undertake the treatment of the cases of lupus laryngis that have occurred.

The frequent cases of eye affections have been treated at the clinic for eye affections in the Communal Hospital (Dr. Med. Ejler Hansen and Dr. Med. Chr. F. Bentsen). Other complications have also had special treatment, and the physicians of the Institute have also seen the patients in their homes, as well as in the numerous pensions which have been started specially for the patients of the institution. Erysipelas and cases of an erysipelatous nature have occurred now and then, but only as sporadic cases. Professor Haslund has continued to lend his assistance in establishing the diagnosis of doubtful cases.

Lastly, it must be mentioned that some of the lupus patients

have had an experimental treatment with Röntgen rays carried out by Johan Fischer, partly at the Communal Hospital and partly at his private address.

During 1898 and 1899 142 patients were treated for conditions other than lupus vulg. Of these cases 15 presented themselves in 1896-1897, 57 in 1898, and 70 in 1899.

(1) *Lupus erythematosus:* 31 patients—27 from Denmark, 2 from Russia, 1 from Norway and 1 from Sweden. Seven were men, 24 women, all above 25 years. At the end of the year 11 were apparently cured, 10 still under treatment, and 10 had broken off the cure without result. Of these last, one died with a strong development of the condition; one became decidedly worse during the treatment. The remaining cases were very little influenced by the treatment. Most of the patients were treated exclusively with light; some were, however, treated by other means, frequently with galvano-cauterisation.

(2) *Alopecia areata.*—Total number of patients 29, all from Denmark; 18 were men, 11 women. Age: 0-15, 8; 15-25, 9; 25-40, 8; 40-60, 4. At the end of the year 22 were cured, 1 still under treatment, while 6 had broken off the treatment without result, most of them after only a few sittings.

Nearly all the patients were also treated with antiseptic baths during the light treatment.

(3) *Epithelioma cutan.:* 17 patients, all from Denmark. Men 7, women 10. Age: 25-40, 1; 40-60, 7; 60-80, 9.

At the end of the year 8 were seemingly cured, 2 were better, and 7 had broken off treatment. Amongst these 1 had been treated for a long time under the diagnosis of lupus vulgaris. The large cancroid ulceration healed, but the condition again quickly got worse; 1 improved, but died from an intercurrent illness; 1 was treated *solaminis causa* for a large ulcus faciei.

(4) *Acne vulgaris and acne rosacea:* 15 patients—14 from Denmark, 1 from Norway. Men 8, women 7. Age: 14-25, 6; 25-40, 5; 40-60, 4. At the close of the year 4 were seemingly healed, 5 decidedly better, 1 still under treatment, while 5 had broken off the cure without result.

(5) *Nævus vasc. planus:* 10 patients in all, of whom 9 from Denmark and 1 from Norway. Men 3, women 7. Age: 0-15, 4; 15-25, 3; 25-40, 3. At the end of the year 1 was seemingly cured, 2 had broken off treatment, and 7 were under treatment.

(6) *Tubercul. cutan.:* 7 cases, ulcus tubercul. anguli oris still under treatment; 3 cases of tuberc. cut. verruc., 2 of which are cured and the third left off treatment without result; 3 cases of gumma were not apparently influenced by the treatment.

(7) *Tricophyt. capitis:* 6 cases, all of them children under 7 years. The result was negative in 4 cases; in 2 cases, both patients strong and the affection of small extent, resulted in cure.

(8) *Favus :* 2 cases, both with negative results.

(9) *Seborrhœa capitis :* 4 cases, all with negative results.

(10) *Eczema faciei et sycosis :* 5 cases, all with negative results.

(11) *Ulcus luet. :* 5 cases, all with negative results. Two cases that were treated for some time under an erroneous diagnosis improved considerably; the 3 others were only treated during a short time and principally from social reasons.

(12) *Keloid after vaccination :* 1 case, in a child aged 6. Treated without result.

(13) *Pigment atrophy :* 2 cases, with negative results.

(14) In various other cases, 8 in all, the treatment was not fully carried through. Amongst these 1 case of otitis chron. and 1 case of tuberculosis vesic. urin. were treated by means of specially constructed apparatus, both without any distinct result.

Notices of Books.

A System of Physiologic Therapeutics. Edited by Solomon Solis Cohen, M.D. Vols. i. and ii. Electrotherapy, by Geo. W. Jacoby, M.D. (Rebman, London.)

That the first two volumes of this splendid series (nine volumes are to follow) should be devoted to electrotherapeutics is significant of the position that this subject holds—at least in America. The book is worthy of its theme, and appreciative acknowledgments are due alike to author, editor and publisher. In its five or six hundred clearly written pages, with nearly four hundred illustrations, this treatise deals with every aspect of its subject—apparatus, methods, diagnosis, treatment.

In a work covering so much ground it is of course inevitable that writer and reader may not always find themselves in perfect accord; for instance, to account for "the generally deplored fact that medical students pay so little attention to the study of electricity," the author believes that there must be "some radical defect in the usual manner in which the subject is presented." In view of the numerous and excellent systematic treatises that have appeared both in England and America, in view of the lucid and original writings of German authors, and remembering all that has been done for electrotherapeutics in France, including its unequalled periodical literature, it is not every one who will feel disposed to subscribe to the above opinion. An explanation may perhaps rather be sought in the attitude, usually gently disparaging to therapeutic electricity, of the ordinary medical teacher in the schools; and in the further fact that the primary aim of the average medical student being first to secure his diploma, he naturally devotes his earliest energies to those

subjects in which he "must pass." Even if the contention be true that the medical neglect of electricity is due to the incompetence of preceding writers, it cannot be said that there is anything so striking and original in this book as to be at all likely to redeem the situation; but following in the footsteps of its predecessors it will certainly more than take its share in helping to build up a sound art of electrotherapeutics.

The captious critic may possibly feel disposed to comment on the very general character of the author's literary references. And even the non-captious critic would have no difficulty in putting his hand upon passages and even whole pages where such reference might be suitably replaced by inverted commas; for instance, those very considerable portions of the book where the author follows Kennelly. There are other passages which, although unaccompanied by any specific reference, cannot fail to remind the reader, both as to matter and manner, of something that he has seen before. The following is one:—

"There is certainly a difference between applying, say, 10 ma. of current at a pressure of 75 volts through a resistance placed in series with the patient, and applying the same number of ma. with the resistance so placed that the pressure is reduced to a degree just sufficient to overcome the resistance of that part of the body which is being treated" (*Physiologie Therap.*, vol. i., p. 142, 1901).

"I hold that there is a difference between applying, say, 10 ma. at 100 volts through a resistance placed in series with a patient, and applying 10 ma. with only just sufficient electromotive force to overcome the resistance of the patient's body" ("Current from the Main;" Lewis, London, 1896).

There are cases throughout the book where reference to obsolete apparatus seems unnecessarily full, and the description of what is modern disappointingly meagre; thus, why devote a whole page (p. 138) to anything so archaic as the plug selector of Brenner, and dismiss in a scarcely longer space the therapeutics of high frequency currents? Certainly no one could carry out the technique of these currents were he to rely only on the instruction afforded in this book. The same may be said of some of the indirect applications of electricity; for instance, the X-rays. From the point of view of practical usefulness the pages devoted to the latter are far too meagre, and lacking in necessary detail.

The section on the induction coil is clear and brief, the latter quality perhaps being rather overdone. The more advanced reader might be anxious to know something further of the construction, merits, and defects of those magnificent induction coils with their variety of windings, their wide ranges of frequency, and their independently driven interrupters, which he is more or less familiar with as "American."

