River Drainage," by G. W. Howell, C.E.; "The Improvement of Sanitary Conditions in the Health and Pleasure Resorts of New Jersey," by Dr. Henry Mitchell; "The Climatic Treatment of Gastro-intestinal Diseases in Children," by Dr. Boardman Reed; "The Need of Medical Officers in School Districts," by Dr. G. F. Wilbur; "Physical Culture in the Schools in its Hygienic Bearings," by Professor James M. Green; "The Relation of Conduits to the Healthfulness of Water," by Dr. W. K. Newton; "Tuberculosis," and "Typhoid-Fever in Munich," by Professor S. G. Dixon of the University of Pennsylvania; "The Present Special Sanitary Needs of our Cities," by James C. Bayles, formerly president of the New York City Board of Health. The annual address by the president was on "The Thermometry of Hygiene."

HIGH ALTITUDE TREATMENT OF PHTHISIS. — Tyson offers certain considerations on this topic from climates marked by (1) extreme purity of the air, (2) aerial rarefaction, (3) low relative humidity, and (4) immunity from wind, fog, and miasmal emanations. The cases sent to such climates should be carefully selected. No case should be sent in which there is senile change, laryngeal ulceration, gout, rheumatism, organic nerve-disease, or hysteria. When there is no marked emaciation, severe pyrexia, or kidney complication, Mr. Tyson finds that the cases do well. An important rule is that the patient should live continually in the chosen place, and not return, even for short visits, to lower altitudes. This length of time, as we learn from the *Brooklyn Medical Journal*, he believes should be fully two years. Cold, dry air is stimulating. It is detrimental to all fungous growth. The secretion from a cavity has a tendency to dry up. Its rarefaction increases the number of respirations, and has a considerable influence in permanently expanding the lungs. Slight oozing of blood from the mouth, nose, and throat is common when patients first arrive. It may be that the mucous membranes near the surface of the body become dry, and there may be blood stasis, especially when the air is cold. In the lungs, however, the supply of watery fluid is so great that dryness is impossible, and, at the same time, the air is warm before it reaches the lungs. The removal of watery vapors would even relieve the congestion without bleeding. It may be, however, that the diminished air-pressure tends to draw the blood to the surface, and so cause the bleeding. Mr. Tyson finds that these slight hemorrhages do not harm, and that the membranes soon become accustomed to the changes in the air.

THE ACIDS OF THE STOMACH. — There is no doubt that the chief acid found in the stomach during natural digestion is free hydrochloric acid. According to *The British Medical Journal*, this has been abundantly proved by Bidder and Schmidt, and numerous observers succeeding them. The methods used are, however, too long and too complicated to employ in clinical work. The physician wishes to know what, in a particular case of disease, are the chemical changes going on in the stomach; whether, for example, hydrochloric acid is present, as well as pepsin and organic acids. Now, in the examination of the contents of a diseased stomach, three forms of acid may be present, — hydrochloric acid, a mineral acid; organic acids, such as lactic acid, butyric, etc.; and, thirdly, acid phosphates. It is chiefly of importance to determine the presence of hydrochloric acid and of organic acids. Many methods have been proposed for doing this: they consist mainly in testing the effect of the stomach contents on various colored solutions. Thus a solution of methyl-violet is decolorized by hydrochloric acid, so that, if this re-action is obtained, the free acid is present in the liquid tested. Lactic acid turns the violet a dirty yellow. Tropæolin also is turned deep reddish-brown by free hydrochloric acid. Unfortunately these tests, simple as they appear, are not accurate, since the re-actions are interfered with by the presence of peptones and of some neutral salts; and, as these are usually present in the stomach contents, no reliable results can be obtained by using methyl-violet and tropæolin. They have been superseded by congo-red, which is turned blue by free hydrochloric acid, and by a solution of vanillin and phloroglucin in alcohol, which is turned a deep red by the same acid. These simple clinical tests are, however, rendered useless by the fact that they are interfered with by the presence of peptone, ammonium salts, chlorides, and phosphates. In the present state of our knowledge, therefore, there is no reliable indicator for the presence of free hydrochloric acid in the stomach contents. Other methods which may be used are too complicated for clinical use. Thus ether has the property of dissolving organic acids from a liquid, leaving the mineral acids in solution. It may thus be used for separating the lactic, butyric, and other acids from the hydrochloric acid; and if, in a liquid obtained from the stomach, it is found that ether removes the whole of the acids present, it may be concluded that no free hydrochloric acid is present. In many cases this conclusion would be an important one as a clear indication for a line of treatment. Dr. Leo has lately published a new method for the indication of free hydrochloric acid which may prove useful. Leo considers the case where it is only a question of the presence of free hydric chloride and of an acid phosphate. To a few drops of the stomach contents a pinch of carbonate of calcium is added. If the acidity, as tested by litmus-paper, disappears, only a free acid is present; but, if the liquid is still acid after the addition of the chalk, an acid salt is present. If, moreover, organic acids be present, they must be first removed by shaking with ether before the chalk is added. It does not seem that Leo's method is one that can be applied at the bedside, because the detection of free hydrochloric acid is chiefly requisite in those cases in which organic acids are also present, as in cases of dilated stomach. At present, indeed, a ready method, suitable in clinical practice for the detection of free hydrochloric acid in organic liquids, is a desideratum.

