

(β) The water to which the specific gravity is referred must be at some other definite temperature, e.g. 60° F., or possibly 4° C., the temperature of maximum density. Thus, if 85° F. as before be the standard temperature of the instrument and 60° F. that of the water, the specific gravity of the liquid at 85° F. is referred to water at 60° F.

III. (α) The liquid to be tested must be at the standard temperature of the instrument.

(β) The graduations are such that they give the value which would be found for the specific gravity of the liquid if it were cooled or heated to some other temperature and referred to water at that² temperature. Thus the standard temperature of the instrument might be 85° F. The instrument would then be used at 85° F., but the graduations on the instrument would be such as to give the specific gravity which would be found for the liquid if it were cooled to 60° F., and referred to water at 60° F.

The following table gives the specific gravities of certain sugar solutions, as determined in accordance with these various methods, assuming coefficients of expansion as given in tables issued by the Kaiserliche Normal Eichungs-Kommission of Berlin :—

Solution	I. Specific gravity at 85° F. in terms of water at 85°	II. Specific gravity at 85° F. in terms of water at 60°	III. Specific gravity at 60° F. in terms of water at 60°*
Water ...	1·0000	0·9968	1·0000
Solution A...	1·0496	1·0462	1·0500
„ B...	1·0989	1·0954	1·1000
„ C...	1·1484	1·1447	1·1500

* In this case the liquid to be at 85° when tested, but the instrument is to give its specific gravity when cooled to 60° in terms of water at 60°.

Thus, taking solution C, and supposing in each case the liquid is at 85° F., the instrument will float immersed up to a definite division on the stem. In method I. this division would be marked 1·1484, in method II., 1·1447, and in method III., 1·1500.

Thus there would be a difference of 1·6 degrees of specific gravity between I. and III., and of 5·3 degrees between II. and III., and it is clearly necessary to specify the method of graduation.

There is one obvious objection to the use of method III. In order to graduate an instrument correctly it is necessary to observe its immersion in a liquid at the standard temperature, and then calculate from a knowledge of the coefficient of thermal expansion of the liquid and of its density at some given temperature what its specific gravity at some other temperature will be, and what mark therefore should be put on the stem. No doubt tables could be made up to do this for various liquids and temperatures, but from the point of view of a standardising institution it is preferable that the errors of graduation which have to be determined in the case of instruments sent for test should rest only on observations made during the test and not on a knowledge of the coefficient of expansion of the liquid in which the instrument is to be used.

The instrument is correctly graduated only for a liquid having one definite coefficient of expansion, and cannot be used without error for others.

Of the other two methods, I. and II., method I. has been the usual practice at Kew. The liquid under test and the water to which it is referred are both taken to be at the standard temperature of the instrument, and this, in ordinary practice in England, is

² A fourth variation might be added by requiring that in this case the water should not be at the temperature to which the liquid is cooled or heated.

about 60°. No. II. has the advantage that the reference temperature of the water is fixed and gives results in agreement with the usual definition of specific gravity, which assumes a fixed temperature for the water.

These notes are circulated with the view of eliciting opinions from makers and users, and also of obtaining information from other countries.

The director of the National Physical Laboratory will be glad to have an expression of opinion from people interested in the subject.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BRISTOL.—On the nomination of the Society of Merchant Venturers, in the college of which the faculty of engineering of the University is provided and maintained, the council has appointed the Right Hon. Sir William Mather, P.C., a member of the board of that faculty, in succession to the late Sir William H. White, K.C.B.

CAMBRIDGE.—The following awards are announced: Harkness Scholarship (geology) for 1913, J. M. Wordie, St. John's College. Frank Smart prizes, J. Line, Emmanuel College (botany); D. J. Gray, King's College (zoology). Wiltshire prize (mineralogy) for 1913, E. V. Appleton, St. John's College; honourable mention, W. E. Evans, St. John's College.

