

they require. Kellner and his school have devised a method which measures the starch equivalent by experiment, a much more satisfactory and practical method than any system which depends purely on calculation.

An animal or a number of animals are kept on a maintenance diet so that their weight remains constant. To this diet is added a known weight of starch, and the increase in weight observed. The animal or animals are then placed again on the same maintenance diet for some time, and then a known weight of the food to be tested is added, and the increase in weight again observed. The data thus obtained indicate that so many pounds of starch produce as much increase in live-weight as so many pounds of the food under experiment, from which it is easy to calculate how many pounds of starch are actually required to produce as much increase in live-weight as 100 lb. of the food under experiment. The starch equivalent thus found expresses an experimentally determined fact which is of immediate practical value in arranging a dietary, its value, however, depending on the accuracy with which it has been determined. Kellner and his colleagues have thus determined the starch equivalents of all the commonly used foods. Their values for concentrated foods, and other foods commonly used in Germany, have been determined with considerable accuracy, and with the method which has also been devised for defining the relation between the experimentally determined equivalent and the equivalent calculated from the analysis by means of a formula, they form by far the most trustworthy basis for arranging a feeding ration including such kinds of foods.

But roots, which form the staple of the diet of fattening animals in Great Britain, are not used on the same scale in Germany, and Kellner's starch equivalents for roots have not been determined with sufficient accuracy or under suitable conditions to warrant their use for arranging diets under our conditions.

This, and the fact that the term starch equivalent is so widely misunderstood, is no doubt the reason why the Kellner equivalent has not been more generally accepted in Great Britain. An advance will be made in the practice of feeding as soon as the starch equivalent of roots has been accurately determined under our conditions, when the Kellner equivalents will no doubt come into general use.

I have now reached the end of my survey. I recognise that it is very incomplete, and that I have been compelled to neglect whole subjects in which important work has been done. I venture to hope, however, that my words have not been altogether unprofitable. It is somewhat difficult to summarise what is in itself really nothing but a summary. Perhaps, however, I may be allowed to point out once more what appears to me to be the moral of the last twenty years of work in agricultural science.

The many practical field and feeding tests carried out all over the country have demonstrated several very striking results; but, if they are to be continued with profit, more trouble must be taken to insure accuracy. Farmers are ready to listen. It behoves us more than ever to found what we tell them on accurate results.

Besides such practical trials, however, much has been done in the way of individual scientific work. The results thus obtained, as, for instance, Russell and Hutchinson's partial sterilisation of soils, Biffen's new wheats, and Beaven's pure Archer barley, are of practical value to the farmer as immediate as the most practical field trial, and of far wider application.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The Herbert Spencer lecture will be delivered by Prof. C. Lloyd Morgan, F.R.S., professor of psychology in the University of Bristol, on Friday, November 7. The subject of the lecture will be:—"Spencer's Philosophy of Science."

DR. O. W. RICHARDSON, F.R.S., professor of physics in Princeton University, New Jersey, has been appointed as from January 1 next to the Wheatstone chair of physics at King's College, London, in succession to Prof. C. G. Barkla, F.R.S.

MRS. W. BAYARD CUTTING and her children have (says *Science*) given 40,000l. to Columbia University for a fund in memory of the late W. Bayard Cutting, who served as trustee of the University from 1880 until his death, in 1912. The income of this fund is to be applied to the maintenance of travelling fellowships, open to graduate students of distinction in letters, science, law, and medicine or engineering.

STUDENTS who are working privately with the object of graduating in the University of London will welcome the "London University Guide and University Correspondence College Calendar, 1914," published by the University Correspondence College, London, and distributed gratuitously. The first part of the volume constitutes the guide, and contains the regulations for the examinations leading to the various degrees to be held by the University of London in 1914 and 1915. The calendar, 1913-14, which completes the volume, gives particulars of the facilities offered by the University Correspondence College to students who desire assistance in their work through the post.

