

Western Ontario, including *Zaphrentis fenestrata* (n.s.) *Blothrophyllyllum approximatum* (n.s.); *Heliophyllyllum colbornensis* (n.s.); *Petraia logani* (n.s.); and *Alecto canadensis* (n.s.).—A detailed report is given of the meeting of the American Association for the Advancement of Science, of which an abstract has already appeared in our pages.

Journal of the Franklin Institute, Oct. 1873.—We have here the second portion of Prof. Thurston's valuable paper on the molecular changes produced in iron by variations of temperature. He comes to the conclusion that at temperatures above 600° and below 70° F., iron conforms to the general law for solid bodies, that increase of temperature diminishes tenacity but increases ductility and resilience, while decrease of temperature has the opposite effect. Below 70° the tenacity increases with diminishing temperature at the rate of 0.02 to 0.03 per cent. for each degree F., while the resilience decreases in much higher ratio. Between ordinary temperatures and a point somewhere between 500° and 600°, on the other hand, iron shows marked deviation from the law, the strength increasing to the extent of about fifteen per cent. with good iron. The practical result is, that as iron does not lose its power of sustaining "dead" loads at low temperature, but greatly loses its power of resisting shocks, the factor of safety in structures need not be increased in the former case, where exposure to severe cold is apprehended; but that machinery, rails, and other structures which have to resist shocks should have large factors of safety, and be protected, if possible, from extremes of temperature.—Mr. Lowe communicates "something new concerning the physical properties of steam," viz., that the external work given out by steam in expanding from the temperature (t') to the temperature (t), bears a constant ratio to the difference; that is, to ($t' - t$). He considers the latent heat performs the internal work, while the sensible heat only is available for external work; in which case that vapour whose latent heat is the smallest, other things equal, would be the best agent for converting heat into work.—A paper on statistics of coal, is compiled from Mr. James McFarlane's "Coal Regions of America."—Mr. Bilgram furnishes an "Elementary treatment of Zeuner's slide-valve;" and Mr. Murphy has a paper on "Bridge building considered normally."—There are descriptions of machinery for utilisation of coal waste, a stone-cutting machine, and a machine for making paper boxes. The latter produces match-boxes at the rate of 3,000 in an hour. Paste is dispensed with, the slips of wrapper being fastened by delicate staples of iron wire.

American Journal of Science and Arts, November, 1873. In this number we find two contributions in chemistry from the Massachusetts Institute of Technology, in one of which it is shown that by solution of cast-iron in an acid, there may be obtained, besides gaseous bodies, which escape with the hydrogen, volatile hydrocarbons, boiling between 93° and 155° C., and probably belonging partly to the saturated, partly to the non-saturated series. Of the latter, considerable quantities may be condensed by combination with bromine, after having passed through a freezing mixture.—Prof. H. L. Smith gives a series of investigations made in the Queen's Chamber of the Great Pyramid, as supporting the view that a high degree of geometrical and astronomical knowledge must have been possessed by the builders, but without superhuman accuracy. In a paper on rocks of the Helderberg era, in the Connecticut Valley, Prof. Dana endeavours to show that Staurotic slate, hornblende rocks, gneiss, mica schist, &c., are extensively developed in a formation of Helderberg age, and probably the Upper Helderberg or Lower Devonian. There is a letter from Dr. B. A. Gould, Director of the Cordoba Observatory (date Aug. 5), giving an account of work recently done there. Zone observations had been begun in September last year, and were nearly half completed, some 50,000 stars having been observed. From a note on the hypsometric work of the U.S. Geological and Geographical Survey of the Territories, we learn that four stations were established: at Denver, 5,000 feet above the sea; Cañon City, 6,000 feet; Fair Play (in the South Park), 10,000 feet; and Mount Lincoln, 14,000 feet; the observations at each being taken three times daily. The U.S. Signal Service have recently established a permanent meteorological station on the summit of Pike's Peak, about 14,000 feet high; the observations will be published daily by telegraph, and will doubtless be of high scientific and popular interest.—Of the remaining matter we may note suggested improvements in filter pumps, and in the arrangement of shutters in a dome for an equatorial telescope.

