Biology. The generous gift by an anonymous donor of 500*l.* towards new apparatus has been a great boon. A gas-engine and many valuable pieces of apparatus have been added.

Prof. Macalister states that the number of students dissecting has been nearly one hundred, and a still larger number attended the lectures on Human Anatomy. Many important specimens have been presented to the Museum of Human Anatomy by Prof. Macalister.

The Philosophical Library is increasingly used, and many valuable donations of books have been received by Mr. J. W. Clark, Prof. Humphry, Prof. Babington, Mr. D. McAlister, and Mr. Pitman of Bath.

SCIENTIFIC SERIALS

American Journal of Science, May 1884.—Remarks on Prof. Newcomb's "Rejoinder," in connection with his review of "Climate and Time," by Dr. James Croll.—Communications from the United States Geological Survey, Rocky Mountain Division, VI.—On an interesting variety of Löllingite and other minerals (one illustration), by W. F. Hillebrand. Amongst the ores analysed by the author there is one from the Missouri Mine, Park County, Colorado, which he thinks may probably be a new mineral. It is composed largely of a sulphobismuthite of copper and silver, and occurs in a quartz gangue associated with chalcopyrite and wolframite.—Notes on American earthquakes, with tabulated record of seismic disturbances in every part of the continent during the year 1883, by Prof. C. G. Rockwood.—Thermometer exposure, by H. A. Hazen. The paper is chiefly occupied with questions relating to the locality in large regions where the thermometer should be exposed in order to obtain the most trustworthy results, and to the immediate environment of the thermometer best calculated to fulfil the same requirement. There are several comparative tables of results obtained with various instruments under varying conditions of time, aspect, and altitude.—Hillocks of angular gravel and disturbed stratification associated with glacial phenomena (four illustrations), by T. C. Chamberlain. The paper deals especially with the kames or eskers analogous to the osars of Sweden, occurring in various parts of New Hampshire, Massachusetts, New York, and Wisconsin. The author infers from their inherent characteristics and their association with morainic belts, that the gravel hills in question were formed, not by beach action, but by numerous marginal streams along the edge of the great ice sheet during the Glacial period.—Extinct glaciers of the San Juan Mountains, Colorado, by R. C. Hills.—On the gender of names of varieties and subspecies in botanical nomenclature, by Asa Gray.—On secondary enlargements of feldspar fragments in certain Keweenawan sandstones (four illustrations), by C. A. Vanhise.—Principal characters of American cretaceous Pterodactyls, part i., the skull of Pteranodon (with plate), by Prof. O. C. Marsh. The skull of these Pterodactyls from the Middle Chalk, West Kansas, is described as differing from that of other known Pterosauria in the absence of teeth and of anterior nasal apertures distinct from the antorbital openings; in the presence of the elongated occipital crest; lastly, in the whole jaws, which appear to have been covered with a horny sheath, as in recent birds. All belong to the genus Pteranodon, some of the species of which were of prodigious size, with a spread of wings of about twenty-five feet. Remains of over six hundred individuals are now in the museum of Yale College.