Supplementing the main part of the book are special articles by various authors on diseases of the eye, throat and ear, general surgery, diseases of the skin and gynæcology, the latter contribution being by Dr. Martin, of Chicago. *Apropos* of recent

controversy it may be noted that this author in the treatment of certain uterine fibroids still advocates the use of "Apostoli currents," that is to say, currents of 150 to 200 milliampères or more. Such teaching is scarcely in accord with a growing consensus of opinion that the electrical treatment of uterine fibroma and fibromyoma must be regarded only as a "symptomatic" one, and that the method of "moderate intensities" (30 to 50 milliampères) is fast rising into favour. These or similar criticisms will no doubt occur to the reader as he travels through the book, but he will nevertheless rise from its perusal satisfied that its teaching is sound and attractively presented.

HANDBUCH DER PHYSIKALISCHEN THERAPIE. Dr. A. Goldscheider and Dr. Paul Jacob. Teil I. Band II. (Teieme, Leipzig.)

The second of the four volumes that are to constitute this series has now appeared, and it quite fulfils the promise of the first. Consisting of nearly 600 pages, about 120 are devoted to massage, about the same number to electro-therapeutics, 165 to gymnastics, 20 to mechanical orthopädics, and 70 to 80 to phototherapeutics. There are 175 illustrations.

The historical notice and physiology of massage are by Dr. Bum, the technique by Prof. J. Zabludowski, and it is quite unnecessary to say that this is most lucidly and thoroughly explained, the description being aided by a profusion of original and excellent illustrations. The introduction to the chapters on Gymnastics is by Dr. Pagel, of Berlin, and the physiology by Dr. Zuntz. Then follows a consideration of Exercises (free exercises, clubs, &c.) and Sports, including hill climbing, swimming, cycling, rowing, skating, snow-shoeing and riding. The chapter on Swedish gymnastics is by Dr. Emil Zander. Gymnastic movements and apparatus (except Swedish) are further considered by Dr. R. Funke, of Prague. The chapter on Mechanical Orthopädics is by Dr. Vulpius, of Heidelberg. The historical introduction to Electro-therapeutics is by Dr. Pagel; the physiology, theory and description of various electrical procedures is by Dr. Ludwig Mann, of Breslau. Here the continuous current, induction currents, galvano-faradic or combined current, the dynamo current, high frequency currents, and the hydro-electric bath are dealt with. Notwithstanding its many excellent points this section is perhaps on the whole rather disappointing. The space allotted to the subject seems scarcely adequate, and the illustrations are meagre and some of them date back to the work of Erb.

The section on Light Therapeutics commences with a historical notice by Dr. J. Marcuse (Mannheim). The Physics and Physiology are by Professor Dr. H. Rieder. The latter includes the action of light on vegetable and animal organisms, on bacteria, and on persons in health. The third division of the subject, *Therapeutics*, deals with the action of light and the effects of the absence of light on the healthy organism, and with the medical aspect of sun baths and electric-light baths, including (*a*) sun baths; (*b*) air baths, air-light baths, and air-sun baths; (*c*) incandescent electric-light baths; (*d*) arc light; and (*e*) concentrated sun and electric-light bath. Chromotherapeutics and electric light in chicken-pox and eczema are also considered. There are also notes on the therapeutic use of Röntgen and Becquerel rays, and the invisible rays of induction coils.

CARBONIC-ACID BATHS: THEIR ACTION ON THE ORGANISM. By Dr. J. A. Rivière. (F. Bouchy & Co., 11, Rue Hélène, Paris.) "La circulation capillaire est la véritable maîtresse de la circulation générale:" Marey.

In an interesting and instructive monograph Dr. J. Rivière, of Paris, explains that the carbonic-acid bath so well known in Germany and German Switzerland (300,000 are given in one season at Nauheim alone) has now become easy to carry out, thanks to an apparatus which in France he was the first to install in his establishment devoted to physical therapeutics. Carbonic acid is by this arrangement discharged into the bath in considerable quantities, the liquefied gas being enclosed in steel cylinders. The gas is given off with safety and ease under a variable pressure of from 2 to 12 atmospheres, which answers all therapeutical requirements. Further, mineral matter is added to the baths by the addition of alkaline and earthy chlorides, whose action, added to that of the carbonic acid, gives effects analogous to the baths of Nauheim, Marienbad, Rheinefelden, Ischl, and other stations abroad celebrated for the rational cure of heart troubles, general debility, arthritism, neuropathies, and diseases of women. The author continues as follows:—

"A veritable 'bath of champagne,' the carbonic-acid bath has been known in France for a century and a half (it was described by Baumé in 1755), and applied for a long time past in a number of thermal stations, notably at St. Albans, almost from time immemorial. The ancient authors say that it causes a sort of pruriginous warmth, with excitation, fulness of the cutaneous vessels, and diaphoresis, acceleration of the pulse and frequent inclination to micturition. On leaving the bath these stimulating and excitant phenomena persist for some time, which makes exercise and warm clothing necessary in order not to interfere with the reaction.

The anæsthesia and the decongestive and revulsive effect which relieves congestion, justly attributed by the older authors to carbonic acid baths, led to their empirical employment in paralysis, rheumatisms, sciatica, myelitis, &c.

Physiological Action of Carbonic-Acid Baths.—The action of these baths varies, of course, with the duration of the bath, its temperature, its mineralisation. If of short duration, it acts as an excitant; if prolonged, its action is calming and tonic. The warmer it is the more sedative and 'resolvant.' As to its mineralisation, the richer it is in chlorides and dissolved gas the more pronounced are the effects we are about to describe.

A temperate bath produces at first a certain sensation of coldness on the skin; then a reaction ensues; little by little ticklings and prickings, redness, and a little smarting is felt upon the integument. The skin is covered with small bubbles of gas which break upon its surface, separating, to a certain extent, the body from the surrounding water and producing a powerful excitation upon the terminations of the cutaneous nerves. The nerves of the skin transmit their vibrations to the nervous centres, which respond to the stimulus in a reflex manner. The biological phenomena thus travel by ingoing nerves towards the nervous centres, and arouse the latter into action. The outcome of this reflex is energetic revulsion from the skin, the circulation gains in strength and amplitude, the molecular exchanges become more active, pulmonary exhalation increases, as does the renal secretion (thanks to splanchnic decongestion and derivation of blood into the capillaries). The organic combustions are thus increased in the gouty. The patient experiences a sense of exhilaration and renovation; appetite and sleep are improved. These baths take the place of exercise without fatigue in those who have led a sedentary and confined life.

Although beyond the Rhine it is the fashion to employ them only in heart disease, they have a wide range of usefulness over and above this.

(*a*) *In arthritism*, and various skin diseases connected therewith, in diabetes and Bright's disease. By stimulation of the various emunctories, excrementitious material is got rid of from the system.

(*b*) *In anæmia* and *chlorosis* the quality of the blood is improved, and anæmic bruits disappear. The same is noticeable in tropical and malarial anæmias.

(*c*) *Obesity*.—Here these baths act by restoration of abnormal nutritive processes, and the gradual disappearance of that general want of tone which is so marked a feature in these cases. The curative action is slow but progressive and continuous.

(*d*) *Uterine troubles*, dysmenorrhœa and the leucorrhœa so common in chlorosis, and often so difficult to get rid of, are improved, and utero-ovarian neuralgia, that *opprobrium artis*, often completely disappears after ten or twenty baths.

(*e*) *Nervous affections*.—These baths are a great help in the treatment of neuralgias and neuroses; in hysterical anæsthesia, chorea, and various forms of spinal irritation they often afford prompt alleviation."