A VERY useful form of pocket diary, which covers the academic year beginning with October, 1913, instead of commencing with January in the usual way, has been published by the Cambridge University Press. Though concerned more particularly with events in the work of the University of Cambridge, the diary will appeal to all whose work is in connection with colleges or schools. The diary is published in three forms, at 1s. net, 2s. net, and 2s. 6d. net respectively. From the same source we have received "The Cambridge Diary for the Academic Year 1913-14," in block form. Each sheet contains seven days, and ample space is provided for manuscript notes of engagements. The price of this diary is 1s. net.

THE establishment of new universities in Germany was one of the chief topics of discussion at the recent congress of German university teachers held at Strasbourg. The movement was strongly opposed in a report presented by Prof. Bücher, of Leipzig. According to this, many corporations, with the encouragement of the Ministry are endeavouring to raise the status of existing institutions to that of university rank. The preponderance of government in such institutions would be municipal, and consequently university independence would be endangered, and, in addition, a high academic standard would not be maintained. Overcrowding of the existing universities was advanced as an argument in favour of the creation of new institutions, but the organisation of such universities as those of Berlin and Leipzig enabled them to deal with large numbers without any detriment to the teaching. Prof. Kaufmann, of Breslau, remarked that quite 40 per cent. of the students were unsuited for an academic training, and the creation of new institutions would in no way relieve overcrowding at the older universities, but simply increase

the total number of students. Many teachers, however, were strongly in favour of the movement, contending that the establishment of universities in the large industrial and commercial centres was an essential and necessary element in modern conditions of life. It was a movement which should be strenuously supported. Side by side with this question arose that of the standard required for the doctorate. The congress considered it should be made imperative for all universities to demand a thesis embodying independent and original research work from the candidate.

THE second annual report of the King Edward VII. British-German Foundation states that there is an increase in the expenditure, due to a larger number of cases assisted, and to the fact that several of the permanent allowances have been raised. We learn from *The Times* that in accordance with the terms of the trust deed, which provides for an annual joint sitting of the two sections of the foundation, alternately in England and Germany, the first joint conference was held last September, at Sir Ernest Cassel's residence in London. The question of the best way of employing the surplus funds was discussed, and it was agreed finally to adopt the following resolution:—"That a certain proportion of the surplus funds of the German section be employed in enabling British subjects to attend or visit universities, schools, institutes, or business establishments in Germany, or to reside in Germany, and that a certain proportion of the surplus funds of the British section be employed in enabling Germans to attend or visit universities, schools, institutes, or business establishments in the United Kingdom, or to reside in the United Kingdom." It is hoped that this scheme will serve to assist students who are not possessed of the necessary means in pursuing a course of studies abroad, and give them an insight into the customs and character of the German people, affording them an opportunity of making lasting friendships with Germans, and thus help in promoting a good understanding between the two nations. The second joint conference of the two sections was held in Berlin on October 25. Its main object was to discuss the merits of the scheme of studentships and the desirability of continuing it.

### SOCIETIES AND ACADEMIES.

#### PARIS.

**Academy of Sciences, October 20.**—M. F. Guyon in the chair.—**Pierre Termier**: The Ar excursion of the twelfth International Geological Congress: the Appalachian region of Canada.—**R. Lépine** and **M. Boulud**: The presence, in the vascular walls, of a ferment setting free a reducing sugar at the expense of the virtual sugar of the blood, and capable of hydrolysing phloridzin. These experiments show that the vascular walls possess a new function, hitherto ascribed to the liver alone.—**Léon Lichtenstein**: Some applications of the notions of functions of an infinity of variables in the calculus of variations.—**François Lukács**: Laplace's series.—**Pierre Idrac**: Experimental researches on the *vol plané*. Photographic experiments with small balloons show that in places where birds are capable of hovering flight there is an ascending current of air with velocities of the order of 3 to 4 metres per second. This corresponds to the magnitude of the velocity of air currents in the *vol plané* of an *aéroplane*.—**R. Fortrat**: An abnormal Zeeman phenomenon with the sodium doublet,  $\lambda=2853$ . The use of a ferro-cobalt electromagnet, made according to the indications of P. Weiss, enabled the author to place an ordinary spark in a field of 49400 Gauss. The experimental results obtained agree closely with the theory of Voigt.—**Raoul Dupuy**: Functional arte-

