scholars are to devote themselves exclusively to study and research in some branch of science, the extension of which is important to the industries of the country. The nominating institutions and the scholars are as follows:—University of Glasgow, W. C. Henderson; University of Aberdeen, A. Ogg; Mason College, Birmingham, T. S. Price; University College, Bristol, E. C. Fortey; Yorkshire College, Leeds, H. M. Dawson; University College, Liverpool, H. E. Annett; University College, London, J. E. Petavel; Owens College, Manchester, J. L. Heinke; Durham College of Science, Newcastle-on-Tyne, J. A. Smythe; University College, Nottingham, G. B. Bryan; University College of Wales, Aberystwyth, S. W. Richardson; University College of North Wales, Bangor, D. Williams (conditional appointment); Queen's College, Galway, J. Henry; University of Toronto, A. M. Scott; Dalhousie University, Halifax, Nova Scotia, D. McIntosh; University of New Zealand, J. A. Erskine.

The following scholarships granted in 1895 have been continued for a second year on receipt of a satisfactory report of work done during the first year:—

Nominating institution.	Scholar.	Places of study.
University of Glasgow.	W. Stewart.	Universities of Glasgow and Berlin.
University of St. Andrews.	H. C. Williamson.	Marine Laboratories, Naples and Kiel.
University College, Dundee.	J. Henderson.	Polytechnicum, Munich.
University College, Liverpool.	J. T. Farmer.	MacDonald Engineering Laboratories, Montreal.
University College, London.	E. Aston.	University College, London, and University of Geneva.
Durham College of Science, Newcastle-upon-Tyne.	A. L. Mellanby.	MacDonald Engineering Laboratories, Montreal, and Durham College of Science.
University College, Nottingham.	M. E. Feilmann.	Polytechnicum, Zürich.
Queen's College, Belfast.	W. Hanna.	Laboratory of Royal College of Physicians and Surgeons, London, and Bacteriological Institute, Prague.
McGill University, Montreal.	R. O. King.	MacDonald Engineering Laboratories, Montreal. (To change for second year.)
Queen's University, Kingston, Canada.	T. L. Walker.	University of Leipzig.
University of Sydney.	J. A. Watt.	Royal College of Science, South Kensington.
University of New Zealand.	E. Rutherford.	Cavendish Laboratory, University of Cambridge.

A limited number of the scholarships are renewed for a third year when it appears that the renewal is likely to result directly in work of scientific importance. The following scholarships granted in 1894 have been renewed for a third year:—

Nomina g institution.	Scholar.	Places of study.
Universi of Edinburgh.	J. C. Beattie.	Universities of Vienna and Berlin.
University of Aberdeen.	W. B. Davidson	Universities of Würzburg and Leipzig.
University College, Liverpool.	Dr. A. J. Ewart	University of Leipzig and Botanical Institute, Java.
University of Toronto.	Dr. F. B. Kenrick.	University of Leipzig.

GENEROUS gifts to educational institutions in America have often been noted in these columns. The New York *Critic* has collected some valuable information concerning the total amounts of such gifts and legacies received from various benefactors. Perhaps the following summary of these encouragements will create a spirit of emulation in the wealthy men of the British Isles before whom it may come. George Peabody, various, £1,035,000. Stephen Girard, Girard College, present value about £3,000,000. John D. Rockefeller, University of Chicago, £1,485,200; Vassar College, £20,000; Barnard College, £5000. Miss Helen Culver, University of Chicago, £205,000. Leland Stanford, Leland Stanford Junior University, from £3,000,000 to £4,000,000. Johns Hopkins, Johns Hopkins University, over £600,000. John C. Green, Princeton College and Lawrenceville School, £600,000. Anthony J. Drexel, Drexel Institute, £600,000. Asa Packer, Lehigh University, 115 acres of land and £500,000. Charles Pratt, Pratt Institute, £540,000; Charles M. Pratt, £8000. Leonard Case, Case School of Applied Science, £400,000. Henry W. Sage, Cornell University, £234,000. Cornelius Vanderbilt (deceased), Vanderbilt University, £200,000; William H. Vanderbilt, £92,000; Cornelius Vanderbilt, £8000. Peter Cooper and his family, Cooper Union, £330,189. Paul Tulane, Tulane University, £210,000. Seth Low, Columbia University, £200,000; Barnard College, £2000. Washington C. De Pauw, De Pauw University, £200,000. James Lick, University of California, £150,000. Isaac Rich, Boston University, £140,000. Ezra Cornell, Cornell University, £134,000. J. Pierpont Morgan, New York Trade School, £100,000. Colonel and Mrs. Richard T. Auchmuty, New York Trade School, £82,000. The total of this list, which is probably not complete, amounts to £15,080,389.