Journal of the Russian Chemical and Physical Society, vol. xvi., fasc. 2.—On the action of the bromide of aluminium on ethylene and on the bromides of saturated hydrocarbons, by M. Gustavson.—On the specific heat of solutions, and on the thermal effects at their formation, by W. Alexeyeff. Submitting to a closer investigation those solutions which are accompanied by a lowering of temperature, the author comes to the conclusion that such is the case for those liquids which have not a chemical affinity, and that those are true solutions; while in those cases where a rise of temperature is noticed, the dissolved liquid enters into chemical combination with the dissolving one. He makes a series of very interesting experiments in order to determine the thermal effects of various solutions.—On the relations between the chemical composition and the refractive power of chemical compounds, by J. Kanonnikoff (second paper).—On the structure of nitro-compounds of the saturated series, by J. Kissel.—On the composition of the mineral waters of Caucasus, by J. Barsilovsky.—On the structure of the blue indigo, by P. Alexeyeff.—On the action of alkalies on chondrine, by M. Schwarz.—On the azocuminic acid, by P. Alexeyeff (first paper).—On chemical affinity, by A. Bazaroff.—Analysis of the epidermis attacked by the *Prosyarsis rubra*, by K. Wagner.—On the preparation of pure albumin, and on the determination of chlorine in urine, by W. Mikhailoff.—On the structure of the atmosphere and on the general laws of the theory of gases, by E. Rogovsky. The strong mathematical inquiry of the author brings him to the following conclusions:—However the atmosphere has no limits, but at a height of 1000 km. the density of air is very near to zero; its constitution varies with the height, the content of oxygen decreasing as the height increases; this change is very slow for heights less than 10,000 m., still it might be ascertained by accurate measurements; for heights less than 10,000 m. the density of air can be calculated as if it were a simple gas; the decrease of density with the height goes on slower when the temperature at the surface of the earth is higher. The paper has to be continued.—On the theory of measurements, by N. Sloughinoff.—On galvanic batteries, by P. Novikoff.

Rivista Scientifico-Industriale, March 31 and April 15.—Electric currents through contact with earth, by Prof. A. Volta.—Experiments with electrified paper, by D. Surdi.—Variations in the electric resistance of solid and pure metallic wires, with variations of temperature, by Prof. Angelo Emo.—On the Gauthier and Walrand methods of distinguishing steel from iron, by the editor.—Note on two hybrids of *Anas boschas* and *Dafila acuta*, by Dante Roster.

Rendiconti del R. Istituto Lombardo, April 3 and 17.—Programme of prize essays in various departments of Science, Art, and Letters proposed for the years 1884–91.—The Castle of Milan, its historic and artistic associations, by Prof. Giuseppe Mongeri.—On some unpublished fragments of Anatolius's Greek version of the "Codex Justinianus," by Dr. C. Ferrini.—Note on Virgil and his Italian imitator, Parini, by Prof. Cr. Fabris.—On Antonio Angeloni Barbiani and his literary productions, by E. B. Prina.—Analysis of the mineral waters of Acquarossa, Canton of Ticino, by Prof. G. Bertoni.—Malformations in the urinary ducts in Bright's disease, by Prof. C. Golgi.—Meteorological observations made at the Brera Observatory, Milan, during the month of March.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 1.—"Report to the Solar Physics Committee on a Comparison between Apparent Inequalities of Short Period in Sun-spot Areas and in Diurnal Temperature Ranges at Toronto and at Kew." By Balfour Stewart, M.A., LL.D., F.R.S., and William Lant Carpenter, B.A., B.Sc. Communicated to the Royal Society at the request of the Solar Physics Committee.

It has been known for some time that there is a close connection between the inequalities in the state of the sun's surface as denoted by sun-spot areas and those in terrestrial magnetism as denoted by the diurnal ranges of oscillation of the declination magnet; and moreover the observations of various meteorologists have induced us to suspect that there may likewise be a connection between solar inequalities and those in terrestrial meteorology.

This latter connection, however (assuming it to exist), is not so well established as the former, at least if we compare together inequalities of long period. It has been attempted to explain this by imagining that for long periods the state of the atmosphere as regards absorption may change in such a manner as to cloak or diminish the effects of solar variation by increasing absorption when the sun is strongest, and diminishing absorption when the sun is weakest.

On this account it seemed desirable to the authors to make a comparison of this kind between short-period inequalities, since for these the length of period could not so easily be deemed sufficient to produce a great alteration of the above nature in the state of the atmosphere.

The meteorological element selected for comparison with sun-spots was the diurnal range of atmospheric temperature, an element which presents in its variations a very strong analogy to diurnal declination-ranges.

