lines. Mr. Jolly here pointed out the position of the successive contractions of the ice required to dam the lake, and described the abundant evidences of this last stage of the glaciers there, in scratchings, carried blocks, boulder clay, &c., and in the splendid horse-shoe moraines of the Treig glacier, lying intact across and along Glen Spean. He held that the lowest road extended up Loch Treig only a short distance, suddenly ceasing there, and not round the whole lake—an additional remarkable proof in favour of a glacier then filling that basin down to the ends of the roads, where a dam was necessary. Similar remarks were made regarding the Glen Gluoy and Glen Laggan parallels.

By means of coloured additions laid over the map, the state of the ice at this period, necessary to fulfil the requisite conditions, was graphically exhibited. Mr. Jolly concluded with an appeal to the Society to study the fascinating problem on the ground itself, so as to help to a final settlement of the much-debated question. Inverness had already done honourable work in connection with it, for the height of the lowest road had been first determined by an Inverness man, Mr. Wm. Paterson, sent there for the purpose in 1847 by Mr. Joseph Mitchell, at the request of Mr. Robert Chambers.

Mr. Horne, of the Geological Survey, Banff, and others, afterwards spoke on the subject, and a cordial vote of thanks was awarded to Mr. Jolly.

The reader may consult with advantage, for the better understanding of the subject, the admirable maps of the district of the Ordnance Survey, both the six- and one-inch, in which the Roads and the related phenomena are accurately and fully laid down; or the special Ordnance selected map of the locality, appended to the paper of Sir Henry James, mentioned above.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The authorities of both Girton and Newnham Colleges have supported the general memorial of 8,500 persons in favour of the admission of women to academical degrees and examinations, by informing the Senate in detail of their past proceedings, the number of their students who have been examined informally, none of whom have failed to attain Tripos standards; and both colleges believe that they will be able to offer sufficient guarantees of stability and good administration, so that the University can admit their students to full academical privileges.

Newnham College has now been fully constituted, with Prof. Cayley as president. Prof. Adams has ably aided the Women's Educational Association during the last seven years as president, and now retires, on the amalgamation of Newnham Hall with it, retaining his place on the Council.

Mr. R. C. Rowe, of Trinity College, is appointed an Examiner in the next Mathematical Tripos, and Mr. A. G. Greenhill Additional Examiner.

Dr. Alexander Dickson has been appointed Regius Professor of Botany in the University of Edinburgh and Keeper of the Royal Botanic Garden of that city in succession to Dr. Balfour, who resigned some time ago.

The new representative Council of Education in France has been completed by the appointment of a number of official members. M. Berthelot has been nominated President by the Ministry. A number of sections and special commissions have been established, amongst which we must direct attention to the Commission for Reforming Secondary Instruction. One of the principal features of the intended reform is to divide secondary instruction into three different courses, so that any pupil leaving the school after having gone through the elementary course might have a general knowledge of the principal subjects which are to be investigated more fully in the other two courses.

The University of the City of Pesth celebrated its hundredth anniversary in presence of the Emperor on the 13th inst.

SCIENTIFIC SERIALS

Annalen der Physik und Chemie, No. 4.—On the propagation of electricity through current water in tubes, and allied phenomena, by E. Dorn.—Thermic theory of the galvanic current, by J. L. Hoorweg.—On the cause of excitation of electricity in contact of heterogeneous metals, by F. Exner.—On diffusion of salts in aqueous solution, by J. H. Long.—On the relation between propagation of light and the density of bodies, by H. A. Lorenz.—On Stokes's law, by O. Lubarsch.—On after images of motion, by G. Zehfuss.—Supplementary note to the paper on currents of the Gramme machine, by O. E. Meyer and F. Auerbach.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 29.—"Measurement of the Actinism of the Sun's Rays and of Daylight." By Dr. R. Angus Smith, F.R.S.

