This we have already been promised, and while the conditions of test and the limits permissible are settled after consultation with the manufacturers, the enforcement of those conditions and the power to refuse the licence rest with an independent body. Such a plan, it seems to me, is far preferable to the alternative under which an association of the manufacturers would run its own testing laboratory.

A similar scheme is clearly applicable to other industries. For engineering work the standards of the Engineering Standards Committee are mostly adopted. The laboratory holds the standard screw gauges of the committee as well as the rail templates and other similar standards. Some organisation whereby standards employed locally for testing purposes are controlled by the laboratory and kept in close correspondence with those at Teddington ought not to be difficult to devise, and would secure much of what is needed, though with screw gauges at present identity of the method of testing rather than of the standard of comparison is what is difficult to secure.

Or, again, with electrical instruments, supply meters, ammeters, voltmeters, and the like can be, and are, sent to the laboratory, and where high accuracy is required this must be done. Very large sums depend now on the measurement of the energy supplied from central stations to big works, tramway systems, collieries, and other large installations, and very high accuracy is needed. This, too, is true in the case of acceptance tests of large machinery. The necessary accuracy can be obtained only in a properly equipped laboratory, and, indeed, in the case of meters, an individual test is always necessary, but where the type has been tested and approved the individual tests could be carried out by inspectors at the works, or at some convenient local institution. And there are many pieces of apparatus and small plant which could be dealt with in a similar manner to the chemical glassware.

The Engineering Standards Committee has specified the performance tests for motors and dynamos requisite before the term "British standard" can be applied to them. It is clearly impossible to expect that every small motor should have been put through these tests. It would be quite simple to arrange that some limited number of the type were tested out at the National Physical Laboratory, that steps were taken, by inspection and occasional tests, to secure that in subsequent production the same standard was attained; and, so long as this was done, to license the manufacturer to put the E.S.C. mark on his machine, and call it a "British standard machine."

The process can be extended to other electrical products; it has already been suggested for lamps, and four years ago I had good hopes that some action of the kind would be taken—1914 stopped it for the time. I would urge that now is the time to develop a scheme of the kind so that we may be ready when once more peace reigns on earth among men of good will.

The scheme is a large one, one that as director I cannot hope to see fully developed. It is enough perhaps for me to have indicated how the laboratory may grow, both as a National Research Laboratory and as a National Proving House and Standardising Laboratory.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

MISS PHYLLIS M. BORTHWICK, lecturer in physics at the Ladies' College, Cheltenham, has been appointed assistant-professor of physics and chemistry at the Lady Hardinge Medical College for Women, Delhi.

ON the first Saturday of each month from May to October, at 3.30 p.m., free public demonstrations on practical bee-keeping will be given in the Horniman Gardens or the Museum, Forest Hill, S.E., by Mr. W. H. Prior, of the Kent and British Bee-keepers' Associations.

M. PAUL OTLET's article in the *Revue générale des Sciences* for February last on "The Future of the International Catalogue of Scientific Literature" contains a short account of the foundation of the catalogue and some proposals for its future development. The vast experience which M. Otlet has acquired at the International Institute of Bibliography at Brussels entitles his opinion on such a subject to respect. It is, however, difficult to reconcile his statement that "before the war the German Government had decided to withdraw from the International Catalogue" with the fact that at the meeting of the International Council of the catalogue held in London on June 11 and 12, 1914, about six weeks before the war broke out, the representative of the German Government, Dr. Uhlworm, proposed the resolution:—"That the International Catalogue of Scientific Literature shall be continued during the years 1916–20," which was adopted by the council. M. Otlet would like to see the International Catalogue extended to include technology, industrial sciences, medicine, agriculture, social sciences, philology, literature, the fine arts, history, geography, philosophy, and religion. In view of such extension he thinks the work of the regional bureaux in the various co-operating countries should no longer be controlled by scientific societies, but undertaken by the authorities of the National Library in each country. M. Otlet suggests that in view of the continual increase in the number of scientific journals, authors should agree not to publish original papers in any periodical that was not included in a list drawn up by mutual agreement. In order that subscribers to the catalogue may be in possession of the latest information, M. Otlet recommends that the index-cards received at the Central Bureau should be printed and issued at once. As each volume appeared, the cards corresponding with that volume would be destroyed by the subscribers, who need keep only such cards as had not yet been published in a volume.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 21.—Sir J. J. Thomson, president, in the chair.—Dr. C. **Chree**: The magnetic storm of December 16–17, 1917, as recorded at Kew and Eskdalemuir Observatories. The magnetic storm of December 16–17, 1917, was of very considerable though not outstanding magnitude. It commenced between 8h. and 9h. on December 16, and had not wholly subsided before the afternoon of the following day. Attention is directed in the paper to the curves for the twenty-four hours commencing at 8h. on December 16. The most active period of disturbance was between 15h. (3 p.m.) on December 16 and 4h. on December 17. A prominent feature in the curves was a succession of oscillations of periods averaging about twenty minutes. There were also, especially at Eskdalemuir, some very large short-period oscillations. The paper compares the oscillations recorded at the two observatories, and gives estimates of the rate of change of the magnetic elements during the most rapid movements. The amplitude and rapidity of the changes proved to be much greater at the more northern station. —E. A. **Owen**: The absorption of X-rays. (1) The absorption coefficients of a number of substances for a radiation of wave-length $0{\cdot}586 \times 10^{-8}$ cm. (the α-line of palladium) have been determined, and the values