Poggendorff's Annalen der Physik und Chemie. No. 7, 1873. In this number, M. Quincke continues his "Optische Untersuchungen," investigating at some length the behaviour of polarised light on its passage through gratings.—M. Riess enunciates thus a new kind of reaction of currents: a wire circuit, part of which is traversed by a given (Leyden) battery current, remaining unaltered, various secondary currents, produced in it successively, react on the primary, so that the weaker secondary corresponds to the stronger primary.—Dr. Voller has examined the influence of temperature on electromotive force of galvanic combinations, and finds that with salt solutions in contact with copper or zinc, the force is diminished by rise of temperature, whereas with acids it is increased.—An interesting paper by Prof. Villari treats of the time flint glass takes to be magnetised, demagnetised, and to turn the plane of polarisation. He rotated a glass cylinder between the poles of an electro-magnet, where it acted like a cylindrical lens to polarised light passing through the poles. When not magnetised, the cylinder, whether in motion or at rest, was neutral to the light; but when magnetised, its plane-rotating power considerably diminished with increasing velocity of rotation; the reason being that, in such quick revolution, each diameter remained too short a time in the axial direction to acquire all the magnetism it would otherwise have. To give flint glass such diamagnetic intensity, as became observable by rotation of the plane, required at the least 0.001244, while to give it all the diamagnetism it is capable of taking under a strong magnet, at least 0.00241 was necessary.—"A contribution to the theory of thermal currents," by M. Avenarius, appears to be an appropriation of results published by Prof. Tait in 1870, and which are incorporated in the professor's Rede Lecture for this year. A similar remark will apply to M. Topley's application of air-friction to the deadening of galvanometer needles, &c., which is simply Sir W. Thomson's dead-beat principle.—M. Raye criticises unfavourably M. Zöllner's theory of sun-spots and protuberances; his own theory represents, in the sun, something like what occurs in our cyclones, in which there is an *upward* air-current carrying with it aqueous vapour, which forms above into a cloud. He thus differs from Faye, who supposes a *descending* current, in the solar cyclones.—M. Hennig describes an apparatus for quantitative spectrum analysis, and M. Schneider continues his account of salts of sulphur. We find also notes on galvanic reduction of iron under the influence of an electromagnetic solenoid, and on the reflection and refraction of sound; from the St. Petersburg and Vienna academies respectively.—An abstract of an instructive paper by M. Vogel on the spectra of comets we hope to give shortly.

SOCIETIES AND ACADEMIES

LONDON

Geological Society, Nov. 19.—Prof. Ramsay, F.R.S., vice-president, in the chair.—The following communications were read:—"Supplemental Note on the Anatomy of *Hypsilophodon Foxii*," by Mr. J. W. Hulke, F.R.S. The material for this note was a slab from Cowleaze Chine, containing portions of two individuals of *Hypsilophodon Foxii*, one consisting of a skull with a great part of the vertebral column, the other of a portion of the vertebral column. The author described some details of the structure of the skull, and especially the palatal apparatus. In connection with the question of the generic rank of *Hypsilophodon*, the author stated that in *Hypsilophodon* the centra of the sacral vertebrae are cylindrical and rounded below, whilst in *Iguanodon* they are compressed laterally and angulated below.—"The Drift-beds of the North-west of England, Part 1, Shells of the Lancashire and Cheshire Low-level Clay and Sands," by Mr. T. Mellard Reade. The author gave a list of the localities in which shells were found, and stated that in all forty-six species had been met with distributed through the clay-beds, those found in the sand-seams being rare and generally fragmentary and rolled. He contended that the admixture of shells in the boulder-clay was due to the tendency of the sea to throw up its contents on the beach, whence changing currents and floating ice might again remove them, and to the oscillations of the land bringing all the beds at one time or another within reach of marine erosive action. He maintained that it is in the distribution of land and sea at the period of deposition of the Lancashire deposits, and not in astronomical causes, that we must seek the explanation of the climate of that

period, the conditions of which he endeavoured to explain by a consideration of the proportions of the species and the natural habitats of the shells found in the drifts.—“Note on a deposit of Middle Pleistocene Gravel near Leyland, Lancashire,” by Mr. R. D. Darbishire. The bed of gravel, about forty feet thick, and about 240 feet above the level of the sea, is covered by yellow brick clay, and overlies an untried bed of fine sea-sand. The shells and fragments occur chiefly at the base of the gravel. The author considered the Leyland deposit, like those on the west of the Derbyshire hills, to be more probably littoral and truly climatic than that of the Liverpool clays, the subject of Mr. Reade’s paper, and hazarded the conjecture that the latter were sea-bottom beds, into which, during some process of degradation and redistribution, the specimens found and enumerated by Mr. Reade had been carried down from the former more ancient retreating coast-lines.

Geologists’ Association, Nov. 7.—Mr. Henry Woodward, F.R.S., president, in the chair.—At this, the first meeting of the session 1873–74, the president delivered the opening address of the new session, in which he gave a review of the progress of geological science during the past year. Mr. Woodward referred to the progress made in the acceptance by botanists and zoologists of the doctrine of evolution. “Darwin’s theory has already passed through the fire like crude ore, it has been roasted, crushed, sifted, washed, and after all the pure metal remains. Our speculations, however, bring us no nearer to the discovery of the origin of life itself.”