Whatever be the explanation, it is certain that physical therapeutics possess, in the gaseous chlorinated bath, suitably installed and administered, a hygienic and curative measure, often powerful, always useful, which deserves to be more commonly known and practised.

FARADISATION OF THE HEAD IN THE TREATMENT OF CHRONIC INSOMNIA AND ASSOCIATED NEUROSES. By S. Sloan, M.D., Consulting Physician Glasgow Maternity Hospital. (Macdougall, Glasgow, 1901.)

In the form of a reprint from the *Glasgow Medical Journal*, the author publishes a record of forty-six cases of insomnia, treated by faradisation of the head during the past three and a half years. The table shows that 45·5 per cent. of the cases were cured, 32·5 per cent. "sufficiently relieved to have made the treatment an undoubted success," 11 per cent. slightly relieved, 9 per cent. received no benefit, 2 per cent. were worse for the treatment, the resulting distress lasting, however, for only a limited time.

The procedure recommended is as follows: The electrodes are of fine copper-wire netting covered thickly with fine soft felt. That for the brow (positive) is about 15 square inches in size; that for the nape of the neck 10 square inches. The greatest frequency of vibration obtainable (as determined by the case) is employed. "The secondary coil and the damper are then slowly pushed home, and a rheostat governing the secondary current slowly and gradually moved till an amount of current just perceptible to the patient is reached. The needle of the faradimeter will now show a deflection of fully one-half mm., equal to about one-fourth of a milliampère. The current is now gradually increased till the maximum is reached—1 milliampère or less—according to what the patient can comfortably bear."[1] (By 1 milliampère faradic current the author means the electro-magnetic equivalent of an amount of sinusoidal alternating current, the galvanometric measurement of whose sinusoidal galvanic equivalent is 1 milliampère.) At the end of a *séance* of 10 to 20 minutes the current

[1] See article on "Faradimeter" by the author in *Trans. Glasgow Philosophical Soc.*, 1898.

is gradually reduced and the patient allowed to remain quietly sitting for a few minutes. The application is repeated three times a week for a fortnight or twice a week for three weeks, six applications being ordinarily sufficient.

The coil is a special one, the secondary being composed of 8,000 to 9,000 turns. Two rheostats are used, one of 50 ohms to control the supply of current to the primary; another, "a compound one," with about 10,000 ohms R. in series with the patient, to control the secondary. "The faradimeter is also of course in series with the patient."

The author thinks that the faradic current acts on the cerebral nerve-cells in a physico-chemical manner. The vibrations of the current breaker occurring about fifty times a second, and giving two currents in different directions at each interruption, "there are thus, in a sitting of 15 minutes, 90,000 impulses passing through each molecule of the brain substance; these must influence metabolic impulses."

To adequately criticise Dr. Sloan's method would be to open up the whole vexed question of the physics of induction coils and the bewildering part that self-induction plays in influencing their output. It is not proposed to do this. It will be more profitable to accept Dr. Sloan's assurances, and try to "do likewise." At the same time it may be remembered that electricity in diverse modalities has scored many successes in the treatment of insomnia.

Some readers will not fail to notice the striking resemblance between Dr. Sloan's patient, who, after treatment, described himself as having a feeling "of walking on air," and Dr. Althaus' patient who, after a fraction of a milli-ampère of continuous current, said, "I do not walk, I fly."

RHEUMATOID ARTHRITIS. By J. G. Douglas Kerr, M.B., C.M. (John Bale, Sons & Danielsson, 89, Great Titchfield Street).

This is a reprint of two articles which have appeared in the *Journal of Balneology*. After the very shadowy and theoretical discussions that have, for the moment, worn themselves out round the subject of gout, it is refreshing to come across anything so clear, practical and robust as this contribution to a kindred question—if, indeed, it may be termed a kindred question, for one of the writer's chief points is very properly to insist on its being quite distinct from gout and rheumatism. The author leans to an infective theory of its origin, and quotes Bannatyne. As to treatment, he does not take so despondent a view as some authorities have done; and, "in the early stages of both acute and chronic cases, were he restricted to one remedy he would unhesitatingly choose the hot-air treatment," applied to the body generally (as in the Dowsing Radiant Heat Bath), rather than in the form of any localised application.

ARCHIVES DES SCIENCES BIOLOGIQUES. (Published by the Institute of Experimental Medicine, St. Petersburg.)

The third and fourth number of vol. viii. have just been received. Their interesting and instructive contents are reserved for fuller notice on a future occasion.

THE TREATMENT OF PULMONARY TUBERCULOSIS BY MEANS OF ELECTRICAL CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL. By Chisholm Williams, F.R.C.S.Ed.

This is a short paper read before the Tuberculosis Congress in London. It follows the clinical methods now fairly well known and laid down by Prof. Doumer, of Lille, Drs. Oudin and Rivière, of Paris, and others. No impartial observer or experimenter can as yet venture any definite opinion as to the therapeutic value of these currents, and it will require much stronger evidence than any that has been yet adduced to satisfy him of their efficacy in phthisis. In the meantime this paper is an interesting contribution to the affirmative side of the question.

Digest of Current American Literature.

A Pertinent Question.—Dr. J. M. Anders, in his address as Chairman of the Section on Medicine of the American Medical Association, at its fifty-second annual meeting, says: "Among the important questions pertaining to the treatment of disease that are awaiting a clearer solution, and should be considered by this section, may be mentioned: serumtherapy, organotherapy, the higher precision of results from alkaloids as compared with drugs, the true sphere of *hydrotherapy*, of *climate*, *rest*, *exercise*, *massage*, *diet*, venesection, and *electricity*. Would not a more careful, thorough, and comprehensive consideration, and a fuller informal discussion of these subjects by the section, lead to increased knowledge pertaining to the most valuable aids for the relief of suffering and the cure of human ills?"—*Journ. Am. Med. Asso.*, July 13, 1901.

The Treatment of Gastric Hyperæsthesia, by Chas. C. Stocton, M.D., of Buffalo.—The writer regards the condition as due to an exaltation of normal sensibility of the gastric mucous membrane, usually appearing in a neurotic patient. Indigestion does not exist, although the condition might be mistaken for a symptom of indigestion. A positive diagnosis can only be made by exclusion, and after a resort to gastric chemistry. These patients are often insufficiently nourished, on account of a tendency to an increase of pain and distress upon taking food. He points out that (1) it is important in the management to increase the gastric tolerance and improve the nutrition by a carefully selected diet; (2) electricity is of signal service with the negative pole in the stomach, and a current of low pressure (5 to 10 ma.) used for five minutes two or three times a week; (3) hydropathic treatment, a cold douche or shower bath to the spine, the Scotch douche, and other hygienic measures, are as important as in the treatment of neurasthenia. In the discussion which followed the presentation of this paper, special attention was directed to the great need of more knowledge of the principles of dietetics by the profession, and especially of the prevailing lack of knowledge of the art of properly preparing food for both the healthy and the sick.—*Phila. Med. Journ.*, June 22, 1901.

The Treatment of Neurasthenia.—Dr. H. N. Moyer, of Chicago, following the classification laid down by Dercum: (1) Distinguishes between the primary form of neurasthenia, or neurasthenia essentialis, the characteristic phenomenon of which is the "fatigue symptom," or an excessive amount of fatigue following ordinary exertion, from the secondary nerve weakness which results from organic disease or nerve weakness, *i.e.*, neurasthenia symptomatica; (2) that the latter form is common in all the acute febrile diseases, and that the diagnosis of true neurasthenia must always be made by exclusion; (3) in the therapeutic management especial value is derived from rest, diet, cold bathing; and the exposure of the patient to the fresh air for several hours in the day, even in the middle of winter, was always followed by marked benefit and increased appetite and powers of assimilation. He regards strychnia as the sheet anchor in the drug treatment.—*Phila. Med. Journ.*, June 22, 1901.