CHOLERA IN PERSIA. — A correspondent of the *Bulletin Medical*, writing from Teheran, says that cholera in a virulent form exists throughout the valley of the Euphrates, and it is feared that it will become epidemic in Persia.

CREMATION IN PARIS. — The cremation furnace in Père-la-Chaise Cemetery, in Paris, is now complete, says *The Medical Record*, and the prefect of the Seine has approved the scale of charge to be enforced thereat. The charge for the use of the cremation furnace is to be fifty francs, which sum includes the keeping in the columbarium of the funeral urn containing the ashes for a period of five years.

BICARBONATE OF SODIUM IN MILK. — Hitherto it has been deemed permissible to add soda bicarbonate to milk to assist in its preservation, but now the Council of Hygiene of the Seine has condemned the practice as one of danger. The transformation of milk-sugar into lactic acid, in milk so adulterated, gives rise to a lactate of soda which is purgative, and frequently a source of almost uncontrollable diarrhœa in infants: consequently the council, in its bulletin, decides that "soda shall no longer be permitted in milk, which is an aliment of the first order, and very often prescribed for invalids and children."

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## ELECTRICAL NEWS.

### The Transmission of Visual Images by Electricity.

A FRENCH electrician endeavors to solve the question of seeing at a distance by electricity, by means of a combination consisting of a selenium cell, a gas-telephone, and revolving mirrors, forming a special apparatus which he designates a "phoroscope," and which he discusses in *La Lumière Electrique* as follows.

The question of seeing at a distance by electricity is governed by the two following fundamental principles. In order to get the impression of the form, outlines, and details of one or several objects, it is not necessary (1) that the eye should receive all the rays proceeding from it; (2) that it should receive, at the same time, the luminous rays necessary for vision.

Some very simple examples will demonstrate the first principle. We can see an object very clearly through wire gauze, and the image is perfect if the interstices are large and the wire fine. Carpets and mosaic seen at a certain distance do not seem to be formed of a number of parallel lines, nor by the juxtaposition of little stones. An engraving, a picture, or especially a chromo-lithograph, show at a distance no discontinuity in the work, although the engraving is composed of lines, and the chromo-lithograph of separate little dots. We see thus that it is possible to have a sufficiently clear

perception of an object by the vision of a system of more or less luminous lines forming a kind of pattern.

The second principle is quite as well known, and is deduced from the duration of the luminous impressions upon the retina, a period of about one-tenth of a second. A series of impressions succeeding one another in a very short time produces the effect of simultaneous impressions; and it follows, that, in order to perceive the image which we have called the pattern, it is sufficient to receive the luminous impressions of the different lines that constitute it in an interval of time less than one-tenth of a second.

It was by taking this principle as a basis that Lissajous studied from an optical point of view the vibratory movements of bodies. His experiments are so well known that we need not enter into them here. Lissajous's curves are produced in a rectangular portion of a picture. If, on the other hand, this object possesses the power of illumination, all the rays proceeding from the space occupied by the curve will, in an exceedingly short space of time, converge at one point after having been subjected to a double reflection on the mirrors of the two tuning-forks that were employed for this experiment.

We may substitute for these forks any movable system whatever, bearing a series of mirrors arranged in such a manner that the displacement of each of them brings upon the same straight line all the rays projected from a portion of an illuminated object. Let us suppose these mirrors to be placed on a circle turning upon an axis perpendicular to its plane, and each of them making a different angle near 90° with this plane. To each mirror there will be a corresponding series of parallel lines in the picture; and, if the rotation is sufficiently rapid, all the rays proceeding from the object represented in the picture will meet at the same time, in as short an interval of time as required. It is thus possible to bring to one point all the luminous rays proceeding from a pattern; and, each portion of the image thus producing its impression upon the retina in succession, it is sufficient that the interval in which these impressions succeed one another should be sufficiently short for them to be rendered simultaneous.

The transformation of the luminous waves into electric currents is performed by means of a radiophonic receiver forming part of an electric circuit. This receiver may be a cell of selenium, lampblack, hydrogenated palladium, etc., the resistance of which varies with the quantity of light received. The different portions of the pattern will act differently, according to the quantity of light emanating from them, and in an interval of time less than one-tenth of a second. The variations of resistance of the circuit will correspond to the image observed.

