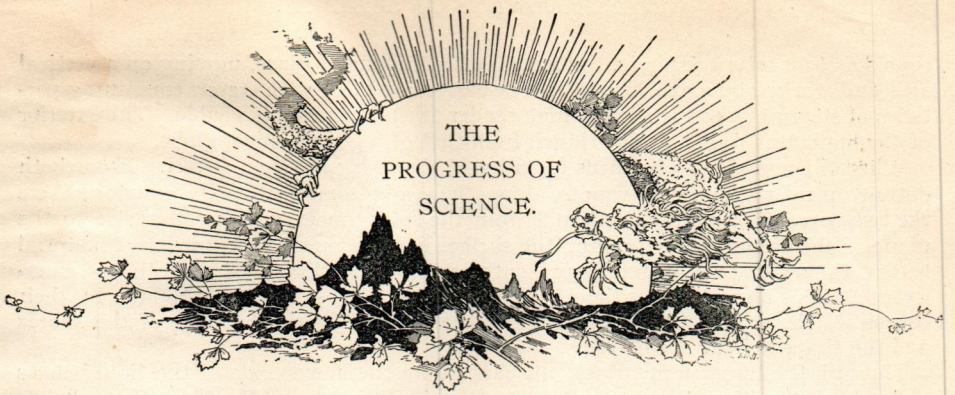


NOBLER than any epitaph carved upon the tombstone of statesman or warrior, are the words fitly spoken by a eulogist of the late Dr. Marion Sims: "That by his wonderful discoveries in the methods of surgical operations and their subsequent treatment, he has added twenty-seven days to the average life of civilized women." In the limited category of such benefactors of the human race as these, the name of Dr. Edouard Seguin should be enrolled, whose discoveries of methods for training children of arrested mental or physical development, have brought intelligence, happiness, and usefulness to thousands of blighted lives. The recent removal of the Seguin Physiological School from New York, and its establishment upon a successful and permanent basis at Orange, N. J., ought to bring vividly to the mind of every educator a sense of the value of this great man's work to humanity. Descended from a long line of eminent physicians in Burgundy, one of the most prominent of the coterie of young French philosophers in the middle of this century, —Ledru-Rollin, Pierre Leroux, Louis Blanc, and Victor Hugo,—a keen thinker, brilliant writer, and forcible speaker, he resolutely set aside the opportunities open to his grasp of placing himself in the front rank of the philosophers and men of letters of France, and devoted himself with a superhuman patience and zeal to the effort "to rend the veil which had hidden the mental perception of the idiot children in the Hospice of Bicêtre, from the eyes of the philosophers of the time." Seguin had found his mission. Patiently he trod and retrod his beaten paths, undaunted by a thousand disappointments, till, at the end of eight years of the severest labor, conducted at his own expense amid prophecies of defeat, he was able to announce to the world that idiocy could be cured; that it was not the result of a deficiency in the power of the brain or the nervous system, but simply the arresting of mental development, occurring before, at, or after birth, and produced by a variety of causes. When asked, "Why do you make the child try the same motions a hundred times a day?" his characteristic response was, "Because she does not make them right in ninety-nine times trying;" and when, finally, through days and weeks of patient devotion upon the part of the master, the idea which he was trying to inculcate, slowly, but certainly, dawned upon the poor, feeble mind, the victory was won. The next idea was conveyed in one-tenth of the time. Thus was the principle established, and the patience, tact, and brave self-denial with which Dr. Seguin toiled from morning till night, unaided, during those eight years with the children of the Bicêtre, were rewarded with the positive proof to the world that an arrested intellect might often be restored even to its normal condition; and this beautiful life of one noble man, cut off all too early, yet not until his work was done, will grow more and more memorable through the ages for the blessings of light, and intellect, and life which it has brought to thousands and thousands of darkened souls.

JOHN S. WHITE.

* * *

A NEW PHYSICAL INSTRUMENT.

THE marine globe, or "apparatus to produce currents similar to sea-currents," consists of a glass globe, under the interior wall of which are constructed the massive outlines of continents and the hollows of sea-basins. The bottom of the sea

consists of an interior sphere, concentric with the one of glass, moving on a vertical axis and worked by a gearing. The sea-basins are filled with water, containing particles of stearine in suspension, which render all its movements visible. The exterior of the apparatus does not differ much from that of a geographical globe.

When the movable globe turns upon itself, the water is seen to start. From both extra-tropical regions it advances, along the sea-bottom, toward the equator; there the two currents, from the north and from the south, meet, and together rise to the plane of the great circle; reaching the surface in a stream that occupies the equatorial belt of the oceans, the waters pour southward and northward of their line of emergence; then, almost immediately borne toward the west, they produce in their course all the secondary currents which are formed by the outlines of the shores and the shapes of the sea-bottoms.

