

Dr. Coulter's work is richly and excellently illustrated, a number of the illustrations being original. For this reason, and, further, because the author touches on questions elsewhere treated only in much larger works, the book may be found useful to such students as can employ it, as Dr. Coulter intends, merely to supplement the theoretical and practical instruction of a competent teacher.

#### OUR BOOK SHELF.

*B. Eyferth's Einfachste Lebensformen des Tier- und Pflanzenreiches. Naturgeschichte der mikroskopischen Süßwasserbewohner. Dritte, vollständig neubearbeitete und vermehrte Auflage. Von Dr. Walther Schönichen und Dr. Alfred Kalberlah. Pp. 700. Taf. 16. (Brunswick: Benno Goeritz, 1900.)*

THIS new edition of Eyferth's work will no doubt be of great use to students of microscopical forms of both vegetable and animal life. It includes representatives of most of the European families and genera of minute plants and animals, and there are sixteen excellent photographic plates giving typical illustrations of the genera. The nomenclature adopted for the botanical sections is that of Engler and Prantl in their "Natürliche Pflanzenfamilien," and the authors state that all recent additions to this branch of scientific literature have been taken into consideration, more especially with regard to results and conclusions arrived at by special workers at the various groups. The species enumerated, and to which are appended short descriptions, are stated to be representative ones about which there is no uncertainty of determination; but in the family Desmidiaceæ the species included are by no means representative, many of the very commonest ones being left out in preference for others which are uncommonly rare and hardly likely to be observed by the ordinary student of microscopical forms of life, for which person the book is undoubtedly written. One also wonders at the inclusion of Naegeli's genus *Oocardium* amongst the Desmids, and the presence of such useless genera as *Holocanthum*, *Schizocanthum*, *Pleurotaeniosis* and *Pleurenterium*, which are introduced directly from Engler and Prantl. A most typical genus of the blue green algae—*Gloeochaete*—is placed in the Rhodophyceæ, and so is *Porphyridium*, which has most claim to be regarded as a reddish form of a blue-green, *Aphanocapsa*-like alga. The animal sections are given rather more completely than the vegetable, but the nomenclature of the Sarcodina seems to be considerably erroneous. The systematic position of *Hydrurus foetidus* amongst the Protozoa is truly remarkable.

G. S. WEST.

*Handbook of British, Continental and Canadian Universities, with special mention of the Courses open to Women. Supplement for 1901. Compiled for the Graduate Club of Bryn Mawr College by Isabel Maddison, B.Sc., Ph.D. Pp. 70. (Pennsylvania: Bryn Mawr College, 1901.)*

THIS is a supplement to a handbook published in 1896 to show the courses open to women in universities. As practically all European universities and colleges are now open to women, the original title was modified when a new edition was called for in 1899, and the book has become a short guide showing for the benefit of men as well as women the university systems, requirements, &c., of various countries. The present supplement contains corrigenda and addenda, bringing the handbook up to date as regards the lists of professors, lectures and the constitutional changes. Though the book is not to be compared with the *Minerva Jahrbuch* in point of value for reference, it may be of service to educationists interested in the facilities for the higher education of women.

NO. 1656, VOL. 64]

#### LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

#### The Subjective Lowering of Pitch.

MR. SHERWOOD (p. 233) seems to have misunderstood my meaning. I did not intend to imply that a singer should be conscious of his own flatness (*i.e.* if loudness causes subjective lowering of pitch), but that his voice, being relatively loud to himself, should sound to him flatter than it really is; and that he would try to counteract the impression by singing sharp. This is the reverse of experience. A singer having a good ear for external music, but singing flat, evidently hears his own voice *sharper* than it really is. Such a singer keeps his voice up better in a chorus, or when the accompaniment is loud enough to produce a subjective impression as strong as that of his own voice.

Malvern, July 14.

F. J. ALLEN.

#### Phototherapy.

AS stated in NATURE, July 11, p. 259, Prof. Finsen of Copenhagen proposed, in 1893, that patients suffering from small-pox should be kept in rooms from which the chemical rays of light are excluded by means of red curtains or red glass. He was anticipated in this treatment by John Gaddesden, who wrote the famous medical treatise "Rosa Medicinæ," and died A.D. 1361. He cured a son of King Edward I. of small-pox by wrapping him in scarlet cloth in a bed and room with scarlet hangings. He says of the result, "est bona cura; et curavi eum in sequenti sine vestigio variolarum," "Dict. of Nat. Biogr.," and "Biographie Générale." M. H. CLOSE.

