vessel containing dilute acid. When a current is passed into this cell the minium on one plate is reduced to metallic lead that on the other is oxidised to the state of peroxide. These actions are reversed while the charged cell is discharging itself. According to M. Reynier one of these cells made large enough to weigh 75 kilograms may store up energy sufficient to furnish afterwards one-horse power of work for an hour.

A correspondent of the *Times* of Monday gave an interesting account of an experiment he witnessed in Paris of storing electrical energy by the method adopted by M. Faure.

"A Faure battery, or *pile secondaire*," he states, "was charged with the electric fluid direct from the ordinary Grove battery and in my presence. It may be more economically done from a Gramme or Siemens machine. The receptacle consisted of four Faure batteries, each about five inches diameter and ten inches high, forming a cylindrical leaden vessel, and containing alternate sheets of metallic lead and minium wrapped in felt and rolled into a spiral wetted with acidulated water, and the whole placed in a square wooden box measuring about one cubic foot and weighing some seventy-five pounds. This was protected by a loose wooden cover, through which the electrodes (in lead) protruded, and were flattened down for convenience of transport. This box of 'electric energy' was handed to me by M. Faure at my request, with the object of submitting it for examination and measurement to our eminent electrician, Sir William Thomson, F.R.S., at the University of Glasgow. I had the box by me all through the journey from Paris on Tuesday night (last week), including a five hours' delay at Calais. I arrived at Charing Cross at 11 a.m. on Wednesday, after running the gauntlet of customs and police authorities, who suspiciously looked askance and seemed to doubt my statement that my box only held 'condensed lightning,' and contained no infernal machine or new explosive destined to illustrate some diabolical socialistic tragedy. From time to time on the journey I tested the force of the discharge and found it to have well maintained its energy. From London to Glasgow required only another ten hours, and finally, in about seventy-two hours from the time of charging in Paris, I had the satisfaction of presenting to Sir William Thomson M. Faure's rare offering of a 'box of electricity,' intact and potent, holding by measurement within that small space of one cubic foot a power equivalent to nearly one million of foot pounds! This wonderful box is now deposited in the laboratory of the Glasgow University, under the vigilant eye of its director, and being submitted to a series of tests and measurements, the results of some of which made Sir William exclaim, 'Why, it's a little witch.'" With reference to this Sir Wm. Thomson writes to us under date May 17:—"I had the marvellous box under trial for seventy-two hours before I left Glasgow yesterday, giving it successive charges, and discharging to various degrees, measuring approximately the whole quantity sent in during the charge, and taken out in the discharge. Thus I shall be able to calculate the amount of energy spent, and the amount recovered under various conditions. Mr. J. T. Bottomley continues the trials in my absence. A considerable time must pass before I have results to publish."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The report of the Botanic Garden Syndicate, as it now stands, recommends the admission of members of the Senate into the Garden on Sunday afternoons from three to six during the present summer, and as an experiment only; three friends may be introduced at the same time, their names being written in a book. Only one entrance is required to be opened, and the curator or his deputy and one policeman are to be present. The number of signatures of residents in favour of this change is very large. Prof. Babington objects, and so do the heads of Queen's, Pembroke, and St. Catherine's Colleges, Professors Cowell and Westcott, and several resident clergymen.

At Trinity College W. K. Sorley (second year) has been elected to a Foundation scholarship for Moral Science, and D'Arcy Thompson (first year) to a Scholarship for Natural Science; E. D. Ritchie (Winchester) and W. B. Ransom (Cheltenham) to Exhibitions of 40*l.* for Natural Science. At King's College S. F. Harmer has been awarded the Vintner Exhibition for Natural Science, and A. P. Laurie (Edinburgh Academy) an Exhibition of 50*l.* for two years.

Mr. Lea is lecturing, in Dr. Foster's advanced course, on the Physiology of Vision.

Mr. Hicks is taking an examination class in Elementary Botany at Sidney College.

Dr. Vines' course of botany this term is one of Morphology, chiefly cryptogamic, with practical work.

The first M.B. Examination commences on June 13, the second on June 7, the third on May 10; the M.C. Examination on June 13.

The open mathematical lectures this term are those of Mr. Dale (Trinity) on Heat, and Mr. Taylor on Higher Plane Curves, Mr. Besant (St. John's), on Sound and Vibrations, Mr. Webb (Emmanuel) on the Potential and Green's Theorem, and Mr. Temperley on Finite Differences.

The first part of the Natural Sciences Tripos begins on June 6.

IN the report of the last Local Examinations (December, 1880) it is stated that the juniors answered satisfactorily in Botany, while the descriptions of specimens by the seniors and their answers in Vegetable Physiology were very weak. In Zoology the seniors did better relatively than the juniors, but practical work was largely deficient. In Geology the answering was bad, and the practical knowledge of specimens extremely meagre.