SCIENTIFIC SERIALS.

Symons's Monthly Meteorological Magazine, July.—The "International Cloud Atlas." Mr. Symons takes the opportunity offered by the publication of this work (of which only a very few copies have yet been distributed) to make a brief reference to the principal works on clouds which have recently preceded the present one, including M. Weilbach's "Nordeuropas Skyformer" (Copenhagen, 1881), the "Wolken-Atlas" of MM. Hildebrandsson, Köppen, and Neumayer (Hamburg, 1890), M. Singer's "Wolkentafeln" (Munich, 1892), "Classificazione delle nubi" by the Specola Vaticana, containing some excellent reproductions of M. Mannucci's photographs (Rome, 1893), and the Rev. W. Clement Ley's "Cloudland" (London, 1894). The "International Cloud Atlas" (Paris, 1896) has been prepared under the superintendence of the International Meteorological Committee, and contains twenty-eight coloured reproductions of clouds. Although none of them is from an English photograph, Mr. Symons thinks our countrymen may be well content to see how largely the international system of 1896 is based upon the work of Luke Howard, and that the classification adopted is practically that of the joint work of Dr. Hildebrandsson and the Hon. Ralph Abercromby.—The spring drought of 1896. Mr. Symons selected twenty-eight stations distributed over the United Kingdom; these show that the rainfall for the first half of the year at eight out of sixteen English and Welsh stations, the total fell below two-thirds of the average, the lowest values being 48 per cent. at Haverfordwest; while for the Scotch and Irish stations the average was 83 per cent. and 80 per cent. respectively. The results for April and May show that at three stations the rainfall was less than 20 per cent. of the average, the total in London being 19 per cent. In 1893 the drought was more severe in parts of England and Wales, but the 1896 drought in the south of Ireland appears to be unprecedented; at Cork it lasted for sixty-four days.

THE numbers of the *Bulletino della Società Botanica Italiana* for May–July contain, in addition to papers of more local interest, one by Prof. G. Arcangeli on the elongation of the organs of aquatic plants (chiefly *Nymphæaceæ*), in which he expresses the opinion that the stress due to the weight of the superposed liquid is the chief stimulus for their adaptation to the depth of the water in which they live. The same author has a note on the sleep of plants, and the benefits which they derive from the varying positions of the leaves by night and by day.

THE contents of the *Nuovo Giornale Botanico Italiano* for July comprise four papers, of which the titles only can be given:—The conclusion of Sig. L. Nicotra's exhaustive essay on the statistics of the Flora of Sicily; Sig. A. Lenticchia on morphological variations in wild and cultivated plants; Sig. F. Tasci on the mycology of the Province of Sienna; Sig. U. Martelli on a new species of *Centaurea* (*C. ferulacea*).

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 18.—"The Determination of the Freezing-point of Mercurial Thermometers." By Dr. J. A. Harker.

The method adopted is to cool distilled water in a suitable vessel to a temperature below 0°, to insert the thermometer,

and then bring about the freezing of the water by dropping in a crystal of ice. The thermometer then rises, and finally attains a steady temperature, differing only very slightly from the true zero.

The apparatus employed consists of two portions, the thermostat and the cooler. The former is a copper vessel, filled with either refined petroleum or a strong solution of common salt. This vessel communicates with the cooler, through which the liquid can be pumped by a rotary stirrer; and by this means it can be cooled and maintained for some time at about $-2°$. The distilled water to be frozen is contained in a glass tube of about 300 c.c. capacity. This is first placed directly into the circulating liquid, and cooled quickly to $-0·5°$ or $-0·7°$. It is then transferred to a cylinder lined with polished metal, placed in the centre of the thermostat. The thermometer whose zero is to be taken is then quickly fixed in position, the bulb and a considerable length of the stem above the zero being immersed in the water. A crystal of ice is dropped in, and the temperature quickly rises to the freezing point.