In order to solve the opposite problem, i.e., to produce this image from the circuit at the receiving station, the writer proposes to employ the gas-telephone, which is an instrument of extreme sensitiveness. It consists of an ordinary telephone in which the portion comprised between the plate, the bobbin, and the inner sides, is in communication with a gas-pipe. The vibrating membrane is pierced in the centre with a little hole, through which escapes the gas, which is lighted. This little flame will undergo a variation in brilliancy at each movement of the membrane, and it will produce a continuous succession of rays similar to those converging upon the radiophonic receiver. In order to show them, and form an image similar to the pattern, a system of mirrors is employed similar to that used at the first station, but acting in the reverse way. It is evident that these two apparatus must act synchronously, like the Hughes and Baudot regulators employed in telegraphy. Station 2 will reproduce upon a sheet the lines taken upon the image at Station 1.

To sum up, the operation of this theoretical "phoroscope," as it is called, is as follows. The different parts which have been described being properly combined, the image to be transmitted is broken up into a series of parallel lines, the different points of which act in succession upon a selenium cell, varying the intensity of the current connecting the two stations. These variations in electrical intensity are transformed by the gas-telephone into variations of luminous intensity, and the successive changes of brilliancy of the little flame are projected upon a sheet at points corresponding to the various points of this sheet. Theoretically, nothing can prevent this double transformation of luminous intensity into electric intensity, but the realization of the experiment is surrounded with difficulties which make us fear that it will be long before a practical phoroscope is produced; but this should not discourage enterprising and persevering physicists.

## NOTES AND NEWS.

LYDIA W. SHATTUCK, for over forty years teacher of botany in Mount Holyoke Seminary, died recently at an advanced age.

— Professor Daniel Kirkwood, for many years a professor of astronomy in the Indiana State University at Bloomington, has removed his residence to near Riverside, in southern California.

— Dr. George M. Sternberg of the army will deliver a lecture before the Brooklyn Institute on Dec. 26. He has selected for his subject "The Methods of Research in Bacteriology," to be illustrated by living forms of bacterial life thrown upon the screen.

— C. F. Wheeler of Hubbardston, Mich., has been appointed assistant in the botanical department of the Experiment Station at the Michigan Agricultural College, in place of Eugene Davenport, who has been elected professor of agriculture in the same institution.

— At the Johns Hopkins University a society of medical students has been organized on the plan of those in Berlin, the object being to bring the men of the various departments into closer connection, to stimulate original research, and to protect the claims of priority of work done by the members.

— Mr. Austin Corbin's game-forest on Croydon Mountain, New Hampshire, has been enriched, says *The American Field*, by the arrival there last week of a carload of buffaloes, two elks, a moose, deer, and a small band of antelopes. The buffaloes were shipped from Winnipeg, Man., by Buffalo Jones, who herds them there.

— The great astronomical event of this month will be the total eclipse of the sun, Dec. 22. Various governments have sent out parties to observe the eclipse itself, the United States steamship "Pensacola" having taken a well-equipped party from the United States to St. Paul de Loando, on the west coast of Africa, for this purpose.

— The greatest depth found by Capt. Spratt in the western Mediterranean basin was between Sicily, Sardinia, and Africa (about 10,600 feet). According to *Nature*, recent measurements in the eastern basin by Commander Magnaghi of the Italian Navy have yielded, as maximum depth, 13,556 feet, between the Islands of Malta and Candia.

— A brief outline of the rapid advancement that the practical application of electricity has made in the last few years is presented in "Everybody's Hand-Book of Electricity," by Edward Trevert, published by Damrell & Upham, Boston. The book is a paper-covered twenty-five cent volume, and treats briefly of electricity and magnetism, dynamos, electric lamps and motors, electric railways, electric welding, measuring instruments, galvanic batteries, and electric bells. It also contains a good glossary of electrical terms, and some useful tables for incandescent wiring.

— In June of the present year a series of observations on the velocity of the wind at the top of the Eiffel Tower was commenced. For this purpose there was erected on the tower, at a height of 995 feet above the ground, an autographic anemometer, constructed by Messrs. Richard Brothers of Paris, another of these instruments being at the same time put up at a station situated 1,650 feet from the foot of the tower, the height in this case being about 69 feet above the ground. Up to the 1st of October last, *Engineering* states, complete observations had been obtained for 101 days; and from these it appears that, on an average, the velocity of the wind is about 3.1 times as great at the more lofty station as it is at the lower. Moreover, the breeze at the top is always fairly strong, as, during the whole of the summer months in which observations were taken, the average velocity of the breeze throughout any given day always exceeded 23 feet per second, and during 21 per cent of the whole period of the observations this average daily velocity was upwards of 33 feet per second. No great storm seems to have occurred during the time over which the observations extend, and we do not know the maximum wind-velocity registered during this time.