#### THE CONGRESS ON TUBERCULOSIS.

FOR some time past most elaborate preparations have been made for this Congress, and latterly it was feared that, owing to the postponement that was necessary on account of the death of Queen Victoria, the attendance, especially of workers from abroad, might be seriously affected. Fortunately, this anticipation has not been realised, and from the list of delegates and the number and importance of the papers promised there appears to be every prospect of a most successful and useful series of meetings.

If the work of the Congress was to be of an educational nature, it could scarcely be hoped that much time could be devoted to new work; and that it would be educational in the best sense of the word soon became evident. Certainly few congresses have succeeded in arousing such interest in matters affecting the health and general welfare of the community.

From the King, who gave his patronage, to the numerous municipal representatives and delegates of learned and philanthropic societies all classes seem to be represented; and that the interest aroused is not merely on paper is evident from the list of those who were present at the opening meeting on Tuesday. The Duke of Cambridge presided at the command of the King, and was supported by the American Ambassador and other Ministers and Ambassadors, the Duke of Northumberland, Earls Derby, Cawdor, Spencer and Cadogan, Lord Lister, the Lord Mayor and a whole host of distinguished scientific men. The Colonies were well represented by Lord Strathcona, Sir Andrew Clarke, Sir Walter Peace and others, whilst the Foreign delegates numbered between two and three hundred. The work of bringing a goodly company together had evidently been in competent hands. Will the work of the Congress be equally good? So far this question may be answered in the affirmative; and should the rest of the meetings be as successful as those of the first and second days, the Congress will have thoroughly justified its existence.

The Secretary General in his opening report referred to the Pathological Museum as one of the chief educational works of the Congress, and there can be little doubt that no such collection of tuberculous specimens has ever before been brought together. Every known tuberculous lesion in man and in the lower animals is illustrated, and every bacillus that in the smallest degree resembles the tubercle bacillus is represented. Classical specimens of Potts, Addison and Astley Cooper are all shown, and of specimens of later date a really typical collection has been made. After other features in the history of the Congress had been alluded to by the Secretary General, the Congress was declared open and a telegram was sent to the King. An answer to this telegram, wishing the Congress all success, came before the close of the meeting. The delegates were then addressed by the Marquis of Lansdowne, Earl Cadogan, the Lord Mayor of London, Lord Strathcona and Lord Lister, whose remarks are reported by the *Times* as follows:—

He said they met under immeasurably happier auspices than could possibly have been the case not many years ago. Thanks to the labours of the illustrious man who would address the general meeting on the following day, they now knew the enemy they had to deal with, which before the discovery of the tubercle bacillus was shrouded in impenetrable obscurity. They also knew, thanks to Pasteur, that that microbe was incapable of originating *de novo* in the human body; that, while some constitutions were more prone to its invasion than others, it must always be derived from similar organisms in the external world. Hence there came to be opened up the splendid prospect of the prevention of tuberculosis. But it was by no means only prevention that they were looking at. They also aimed in the present day at the cure of consumption. In this respect matters were very much more hopeful than they had been till quite recently. The physician might learn a great deal in this point of view from the experiences of the surgeon. There were a great many surgical complaints which they now knew to be just as much tubercular as pulmonary consumption—that was to say, they were just as much due to the growth of the tubercle bacillus. Yet the surgeon knew that in many of these cases the disease might be completely cured; that, in consequence of the means—of which they were getting to know more and more every day—which the animal organism had of resisting microscopic invaders, the tubercle bacillus was not only arrested in its progress, but swept away altogether, and the result came to be a healthy state of the tissues and parts in which it was. These experiences showed that tuberculosis was not necessarily an incurable disease. That was an immense point to have demonstrated. Thus, they were not surprised to learn that physicians were coming to look upon the cure of consumption more hopefully than they used to do, by treating it on recognised principles and on the same broad, general lines as surgical tuberculosis. For his own part, as a surgeon, he had had cases of pulmonary disease brought but little under his notice; but he had been surprised, even in his limited experience, at the numerous cases among his own patients in which people who many years ago had consumptive lungs had subsequently become free from all traces of the disease and had lived healthy, robust and useful lives. These cases he ventured humbly to regard as cases of cure of consumption. Then there were attempts now being made by the use of various specific means to deal with consumption even in its more advanced forms. He must not refer to that at the present time further than to say that some of them at least had very promising aspects. They might be sure that these means would be most carefully considered by the Congress, and he need not say how cordially he hoped and anticipated that their deliberations would be fraught with good. There was another point in which he believed the Congress would be useful besides the concentrated wisdom of the eminent men who had come as delegates to take part in it. If the prevention of tuberculosis was to be effectively carried out, the general public must aid the physician and the surgeon in the endeavour. He anticipated that that splendid gathering of scientific men from all parts of the world, meeting under Royal patronage, for which he might venture to express their profound gratitude, would indicate to the public the vast importance of the work they were engaged