Experiments made with good mercurial thermometers showed that if ice be present in sufficient quantity, the final temperature attained by the mixture of ice and water is not influenced perceptibly by variation of the temperature of the circulating liquid within fairly wide limits. As, however, it seemed desirable to control this result by some other means, a platinum thermometer and bridge were designed, capable of indicating with certainty a change of 0·0001°, and a description of the whole arrangement employed to attain this degree of accuracy forms the second half of the paper. The resistances in the bridge were of manganin, and the thermometers were provided with the compensating leads, devised by Mr. Callendar. The maximum current which can be used in accurate measurements with these thermometers is about 0·02 ampere, and therefore the galvanometer employed required to be extremely sensitive. The instrument selected was a low resistance astatic one with vertical needle system, and gives at the greatest working sensibility one scale division for 1×10^{-10} ampere.

With this arrangement the influence of various conditions on the final temperature attained by the mixture of ice and water was studied. The results were found to be in close agreement with the theoretical deductions of Nernst, and it was quite easy to keep the temperature in the freezing vessel constant to within one or two ten-thousandths of a degree for an hour at a time.

The conclusion drawn from the previous experiments made with mercurial thermometers as to the small influence of changes in the external temperature, and in the temperature of the circulating liquid on that of the freezing vessel, was also confirmed, and it was found that a change of two or three degrees in the temperature of the circulating liquid only caused the temperature of the mixture in the tube to alter by three or four ten-thousandths.

EDINBURGH.

Royal Society, July 20.—The Hon. Lord M'Laren in the chair.—Prof. Tait gave a brief description of a paper by Lord Kelvin on the different configurations possible with the same law of force according to Boscovich. In previous papers the author had confined himself to a treatment of the nature of configuration. This paper was a daring application of principle towards a rational explanation of crystalline form, having regard to the mutual forces involved.—Prof. Ludwig Boltzmann's communication, read by Prof. Tait, on the importance of Clerk-Maxwell's contributions to the kinetic theory of gases, consisted of a few sentences setting forth the writer's high respect for Clerk-Maxwell, and defining his relations with M. Bertrand. The paper in full was promised later.—Dr. Halm read an abstract of his paper on theoretical researches on the daily change of the temperature of the air. The fundamental differential equations of the problem, so far as they concern the curve of temperature during night, were first propounded by A. Weilenmann, in his essay, "Ueber den taeglichen Gang der Temperatur zu Bern" (*Schweizerische Meteorol.*, Beobachtungen ix., 1872), which may be considered as the first successful attempt at investigating the question from a theoretical point of view. But the physical explanation of his mathematical terms being insufficient, the author undertakes to show that these equations are in perfect agreement with the fundamental laws of radiation and conduction of heat, as given by Fourier and many others. The general question, by what means does the lowest layer of the atmosphere, the temperature of which is recorded by our thermometric instruments, receive or lose heat, may be answered by this result. Every change of temperature is caused by continuous radiation between the soil and an unknown part of the atmosphere—for which, however, there can be substituted, under all circumstances, two masses of air with the same coefficient of radiation, one of these having the variable temperature of the observed lowest layer; the other, a constant temperature. The next part of the paper consisted in proving that Weilenmann's equations, by a proper application of the sun's radiating power at every moment during the day, can be used for deriving an integral which gives expression to the change of the temperature during the time from sunrise to sunset. This integral consists of two different parts, one of which contains two arbitrary constants, naturally involved by the process of integration; the others are functions of time introduced by the law of solar radiation on a horizontal surface. But it can easily be proved that both the arbitrary constants have to disappear in every case, so that the change of temperature appears to be regulated simply by functions directly depending on the radiating power of the sun. Considering the fact that the conditions of radiation must be importantly influenced by various systematical disturbances, such as convection currents, the continuous change of the quantity and quality of atmospheric moisture, the state of cloudiness and the physical conditions of the soil, great importance has to be laid on the question how these may be given expression to in the fundamental equations of the problem. As far as the convection currents are concerned, their influence is shown to be in perfect agreement with observations, the range of temperature being diminished, and the time of maximum being brought nearer to the culmination of the sun when the direction of the current is from a cold quarter; the opposite being the case when from a warm one. The effect of sea-breezes is an example of the former condition; that of currents flowing from a mountain to the valley during daytime, an example of the latter. The very considerable effect of the daily change in the amount of atmospheric moisture, which has been deduced from direct observation of clouds and the absolute humidity of the air, complicates the theoretical equation by adding a new term, the parameters of which can be shown to be in full agreement with these observations. The most important branch of the subject treated in the paper was the determination of the solar constant from the *daily* temperature observations, which, after the influence of the state of cloudiness and the change of the physical conditions of the soil therefrom resulting, have been investigated, show values sufficiently accurate to admit of examining the question of the periodicity of solar radiation by a method the advantages of which seem obvious compared with the commonly used method founded on study of mean *annual* temperatures. From a large number of stations in Austria and Hungary, whose observations, extending over the years 1876–93, have been used, the author shows a close correspondence between the inverted curve of sun-spots and that of solar radiation. A much fuller investigation, however, extending over a longer series of years, and embracing a greater extent of territory, is required to finally establish the results deduced.—Prof. J. M. Dixon, of St. Louis, described in an interesting and popular manner the tornado which recently visited that city, and of which he was an eye-witness. The report already given in NATURE (vol. liv. p. 104) he characterised as correct.—Mr. Robert Kidston read a paper describing some cones of *Sigillarii*, in which the structure of the sporangia was shown. The sporangia appeared to be immersed in the bracts in a somewhat similar manner to that which occurs in *Isoetes* showing that the affinities of *Sigillarii* are with *Isoetes*, as conjectured by Goldenberg. Two new species of Sigillarian cones (*Sigillariostrobus*) were described, and a new species of *Sigillaria*.—Prof. Charteris read a short paper on the physiological action of eucaine. He claimed for this new antiseptic, which he described merely as a compound synthetically prepared, that it was not so toxic as cocaine, while the anæsthesia it produced was as complete. It did not contract the pupil when applied to the eye, and a solution in water did not decompose.—The Chairman, in a few words, reviewed the work of the past session, and held out hopes of further prosperity and usefulness in the future.