There are two ways in which a comparison may be made between solar and terrestrial inequalities. We may take each

individual oscillation in sun-spot areas, and find the value of the terrestrial element corresponding in time to the maximum and the minimum of the solar wave. If we were to perform this operation for every individual solar inequality, and add together the results, we might probably find that the magnetic declination range was largest when there were most sun-spots. If, however, we were to make a similar comparison between sun-spot daily areas and diurnal temperature-ranges we might not obtain a decisive result. For at certain stations, such as Toronto, it is suspected (the verification or disproval of this suspicion being one of the objects of this paper) that there are two maxima and two minima of temperature-range for one of sun-spots. The effect of this might be that in such a comparison the temperature-range corresponding to a maximum of sun-spots might be equal in value to that corresponding to a minimum, or, in other words, we should get no apparent result, while, however, by some other process proofs of a real connection might be obtained. But if we can get evidences of apparent periodicity in sun-spot fluctuations when dealt with in a particular manner, we have at once a method which will afford us a definite means of comparison. And here, as Prof. Stokes has pointed out, it is not necessary for our present purpose to discuss the question whether these sun-spot inequalities have a *real* or only an *apparent* periodicity. All that is needful is to treat the terrestrial phenomena in a similar manner, or in a manner as nearly similar as the observations will allow, and then see whether they also exhibit periodicities (apparent or real) having virtually the same times as those of sun-spots, the phases of the two sets of phenomena being likewise allied to one another in a constant manner.

It is such a comparison that the authors have made, their method of analysis being one which enables them to detect the existence of unknown inequalities having apparent periodicity in a mass of observations. A description of this method has already been published in the *Proceedings of the Royal Society* for May 15, 1879. The comparison was made by this method between sun-spot observations extending from 1832 to 1867 inclusive, Toronto temperature-range observations extending from 1844 to 1879 inclusive, and Kew temperature-range observations extending from 1856 to 1879 exclusive. The following conclusions were obtained from this comparison :—

1. Sun-spot inequalities around twenty-four and twenty-six days, whether apparent or real, seem to have periods very nearly the same as those of terrestrial meteorological inequalities as exhibited by the daily temperature-ranges at Toronto and at Kew.

2. While the sun-spots and the Kew temperature-range inequalities present evidence of a single oscillation, the corresponding Toronto temperature-range inequalities present evidence of a double oscillation.

3. Setting the celestial and terrestrial members of each individual inequality, so as to start together from the same absolute time, it is found that the solar maximum occurs about eight or nine days after one of the Toronto maxima, and the Kew temperature-range maximum about seven days after the same Toronto maximum.

4. The proportional oscillation exhibited by the temperature-range inequalities is much less than the proportional oscillation exhibited by the corresponding solar inequalities.

Chemical Society, May 15.—Dr. Perkin, F.R.S., president, in the chair.—The following papers were read :—On refraction equivalents of organic compounds, by Dr. J. H. Gladstone. In this paper is given a series of tables embodying the results of observations made from time to time since 1870. In these tables the refraction equivalents for the line A for about 140 substances are given and compared with the refraction equivalents calculated from the following values of the respective elements :—Carbon (saturated) 5·0, carbon in C_nH_n 5·95, carbon double-linked 6·1, hydrogen 1·3, oxygen single bond 2·8, oxygen double bond 3·4, nitrogen 4·1, nitrogen in bases, NO_2, &c., 5·1, chlorine 9·9, bromine 15·3, iodine 24·5, sulphur single bond 14·1, sulphur double bonds 16·0.—On the estimation of silicon in iron and steel, by T. Turner. The author has compared the various methods of analysis, and concludes that the chlorine process suggested by Watts, with certain modifications, is applicable to all classes of iron, and is on the whole the best.—Note on the melting-points and their relation to the solubility of hydrated salts by Dr. W. A. Tilden.—Note on ferric sulphocyanate, by A. J. Shilton. The author finds that a large excess of potassium sulphocyanide or of boiling hydrochloric acid interferes with the well-known blood-red colour given by ferric salts and a sulphocyanide.—A memoir detailing some minor researches on the action of ferrous sulphate on plant life, by Dr. Griffiths. The author finds that 0·15 per cent. of ferrous sulphate added to a solution of various salts aids, whilst 0·2 per cent. is fatal to, the development of mustard seeds and cabbage plants.