The Bed Treatment of Insanity.—In an editorial comment on this subject, the advantage of rest, in the acute psycho-neuroses especially, is pointed out, and the fact emphasised that no greater mistake can be made in the treatment of many of the cases of incipient insanity than that of giving the patient "change of scene" by hurrying him or her from one place to another. In this way exhaustion, brain tire, and confusion are increased. The danger of postponement of treatment is also pointed out, and the value of auxiliary modes of treatment. Among these the first importance is attached to hydrotherapy. "We would rather take our chances with the two agents, bed treatment and hydrotherapy, than with any other two distinct methods. Massage is an important adjunct to hydrotherapy. Skilful feeding needs no championing; a good guide to go with it is an occasional blood count. We know on good authority that in one hospital in Philadelphia they are making more and quicker cures in insanity since they introduced hydrotherapy and resort more to bed treatment. In this way the nutrition of the neurons is saved, which is the first and last indication in insanity. Drugs will not do it. During convalescence an outdoor life, and then possibly a little change of scene, are indicated."—*Phila. Med. Journ.*, August 3, 1901.

The Physiologic Cure of Colds.—Dr. Chas. H. Shepard, Superintendent of Brooklyn Heights Sanatorium, in discussing this question says: "(1) Exposure is less responsible for colds than inactivity of excretory organs, the mucous membranes of the head discharging the impurities of the system, instead of the proper eliminating organs; (2) lowered nerve-tone weakens vital resistance to morbific changes; (3) highly-seasoned food and frequent eating occasions congestion of the mucous membranes. A starving man cannot take cold." As a form of radical treatment, Dr. Shepard considers the Turkish bath a *sine qua non*. The avoidance of alcoholic stimulants, greatly diminished diet, quantities of water internally, with thorough evacuation of the bowels, will, in his opinion, serve to break up most colds. Quinine should be avoided. —*Med. Review of Reviews*, July 25, 1901.

[The incandescent light and heat bath might appropriately have been mentioned in this connection.—ED.]

FOOD AND DRINK.

Our Daily Bread.—George Homan, in a review of the methods of bread-making, claims that there is no special difference as regards wholesomeness between alum and cream of tartar baking-powders, and states that the preju-

dice against alum dates from the time when it was used to whiten flour. The nutritive value of flour is lost in the common, every-day methods of baking bread, and the method of bread-making has not yet reached perfection. Serious digestive difficulties may follow the use of yeast-made bread as well as baking-powder bread.—*St. Louis Cour. of Med.*, May, 1901.

Gelatine as a Food Stuff.—Gelatine is recommended by Graham Lusk as an accessory food-stuff in diseases where there is high tissue-waste, since it protects the body from too large a proportion of proteid waste. Small quantities are nearly as beneficial as larger ones. It can never be fully substituted for proteid food.—*Journ. Am. Med. Asso.*, June 8, 1901.

Infant Feeding.—"The place of Cereals in Infant Feeding" is discussed by Henry Dwight Chapin, of New York, who states that chemical analyses of milk are not the only scientific basis of comparison; that nature adapts an animal's milk food to its digestive system, and that the milk of the cow and woman were intended for different digestive systems. He points out that as cow's milk forms solid curds and woman's flocculent curds, it is necessary that the curd of cow's milk should be broken up mechanically when intended for infant feeding; that as cereal gruels have this mechanical action upon the curd of cow's milk, and infants are able to utilise them, their use is rational. He believes that it is often preferable to make a standard diluent of digested gruel, as this not only breaks up the curds, but exposes a surface of milk proteids and not starch, and furnishes a certain amount of nourishment that is at once available for carrying on the work of digestion, taking the place of part of the soluble proteids, and also forms a satisfactory substitute for milk when it must be withheld for a few feedings.—*N.Y. Med. Record*, July 6, 1901.

NOTE.—The mechanical breaking-up of the curds of cow's milk renders it much more digestible for adults as well, and in all conditions where the digestive organs are enfeebled it should be directed in prescribing either a partial or complete milk diet.—*M. A. C.*

Infantile Scorbutus.—Dr. John Lovett Morse discusses the etiology, symptoms, treatment, &c., and reports six cases. The chief if not the sole cause of infantile scurvy is found in the diet, but the error in diet is not always easily seen. It generally occurs in babies fed on prepared foods, but no definite conclusions are drawn as to just what elements in the food are responsible. Anæmia and general malnutrition are probably the earliest symptoms, followed by pain upon motion or handling in the legs, and next in the back and arms. The extremities are usually held rigid and the legs, as a rule, flexed at the thighs and knees. As the disease progresses swellings are apt to appear at the ends of the diaphyses, pyriform and symmetrical in shape, and due to subperiosteal hæmorrhages. If extreme, separation of the epiphyses may result. The most common symptoms, swelling and sponginess of the gums, appear later. In severe cases there are cutaneous hæmorrhages. Hæmorrhages from the nose stomach and bowel are not infrequent in the worst cases. Hæmaturia is rare and albuminuria infrequent. Fever is not a prominent symptom and usually accidental. Briefly, the pathologic lesions are anæmia, hæmorrhage, and ulcerative stomatitis. After pointing out in what manner the diagnosis is to be made from rheumatism, purpura, rickets, syphilis, Potts' disease, infantile paralysis and injury, he states that more specific conclusions as to what the food elements are which are responsible for the condition than those formulated by the Committee of the American Pedriatic Society are not

at present justifiable: "(1) The development of the disease follows in each case the prolonged employment of unsuitable food; (2) in general, the farther a food is removed in character from the natural food of the child the more likely it is to be followed by scurvy." Treatment consists in the regulation of diet and the administratiou of orange or lemon juice; either alone may be sufficient, but a combination is best. No drug is of any use. Quiet, on account of pain, is advisable.—*Boston Med. and Surg. Journ.*, May 16, 1901.

In a paper read before the New York Academy of Medicine on "Gastro-Intestinal Intoxication Occurring with Forms of Mucous Colitis in Children," Koplik regulates the diet, if possible, by placing the patient on skim milk. Cream (fat) he finds is especially noxious in some cases. The children will not take it; fat causes alarming symptoms, such as nausea. A carefully selected mixed diet seems to be the best. Skim milk, cocoa, cereals of all kinds, meat once a day, and vegetables which have very little residue, seem to be the best form of diet. Those vegetables which appear undigested in the fæces must be avoided. Spinach is instanced as of such a character as to be non-assimilable in children. Strained *purée* of peas and baked potatoes seem to be the most easily assimilated. Fruit juices, such as orange juice, are well borne.—*Phila. Med. Journ.*, July 27, 1901.

Milk.—In a paper, "Conclusions Based upon Three Hundred and Thirty Outbreaks of Infectious Diseases Spread through the Milk Supply," Kober concludes: That all milk may be rendered unfit to use by the development of bacteria; by the improper feeding of the animals; and by acquiring the infectious organisms after leaving the animal. He has tabulated 330 outbreaks of infectious diseases spread by the milk supply, consisting of 195 epidemics of typhoid fever, 99 of scarlet fever, and 36 of diphtheria. Of the epidemics of typhoid fever, 148 were due to the disease invading the farm or dairy; 16 were due to intentional dilution with infected water; and in 7 cases the cows probably waded in sewage-polluted water. In one case the milk pails were washed with cloths used about the patients. Of the 99 epidemics of scarlet fever, the disease existed at the farm or dairy in 68; in 6 cases the helpers had lodged in or had visited infected houses; in 2 cases the infection was conveyed by bottles infected at customers' houses; in 17 cases the dairy helpers were suffering from the disease while handling the milk; and in 10 cases they had acted as nurses. The epidemics were also spread by wiping the milk cans with infected cloths, by storing the milk in the sick room, and apparently by disease of the cattle. Diphtheria existed at the dairy or farm in 13 cases, and in 3 cases the employees were ill while still handling the milk; in 12 cases the cows were diseased. Of these epidemics 243 were reported from England, 14 from Germany, 5 from France, 5 from Austria, and 52 by American, and 11 by Scandinanvian authors.