ST. ANDREWS.—The Senatus Academicus has resolved to confer the honorary degree of LL.D. on the following:—Lieut.-Col. Sir Chas. H. Bedford, Dr. George Albert Boulenger, F.R.S., Mr. J. Balfour Browne, K.C., Mr. F. Cornwallis Conybeare, Prof. Herbert J. C. Grierson, and Prof. W. R. Hardie.

THE issue of the *London University Gazette* for June 4 gives particulars of the advanced lectures in scientific subjects which have been arranged during the present month for students of the University and others interested. Of those lectures which have still to be delivered may be mentioned a special lecture on the work of the Carnegie Nutrition Laboratory in Boston, to be given in the Physiological Laboratory of the University, South Kensington, on June 20, at 5 p.m., by Prof. F. G. Benedict, director of the Carnegie Laboratory. The admission to the lecture is free, without ticket.

THE report of the council for the year 1913 to the members of the City and Guilds of London Institute provides full statistics and particulars of the subscriptions and donations of the great City companies to the institute since its inauguration. The total amount given to the institute during thirty-four years for the purposes of higher education reaches 889,139l. Three of the companies—the Goldsmiths', Clothworkers', and Fishmongers'—have each given above 120,000l.; eight others have each contributed above 20,000l. and other five more than 10,000l. The most recent gift is that of the Goldsmiths' Company towards the extension of the City and Guilds (Engineering) College, which is incorporated in the Imperial College of Science and Technology. During the year under review the Goldsmiths' Company supplemented by a further sum of 37,000l. its original gift of 50,000l., which was commented upon in the last report of the council.

THE King Edward VII. British-German Foundation, instituted by Sir Ernest Cassel, decided last year to assist a number of young men of British nationality to prosecute special studies in Germany after the completion of their studies at one of the British universities. The council of the British sec-

tion of the foundation has just awarded seven studentships with this object in view, and from the list of successful candidates, published in *The Times*, we notice that four of the students will proceed in Germany with scientific research as follows:—Mr. F. H. Smith, Pembroke College, Cambridge, chemical research; Mr. R. S. Wishart, Edinburgh University, chemical research; Mr. A. Cowe, Edinburgh University, neurology and gynæcology; Mr. S. G. Barker, Imperial College of Science and Technology, London University, scientific research in vapour pressures. The studentships are for one year and of the value of 175*l.*, and a condition of their tenure is continuous residence in Germany for this period. The cost of these will be defrayed by the German section of the foundation, while the British section is bearing the expense of a limited number of German students who, under a corresponding scheme, will visit this country in the autumn.

In a communication from *The Times* correspondent at Toronto on June 5, it is announced that the report of the Royal Commission on Industrial Training and Technical Education in Canada, instituted three years ago, has now been made public. The report suggests that a fund of 600,000*l.* be provided annually by the Dominion for a period of ten years, and be divided among the provinces on the basis of population for the promotion of higher technical education and industrial training, while for elementary schools teaching manual training and domestic science a grant of 70,000*l.* a year for ten years is recommended. The report also proposes the establishment in each province of a board qualified to carry on industrial training. It advocates the provision of suitable and adequate apparatus and equipment for teaching purposes, the foundation of scholarships for students, the engagement of experts with experience in industrial training, and the creation of central institutions to supplement the work carried on by the provincial and local authorities. Workers in factories whose main task is to attend or to operate machines should, it is suggested, receive instruction which would develop all-round skill and increase their interest beyond the routine of automatic operations. Such training should be provided as will conserve and develop occupations in which skilled handicraft is required. The interests of the rural population should be preserved so far as possible by industrial training and technical education suitable to the needs of its workers. The needs of girls and women for organised instruction and training in housekeeping and home-making under modern industrial conditions should be recognised. The report also recommends that schools for fishermen should be established, and that provision be made for instruction in packing and curing. The distinguishing characteristic of the report is the attention which it gives to the problems of the rural communities.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 12.—Sir Archibald Geikie, K.C.B., president, in the chair.—Commendatore G. Boni: Address on recent researches on the Palatine, in relation to geology, ethnology, and physics.—J. G. Thomson and D. Thomson: The growth and sporulation of the benign and malignant Tertian malarial parasites in the culture tube and in the human host.—Sir David Bruce, Majors D. Harvey and A. E. Hamerton, and Lady Bruce: (1) *Plasmodium cephalophi* sp. nov. (2) The trypanosome causing disease in man in Nyasaland. II., Susceptibility of animals to the human strain. (3) Trypanosome diseases of domestic animals in Nyasaland. I., *Trypanosoma simiae* sp. nov.