Physical Society, May 10.—The meeting was held in the chemical theatre of the Mason College, Birmingham. Members had previously visited some of the factories in the town, including Gillott's pen works.—Dr. Guthrie, president, took the chair at three p.m., when Prof. J. H. Poynting made a communication on an experiment illustrating the refraction of water-waves. The experiment was designed to illustrate by means of waves in water the refraction of waves when they pass from one medium to another in which their velocity is different. The apparatus consisted of a tank 2 feet 6 inches square, with a plate-glass bottom. Water is poured into the tank to a depth of say 5 to 6 mm. The lid of the tank consists of a calico screen, and is slightly tilted up. A limelight under the tank projects the wave on a screen. Plates of glass 3 or 4 mm. thick are placed in the tank, thus reducing the depth of water. If waves are sent across the tank they travel more slowly through the shallow water, and are seen to be refracted. When circular or lenticular plates are used, the refracted waves are seen to converge to a focus.—Mr. C. J. Woodward exhibited an oxy-hydrogen lantern suitable for lecture purposes.—Dr. Gladstone took the chair, and Prof. Guthrie, president, exhibited a sealed tube containing 46·6 of tri-ethylamine, and 53·4 of water. At temperatures between 0° C. and 18·3° C. the liquid forms a clear mixture. At 18·3° it becomes turbid, and at 26° C. almost perfect separation is effected. It was stated that all proportions of the two liquids containing about 15 per cent. and 50 per cent. of triethyl amine become turbid at the same temperature. A mixture containing 4 per cent. requires a temperature of 41° C. to produce turbidity, while one containing 90 per cent. is turbid at 6° C. A series of sealed glass bulbs containing the liquids in different proportions can be employed to indicate the fever temperature of the body if placed under the tongue. The author also showed the connection between such separation by heat and the separation between the same two bodies by cold, whereby in the latter case, according to the strength of the solution, either ice or subcryohydrate is separated, until the composition and temperature of the cryohydrate is reached (19·2 per cent. ; −3·8° C). The peculiar white condensed vapour of the chloride of triethylammonium was exhibited. The white fume of this body so quickly aggregates into masses, that the shapes of the smoke-lines and curls are preserved. Dr. Gladstone agreed with the author in supposing that the separation of triethylamine and water was continuous in nature with the separation of ammonia from water by heat. Dr. Tilden exhibited a tube containing a cold, clear solution of amylic alcohol in water which became turbid on gently warming, and clear again on heating to about 60° C. He suggested that a similar remixing might take place with ethylamine and water. Prof. Silvanus P. Thompson recalled the experiments of Prof. Ramsay on the critical state described by Andrews, and the failure of a body beyond the critical condition to retain in solution the substances it held as a liquid. Mr. W. Lant Carpenter suggested the microscopic examination of the triethylamine and water mixture at its critical temperature.—Members then visited the College rooms.

Royal Microscopical Society, May 14.—Rev. W. H. Dallinger, F.R.S., president, in the chair.—A resolution was passed altering the by-laws so as to make ladies eligible as Fellows of the Society, but without the right of attending ordinary meetings.—Dr. Golding Bird exhibited a new freezing microtome of his construction, adapted for students and intermittent workers, and for use with ice and salt, or with ether.—Mr. Boecker showed an extensive series of Bacteria, Bacilli, and other Schizomycetes.—A very curious microscope of the date of 1772 was exhibited by Mr. Crisp, in which, with other peculiarities, three objectives were attached to a sliding plate at the end of the nosepiece in a way similar to that adopted in the modern Harley and other microscopes. Also two microscopes by Reichert of Vienna, one with a very simple form of Abbe condenser, and the other with a polarising prism attached to a swinging and rotating diaphragm.—The following apparatus and objects were also exhibited and discussed :—Frog plate made of glass, with serrated edges for the string; Griffiths' multiple eyepiece (an attempt to combine four eyepieces in one by fixing different eye-lenses in a rotating disk); Bradley's "mailing boxes" for sending one or several slides conveniently