LONDON.—At the presentation day last week at the University of London, when the certificates of degrees and honours won by the successful students at the late examinations were distributed, three ladies received certificates of matriculation, and four degrees of B.A. Earl Granville said that this year they had lost by death Sir Philip Egerton, a man of great cultivation, who had always shown the greatest interest in the work of the University. There were other losses which they regretted, but which carried some consolation with them, as being highly to the credit of the University—as, for instance, the departure of Dr. Greenfield, who had for so long been identified with the Brown Institution, to Edinburgh University. They were perhaps aware that in 1852 Mr. Brown had left a sum exceeding 20,000*l.* for the creation of an institution for the investigation and cure of diseases peculiar to animals useful to man, the donor expressing a desire that the University of London should appoint a committee of their body or of medical men outside to scientifically carry out his views. Ten years ago that institution was established, and during that period few or no cases of interest to it had been discussed in which it had not taken a leading part. These investigations had, he believed, been carried on in a manner which promised the greatest possible advantage, not only with regard to the diseases of animals, but also to those of man. During the past year 3870 animals had been cured, and as an example of the great kindness with which the patients were treated he would relate the following anecdote:—A distinguished member of the Senate was driving along the road in which the institution was situated when suddenly his hack cab came to a dead stop. He asked the driver whether his animal was lame or ill, but the driver answered, "No sir. I never can get him past this place since he had his corn cured here; he likes it so much that he always wants to stop." Results had shown that the University was justified in extending the limits of its operations to the Brown Institution. After careful consideration it had been determined to extend the examinations into the science and art of teaching, for which purpose a scheme had been prepared, which would shortly be carried out. As a member of a Government which adopted as its first principle economy of public funds he was glad to be able to give an instance that this did not always degenerate into niggardly stinginess. Their application to the Treasury for the establishment of a practical museum of natural history to enable them satisfactorily to carry on examinations on their own premises had been most liberally met, and he hoped that in a very short time such a department would be opened.

THE annual distribution of prizes to the successful students at the London School of Medicine for Women took place on Wednesday last week. The report stated that up to the present eighty-six pupils had been received, of whom forty-four are now attending. Nine of these were studying for the University of London, four were amateurs, and the remaining thirty-one were training for examination by the College of Physicians in Ireland. Altogther twenty-five ladies had now been declared qualified to practise. The report of the treasurer, the Right Hon. James Stansfeld, M.P., stated that the expenditure had been 2018*l.*, of which one-half had been provided by the students' fees. The subscriptions had been 626*l.* 17*s.* 6*d.*, as against 723*l.* 15*s.* 6*d.*

last year; and the donations 33*l.* 2*s.*, as against 18*l.* There had been several large legacies realised, amongst them one of 4050*l.* from Mrs. George Oakes.

MANCHESTER.—We understand that a sum of 1500*l.* has been offered by a benefactor to the Council of Owens College for five fellowships of 100*l.* a year, each renewable for a second or third year, the conditions being that they shall be awarded on evidence given by the candidates of their past work in literature or science, and on their satisfying the electors as to their subsequent devotion to original work. The scheme is as yet only under consideration. We likewise understand that Mr. Waterhouse is preparing plans for completing a portion of the buildings required for Owens College, including museums for natural history, geology, and mineralogy, and for the lecture-rooms and laboratories required for the professors of the above subjects.

On Saturday next (May 21) Prof. Boyd Dawkins, F.R.S., will begin the seventh series of Field Lectures in Geology, at Miller's Dale Station, Derbyshire. That and the two following Saturdays will be devoted to the examination of the Carboniferous rocks of the Pennine Chain. On Saturday, June 9, the class will visit the British Museum (natural history) under the guidance of Dr. Woodward, F.R.S., for the study of the mammalia associated with Pleistocene Man. On June 10 the brickfields at Crayford and Erith, in Kent, will be visited under the guidance of Mr. F. C. Spurrell; and on the 11th the subject of the Antiquity of Man will be finished by an examination of the collections of prehistoric archæology in the British Museum (Bloomsbury).

THE Queen has directed letters patent to be passed under the Great Seal granting and declaring that the degrees of Bachelor and Master of Arts and Bachelor and Doctor of Medicine, of Laws, of Science, and of Music, granted or conferred by the University of Adelaide, South Australia, on any person, male or female, shall be recognised as academic distinctions and rewards of merit, and be entitled to rank, precedence, and consideration in the United Kingdom and in the colonies and possessions of the Crown throughout the world, as fully as if the said degrees had been granted by any university of the United Kingdom.

SCIENTIFIC SERIALS

Journal of the Royal Microscopical Society for April, 1881, vol. i. ser. ii. part 2, contains—Prof. P. Martin Duncan, on a Radiolarian and some Microspongidæ from considerable depths in the Atlantic Ocean (plate 3).—Dr. Lionel S. Beale, the President's address.—Prof. E. Abbe, on the conditions of orthoscopic and pseudoscopic effects on the binocular microscope.—A. D. Michael, on a species of Acarus believed to be unrecorded (plate 4).—Prof. E. Abbe, on the estimation of aperture in the microscope. The summary of current researches, pp. 217-364.—Proceedings of the Society. (In the summary of current researches appears a memoir by Mr. Crisp, "On Aperture, Microscopical Vision, and the Value of Wide-Angled Immersion Objectives," in which the whole subject is very exhaustively and clearly put.)