When examining the air of towns and the effect of smoke and fogs, I have often wished for a very simple chemical method of measuring the total light absorbed by these gases, vapours, and floating solids. I do not undervalue the work of others, but I think I have obtained a process promising good results with great simplicity, although I daresay it introduces its own class of difficulties.

1. The fundamental fact is that when iodide of potassium in solution is treated with nitric acid, so small in quantity as to cause no change of colour in dull diffused light, a change takes place when the same mixture is brought into clear light; iodine is set free and the solution becomes yellow.

2. The amount of iodine freed can be titrated with great exactness by the use of hyposulphite, as is well known.

In these two facts lies the whole process: the first is the new part, the second makes the first quantitative, and its use is of course part of the novelty.

3. It is known that strong acid liberates iodine. Weak acid does so after a long time, but the process is hastened by light.

4. Heat even to the boiling point does not act so well as light (experiments being made in sealed tubes to prevent loss of iodine, and with a considerable volume of air).

5. Heat assists the action of light.

6. A solution may be exposed day after day so as to give the accumulated effect of sunlight, in a measurable condition at the end of the time.

7. The solution of iodide of potassium as hitherto obtained is subject to change. An old solution, that is, one nearly a month old, was found more sensitive than a new one in all cases tried.

8. The result of No. 7 is, that a certain allowance may require to be made for this, in those cases where the periods of observation with one solution are long.

9. The amount of allowance to be made for temperature is not made out. It is not certain that any is required in the cases when weak acid is used. The weather has not allowed any combined action of great light and heat, but with heat and light in the rays from an electric light with a parabolic reflector, the action was very rapid.

10. Specimens of experiments (prospective at first). It was found convenient to use a solution of 2 grms. of iodide of potassium, afterwards changed to 1 grm., in 100 of water, and to use half of this for an experiment, *i.e.*, 50 cub. centims. of the solution, which may be called A.

A nitric acid solution having an acidity equal to 1 per cent. of sulphuric anhydride was made; this may be called B. Only very small portions of B were added to A.

Examples in which the decomposition was measured by a solution of hyposulphite of sodium, which may be called solution C = 0·1 grm. per litre of iodine (or as convenient). I shall extract experiments made with B solution 0·8 cub. centim., because it is an intermediate one (·2, ·4, ·8, 1·6, and 3·2 have hitherto been the favourites).

1880.		B sol.		Measure by C solution (hyposulphite).
Mar. 3	Sunshine and cloud alternately	0·8	After 2½ hours	8·1. First colour in 20′.
,, 4	Sunshine	0·8	—	First colour in 30′.
,, 5	Dull all day	0·8	,, 4 ,,	0·9.
,, 8	Sunshine	0·8	,, 2½ ,,	7·5. Colour in 20
,, 9	A little sunshine ...	0·8	,, 2½ ,,	4·8.
,, 10	Foggy, with a gleam of sunshine	0·8	,, 6 ,,	1·5.
,, 11	Bright	0.8	,, 2½ ,,	7·2.
,, 12	Dull and wet	0·8	,, 3 ,,	0 6.
,, 13	Dark and dull	0·8	,, 2½ ,,	Faint trace.
,, 15	Changeable	0·8	,, 2½ ,,	1·8.
,, 16	Changeable	0·8	,, 2½ ,,	1·6.
,, 18	Sun through haze ...	0·8	,, 2½ ,,	5·8.
,, 19	Bright	0·8	,, 2½ ,,	11·5.
,, 20	Fog till 11.30	0·8	,, 2½ ,,	3·2.
April 1	Sun and showers ...	0·8	,, 2½ ,,	1·6.