obtained confirm those of Bragg and Pierce in the case of elements used in common. (2) The atomic fluorescent absorption coefficient is proportional approximately to the fourth power of the atomic number of the absorber. (3) The following relation exists between the atomic fluorescent absorption coefficient, atomic number of the absorber, and the wave-length of the radiation absorbed, $fa = CN^4\lambda^3$, where C is a constant over certain ranges, but changes abruptly at critical points. This relation is independent of the scattering coefficient; it refers only to the loss of energy of X-radiation by the production of corpuscular radiations and the fluorescent X-radiations that accompany them. (4) Calculations based on the above general relation show that the molecular total absorption coefficients of different substances observed by Auren with radiation of wave-length $0{\cdot}35 \times 10^{-8}$ cm. may be deduced very approximately from the atomic total absorption coefficients obtained for different elements with radiation of wave-length $0{\cdot}586 \times 10^{-8}$ cm. if the coefficient of scattering be assumed to have a constant value of 0·2 for all elements from hydrogen to bromide for both these radiations.

Linnean Society, March 21.—Sir David Prain, president, in the chair.—Miss B. Muriel **Bristol**: A Malayan form of *Chlorococcum humicola* (Naeg.), Rabenh. Cultures were made in October, 1915, from about sixty specimens of soil, the observations now reported being obtained from Kajang, near Kuala Lumpor, Malay States, after about two years in a closed specimen-tube; the soil was placed in a mineral-salt solution and allowed to remain under the room-temperature. In June, 1916, growth of the soil-alga began, and its life-history is now set out, tracing it from the vegetative cells, which are solitary or congregated into globular clusters. Later, multiplication by zoogonidia was observed, with their fusion forming zygotes, also by aplanospores, but true vegetative division does not take place. The same alga was found in soil-cultures from English localities, in some cases of considerable age. Thus a sample from Rothamsted Experimental Station taken in 1856 yielded the alga, but a sample taken in 1846 did not, so that presumably a period of seventy years marks the extreme limit of revival.

Zoological Society, March 19.—Dr. A. Smith Woodward, vice-president, in the chair.—Miss Maude L. W. **Cleghorn**: First report on the inheritance of visible and invisible characters in silkworms.