rial hypertensions. Pseudo-arterio-sclerosis. A discussion of the means of differentiating arterio-sclerosis from functional hypertension.—**P. Chaussé**: The path of penetration of the tuberculous virus in the calf and the tuberculigenic power of cow's milk. Inhalation is the usual mode of tuberculous infection in the young calf; intra-uterine infection must also be taken into consideration, since the latter furnishes an important proportion of the graver cases. Although the calf is much more exposed than the adult animal to infection through the alimentary canal, this is relatively the least important mode of infection. The milk of the cow is not the cause of infection of the calf to any great extent.—**J. Danysz**: The use of some new medicinal combinations in the treatment of trypanosomiasis. A compound obtained by the action of silver nitrate upon arsenobenzene, was found capable of sterilising the blood of rabbits infected with Surra by a single injection. *Trypanosoma rhodesiense* was more resistant but succumbed to a mixture of the above reagent with trypan red.—**Jules Amar**: The physiological effects of work and the degree of fatigue.—**R. Anthony**: The experimental study of the factors determining the cranial morphology of mammals deprived of teeth.—**J. Chaîne**: The *ilots* of the Termites.—**M. Lemoigne**: The butylene-glycollic fermentation of glucose by staphylococci.—**Lucien Mayet** and **Jean Pissot**: The discovery of the engraved bone of a mammoth showing a human figure, in the upper Aurignacian layer of La Colombière, near Poncin. The drawing described would appear to be the first engraving of man of the middle Quaternary epoch.—**Jean Boussac**: The geological constitution of Haute-Tarentaise.—**F. Dienert**: Remarks concerning some experiments with fluorescin.

### BOOKS RECEIVED.

Records of the Indian Museum. Vol. viii., Zoological Results of the Abor Expedition, 1911-12. Part 3. September. Pp. 191-231+plates. (Calcutta.) 2 rupees.

Memoirs of the Indian Museum. Vol. iv., No. 1, An Account of the Crustacea Stomatopoda of the Indo-Pacific Region, based on the Collection in the Indian Museum. By S. Kemp. Pp. 217+plates. (Calcutta.) 15 rupees.

Über Natronzellstoff: seine Herstellung und chemischen Eigenschaften. By Dr. C. Christiansen. Pp. v+154. (Berlin: Gebrüder Borntraeger.) 5 marks.

Einführung in die Mykologie der Gebrauchs- und Abwässer. By Dr. A. Kossowicz. Pp. vi+222. (Berlin: Gebrüder Borntraeger.) 6.60 marks.

Handbuch der Morphologie der Wirbellosen Tiere. Edited by A. Lang. Zweite Begw. Dritte Auflage. 4 Band, 3 Lief. (Jena: G. Fischer.) 5 marks.

A Text-Book of Quantitative Chemical Analysis. By Dr. A. C. Cumming and Dr. S. A. Kay. Pp. xi+382. (London: Gurney and Jackson.) 7s. 6d. net.

Elementares Praktikum der Entwicklungsgeschichte der Wirbeltiere mit Einführung in die Entwicklungsmechanik. By Dr. O. Levy. Pp. viii+183. (Berlin: Gebrüder Borntraeger.) 5.60 marks.

Conseil Permanent International pour L'Exploration de la Mer. Investigations on the Plaiice. General Report. By Dr. F. Heincke. I., The Plaiice Fishery and Protective Regulations. First part. Pp. 153+xxxv+iv plates. Rapports et Procès-Verbaux des Réunions. Vol. xv. Juillet 1911-Juillet 1912. Pp. viii+167. (Copenhagen: A. F. Høst et Fils.)

Technological Museum, Sydney. Technical Education Series. No. 18, Cabinet Timbers of Australia. By B. F. Baker. Pp. 186+lxviii plates. (Sydney.)

Les Lois Empiriques du Système Solaire et les Har-