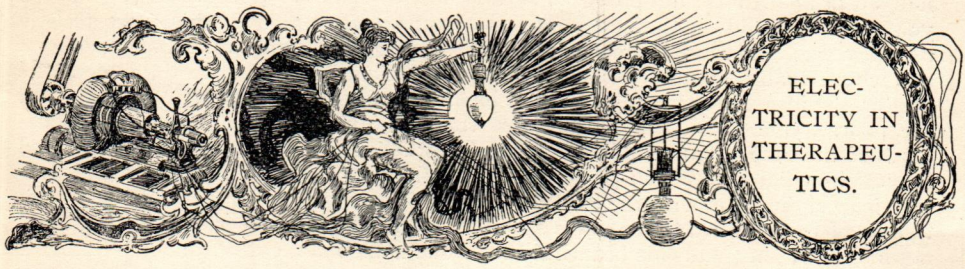
Through the transparent glass, one can follow the movements of the liquid mass and get a better idea of sea-currents than from the finest map. For the best specimens of hydrography seem only dead-letter compared with these real, moving currents, emerging, advancing on the surface, then disappearing in the depths of these miniature oceans, the capacity of which is scarcely more than a few glasses of water.

This apparatus is both a useful plaything for children and an object of serious thought for students. Every young geographer in our primary schools would delight to follow with his eyes, on this little artificial world, the marvellous evolutions of the water of the oceans; every earnest investigator into the phenomena of nature would be surprised at the facts revealed by this simple instrument, and would perhaps be disposed to question the value of certain notions on the physics of the globe which till now he has held without questioning.

The marine globe would facilitate the teaching of geography, so far as the sea-currents are concerned, and the modifications these effect in climate, regardless of latitude; it may also aid navigation, and furnish hydrography with valuable data for the coordinating and completing of the experimental study of marine currents, their origin, their mutual relations, their temperature, their fauna, etc. Finally, it seems to me it may promote the science of physics, because it is, as concerns the liquid element, the material demonstration of this hypothesis which led to its construction: "The liquid element enveloping the solid nucleus of the terrestrial globe, being set in motion by diurnal rotation, receives from this an impulse which, modified by the outlines of continents, produces, in nearly all their details, the currents of the sea."

The Academy of Sciences, and the Bureau of Longitudes, have very favorably received the "marine globes" presented to them by the author.

T. E. ROUGERIE, Bishop of Pamiers.



ELECTRICITY IN THERAPEUTICS.

UNTIL recently, the application of electricity to therapeutics was entirely empirical, no one knew just what happened, or what to expect. There were no means for knowing, with any definiteness, how strong a current was being employed, until there was devised and adopted a system of electrical units with which comparisons could be made. Now volts, and ohms, and ampères are as well known and applicable in medicine as grains and pints.

Formerly, magneto-electric machines, or so-called medical coils, giving intermittent currents, were employed for all sorts of medical purposes; but now continuous

currents have been found to be much more serviceable, and galvanic batteries of many cells, or the current from the electric light wires, are made to do service.

It is interesting to note that the physical effects of a current of electricity are substantially the same in living tissue as they are outside it in inorganic substances. There is first what is called electrolytic action, where molecules are broken up and new combinations arise. Oxygen or acids are set free at the positive electrode, where the current enters, and hydrogen and alkalies are set free at the negative electrode. Then there is next what is called cataphoric action, in which substances are borne along into the tissue in the direction the current goes; and lastly, there is catalytic action, in which chemical reactions take place, because of the mere presence of the current, but in which it apparently takes no part. The physiological effect of the electrolysis in the tissues differs at the two terminals. At the positive, where the current enters, the liberated oxygen or acid has a drying and coagulating effect, so that hemorrhages, ulcerations, and congestions on the skin or mucous surfaces, yield readily to the application. The material of the electrode is here important. Gold, platinum, and carbon do not enter into chemical combination readily, but copper, zinc, and iron form soluble metallic salts, which may be useful or harmful. As they are germicidal, they may be advantageous in parasitic diseases of the skin, glands, or hair follicles. Cataphoric action will make the metallic salts to penetrate deeper, and may thus cause discoloration.

At the negative electrode the liberated products result in softening and saponifying the tissue, and this process is adapted to the removal of warts, moles, hairs, and the destruction of such abnormal tissue as frequently forms over burns, scalds, acid erosions, inflamed surfaces, and canal strictures. Much experience and careful watching are needful for electro-medical treatment, for it is clear that electricity possesses no virtue as such for the cure of anything. It will make as bad ulcers as it will heal, and destroy life as complacently as strychnine or the guillotine.