in and would lead to their cooperation in the endeavour to minimise and possibly eventually to stamp out entirely the greatest scourge of the human race.

Some idea of the standing of the delegates may be gathered from the following list of those who were presented to H.R.H. the Duke of Cambridge, and who spoke, each on behalf of his nation:—Prof. Osler, from the United States of America; Prof. von Schrötter, Austria; M. le Sénateur Montefiore Levi, Belgium; Prof. Charles Gram, Denmark; Prof. Brouardel, France; Prof. von Leyden, Germany; Prof. Thomassen, Holland; Prof. Frédéric Koranyi, Hungary; Sua Eccellenza Senator Enrico di Rienzi, Italy; Prof. Holmboë, Norway; Prof. Cortezo, Spain; Prof. Hofmarshal Printzsjöld, Sweden; Dr. Louis Secretan, Switzerland. Greece and Roumania were also represented, as well as the Universities and all the medical societies and public health bodies in the kingdom.

The work of the Congress has been arranged in four sections. In the first all questions concerning the relations of the State and municipalities to the prevention of tuberculosis are to be discussed, and if the number of papers announced is any criterion, little should remain undiscussed at the conclusion of the Congress. The second section deals with medicine, including climatology; the third with pathology, including bacteriology; and the fourth with tuberculosis in animals.

In addition to the purely sectional work, three general addresses will be given. The first of these, by Prof. Koch, of Berlin, dealing with the preventive measures to be taken in connection with tuberculosis, is printed in full in this number; Prof. Brouardel, of Paris, will give the second address; and Prof. McFadyean, of the Royal Veterinary College, the third. Prof. Koch is also announced to open a discussion on tuberculin—a discussion that should be of a very interesting character.

The "social" programme is unusually attractive, but in no way interferes with the efficient working of the important or business meetings of the Congress. We shall watch with interest the further proceedings of the Congress.

#### THE LIQUEFACTION OF HYDROGEN.

THE liquefaction and solidification of hydrogen form the last of the definite stages, so far, in the progress towards the absolute zero of temperature. To make the account of this stage clear, it will be necessary to compare it briefly with those which preceded it.

During the third decade of the last century, Faraday found that, whereas different substances have different boiling-temperatures at ordinary pressure, or different condensation-pressures at ordinary temperature, the lowest boiling point could be lowered further by reducing the pressure artificially. Thus by exhausting with a vacuum-pump the vapour from a vessel containing solid carbonic acid, he was able to obtain cold intense enough to liquefy a large number of gases exposed to the low temperature and, at the same time, to considerable pressure. This may be called the vaporisation method of cooling. Pictet in 1877 showed how its effect might be intensified by using the cold so obtained by the low-pressure boiling of one substance, such as sulphur dioxide, to condense at high pressure some more volatile gas, such as carbonic acid, the subsequent boiling of which at reduced pressure would produce a further reduction of temperature. The successive falls of temperature obtained in this way have caused this to be known as the cascade system of refrigeration. Pictet himself thought that by this means he succeeded in liquefying and solidifying hydrogen, and, though this was probably a mistake, the method has proved a very useful one. By the choice of more suitable substances, carbonic acid and ethylene,