It is believed by Kober that the laws now on the statute books regarding milk practically deal only with adulteration, and do not control the methods of handling or preparation.—*Am. Journ. of Med. Sciences*, May, 1901.

Diet in Typhoid Fever.—Dr. William Osler states that the diet should consist of milk with lime water and egg albumen during the febrile stages. Rarely should artificial foods be ordered, but an abundance of cold water.

Dr. Frank Billings regards milk as the best diet. Animal broths should not be used alone as a food, nor given when diarrhœa is present. When patients are suffering from nausea, vomiting, poor digestion, constipation, or diarrhœa, milk constitutes the ideal diet.

Tyson, of Philadelphia, states that milk is the safest and by far the most satisfactory diet, for the reason that it is a properly constituted diet of proteids, fats, sugars, minerals, and water, which demands modification as to proportion by reason of age, occupation, and climate. The quantity required may be, for adults, four ounces as a minimum to three ounces as a maximum, every two hours. If diarrhœa is present, a deviation from the milk diet must be made in some cases because of its disagreement with the patient, or because of some prejudice against it, but in his experience such patients are rarely found. If milk increases the tendency to constipation it should not be boiled, and in such cases buttermilk can be substituted with advantage. He believes that there is but little danger in substituting the meat broths as far as their favouring the multiplication of bacteria in the intestines is concerned. Such preparations should be made by the use of heat, and are therefore sterile at the outset. In cases where the milk cannot be assimilated when reduced to the minimum amount, he finds that there is no more satisfactory nourishment than albumen water. The whites of two eggs to a pint of cold water is an average proportion, to which a teaspoonful of lemon juice may be added as a flavour. In the convalescent stage he adheres to one rule: continuance of the liquid diet until the temperature has been normal one week, then allow one soft-boiled egg daily, and after a few days other articles may be added, such as well-boiled rice or well-cooked oatmeal, two or three raw oysters, &c.—*Journ. Am. Med. Asso.*, August 10, 1901.

Treatment of Hyperacidity of the Stomach.—Dr. Hewes endeavours to reduce the acidity of the stomach by the administration of proteid food substances which combine with large quantities of acid, and by alkalies which neutralise the acid present. The diet is made to contain as high a proportion of proteid material as is comfortable for the individual. Six meals a day, the constituents of each prescribed, are ordered. Starches should be limited, as their digestion in the stomach in these cases is limited. Carbohydrate foods, sugars or predigested starches, and dextrinised flours are used as much as possible. For the distress or eructations some proteid, as a raw egg, is to be taken. In obstinate cases lavage proved a useful adjunct to treatment. Careful attention should be given to baths, exercise, the bowels, and general manner of living.—*Boston Med. and Surg. Journ.*, November 9, 1900.

HEAT AND COLD.

Superheated Air in the Therapeutics of Chronic Catarrhal Otitis Media.—Dr. G. W. Hopkins has obtained benefit from the use of superheated air in the above conditions. Arteriosclerosis, serous effusion into tympanum, and perforations of the tympanum are regarded as contraindications to its use.

Technique.—The ear is thoroughly cleansed with alcohol for several days; narrow strips of dry gauze are then packed into the ear and a large pad of dry gauze placed over the ear, which is then covered with the canvas sleeve hot-air conductor and a current of air at a temperature of 400° F. sent into the canal. This temperature he finds is easily borne, but is usually followed by a severe headache, which he relieves with codeine. The eustachian tube is always inflated with a warm stimulating vapour from a nebuliser after the treatment, and this is concluded with vibratory massage.—*N.Y. Med. Record*, June 1, 1901.

Hot Air.—Dr. Orwin S. Wightman in discussing hot air as a therapeutic agent concludes as follows: (1) Dry heat is a valuable pain-reliever without any

of the depressant effects common to drugs; (2) in connection with constitutional and medicinal treatment, we have in it a positive curative agent; (3) it is a stimulant to rapid repair and absorption; (4) it is one of the most valuable eliminative agents we possess; (5) where indicated, it possesses a sedative action on the nervous system obtained by no other means.—*N.Y. Med. Journ.*, August 17, 1901.

Dry Heat.—Willard, of Philadelphia, points out the ease with which dry heat can be had for external applications in a variety of conditions and emergencies now that electric lighting is so common in hospital and private home, viz., by the use of an ordinary electric bulb attached to a long flexible cord and wrapped in one or two layers of cloth. He has found it of the greatest comfort applied between the scapulæ at the first symptoms of a chill, and often preventive of a rigor. For local pains in chest or abdomen, and neuralgic pains in the head, it has all the advantages of the hot-water bag and never grows cold; while used as a flat iron it is very helpful in muscular rheumatism and sciatica. Following operation as an application for cold feet, it has the special advantage of quick and continuous service.—*Phila. Med. Journ.*, June 8, 1901.

Rheumatoid Arthritis.—Dr. Gilbert L. Baily holds to the bacterial origin of this condition and favours the use of dry hot air followed by massage. He has seen great benefit thus produced. The earlier the treatment is instituted the better, but does not regard the disease as hopeless, and is of the opinion that no case is too old to be benefited by treatment. Special attention should be given to lesions of the mucous membranes during middle life and especially to the menstral disorders in women near the climacteric.—*The Cincinnati Lancet Clinic*, July 13, 1901.

Electro-thermic Hæmostasis in Abdominal and Pelvic Surgery.—In a paper with the above title Dr. Andrew J. Downes reviews the history of this method, and notes that the credit for the application of electric heating and the development of practical electro-thermo-hæmostatic instruments belongs to the late Dr. Skene. The latter in his work gave credit to Keith for first having used heat to the compressing blades of forceps in the control of hæmorrhage. Downes refers to the necessity of hæmostasis in aseptic surgery, *i.e.*, not only of a certain method of occluding the vessels, but of doing it with an agent that would not either immediately or remotely complicate the case. None of the methods in general use meet these conditions, in his opinion, and he objects to the actual cautery, silk ligatures, the angiotribe, and even to the sterile absorbable ligatures. He claims that the only practical method of obtaining heat in compressing blades in a measurable and controlable form is by electricity. The instruments used by Downes are his own modifications and improvements of the Skene instruments, and are illustrated in his article; they are for use in pelvic and other surgery. Not only are they of value in hæmostasis, but they are also useful in occluding tubular strictures usually requiring ligation, such as the vermiform appendix, the Fallopian tubes, and the ureter. A series of twenty cases are recorded in which the instruments were used successfully. "Upon microscopic examination the area of the clamped portion shows entire obliteration of the mucous, sub-mucous, and muscular coats. The opposite serous coats seemed to be in apposition." This, says the writer, "means that an area of homogeneous agglutinated tissue forms the stump."—*Journ. Am. Med. Asso.*, August 17, 1901.