A. E. DOLBEAR.

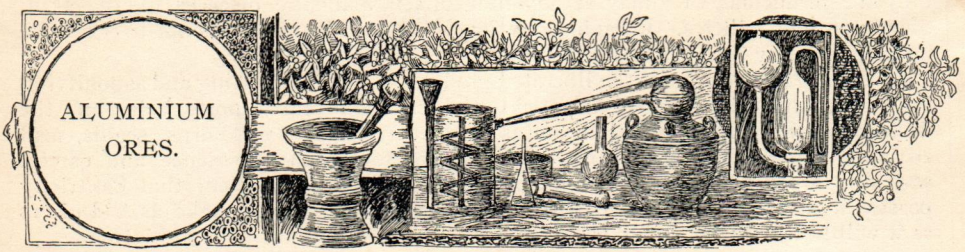
IT is easy to infer that the problem of the sun's temperature is a difficult one, from the fact that the estimates of various reputable authorities range all the way from the millions of degrees contended for by Secchi and Ericsson, to the three, four, or five thousand of Pouillet and Vicaire. The very high estimates, however, are obviously wrong, being based on the hypothesis that the amount of heat radiated by a body is proportional to its absolute temperature. It really increases much more rapidly, as has been known for a long time, and the low estimates referred to are founded upon a purely empirical law deduced from this knowledge,—a law of more than doubtful application to conditions differing so much from those of laboratory experiments. For the past decade the value assigned by Rosetti (about 18,000° F.) has been very generally accepted as the most probable; but within the last two years new investigations by Le Châtelier, in France, and by Wilson and Gray, in Ireland, working by different methods, both apparently improvements on Rosetti's, lead to reasonably accordant values, which are considerably lower,—14,000° and 12,000°.

Within a few months Scheiner, of Potsdam, has come upon a spectroscopic phenomenon which in a general way confirms these results, without, however, deciding between them. Among the lines in the spectrum of magnesium, there are two which

behave in a curiously contrasted way. One of them, having a wave-length of 435.2 microns, is conspicuous in the spectrum produced by the electric *arc*, where the temperature is not far from 6000° F., but is wholly absent from the *spark*-spectrum at a temperature much higher,—probably not less than 20,000°. The other line (wave-length 448.2) is brilliant in the spark-spectrum, and absent in that of the arc.

Now this latter line is very conspicuous as a dark line in the spectra of the great white stars, like Sirius and Vega, and wanting in the solar spectrum, while just the reverse is true of the other. Hence, the obvious conclusion that the white stars are much hotter than the sun, and that the temperature of the sun's absorbing atmosphere is approximately that of the electric arc,—certainly not lower than that, but also certainly not so high as that of the electric spark. As for the photosphere, or shell of incandescent cloud, which constitutes the visible surface of the sun, it must be much hotter than the absorbing atmosphere. It is a pity that the observation does not fix the limit of possibility somewhat more closely, but to do so it would be necessary to determine just the temperature at which one of the magnesium lines gives place to the other, and so far as we now know, it may be anywhere between 6000° and 20,000°.

C. A. YOUNG.



AT first aluminium was produced commercially only from artificial chloride, reduction being effected by metallic sodium; but Deville pointed out that many salts of aluminium could be reduced in the laboratory by the electric current. Later, it was discovered that cryolite, or fluoride of aluminium and sodium, could also be reduced with sodium. This ore is mined in Greenland. Within a few years it has been found that if an electric current is passed through a bath of molten cryolite, or of fluoride of aluminium and calcium, and if oxide of aluminium is added to the bath, this oxide is reduced to the metallic state. This fact gives great importance to natural oxides of aluminium, as a source of supply of the metal. Of these the most abundant and important are the bauxites, hydrated oxides, containing variable quantities of water, and various impurities. They have been discovered not only at Baux, in France, but in other parts of Europe and in North America. In the United States, the mineral has been mined in Arkansas, and in Georgia and Alabama. In 1892 nearly ten thousand tons of the ore were produced in the latter region.

The geological occurrence and origin of Bauxite have naturally attracted the attention of geologists of late, and papers have appeared simultaneously by Mr. F. Laur, on the bauxites of France, and by Mr. C. W. Hayes, on the deposits of the Appalachians. In the Coosa valley, the deposits are largely made up of pea-like grains, a structure strongly suggesting deposition from springs. The ore bodies are invariably found as oval accumulations above a thick mass of aluminous shales, and are intimately associated with a system of faults. Mr. Hayes reaches the conclusion from these and other observations, that the ores are hot spring deposits, a character which he does not suppose attributable to the French ores. Mr. Laur re-discusses the French deposits "after twenty years spent in their exploitation," and concludes that the only theory of their origin to be considered is that of deposition from hot springs. Such a coincidence among workers in different regions is very gratifying, and a careful revision of the circumstances of the occurrence of bauxite in other regions will now be expected. Mr. Laur attributes much of the impurities of bauxite to absorption of other substances analogous to that which takes place in the production of the pigments called "lakes."

GEORGE F. BECKER.