(*a*) 2½ hours' exposure to not very bright clouds; (*b*) in dark:—

(*a*) Temp. 12° C. in light. Sulphuric acid used, same acidity.	C sol. required.	(*b*) Temp. 20° C. in dark. Sulphuric acid.	C sol. required.
0·4	0·5	0·4	0
0·8	3·9	0·8	0
1·6	4·9	1·6	0
3·2	6·1	3·2	0

11. There seems, therefore, no reason to doubt that this is a true photometric process, with special capacities to be developed in time. I may add that I did obtain better results at the window of my house than at the laboratory at the same time, the latter being nearer the centre of the town; thus the process has done the duty it was intended for, although only once tried for this special purpose. I am looking to it as an agent specially for the examination of climate, but of course it may have many uses. This process does not aim at delicacy, but at accumulation of effect. I have not spoken of a standard; the results are only comparative, but the process may be made to supply its own standard.

12. Since writing the above it appears that by using sulphuric acid some of the fears at first entertained may be avoided, as is shown by the following extract:—

B sol.	C sol. required after 2½ hours' exposure of A to light.	C. sol. required after 50 hours' exposure of A to darkness.
0·2	7·6	0·3
0·5	15·1	0·6
1·0	23·4	0·6
2·0	30·4	0·7
4·0	43·6	0·7
6·0	53·8	1·3

The temperature of the solutions exposed to light = 13° C., kept in darkness = 22° C. The iodine volatilised by heat was found so little that it might be neglected here.

The strength of solutions and the kind of acid to be used may vary. Similar results may be got by using bromide of potassium, but it is less delicate. The surface exposed and other questions require attention.

Mathematical Society, May 13.—C. W. Merrifield, F.R.S., president, in the chair.—The following communications were made:—On Cremonian congruences, by Dr. Hirst, F.R.S.; on some statical and kinematical theorems, by Prof. Minchin; on a class of analytical problems, by Prof. Cayley, F.R.S.

Linnean Society, May 6.—H. T. Stainton, F.R.S., in the chair.—Three Foreign Members were elected.—Mr. T. Christy read a letter from Mr. Blacklaw, of St. Paulo, Brazil, intimating that his experiments to rear the Liberian coffee plant had all failed, though different seasons, altitudes, and other conditions, without and indoors, had been tried.—The abstract of a paper by Prof. G. Dickie, notes on algæ from the Amazon, was read by the Secretary. This collection was made by Prof. J. W. H. Trail, and consists of 288 species, whereof 190 are diatoms, 31 desmids, and 67 other algæ, 9 of the latter being new forms.—Prof. P. M. Duncan orally communicated the substance of a paper on an unusual form of the genus *Hemipholis*, Agass. This was dredged by Dr. Wallich off the Algulhas Bank, S.W. of the Cape of Good Hope. Its zoological position may be doubtful, for the classification of the Ophiuroidea is at present full of anomalies; but the specimen itself nevertheless possesses unusual interest from the nature of the so-called dental or chewing apparatus. These peculiar dental structures and other points were elucidated by the author.—Mr. G. T. Bettany gave some remarks on the vocabulary of botanical terms in use in the description of flowering plants. The author advocated making a distinction between terms used in elementary descriptions in educational works and those used in the terse and complete floras. Under evolution there was much chance of botanical progress if terms were simplified and made such as children could comprehend; but almost every book aiming at comprehensiveness became obscure. Thinking it necessary to give every possible variety of terms and to add to them, it repelled, instead of aiding in the wide diffusion of knowledge. For these and other reasons the author strongly objected to the now too frequent use of tri- and polysyllabic terms.—Prof. Ray Lankester read a paper on the tusks of the fossil walrus found in the red crag of Suffolk. He withdraws the generic name of *Trichecodon*, instituted by him in 1865, and refers a series of later-discovered large tusks in the Ipswich Museum, as also his formerly-described specimens, to the living genus *Trichechus*, but specifically distinguished in this case as *T. Huxleyi*. He is inclined to think there is insufficient ground for the generic subdivisions *Alachtherium* and *Trichecodon*, as used by Van Beneden, and moreover signifies his opinion that there is yet no good evidence in support of the association of the Suffolk and Antwerp tusks.—A short communication, on an irregular species of *Amblypneustes*, by Mr. Chas. Stewart, was taken as read.