The Curative Value of Cold.—Dr. E. H. Coover, in a paper on "Coxalgia," discusses the value of cold as a curative form of treatment particularly adapted to the early stages of all coxo-femoral inflammatory affections as well as to the distinct arthritic, acetabular, and femoral forms of hip-joint disease; and suggests it as at least of marked advantage in well-developed cases, used either alone or in conjunction with extension and the other usual procedures. He asks, "Since cold bathing and sponging and the local application of ice and refrigerating media are of such general use in allaying inflammation, why not give them some consideration in the treatment of coxalgia? Ice is applied to the head in inflammation of the brain, to the chest in pneumonia, to the abdomen in inflammatory diseases of the viscera, and to the pelvis in certain uterine and ovarian affections; then why not apply it to the hip in diseases of the joints?" He quotes Stengel, who says: "The primary object of the cold bath is not to reduce temperature; its value is mainly as a stimulant and supportive. It causes increased force and reduced rate of the respiration; it strengthens and slows the pulse; it reduces temperature; it probably aids in the elimination of toxic products; but above all else it stimulates and supports the nervous system. . . . The theory that is receiving the most support is that the action of the cold is not so much to lower the temperature; it is eliminative." Coover claims that in hip-joint disease the action of the cold is to allay inflammation, arrest suppuration, and promote a healthy nutrition. It shortens the stages and lessens the severity of the disease, and if cases are taken in time there will be little or no deformity, and the danger of wasting the strength of the body and fatal issue resulting in consequence is made very remote indeed. Its value in inflammatory conditions in other parts of the body points to it as a rational method of arresting this formidable disease. The cold does not destroy bacilli, but renders them inactive and gives nature a chance to restore broken-down tissue. Care must be taken not to produce a depressing effect upon the patient. To this end, several layers of some fabric or of paper should intervene between it and the skin. In one case reported, cure soon followed. Night sweats disappeared within a week, and sleep was better and free from pain. In fifteen days the patient was better and relieved from all suffering, though the knee and heel were still painful. Cure seemed complete in about six months. No extension or counter-extension was employed. Two other cases are reported—one a lady, aged 24, who was cured, the other a case of traumatism of the hip-joint.

Technique.—The region of the affected joint is surrounded with ice caps kept constantly replenished. Skin not allowed to become deep red, and purple red is avoided by the intervention of layers of flannel or newspaper.—*Phila. Med. Journ.*, July 13, 1901.

MASSAGE, MOVEMENTS, AND MEDICAL GYMNASTICS.

Pelvic Massage.—Dr. Louise Southgate sums up her results in "Pelvic Massage," as an aid in the treatment of "Gynæcological Lesions," as follows: Relief from pain and soreness; breaking up of adhesions; absorption of exudates; reduction of large recent subinvolution; dimunition in size of old chronically enlarged uteri; slight dimunition in size of enlarged fibrous ovaries; reduction in size of retroverted hypertrophied uteri, complicated with enlarged appendages and lax vaginal walls, with slight improvement of the retroversion; retroverted prolapsed uterus with complications restored when electricity was

added to the massage; severe dysmenorrhœa of many years' standing, caused by adherent ovary, cured.—*Cincinnati Lancet Clinic*, June 29, 1901.

Muscular and Joint Sprains and their Treatment.—Dr. Harold Sneve, in a paper on "How to Treat Muscular and Joint Sprains of Railway Employees," tabulates 90 cases occurring among the employees of the Chicago Great Western for the year 1899. The character of the injury in these 90 instances was as follows: Sprains or strains of fingers, wrist joints, shoulder joints, foot and ankle, knee, hip and thigh, arm, back and side. The largest number of sprains reported were of the ankle and foot—22 cases out of 90. Wrists were sprained 15 times. In all the cases of strains, by far the greatest number were of the back, or 18 cases of the lumbar region. The preponderance of back injuries were among engineers; of ankles in brakemen; while firemen sprain backs, shoulders and wrists indifferently. The pathology is also discussed as a basis for rational treatment. In summing up, he states that (1) ligaments are rarely if ever torn in so-called sprains, and are never stretched; (2) the pathology in the majority of sprains is a rupture of the areolar and connective tissue around the joint, and a contusion of the lining of the joints; (3) immobilisation of muscles is not rest. On the contrary, in all sprains the muscles should have passive exercise the first few hours and days, and active exercise after that. In the majority of cases active exercise should be instituted from the beginning; (4) the plaster casts should not be used at all, even in cases where there is a fracture, unless it be impossible to maintain a proper position of the joint; (5) hydrotherapy in the shape of ice applied over a wet cloth for the first few hours, water in the shape of hot fomentations, or in the shape of the Scottish douche, where stimulation is desired is of very great value; (6) the counter-irritation of static electricity in conjunction with massage is the best treatment for a sprain; (7) the ambulatory treatment of sprains in conjunction with massage is to-day the best treatment. —*Journ. Am. Med. Asso.*, June 1, 1901.

Physical Education.—W. A. Sargent, in an article on "Ideals in Physical Education," calls attention to the decay of certain forms of sport; the evils of setting up professional standards for amateurs; the tendency towards barbarism in certain games; the need of more general physical training instead of encouraging special athletes; and the danger of pushing special methods as ends in themselves, rather than as means toward improvement of the individual average man. Abnormal athletes are not what is desired, but to get the highest type of physical perfection in general; and to that end it is necesary to be constantly on guard to check abuses and restrain excesses.—*Med. News, N.Y.*, July 6, 1901.

The Gynæcological and Obstetrical Significance of Girlhood.—Dr. Henry P. Newman points out the importance of the proper physical training of girls during the developmental period of puberty, and the prevention of lack of development of the cervix and uterus, which is a serious handicap to their future sexual life, and possibly may result in grave and even fatal conditions after marriage. He also discusses the surgical treatment of such conditions.—*Chicago Medical Recorder*, May, 1901.

Chronic Heart Disease in Children Relieved by Systematic Movements.—Dr. J. M. Taylor, as the result of his experience in the treatment of chronic heart-disease in children, notes the fact that in many cases apparently hopeless conditions may be no detriment to a long life, and that by physical

training much may be done to restore cardiac activity. What is true of boys is much more true for girls, because of their complex circulatory apparatus. Appropriate exercises prevent congestive developments in the liver, kidneys, and lungs, and maintain the functions of the skin and nervous system, and generally assist in healthy metabolism. In marked cardiac disorders he favours rest in bed, but with improvement in the condition there comes a time when some activity may be commenced under guidance and rules. He points out that physicians are often ignorant in the matter of physical training, and often give worse advice than practical trainers. No harm can come from employing certain systematic procedures, passive movements by the operator twice a day when absolute rest is still required, and as the condition still improves the use of gentle massage of the limbs, and later of the trunk twice or thrice a day. Still later the child should be taught to lift the shoulders and make them flexible by placing the clasped hands on top of the head and making repeated efforts at raising and lowering the scapular muscles, in order to exercise the diaphragm and lungs by this forced breathing. Active extension of the limbs, while still lying on the back, may be made in different directions, and as the condition improves, the operator may meet these extensions with a certain amount of resistance, keeping careful watch meanwhile on the pulse and circulation. Still later the child may be allowed to sit up and the exercise carried still further. Neck exercises are of great advantage. Moving the head and muscles of the thigh and hips should receive special attention in cases of weak heart and lungs. More complex movements suitable for more vigorous children may be employed later on.—*Amer. Med.*, May 25, 1901.

CLIMATE.