by post; Dancer's objects found in flue-dust and coal-ash; Stokes' minnow-trough; B. W. Thomas's Foraminifera obtained by washing clay from the boulder drift in Minnesota, showing forms identical with some now found living in the Atlantic Ocean; some exceptionally well mounted slides of arranged Diatoms by R. Getschmann of Berlin; some curious Schizomycetes by Mr. Cheshire, and a rotalian from closed flint nodular cavity metamorphosed into chalcedony, by Dr. G. C. Wallich.—Dr. P. H. Carpenter gave an account of his views respecting the nervous system of the Crinoidea, and exhibited some preparations in illustration of them. He directed attention more particularly to the branches from the axial cords of the skeleton, which extend upwards into the ventral perisome at the sides of the ambulacra, both of the arms and of the disk.—The President, Mr. Glaisher, vice-president, and Mr. A. W. Bennett, a member of the Council, were appointed a deputation for the Society, to attend the annual meeting of the American Society of Microscopists at Rochester, N.Y., U.S.A., on August 19 next.

Royal Meteorological Society, May 21.—R. H. Scott, F.R.S., president, in the chair.—Capt. W. W. Hampton and C. D. F. Phillips, M.D., F.R.C.S., F.R.S.E., were elected Fellows of the Society.—The following papers were read:—Notes on the proceedings of the International Polar Conference held at Vienna, April 17 to 24, 1884, by R. H. Scott, F.R.S., president.—Meteorological observations on the Maloja Plateau, Upper Engadine, 6000 feet above the sea, by Dr. A. T. Wise. The Maloja Plateau is situated at the higher extremity of the Upper Engadine, and is protected from northerly, easterly, and southerly winds. The author gives some account of the meteorology of this plateau, and also the observations made during the four months from November 1883 to February 1884.—On some results of an examination of the barometric variations in Western India, by A. N. Pearson.—Illustrations of the mode of taking meteorological averages by the method of weighing paper diagrams, by R. Inwards, F.R.A.S.—Ten years' weather in the Midlands, by Rupert T. Smith.

EDINBURGH

Royal Society, May 5.—Mr. Robert Gray in the chair.—Dr. Sang gave a paper on the formulæ for computing logarithmic sines.—Mr. J. Murray communicated a paper, by Mr. J. T. Cunningham, on a new Trematode.—Mr. George Seton read a paper on the vital statistics of Scotland; and Prof. Turner gave a communication, by Mr. A. Wynter Blyth, on the results of experiments made by him on the chief disinfectants of commerce. His object in experimenting was to discover their efficiency in destroying the spores of *Anthrax bacillus*.

May 19.—Mr. Robert Gray, vice-president, in the chair.—Prof. Chrystal communicated a note, by M. Hermite, "Sur la Reduction des Intégrales Hyperelliptiques."—Prof. Schuster, at the request of the Council of the Society, gave an address on the discharge of electricity through gases. His address was illustrated by several beautiful experiments.