Zoological Society, May 4.—Prof. W. H. Flower, F.R.S., president, in the chair.—Mr. Sclater exhibited a specimen of the Ibis (*Geronticus comatus*), lately obtained at Biledjik, on the Euphrates, by Mr. Danford, and made some remarks on its previously-known distribution.—Dr. A. Günther read a note correcting the statement made by him at the meeting of the Society on January 20 last respecting the occurrence of *Holocanthus tricolor* on the British coast. Further particulars received by Dr. Günther had led him to decide that this fish could not be considered as having been caught on the British coast.—Mr. W. A. Forbes read a note on the cause of death of a leopard in the Society's menagerie.—Mr. Dobson exhibited and made remarks on some bones of the Dodo which had been transmitted from Mauritius in 1847–50 by Dr. F. Reid to Sir James Macgregor, and having been deposited at Fort Pitt, Chatham, were afterwards removed to Netley Museum.—Mr. F. Jeffrey Bell exhibited the immature specimen of *Echinolampas*, referred to by him in his communication on *Palæolampas*, pointing out its more differentiated characters, and suggested the possibility of its being an example of *E. oviformis*.—Prof. Flower called the attention of the meeting to the fact that a young specimen of the Lesser Fin Whale (*Balæonoptera rostrata*), fifteen feet long, which had been taken off the coast of Cornwall, was now being exhibited in London.—A communication was read from Prof. J. O. Westwood, containing an account of the species of Saw-flies composing the Australian genus *Perga* of Leach.—A communication was read from Dr. W. J. Hoffman on a supposed instance of hybridisation between a cat and a lynx.—Mr. W. A. Forbes read the second and third parts of his series of papers on the anatomy of Passerine birds. These communications related to the syrinx and other points in the anatomy of the *Eurylæmidæ*, and to the structure of *Philepitta*, and its position among the Passeres.—A communication was read from Mr. F. Day, in which he gave the description of a new Entomostracon from Afghanistan.—Mr. Oldfield Thomas read a paper on a collection of mammals brought from Ecuador by Mr. Clarence Buckley. Among these was a new species of *Bassaricyon*, proposed to be called *B. alleni*.—Mr. A. G. Butler read a paper containing descriptions of a collection of Lepidoptera made by Major Howland Roberts at Rokeran, near Kandahar, on the River Urgundab.—Mr. G. French Angas read a paper containing further additions to the marine molluscan fauna of South Australia, with descriptions of six new species.—A second paper by Mr. Angas contained the descriptions of three species of marine shells from Port Darwin, Torres Straits, discovered by Mr. W. J. Bednall, and of a new *Helix* from Kangaroo Island, South Australia.

Geological Society, April 28.—Robert Etheridge, F.R.S., president, in the chair.—Rev. James Oliver Bevan, M.A., Arnold Hague, Augustus Constable Maybury, Henry Peter Meaden, William Peregrine Propert, and Francis Randell were elected Fellows of the Society.—The following communications were read:—Description of parts of the skeleton of an anomodont reptile (*Platypodosaurus robustus*, Ow.) from the trias of Graaff Reinet, South Africa, by Prof. Owen, C.B., F.R.S. The author referred to certain triassic reptiles from South Africa, already described by him, as showing certain resemblances to implacental mammals. Another still more interesting indication of such resemblances is furnished by some remains from Graaff Reinet received from Mr. E. J. Dunn. These consist of some thoracic vertebræ with portions of ribs, a sternal bone, a scapula, and a right humerus, found imbedded in one mass of rock, and of a femur and phalanges, and a pelvis in another mass. The author described these bones in detail. The vertebræ were said to agree most nearly with those of *Dicynodon* and *Oudenodon*. The supposed sternal bone is of a rounded hexagonal form, and is regarded by the author as the anterior bone of the sternum proper, which is usually unossified in recent lizards, but well ossified in *Ornithorhynchus*. In the scapula, also, the author pointed out resemblances to that bone in *Ornithorhynchus*. The humerus in its general proportions, and