Dr. J. T. Eskridge, in a paper upon "The Influence of the Climate of Colorado on the Nervous System in Health and Disease," finds that no unpleasant effects are experienced by healthy individuals on first going to Colorado if they do not attempt over-exercise. There is a sensation of well-being and stimulation with a desire to be doing. The stimulation of the motor system results in restlessness and a tendency to over-exercise, and this in turn leads to irritability. Many of the nervous symptoms he believes are due to suggestion. In healthy and acclimatised persons, who become accustomed to the rarefied air, sleep is generally easily obtained and more refreshing and stimulating. There seems, however, to be a greater tendency to nervousness and sleeplessness than at lower levels, and he is inclined to think that there is some truth in the opinion that nervousness and insomnia are aggravated by prolonged residence, but he does not believe that mental or organic nerve-troubles are specially encouraged. The insomnia due to malnutrition in tuberculous subjects is greatly relieved with improvement in the condition of the lungs, and nervous irritability also disappears as the general health improves. Mental depression in tuberculous subjects is more common than at the sea-level. This he believes is largely due to isolation and other conditions pertaining to the environment. He asks, "Is tuberculosis more likely to attack the nervous system in Colorado than at lower levels?" This he thinks may be safely answered in the affirmative for adults, but in the negative for children. Hysteric subjects do better at the sea-level than in Colorado, and the same is true to some extent of the neurotic cases of migraine and chorea. For the nervous and impressionable form, childhood, and in epileptics, the conditions are less favourable than at a lower level. Insanity he finds less frequent than

in the Eastern States, according to the population. Maniacal conditions seem to be somewhat aggravated. No special difference in frequency, occurrence, and results of organic nerve-disease has been observed by him between Colorado and elsewere.—*Denver Med. Times*, June, 1901.

Air.—Dr. George H. Carveth, of Toronto, in a paper read before the Ontario (Canada) Medical Association, discusses the open-air treatment of disease: (1) In the house with wide open windows; (2) in beds on the verandah; (3) in beds under tents on the lawn. At first he experienced some difficulty in getting his patients to consent to be treated in this manner, but after they had become habituated to life in the open-air, they returned indoors reluctantly. He has treated in this way cases of iritis, fracture, the radical cure of hernia, rheumatoid arthritis, tubercular disease of the spine, typhoid fever, and a case of hysterectomy.—*Journ. Am. Med. Asso.*, July 6, 1901.

ELECTRICITY.

Dr. Leonard C. Stamford, on "Static Electricity in the Treatment of Sprains," reports a number of cases. For sprains with little or no effusion, such as ankle sprain, the disruptive discharge affords a very satisfactory method of treatment, giving immediate relief, which lasts from two to four hours, after which some reaction follows, more or less, according to the condition and the work put upon the limb. In the average case this period of relief endures longer with each successive treatment until cure is established. In an ordinary sprained ankle daily treatment for five to seven days suffices to remove lameness. Where effusion is present, as in synovitis of the knee, while relief is afforded for a short time by the use of the disruptive discharge, there is a little other effect. With the removal of the effusion, however, it is a valuable aid in stimulating and strengthening the weakened structures. The best results are obtained in recent cases, although cases of longer standing yield, but require a longer period of treatment.—*Med. News, N.Y.*, July 20, 1901.

Cataphoric Medication in Ringworm.—In "Notes on Ringworm," Dr. A. Ravolgi states that any substances causing defoliation of the epidermis will suffice for local application. In obstinate cases he uses a sponge-covered electrode saturated with the usual ordinary 1 per cent. bichloride of mercury solution to the diseased patch attached to the positive terminal. The negative contact is placed at some distance (should be so arranged as to minimise resistance). By the cataphoretic transfer of the drug a much more powerful action is secured than would otherwise be possible.—*N.Y. Med. Journ.*, June 29, 1901.

Prostatic Hypertrophy.—Dr. S. H. Linn reports that he can obtain the best results in prostatic hypertrophy by local treatment of the prostate *per rectum* rather than *per urethram*. He covers the rectal electrode with moist carbolated gauze, soaked in a solution of potassium iodide. The decomposition and transference effected by the current insures the action of the nascent iodine. —*Eclec. Med. Journ.*, April, 1901.

Röntgen Rays.—Dr. Francis H. Williams, of Boston, in "Notes on the Treatment of Some Forms of Cancer by the X-rays," states that he has treated cases of epithelioma of the lip, of the hand, and of the eyelid. The advantages of the treatment are: (1) That there is no pain; (2) that there is no delay on account of dread of the knife; (3) that healing can occur without caustic effect; (4) that the results from a cosmetic standpoint are excellent; and (5) that the treatment is ambulatory. The disadvantages of the method

are: (1) That great care is required; (2) that it is expensive; and (3) that the treatment must be continued for some time.—*Phila. Med. Journ.*, June 1, 1901.

At a regular meeting of the Cincinnati Academy of Medicine, June 24, 1901, Dr. E. H. Shields presented a case of pigmented nævus of the foot, which he was treating by means of the X-rays. Healing had unquestionably taken place in some portions, but the result was only fairly satisfactory. He reported three cases of lupus treated by the same method. In one the result was decidedly encouraging; a second is negative; third still under observation progresses nicely towards recovery. The exposure lasted from ten to thirty minutes, average fifteen minutes; no burn. Distance from the tube, six to twelve inches.

Dr. Merrill Ricketts reported complete relief from pain in a case of multiple sarcoma with skin nodules, while under X-ray treatment, with drying, scaling, and atrophy of many of the nodules. Death followed dissemination of the disease.

Dr. Shields added that he had seen several cases of chronic rheumatism entirely relieved of pain by subjecting them to the X-rays.—*Journ. Am. Med. Asso.*, July 27, 1901.

LIGHT.

Dr. W. S. Gottheil, of New York City, in a preliminary communication on the use of light in cutaneous medicine, states that he does not believe, from his experience, that hourly *séances*, as per the method of Finsen, are necessary for the treatment of cutaneous diseases with the chemical rays of light. He uses the arc light, and while believing that the chemical rays of light have a wide field of usefulness in cutaneous medicine, states that he is not prepared to make any definite statements as to results obtained, save in two cases. In one extensive lupus vulgaris they promise to be brilliant. An area of two inches square which has been treated, is a marked contrast to the other locations where the disease is progressing. It is almost white; only two or three lupoid nodules remain, and they are disappearing. The second case, one of obstinate tertiary syphilitic ulceration of the leg, is now nearly healed, after resisting other internal and local treatment for weeks. He points out that favourable results have followed in the experience of others by the use of the chemical rays of light in lupus vulgaris, lupus erythematosus, mycotic eczema, trichophytosis, favus, impetigo, furunculosis, tuberculosis cutis, epithelioma, mycosis fungoides, blastomycosis, actinomycosis, and believes that the chemical rays of light have a wide field of usefulness in cutaneous diseases.—*Journ. Am. Med. Asso.*, July 6, 1901.

HYDROTHERAPY.

Cold Water in Therapeutics.—Dr. Alfred Gordon, of Philadelphia, refers to the paper of Dr. Simon Baruch, abstracted in *The Journal*, for July, and to the use of cold douches at Salpetriere, in both organic and functional nerve diseases. He was especially impressed with the relief from intense pains experienced by tabetic patients, and of the efficacy of the daily cold douche in cases of cerebro-spinal syphilis or syphilis of the cord. He also observed that patients suffering from functional nervous disorders improved more satisfactorily under the influence of cold douches: that when placed upon purely medical treatment the symptoms of the disease returned. In his own experience he has found cold spongings and cold douches of great value in petit mal,

migraine, hysteria, and chorea. In a case of spyhilis of the cord the patient affirms that he cannot do without the cold applications; the rigidity and numbness of the legs being aggravated whenever he omits the water treatment for a few days. He corroborates Baruch's assertion that a few ounces of cold water acts upon the mucous membrane of the stomach as a cold douche, and refers to the magical relief experienced by a neurasthenic patient from anorexia under the influence of a "swallow of ice-water before each meal." From his own experience, and that of others, he concludes that water, and particularly of low temperature, is one of the most powerful agents in therapeutics, and it is to be regretted that it is neglected by many physicians.—*Phila. Med. Journ.*, July 20, 1901.