Mineralogical Society, March 19.—Mr. W. Barlow, president, in the chair.—Prof. E. S. **Federov**: Graphical operations with four independent variables. *A propos* of Boeke's suggestion of the use of multi-dimensional geometry for such operations, with special reference to the case of the chemical constitution of tourmaline, the author remarks that he had already put forward a similar suggestion, without, however, making use of imaginary dimensions. A system of points is replaced by a system of vectors, and in this way, since each end of a vector has two co-ordinates, a relation between four independent variables may be expressed graphically. Different series of vectors of the first order give rise to vectors of the second order, and they in their turn to vectors of the third order. Certain special cases were discussed.—Prof. R. P. D. **Graham**: Lattice-like inclusions in calcite from North Burgess, Ontario. The calcite, which is almost invariably twinned about $e(01\bar{1}2)$, contains numerous fine needles, arranged parallel to the edges of the rhombohedron *e*, of a hydrous magnesium silicate, which chemical analysis showed to correspond with the formula $5MgO.6SiO_2.4H_2O$, which is usually assigned to the mineral spadaite. Since the needles are only slightly acted on by cold dilute acid, they remain behind in the form of a lattice on dissolution of the calcite. Other included minerals are pyroxene, quartz, titanite, and pyrites. The source of the solutions which supplied the magnesium silicate was discussed.—Dr. J. W. **Evans**: Linear rock-diagrams. The different types of linear or variation diagrams, in which the chemical constituents of different rocks are represented by vertical distances, were reviewed, and the use of modifications to indicate the probable mineral compositions was proposed. Each rock is represented by two diagrams. In the first or alumina diagram, distances representing the molecular proportions of (1) the potash, (2) the potash and soda, and (3) the potash, soda, and lime in each rock are measured vertically upwards from the base line, and corresponding points for different rocks are connected by continuous lines. At the same time distances representing (4) the alumina, (5) the iron oxide, and (6) the magnesia are measured on the same lines in the same manner, and are connected by continuous lines. Not only will this diagram indicate the proportions of the constituents, but also the position of the points on line (4) relative to those on lines (2) and (3) will indicate the probability of the occurrence of minerals dependent on the amount of alumina. If (4) is higher than (3), andalusite, cordierite, or mica may be expected, as well as hypersthene, all the lime being converted into anorthite. If (4) is less than (3), diopside, augite, or the corresponding amphiboles will probably be present, and, if it is less than (2), minerals of the ægirine type may be found. In the second, or silica, diagrams the lowest series of points shows the amount of silica required by the bases of a rock for the formation of leucite, nepheline, anorthite, wollastonite, and olivine, the second series the additional silica necessary to form orthoclase and albite, and the third series the amount required to convert the olivine into hypersthene, while the fourth line represents the amount of silica actually present. The position of the last relative to the others will throw valuable light on the silicates that may be expected, though allowance must be made for the influence of the bases on one another. For instance, the presence of the constituents of wollastonite will call for a higher silicification of part of the olivine to form a monoclinic pyroxene or amphibole at the expense of the felspars.

MANCHESTER.

Literary and Philosophical Society, March 19.—Mr. W. Thomson, president, in the chair.—Prof. G. Elliot **Smith**: Race, character, and nationality. The influences of race and heredity, geographical circumstances, and language, though potent in various directions to affect the character and achievements of individuals and to play a part in the development of the true spirit of nationality in a community, are not the chief factors. The personal experience of each individual, his social environment, and especially the traditions of his community, shape his outlook on life, determine his character, and give specific directions to his inherited aptitudes. The most powerful forces that mould nationality and weld together a heterogeneous collection of people of varied origin, abilities, and traditions consist of historical circumstances which provide the community with common aims and aspirations, common traditions and social fashions, common trends of thought and modes of behaviour. Such circumstances play a more vital part than mere race or hereditary aptitudes in the development of the spirit of nationality.

PARIS.

Academy of Sciences, March 18.—M. Paul Painlevé in the chair.—The president announced the death of Lord Brassey, correspondant of the Academy for the section of geography and navigation.—P. **Termier**: Contribu-

tion to the knowledge of the tectonics of the Asturias: anomalies at the contact of the Coal Measures and the Arnao Devonian.—P. A. **Dangeard**: The nature of the chondriome and its *rôle* in the cell. Current views on the nature and function of the chondriome are questioned, and new facts based on a method of staining with cresyl-blue are given. This stain can be applied in such a manner that there is no interference with the life of the cell. It is shown that, contrary to the generally accepted view, the chondriome of the cell is altogether independent of the plastidome.—E. **Ariès**: A formula giving the saturated vapour pressure of a diatomic liquid. An extension of the method described in previous communications for monatomic liquids. Chlorine and carbon monoxide are worked out as examples.—M. G. Kœnigs was elected a member of the section of mechanics in succession to the late M. H. Léauté.—M. T. **Beritch**: The convergence and divergence of series with real positive terms.—A. **Buhl**: The intervention of the geometry of masses in certain theorems concerning algebraic surfaces.—L. **Schlussel**: The measurement of rapid and irregularly variable dynamical actions.—B. de **Fontviolant**: New theory relating to the effects of the wind on bridges.—D. **Eydoux**: The movements of water in equilibrium pipes.—A. B. P. **Leme**: A new method of quantitative analysis. Suggestion for a new arrangement of spectrograph for quantitative work.—A. **Mailhe** and F. de **Godon**: A new method of preparation of monomethylaniline and dimethylaniline by catalysis. A mixture of the vapours of methyl alcohol and aniline is passed over alumina at a temperature between 400° and 430° C., when a mixture of monomethylaniline and dimethylaniline is obtained, containing only traces of aniline. By a repetition of the process with addition of methyl alcohol, dimethylaniline is obtained. The new method has the following advantages over the process in current use: the aniline may contain water and the methyl alcohol need not be specially purified from acetone; also the use of autoclaves and high pressures is unnecessary.—E. **Léger**: The action of hydriodic acid upon cinchonine and on its isomers, cinchonigine, cinchoniline, and apocinchonine.—L. **Gentil**, M. **Lugeon**, and L. **Joleaud**: The existence of a Triassic sheet in the Sebou basin, Morocco.