especially in the great development of its ridges, was also shown to resemble the same bone in the Monotremes. The ungual phalanges were described as broad and obtuse, probably constructed to bear claws adapted for digging, as in *Echidna*; the femur also resembles that of the last-named animal. The author remarked upon these approximations to the monotrematous mammalia, in allusion to which he proposed the name of *Platypodosaurus robustus* for this animal, the humerus of which was 10½ inches long and nearly 6 inches broad at the distal end. He also alluded to the interesting problems opened up by the study of these South-African reptiles in connection with their possible relationships to the low implacental mammalia of New Guinea, Australia, and Tasmania.—Note on the occurrence of a new species of *Iguanodon* in the Kimmeridge clay at Cumnor Hurst, three miles west of Oxford, by Prof. J. Prestwich, F.R.S. The pit in which the occurrence of *Iguanodon* was discovered was worked in Kimmeridge clay at the foot of an outlying mass of Lower Greensand forming an isolated hill. The Portland beds, which occur at Shotover, are here wanting. The bones were found in a thin sandy seam intercalated in the clay, and traversing the hill at least fifteen feet below the greensand. The skeleton was probably almost entire; but, as attention was not directed to it until nearly all the clay had been removed, many bones were lost and others injured. Several vertebræ of *Ichthyosaurus* were found in the same seam, and the characteristic *Gryphæa virgula* occurred in profusion. The clay above and below contained fossils of Kimmeridge types. The author stated his opinion that land probably lay to the south-west of the Oxford district.—On *Iguanodon prestwichii*, a new species from the Kimmeridge clay, by J. W. Hulke, F.R.S. In this paper the author described in detail the remains of *Iguanodon* found at Cumnor Hurst in the Kimmeridge clay, as described in the preceding paper. They illustrated nearly every part of the skeleton of an immature individual, adding greatly to our knowledge of the variation of the vertebræ in the several regions of the vertebral column, and of the structure of the head and hind limbs. In the latter both the tibia and the fibula articulate (as in embryo birds) with the *os calcis*, which bone is now first identified in *Iguanodon*. The sacral vertebræ were only four in number, and the species further differed from the Wealden *Iguanodon mantelli* in the simpler character of the serration of the teeth, of which the lamellæ are not mammillated, and in having the vertebræ of the trunk and sacrum not so compressed. The author named the species *Iguanodon prestwichii*.

Institution of Civil Engineers, May 11.—Mr. W. H. Barlow, F.R.S., president, in the chair.—On the manufacture and testing of Portland cement, by Major-General H. Y. D. Scott, F.R.S., and Mr. Gilbert R. Redgrave.—On Portland cement concrete, and some of its applications, by Mr. E. A. Bernays.—On Portland cement: its nature, tests, and uses, by Mr. John Grant.

Anthropological Institute, May 11.—A. L. Lewis in the chair.—The following papers were read:—Notes on prehistoric discoveries in Central Russia, by C. H. E. Carmichael, M.A.—Notes on the occurrence of stone implements of the surface-period in South Russia, by W. D. Gooch.—Notes on the Western Regions, by A. Wylie.—On jade implements in Switzerland, by Hodder M. Westropp.—Flint implements from the Valley of the Banu, by W. J. Knowles.