Annalen der Physik und Chemie, No. 4.—Experimental investigation of the connection between refraction and absorption of light, by E. Ketteler.—On the ratio of intensity of the two sodium lines, by W. Dietrich.—On the condensation of gases on surfaces in their relation to pressure and temperature, by H. Kayser.—Influence of pressure on the surface-tension of liquids, by A. Kundt.—Variations of the vapour-density of some esters with pressure and temperature, by P. Schoop.—On differences of tension between liquids touching each other, with reference to concentration, by E. Kittler.—On electric ring-figures and their alteration of form by the magnet, by E. Reitlinger and F. Wächter.—On the divergence of Ampère's theory of magnetism from the theory of electromagnetic forces, by J. Stefan.—On some remarks of Herr C. Neumann on electrodynamics, by R. Clausius.—The law of Clausius and the motion of the earth in space, by E. Budde.—On the extent of the electric expansion in glass and caoutchouc, by Dr. J. Korteweg and V. A. Julius.—The glass plate battery, by Th. Erhard.—Some remarkable properties of flames, by W. Holtz.

American Journal of Science, April.—Monograph by Prof. Marsh on the Odontornithes, or toothed birds of North America, by G. B. Grinnell.—On some elements in orographic displacement, by W. J. McGee.—On the indices of refraction of certain compound ethers, by J. H. Long.—On the Whitfield County, Georgia, meteoric iron, by W. E. Hidden.—The basin of the Gulf of Mexico, by J. E. Hilgard.—On the geology of Florida, by E. A. Smith.—The magnetic survey of Missouri, by F. E. Nipher.—American sulpho-selenides of mercury, by G. J. Brush.—Analysis of Onofrite from Utah, by W. J. Comstock.—Effect of great cold on magnetism, by J. Trowbridge.—Channel fillings in Upper Devonian shales, by H. S. Williams.—A new order of Jurassic reptiles (Cœluria), by O. C. Marsh.—Discovery of a fossil bird in the Jurassic of Wyoming, by the same.—American pterodactyls, by the same.

Journal of the Franklin Institute, March.—Experiments with the Perkins machinery of the *Anthracite*, by Mr. Isherwood.—The wearing power of steel rails in relation to their chemical composition and physical properties, by Dr. Dudley.—Note on steam cylinders, by Prof. Marks.—Novel mode of originating an index wheel, by Dr. Grimshaw.—The polarisation of sound and the nature of vibrations in extended media, by Prof. Robinson.—Gyroscope model for class-illustration, by Dr. Rand.

Reale Istituto Lombardo di Scienze e Lettere. Rendiconti, vol. xiv. fasc. vii.—Grafts of the vine, by Count Trevisan.—On the determination of maximum moments, &c. (continued), by Prof. Clericetti.—On two rare helminths of reptiles, by Prof. Pavesi.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 28.—"The influence of Stress and Strain on the Action of Physical Forces." By Herbert Tomlinson, B.A. Communicated by Prof. W. Grylls Adams, M.A., F.R.S. Part I.—Elasticity. "Young's Modulus."

The values of "Young's modulus" were determined for several metals by a method devised by Sir W. Thomson.

A large number of experiments with different loads were made, and after a great many unsuccessful attempts to account for certain discrepancies which could not be explained away as errors of observation, the following facts were elicited:—

1. After a wire has suffered permanent extension, the temporary elongation which can be produced by any load becomes less as the interval between the period of permanent extension and that of applying the load becomes greater.

2. This increase of elasticity is greater in proportion for large loads than for small ones.

3. The increase of elasticity takes place whether the wire be allowed to remain loaded or unloaded between the period of permanent extension and that of the testing for the elasticity.

4. The *rate of increase* of elasticity varies considerably with different metals; with some the maximum elasticity is apparently attained in a few minutes, and with others not till some days have elapsed, iron and steel being in this last respect very remarkable.

5. The elasticity can also be increased by heavily loading and unloading several times, the rate of increase diminishing with each loading and unloading.

6. A departure from "Hooke's law" more or less decided always attends recent permanent extension, even when the weights employed to test the elasticity do not exceed one-tenth of the breaking weight.

7. This departure is diminished very noticeably in the case of iron, and much less so in the case of other metals, by allowing the wire to rest for some time either loaded or unloaded; it is also diminished by repeated loading and unloading.

The effect of permanent extension on the value of "Young's modulus" was tried according to the direct method for iron and copper, and indirectly for most of the metals.

From both the direct and indirect methods results were obtained which showed:—

1. That, in all metals, provided the wire has not been kept heavily loaded for some time before testing, permanent extension produces decrease of elasticity, if the strain be not carried beyond a certain limit.

2. That, if the extension be carried beyond the above-mentioned limit, further permanent increase of length causes increase of elasticity.

3. That, in the case of iron, heavy loading for some time so increases the elasticity that, even when the extension would have caused diminution of elasticity without such continued loading, the latter will, if sufficient time be allowed, change this diminution into an increase; in the case of copper this is not so.

The effect of suddenly chilling steel heated to a high tempera-