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Part ii., The susceptibility of various animals to *Trypanosoma simiae*. (4) Trypanosome diseases of domestic animals in Nyasaland. I., *Trypanosoma simiae* sp. nov. Part iii.

Zoological Society, June 3.—Prof. E. W. MacBride, F.R.S., vice-president, in the chair.—Sir Arthur H. Church: Notes on turacin and the turacin-bearers. This paper contains a summary of the chief facts as to the composition, properties, and occurrence of turacin, the soluble crimson pigment of the Musophagidæ. Special stress is laid upon its constancy of composition, the limitation of its occurrence to certain plant-eaters, and the relation of its spectrum to the spectra of hæmoglobin and chlorophyll. Some current errors concerning turacin are corrected.—Dr. P. Chalmers Mitchell: Observations on the anatomy of the shoe-bill (*Balaeniceps rex*). The author showed that *Balaeniceps* and *Scopus* shared so many anatomical characters, and of these so many occurred also in storks, that if the reasoning generally followed by anatomical ornithologists were adopted, *Balaeniceps* and *Scopus* must be placed with storks rather than with herons. He submitted, however, that such a method was irrational, unless it were accompanied by a much closer scrutiny of the value of the characters than had hitherto been made or was yet possible, and that for the present *Balaeniceps* must be regarded as the representative of a division equivalent to storks and herons. He thought also that the relation of the Steganopods to these three groups required reconsideration.—T. H. Withers: Some Miocene Cirripedes of the genera *Hexelasma* and *Scalpellum* from New Zealand. An account is given of the "gigantic Cirripede" of New Zealand, originally described as *Scalpellum aucklandicum*, of which remains have long been known to occur in the Waitemata Beds (Miocene) of Motutapu Island, Auckland Harbour.—Prof. A. Dendy and R. W. Row: The classification and phylogeny of the Calcareous sponges, with a reference list of all the known species, systematically arranged. This memoir aims at a complete revision of the genera of Calcareous sponges. Fifty recent genera are recognised and diagnosed, and all the described species, amounting to 433, are arranged under these genera. The rejected generic names, which are listed separately, amount to ninety-seven. The fifty accepted genera are grouped in ten families, and Poléjaeff's subdivision into Homocœla and Heterocœla is abandoned.—Surgeon J. C. Thompson: Contributions to the anatomy of the Ophidia.—Prof. T. Wingate Todd: Observations on Osteomalacia in the zoological collections of Manchester and Cleveland.

Linnean Society, June 5.—Prof. E. B. Poulton, F.R.S., president, in the chair.—Miss L. S. Gibbs: A contribution to the flora and plant-formations of Kinabalu and the highlands of British North Borneo.—H. Scott: The Histeridæ of the Percy Sladen Expedition to the Seychelles.—Mme. Weber van Bosse: Red marine algæ from the Indian Ocean.—J. G. Needham: Myrmeleonidæ.—W. L. Distant: Rhynchota from the Seychelles. Part I., Heteroptera.—Prof. R. J. Harvey Gibson: *Mystropetalon*, Harv.

Mathematical Society, June 12.—Prof. Love, president, in the chair.—Sir J. Larmor: The electromagnetic force on a moving charge in relation to the energy of the field.—Prof. E. Laudau: Einige Ungleichungen für zweimal differenzierbare Funktionen.—G. H. Hardy and J. E. Littlewood: (1) The fractional part of $n^k\theta$. (2) The trigonometrical series associated with the elliptic θ -functions.—Dr. T. J. P.A. Bromwich: Foucault's pendulum.—J. Hammond: A certain definite integral.