In morphology a review would be ineffective which did not go somewhat deeply into detail. The splendid hypothesis of Schwendener, of the composite nature of lichens as a commensal union of *Algæ* and *Fungi*, has gradually won its way into acceptance. In England there is little of the first rank which calls for note except the researches of Bower on the production of sexual organs on the leafy plant in ferns without the intervention of an intermediate generation.

In vegetable physiology there seems a pause. The purely physical line of inquiry, as already suggested, seems to have yielded its utmost. The more biological line of inquiry has only yet begun to yield a foretaste of the results which will undoubtedly ultimately flow from it.

Something must be added as to systematic and geographical botany. The "Genera Plantarum" of Bentham and Hooker, the work of a quarter of a century at Kew, affords a complete review of the higher vegetation of the world, and has been accepted generally as a standard authority. To Bentham also we owe the completion of the "Flora Australiensis," the first complete account of the flora of any great continent.

In geographical botany, perhaps the most interesting results have been the gradual elaboration of a theory as to the distribution of plants in Africa, and the botanical exploration of China, of the vegetable productions of which, twenty years ago, almost nothing was known.

In the classification of the lower plants, perhaps the most interesting result has been the happy observations of Lankester upon a colored bacterium, which enabled him to show that many forms previously believed to be distinct might be phases of the same life-history.

In geology probably the greatest advance has been in the application of the microscope to the investigation of rock-structure, which has given rise to a really rational petrology. All except the coarser-grained rocks were only capable of being described in vague terms. With modern methods, their crystalline constituents are determinable, however minute, and the conditions under which they were formed can be inferred.

It is impossible, even in a brief review of this kind, to think only of what has been won, and to ignore the loss of leaders who were once foremost in the fray. In England three names which will never be forgotten have been removed from the muster-roll. Darwin, Joule, and Maxwell can hardly be at once replaced by successors of equal eminence. As the need arises, however, men will no doubt be found adequate to the emergency, and it is at least satisfactory to know that they will appeal to a public more capable than heretofore of appreciating their efforts.

The support afforded by the governments of western Europe to scientific investigation has been markedly increased within the period which we survey. France has largely extended her subsidies to scientific research, while Germany has made use of a large part of her increased imperial revenue to improve the arrangements for similar objects existing in her universities. The British Government has shown a decided inclination in the same direction: the grant to the Royal Society for the promotion of scientific research has been increased from £1,000 to £4,000 a year; while subsidies have been voted to the Marine Laboratory at Plymouth, to the Committee on Solar Physics, to the Meteorological Council, and quite recently to the university colleges throughout the country; of which last it is to be hoped that a fair proportion will be devoted to the promotion of research rather than to the reduction of class fees.

Twenty years ago, England was in the birth-throes of a national system of primary instruction. This year has seen the state recognition of the necessity of a secondary and essentially a scientific system of education, and the Technical Instruction Act marks an era in the scientific annals of the nation.

The extension of scientific teaching has gone on rapidly within and without our universities. Twenty years ago the Clarendon Laboratory at Oxford was approaching completion, and was the only laboratory in the country which was specially designed for physical work. Now, not only has Cambridge also its Cavendish Laboratory, but both universities have rebuilt their chemical laboratories, both have erected buildings devoted to the study of biology, and the instruction of students in both zoölogy and botany has taken a characteristic practical form which we owe to the system of concentrating attention on a series of selected "types" introduced by Rolleston and by Huxley. Oxford has been furnished with an astronomical observatory by the liberality of Warren de la Rue, and Cambridge has accepted the noble gift of the Newall telescope. Nor have such proofs of the vitality of science been confined to the universities.

Twenty years ago the Owens College was a unique institution. Now, united with two thriving colleges in Leeds and Liverpool, it forms the Victoria University; while science is studied in appropriate buildings in Birmingham, Newcastle, Nottingham, and half a dozen towns beside.

A race is thus springing up which has sufficient knowledge of science to enforce due recognition of its importance; and public opinion can now, far more than in the past, be relied on to support its demands. Fortunately, too, these can be authoritatively expressed. The Royal Society wields, if it chooses to exercise it, an enormous power for good. Admitted on all hands to be the supreme scientific authority in this country, its decisions are accepted with a deference which can spring only from respect for the knowledge and scrupulous fairness by which they are dictated. If sometimes it moves slowly, it is delightful to turn from the babble of the politicians to the study of an institution which does its work well, and perhaps too noiselessly. But even the House of Commons, hitherto ignorant and therefore apathetic in matters scientific, is awakening to the fact that there are forces to be reckoned with, and impulses to be stimulated and controlled, which are of more enduring import to the national welfare than mere party politics. And the people, too, are beginning to see that it is to the economic working of these forces, and to the right direction of these impulses, that their representatives are bound to give attention. True it is that another generation may possibly pass away before either the House of Commons or even ministers are sufficiently instructed in science to recognize fully their responsibility in this direction.

Whatever, then, the future may bring, the last twenty years have been characterized by progress both steady and rapid. The tide flows on with no sign of check, and we accept the success of *Nature* in no spirit of self-gratulation, but as a straw by which the speed of the current may be gauged.

HEALTH MATTERS.

Ozone in the Treatment of Phthisis.

RANSOME records the treatment of thirteen cases of pulmonary tuberculosis by the inhalation of ozone. Each cylinder used contained seven litres of pure oxygen ozonized up to nine per cent. No other treatment was employed. The cases represented various stages of the disease, and were all under observation for more than one year. The author says that the results obtained were a continuous freedom from fever, absence of night-sweats, diminished expectoration, and great gain in weight and strength.

The author believes that ozone does not act as a direct germicide, and that the control over the disease does not seem to come from any direct action upon the tubercle bacillus. It acts by restoring tone to diseased portions, and has a beneficial effect on the general health.

In the paper the daily notes are given of each case. As the *Brooklyn Medical Journal* observes, one can hardly find the author's conclusions in these notes. In one case, certainly, the inhalations caused a fresh bronchitis, and emesis also ocurred in others. These patients, perhaps, would have improved quite as much if no ozone had been given, as they received good care and good food. The author offers the treatment as giving the best results as yet obtained.

NEW JERSEY SANITARY ASSOCIATION. — The New Jersey Sanitary Association met in the State House, Trenton, on Nov. 22 and 23. The officers were Dr. Dowling Benjamin of Camden, president; and Dr. D. C. English of New Brunswick, secretary. Papers were read on the following subjects: "The East Orange Sewage-Disposal Works," by C. P. Bassett, C.E.; "The Passaic

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."

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