PARIS

Academy of Sciences, May 19.—M. Rolland, president, in the chair.—Note on a theorem of M. A. Lindstedt concerning the problem of the three bodies, by M. F. Tisserand.—On bromic substitutions, by MM. Berthelot and Werner.—Kinematic analysis of the action of walking in man (four illustrations), by M. Marey.—Note on the twenty-three first sheets of the map of Africa to the scale of 1 : 2,000,000, presented by Col. Perrier to the Academy, by M. F. Perrier. The map, which is mainly the work of Capt. de Lannoy, will consist altogether of sixty-two sheets, and is expected to be completed towards the end of 1887.—Pathological experiments on rabies, by M. Pasteur, assisted by MM. Chamberland and Roux.—Note on the attenuation of cultivated virus treated with compressed oxygen, by M. A. Chauveau.—Note on the transformation of conicine to propylpyridine; regeneration of conicine, by M. A. W. Hofmann.—Observations on the new planet 236 (discovered at Vienna, by M. J. Palisa, on April 26, 1884), made at the Paris Observatory (equatorial of the west tower), by M. G. Bigourdan.—Determination of the elements of rotation of the sun, by M. Spörer.—Properties of nine points of a left curve of the fourth order, of seven points of a left cubic, of eight associated points, by M. A. Petot.—On a linear equation of the third order analogous to Lamé's equation, by M. E. Goursat.—Remarks relative to the velocity of propagation of the wave produced in the Indian Ocean by the Krakatoa eruption, by M. Boussinesq.—Adoption by the Vienna International Polar Conference of new absolute magnetic unities (centimetre, gramme, second), by M. Mascart.—New method of measuring the intensity of an electric current in absolute unities, by M. Henri Becquerel.—Note on a new mercurial galvanometer, by M. G. Lippmann.—On the variations of the physical properties of bismuth placed in a magnetic field, by M. Hurion.—On the coefficients of expansion in the elementary gases, by M. J. M. Crafts.—On the various theoretic results that have to be considered in steam engines, by M. P. Charpentier.—On the transmission of sound by gases, by M. Neyreneuf.—Note on the variation of the indices of refraction of quartz under the influence of temperature, by M. H. Dufet.—On the determination of the densities of vapour by gaseous displacement under reduced and variable pressure, by M. J. Meunier.—Action of the sulphuret of potassium on the sulphuret of mercury, by M. Debray.—On the acid phosphates of baryta, by M. A. Joly.—On the solubility of salts, by M. Etard.—Note on crystallised chloride of ammoniacal silver and iodide of ammoniacal silver, by M. Terreil.—On an artificial pseudomorphosis of silica, by M. A. Gorgeu.—Analysis of the mineral waters of Brucourt, Calvados (Normandy), by M. Vulpian.—On the employment of superphosphates in agriculture; observations in connection with a recent note of M. Lechartier, by M. P. P. Dehérain.—Comparative nitrifying action of some salts either naturally contained in or superadded to vegetable soils, by M. P. Pichard.—A new series of experiments on the differential perception of colours, by M. Aug. Charpentier.—Note on the brain of *Eunice harassii* and its relations to the hypoderm, by M. Et. Jourdan.—On the genus Rhopalea (simple Ascidians), by M. L. Roule.—On the presence of the Egyptian Naja (*Naja haje*, Dumer.) in Tunis, by M. Valery Mayet.—Pretended influence of light on the anatomic structure of the leaves of *Allium ursinum*, by M. Ch. Musset.—Remarks on a hypsometric map of Russia, by General de Tillo.—On the remarkable solar halo recently observed at Palermo, by M. A. Ricco.—Fresh observations on the crepuscular lights seen in the Isle of Bourbon, by M. Pelagaud.

CONTENTS

	PAGE
The Dilution of Dog Poison	97
The Mammalia of India and Ceylon	98
North American Mollusca. By Dr. J. Gwyn Jeffreys, F.R.S.	99
Our Book Shelf:—	
Step's "Plant-Life"	99
Letters to the Editor:—	
The Equatorial Coudé of the Paris Observatory.—**Howard Grubb, F.R.S.**	100
The Earthquake.—**H. C. Sorby, F.R.S.; Antoine d'Abbadie; A. Shaw Page**	101
Instinct in Birds.—**R. S. S.**	102
A Remarkably Brilliant Meteor.—**Rev. John Hoskyns-Abrahall**	102
Right-sidedness.—**E. H.**	102
Modern Travel—A Scientific Education	102
The Late Monsieur Wurtz	103
Robert Angus Smith. By **Prof. T. E. Thorpe, F.R.S.**	104
Norwegian Geodetical Operations	105
Saturn (*Illustrated*)	105
Earth Currents	106
Notes	107
Geographical Notes	109
The Movements of the Earth, IV. By **J. Norman Lockyer, F.R.S.** (*Illustrated*)	110
The Royal Commission on Technical Instruction	113
On the Nomenclature, Origin, and Distribution of Deep-Sea Deposits, II. By **John Murray** and **Rev. A. Renard**	114
University and Educational Intelligence	117
Scientific Serials	118
Societies and Academies	118