PARIS

Academy of Sciences, July 27.—M. A. Cornu in the chair.—On the water-spout of July 26, at the Museum of Natural History, by M. Milne-Edwards. An account

of the disastrous effects upon the Museum produced by this water-spout.—On some new experiments relating to the preparation of the diamond, by M. H. Moissan.—Study of the black diamond, by the same. Black diamond, reduced to a very fine state of division, and heated in a stream of oxygen to a temperature about 200° C. below the temperature of combustion of the diamond, gives off a very small amount of carbon dioxide, and the diamond remaining is transparent.—A Spanish truffle and three new truffles from Marocco, by M. Ad. Chatin. The new specimens are described as *Terfezia Mellerionis*, of Laroche, *Terfezia Leonis* (var. *heterospora*), of Laroche, and *Terfezia Boudieri*, of Mazogan.—On the homogeneity of argon and helium, by Prof. W. Ramsay and J. Norman Collie. By fractional diffusion through porous tubes, argon yields two portions, of which the lighter has a density of 19·93, the heavier of 20·01. Similar experiments with helium gave densities of 1·874 and 2·133 for the two extreme portions, results which were confirmed by measurements of the refractive indices by Lord Rayleigh. Both specimens gave spectra which were absolutely identical, and hence the possibility is suggested of there being here a true separation of light molecules from heavy molecules of the same substance.—On the mononitrile of camphoric acid, its anhydride and anilide, by MM. A. Haller and Minguin.—On a method for giving the exact direction of a sound signal, by M. E. Hardy. Two methods are given for effecting this at sea.—Note accompanying two memoirs on thermochemistry, by M. Langlois.—On the error of refraction in geometric levelling, by M. Ch. Lallemand. It is shown that the effect of the refraction of the air, which can generally be neglected or eliminated in triangulation, becomes quite appreciable in levelling, and a formula is developed for introducing the necessary correction.—On the distribution of the displacements in metals subjected to stresses, by M. G. Charpy. The suggestion of M. Hartmann that metals, in spite of their known heterogeneous structure, behave as homogeneous bodies, has been submitted to further experiments, with the result that the displacements vary from point to point, and correspond in all respects with the structure shown micrographically.—On the density and mean specific heat between 0° and 100° of the alloys of iron and antimony, by M. J. Laborde. The numbers found for the specific heats are all greater than those calculated from the assumption of simple mixture.—On the determination of the ratio of the specific heats of gases, by MM. G. Maneuvrier and J. Fournier. The final results are: for air 1·392, for carbon dioxide 1·299, for hydrogen 1·384.—Researches on the relations existing between the radiation of a body and the nature of the surrounding medium, by M. Smoluchowski de Smolan. An experimental study of the formula of Clausius, according to which the emission should be proportional to the square of the refractive index of the medium. The general result is to confirm the law of Clausius.—Cranial endography by means of the Röntgen rays, by MM. Remy and Contremoulins.—Study of the nitrogren and argon of fire-damp, by M. Th. Schlœsing, jun. Specimens of fire-damp collected with suitable precautions from many sources all contained nitrogen, showing a notable amount of argon; the ratio of argon to nitrogen was, within the limits of experimental error, about the same as in air.