BOOKS RECEIVED.

Medical Electricity. By Dr. L. Jones. Seventh edition, revised and edited by Dr. L. W. Bathurst. Pp. xv+588. (London: H. K. Lewis and Co., Ltd.) 15*s*. net.

The Nature of Solution. By H. C. Jones. With a Biographical Sketch by Prof. J. E. Reid, and Tributes by Profs. Arrhenius, Ostwald, and Woodward. Pp. xxiii+380. (London: Constable and Co., Ltd.) Price 12*s*. 6*d*. net.

The Megalithic Culture of Indonesia. By W. J. Perry. Pp. xiii+198. (Manchester: At the University Press; London: Longmans, Green, and Co.) Price 12*s*. 6*d*. net.

Aeronautics in Theory and Experiment. By W. L. Cowley and H. Levy. Pp xi+284. (London: E. Arnold.) Price 16*s*. net

Essays in Scientific Synthesis. By Eugenio Rignano. Pp. 254. (London: G. Allen and Unwin, Ltd.) Price 7*s*. 6*d*. net.

Lecithin and Allied Substances: The Lipins. By Dr. H. Maclean. Pp. vii+206. (London: Longmans, Green, and Co.) Price 7*s*. 6*d*. net.

Thirty-first Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1909–10. Pp. 1037. (Washington: Government Printing Office.)

DIARY OF SOCIETIES.

MONDAY, APRIL 8.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The Future of the Albanian State: Capt. J. S. Barnes, R.F.C. (leave permitting).

ARISTOTELIAN SOCIETY, at 8.—Value and Existence: Dr. F. C. S. Schiller

TUESDAY, APRIL 9.

ROYAL INSTITUTION, at 3.—Scientific Signalling and Saiety at Sea: Prof. J. Joly.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—The Derwent Valley Water works: E. Sandeman.

ZOOLOGICAL SOCIETY, at 5.30.—Head of the Charasinid Fish, *Hydrocyon goliath*: Dr. G. A. Boulenger.—The Variation of the Pit-Viper, *Lachesis atrox*: Miss J. B. Procter.

RÖNTGEN SOCIETY, at 8.—The Silvanus Thompson Memorial Lecture: Sir Ernest Rutherford

WEDNESDAY, APRIL 10.

ROYAL INSTITUTION, at 3.—Scientific Signalling and Safety at Sea: Prof. J. Joly.

BRITISH ASSOCIATION GEOPHYSICAL COMMITTEE (Royal Astronomical Society), at 5.—Earthquake Waves: Prof. H. H. Turner and Dr. G. W. Walker.—Earthquake Frequency: R. D. Oldham.

THURSDAY, APRIL 11.

ROYAL INSTITUTION, at 3.—Experimental Psychology: Lt.-Col. C. S. Myers.

INSTITUTION OF ELECTRICAL ENGINEERS (Cancer Hospital, Fulham Road), at 6.—Joint Meeting with the Electrical Section of the Royal Society of Medicine.—Papers on Medical Electricity.

INSTITUTION OF MINING AND METALLURGY, at 5.30.—Presidential Address: Hugh F. Marriott.

OPTICAL SOCIETY (Imperial College of Science and Technology, South Kensington), at 8.—The Balsam Problem: J. W. French.

FRIDAY, APRIL 12.

ROYAL INSTITUTION, at 5.30.—Absorption and Phosphorescence: Prof. E. C. C. Baly.

ROYAL ASTRONOMICAL SOCIETY, at 5.

SATURDAY, APRIL 13.

ROYAL INSTITUTION, at 3.—Musical Instruments Scientifically Considered: Prof. E. H. Barton.

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