PARIS

Academy of Sciences, May 10.—M. Edm. Becquerel in the chair.—The following papers were read:—On the transcendants which play a fundamental part in the theory of planetary perturbations, by M. Tisserand.—On a proposition of the theory of elliptic functions, by M. Hermite.—On a rain of dust observed from April 21 to 25, 1880, in the departments of Basses-Alpes, Isère, and Ain, by M. Daubrée. This dust gave a reddish tinge to snow on the mountains at Barcelonnette, up to 2,800 and 3,000 m. (snow further up remaining white). Its chief mineralogical characters were: effervescence with acids, mixture of hydrated peroxide of iron, presence of spangles of mica, residue of fusible acids, principally feldspathic. The dust is thought to be of terrestrial origin, but not volcanic, nor Saharan. (Somewhat similar showers fell in France in October, 1846, and May, 1863.) The same phenomenon seems (from another note) to have been experienced at Autun (Saône-et-Loire) on April 15, *i.e.*, ten days before.—On the crystalline form of magnesium, by M. Des Cloizeaux. Having examined the fine magnesium crystals lately obtained by M. Dumas, he finds that among the rhombohedric metals magnesium is that which, after zinc, presents the most acute primitive rhombohedron. The crystals in question are very malleable and sectile; no cleavage was observed.—On a Cicadella (*Hysteropterum apterum*) which attacks the vines in the department of the Gironde, by M. Blanchard.—On the law of reciprocity in the theory of numbers, by Prof. Sylvester.—On the new siphon established over the Canal Saint Martin, and on the works of sanitation of the Bercy quarter, by M. Levy. The sewers of Bercy (which formerly discharged into the Seine) are in some parts lower than the collector designed for them, and had to cross the Canal Saint Martin to reach this. An ingenious system of siphons and trompes was devised to meet the difficulty.—On linear functions, by M. Pellet.—Experimental researches on the decomposition of some explosives; analysis of products, by MM. Sarran and Vieille. This related to decomposition of explosives under a pressure near the atmospheric. In this case all the explosives liberate bioxide of nitrogen and carbonic oxide. It is important, then, in mining operations to avoid with all care failure of detonation.—On the determination of algebraic integrals of algebraic differentials, by M. Zeuthen.—On simultaneous linear equations and on a class of non-plane curves, by M. Picard.—On a class of functions of two independent variables, by M. Picard.—On the theory of phenomena of interference where rotatory polarisation intervenes, by M. Gouy. He takes a point of view of interference phenomena different from that of Fresnel, and superior in simplicity.—On the equipotential lines of a plane formed of two halves unequally conductive, by M. Guébhard.—On the mutual actions of magnetic needles plunged in liquids, by M. Obalski. Two magnetic needles are hung opposite each other (and a little beyond the range of attraction) by two unlike poles from very fine threads over water in a vessel, which water can be raised gradually over them (by means of a connected tube of caoutchouc). When immersion begins, the needles draw near each other by their immersed parts, and when the immersion has reached the third or fourth of the needles' length, they go together. This is probably due to the separating force of gravity being weakened by immersion.—Analysis by the graphic method of movements produced by excitations of the brain, by MM. François Franck and Pitres. To the detached tendon of a limb-muscle they attached the transmitting myograph; an electro-magnetic signal (of M. Deprez) registered the time on the drum, and another signal the excitation. The character of movements caused by various electrical excitations is described. As to retardation of the movement on the instant of cortical excitation, this is found constant for a given muscular group in the same animal, whatever the form or intensity of the electric excitant. A notable part of it is due to physiological resistance of the grey cortical substance. Beyond a certain intensity of stimulation movements are produced on the same side of the body as the part of brain stimulated, as well as on the opposite, and the retardation for these movements is greater. The retardation is greater for hind than for fore limbs.—On a rain of dust at Autun, by M. De Jussieu (see above).—M. De Lesseps presented specimens of silver ore from California, and gave some information about Mr. Mackay's mines at Virginia City, the galleries of which have been pushed about 1,000 metres, a depth hardly exceeded in Europe (Bohemia). Descent is by means of hydraulic motors.

CONTENTS

ERRATA.—Vol. xxi. p. 202, col. 2, line 5 from bottom, for "Lethō" read "Pethō"; p. 220, col. 2, line 22 from bottom, for "Lethō" read "Pethō."