—On the preparation of selenic acid, by M. R. Metzner. This acid is readily obtained by oxidising dilute solutions of selenious acid with free permanganic acid.—On a new cobaltite, by M. E. Dufau. By heating magnesia and cobalt sesquioxide in the electric furnace a crystallised magnesium cobaltite, $MgCoO_3$ is obtained.—On the solutions of trichloracetic acid, by M. Paul Rivals. A thermochemical study of the dissociation of trichloracetic acid in solution.—On vinyl-trimethylene and ethylidene-trimethylene, by M. G. Gustavson.—On the constitution of pinacoline, by M. Maurice Delacre.—Crystallographic properties of some alkyl-camphors of the aromatic series, by M. J. Minguin.—Formation and etherification of crotonylic alcohol, by M. E. Charon.—On the electrolysis of the fatty acids, by M. J. Hamonet.—On several modes of preparation of the blue nitrosodisulphonic acid and its salts, by M. Paul Sabatier.—New observations on *Clythra quadripunctata*, by M. A. Lécaillon.—Influence of the reaction of the medium upon the activity of the oxidising ferment of mushrooms, by M. E. Bourquelot.—On a cellulose filter, by M. Henri Pottevin. A description of a cellulose filter capable of taking the place of the biscuit porcelain filter. Owing to the cheapness of material, instead of the cleaning process necessary for porcelain, a new disc can be used.—The mechanism of the extension of the blastoderm, and its relation to the eye of the fish, by M. E. Bataillon.—On the presence in the superior laryngeal nerve of secretory and vasculomotor fibres for the mucous membrane of the larynx, by M. E. Hédon.—On the physiological significance of direct cellular division, by MM. E. G. Balbiani and F. Henneguy.—Study of the gizzard in some *Blattidæ* and *Gryllidæ*, by M. Bordas.—The constitution of the phosphates of lime from Tunis, by M. L. Cayeux.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—The Student's Handbook of British Mosses: H. N. Dixon and H. G. Jameson (Eastbourne, Sumfield).—The G. E. R. Co.'s Tourist Guide to the Continent (London).—A Text-Book of Physical Exercises: Dr. A. H. Carter and S. Bott (Macmillan).—La Distillation des Bois: E. Barillot (Paris, Gauthier-Villars).—Monthly Current Charts of the Indian Ocean (London).—Catalogue of the Described Diptera from South Asia: F. van der Wulp (Nijhoff, Hague).

PAMPHLETS.—Peabody Institute 29th Annual Report (Baltimore). Symbolism in American Art: F. W. Putnam and C. C. Willoughby (Salem, U.S.A.).

SERIALS.—Astronomical Observations and Researches made at Dunsink, 7th Part (Dublin, Hodges).—Longman's Magazine, August (Longmans).—Chambers's Journal, August (Chambers).—Proceedings of the Aristotelian Society, Vol. 3, No. 2 (Williams).—Proceedings of the Edinburgh Mathematical Society, Vol. xiv. (Williams).—L'Anthropologie, tome vii. No. 3 (Paris, Masson).—Good Words, August (Isbister).—Sunday Magazine, August (Isbister).—Humanitarian, August (Hutchinson).—Contemporary Review, August (Isbister).—National Review, August (Arnold).—Physical Review, Vol. 4, No. 1. (Macmillan).—Bulletin de l'Académie Royale des Sciences de Belgique, 1896, No. 6 (Bruxelles).—Journal of the Institution of Electrical Engineers (Spon).—Journal of the Chemical Society, (Gurney).—Century, August (Macmillan).—Scribner's Magazine, August (Low).—Notes from the Leyden Museum, Vol. xviii. No. 1 (Leyden, Brill).—Fortnightly Review, August (Chapman and Hall).—Westminster Review, August (Warne).—Ornithologist, August (Bale).—Gazetta Chimica Italiana (Rome).—Revue Générale des Sciences, July (Paris).—Memoire della Spettroscopisti Italiani, July (Rome).—Bulletin de la Société d'Encouragement, July (Paris).

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