Notes.

Restoration of Voluntary Movements by Nerve-Crossing.—In the physiological section of the British Association meeting, Dr. R. Kennedy, of Glasgow, in an interesting paper on the "Restoration of Voluntary Movements after Alteration of the Nerve Supply by Nerve-Crossing or Anastomosis," said that experiments on animals had shown that when the nerves supplying the flexor muscles of a limb were divided and cross-united to the nerves supplying the extensor muscles, the result was the animal regained the functions of the limb. This had been proved to be due to the fact that the nerve centres for the flexor and extensor muscles interchanged their positions, and were able to innervate the new muscles with which they had been connected. The principle of nerve-crossing found a practical application in cases of paralysis or other defect in the muscle or group of muscles supplied by a particular nerve. A portion of the nerve below the lesion could be grafted on to the neighbouring normal nerve with a probability of restoration of the functions of the affected muscles. Dr. Kennedy illustrated this in his paper by a series of lantern slides showing the case of a woman suffering from facial spasm of long standing, which he had treated by dividing the facial nerve and grafting its distal end on to the spinal accessory nerve, with the result that the voluntary movements of the face had already been in great part restored, and the spasmodic condition had not returned.—*The Times.*

Phonetics.—The following is the report (taken from *The Times*) of Professor McKendrick's demonstration of apparatus employed in researches on the subject of phonetics at the meeting of the British Association, Glasgow. He pointed out the movements of the organs of voice and speech were so complicated as to require the application of many methods of research. When one spoke there were movements of the lips, tongue, soft palate, and larynx, and sometimes movements of the muscles of expression. Again, there were special characteristics about vocal sounds which distinguished them from the sounds of musical instruments. Questions arose as to the true nature of vowel sounds and as to what was the physical constitution of a word. It had been suggested that language might be recorded, not by words and syllables, but by signs or symbols which would indicate what had to be done by the vocal and the articulating organs for the production of any given sound. Dr. McKendrick then gave an historical account with graphic illustrations of all the methods adopted for the investigation of speech sounds from 1875 onwards. Numerous illustrations were thrown upon the screen showing especially the

apparatus employed and the results obtained by several French physiologists in the laboratory of the Collége de France. He traced the gradual evolution of the phonograph, and described the methods adopted for the analysis of the marks made upon the wax cylinder of that instrument. He then examined the various theories put forward regarding the formation of vowels, and gave especial prominence to special researches made recently by Marage, of Paris, who seemed to have settled this vexed question of the nature of vowels. Marage had been able to reproduce vowels with a degree of fidelity by artificial contrivances which had far eclipsed the previous efforts of workers in the same field. He then alluded to a book by Jespersen, who had endeavoured to form an *analphabetic* method of recording sounds by means of letters and symbols. In concluding, he said that just as photography registered the chain of phenomena during time, so phonography (that is, the use of the phonograph) might be used for the registration of sounds. An example of sounds would then be obtained appealing to the sense of hearing. How little could one tell from written characters the exact sounds of Ancient Sanscrit, or how Demosthenes spoke in Greek or Cicero in Latin. It would be interesting to hear the exact accent of old English or Scotch of the fifteenth century. He advocated the registration of dialects, and said that such a collection of phonographic records would help forward the science of languages. At the close of his paper he gave a demonstration, by means of a large phonograph, of the way in which the sounds of that instrument might be intensified by causing the waves to fall upon a microphone, which, in turn, affected a loud-speaking telephone.

It was expected that Professor McKendrick's important demonstration would form the introduction to a discussion upon the subject, and that Dr. Lloyd, of Liverpool, Dr. Pipping, of Helsingfors, and Dr. Boeke, of Alkmaar, would attend the meeting of the Association for this purpose. Unfortunately, however, none of these gentlemen were present; but in their absence Professor Sherrington, who said he had seen in Paris M. Marage's apparatus, after congratulating Professor McKendrick upon his extremely lucid and valuable exposition of the synthetic, or rather synoptic, view of the history and theory of phonetics, observed that Marage's success in the artificial reproduction of the vocal sounds was marvellous, because of the extraordinary striking similitude of the artificially-reproduced vowel sounds to the natural sounds as made by man, especially the *a* and *o* sounds. The apparatus was simple, but M. Marage had been very fortunate in having been able to get models, taken from wax impressions, of the mouth and aural cavity of a human subject at the moments when he was trying to pronounce these vowel sounds.

Lupus Lamps.—It has been proposed to substitute metallic for carbon points in the production of the arc; and experiments on this subject are now being carried out, both in England and abroad.

Treatment of Lupus by Excision.—Reiner (*Wien. med. Presse*, April 8, 15, 22, 29, and May 16, 1900) advocates the treatment of lupus by excision, as being superior to any of the newer methods.

Luminous Heat Baths and Mediterranean Fever.—An extensive trial, so far with highly satisfactory results, is now being made on board H.M. Hospital Ship "Maine," now on the Mediterranean Station, with a view of testing the usefulness of Luminous Heat Baths (Dowsing System) in the treatment of Neuritis and other troublesome sequelæ consequent on Mediterranean Fever.

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VOL. II. NO. 4. OCTOBER 15, 1901.

THE JOURNAL OF PHYSICAL THERAPEUTICS

AN INTERNATIONAL QUARTERLY REVIEW.

Edited by W. S. HEDLEY. *American Editor*, M. A. CLEAVES.

LONDON:
JOHN BALE, SONS & DANIELSSON, LTD.,
Publishers,
83-89, Great Titchfield Street, W.

THE

Journal of Physical Therapeutics

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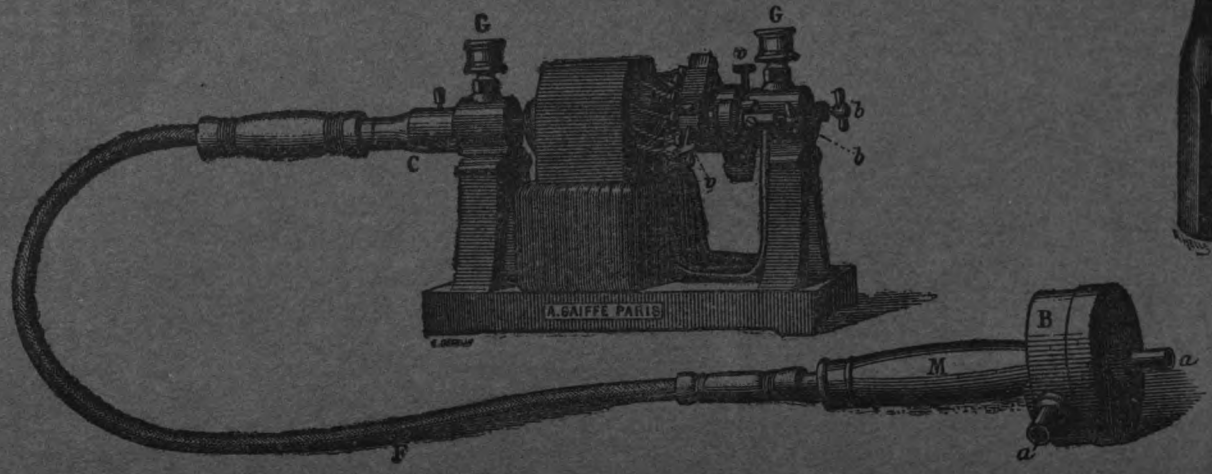

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