Meteorological Society, Nov. 19.—Dr. R. J. Mann, president, in the chair.—The following papers were read:—The thunderstorm at Brighton on Oct. 8, 1873, and its effects, by F. E. Sawyer, and some considerations suggested by the depressions which passed over the British Islands during September 1873, by F. Gaster.—A discussion took place on the best form of thermometer stand. It was resolved that the following conditions should be fulfilled:—(1) The contained thermometers must at all times be shielded from the direct rays of the sun; (2) The stand must be so arranged that even when its own external temperature is raised, the thermometers shall not be thereby affected; (3) As reflected heat must diminish the accuracy with which thermometers indicate air or shade temperature, these disturbing causes should be excluded; (4) The temperature of the air alone being desired, it is necessary that the readings of the thermometers be not affected by radiation to the sky; (5) It being desirable that one pattern of stand be used in all localities, it follows that it should be absolutely independent of all surrounding objects; (6) There must be free access of air round the thermometers; (7) No rain should ever reach the dry-bulb thermometers, for if it does, it improperly lowers their temperature, making them read even lower than the wet bulb; (8) The stand must also be unaffected by snow, both as a direct fall or from obstructed circulation of air; (9) It is very desirable that the stand require no attention between the hours of observation; (10) It is desirable, but not absolutely necessary, that room be provided for a duplicate set of instruments; (11) The stand should not be costly; (12) It should be capable of easy transmission by rail or otherwise. Mr. Prince gave an account of some experiments he had made, and was of opinion that the true temperature of the air could be obtained without a stand. Mr. Symons thought that a stand constructed on the Kew and Stevenson pattern combined, but smaller than the former and larger than the latter would be the best form of stand to adopt. The meeting not having the results of the comparison of the observations made with the different stands at Strathfield Tunggis, the discussion was adjourned till after these are published.

Anthropological Institute, Nov. 25.—Prof. Busk, F.R.S., president, in the chair.—Mr. F. W. Rudler read a report on Anthropology at the meeting of the British Association at Bradford.—Dr. G. W. Leitner, Principal of the Government College of Lahore, gave an account of the Siah Posh Kafirs, a race of people inhabiting Kafiristan, on the south-eastern slope on the Hindu Kush. Kafiristan may be said to form a triangular tract of country lying between 35° and 36° N. lat., and 70° and 72° E. long., and is bounded on its sides by Kábul, Badakshan, and Kashmir. The name of Siah Posh Kafirs was given to them by the Mohammedans, “Siah” meaning “black,” “Posh” clothing, and “Kafir” infidel; for in fact a Kafir, according to the Mohammedans, was any one who did not follow the teaching of Mahomet. The Kafirs claimed to be a sort of country cousins of the British. Slavery existed within their own country, and also within five miles of Peshawur, where the Kafirs were sold in

the open market. The consequence was that the Kafirs in retaliation, kept the roads leading to Central Asia in a state of insecurity, and murdered all travellers coming within their reach. Dr. Leitner, referring to the asserted Macedonian origin of the Kafirs, said that that supposition was founded on very loose and vague data, and that they themselves knew nothing of Alexander. The Tunganis, another of those races, claimed direct descent from Alexander’s soldiers. Another theory was that the Siah Posh Kafirs were Zoroastrians, who were supposed to have been forced into the hills by the Arabs, and the existing customs among the Kafirs certainly seemed to support the idea that they were ethnologically connected with the Parsees. He inclined to the opinion that they were Aborigines; and if they were not descended from the same stock as the “Arian” race, they were certainly, as far as language was concerned, equally related to the Sanscrit.

Entomological Society, Nov. 17.—Prof. Westwood, president, in the chair.—Mr. Higgins exhibited *Deilephila euphorbia* and *Sphinx pinastri*, bred from larvæ taken in June 1872, near Harwich.—Mr. Champion exhibited several rare Coleoptera taken at Braemar and other places during the past season.—Mr. Boyd exhibited a Trichopterous insect, *Brachycentrus subnubilus*, a species which constructs quadrangular cases, which had been reared from the egg state.—Mr. Müller remarked on some galls found by Dr. Masters on the roots of *Deodara*, which he considered identical with the galls of *Biorhiza aptera*, Fab., usually occurring on the roots of oak.—Mr. Bird exhibited *Chilo gigantellus* from Horning Fen, and Mr. Vaughan *Pempelia davisellus* reared from Furze.—Mr. Stevens exhibited some rare Lepidoptera taken on the South Coast.—A paper was read, entitled “Notes on the Habits of *Papilio merope* Auct., with a Description of its Larva and Pupa,” by J. P. Mansel Weale, B.A. Also a paper entitled “Observations on *Papilio merope* Auct., with an account of the various known Forms of that Butterfly,” by Roland Trimen, F.L.S., &c.—Some remarks were communicated by Mr. Miskin, of Brisbane in Queensland, respecting *Mynes guerini* of Wallace, which he considered identical with *M. geoffroyi* Guerin, and directing attention to the singular habit of the pupæ, which were suspended in groups of three or four individuals, united at the tails.

Royal Horticultural Society, Nov. 12.—Scientific Committee.—A. Grote, F.R.S., in the chair.—The Rev. M. J. Berkeley sent a Capsicum from Transylvania with two small fruits produced from the placenta.—Mr. Anderson Henry sent fruit of *Tacsonia quitensis*, produced in a cool greenhouse.—Mr. Wheble sent wood and bark of *Sequoia sempervirens*, the latter being extremely similar to that of the large tree exhibited at the Crystal Palace.—Prof. Thiselton Dyer exhibited preparations of the buds upon the leaves of *Malaxis*, prepared by Prof. Dickie.

General Meeting.—H. Little in the chair.—Prof. Thiselton Dyer called the attention of the meeting to the fine plant of *Vanda cœrulea* with four panicles; a plant of the recently introduced *Batemania Burtii* from Costa Rica; specimens of a species of *Stylidium* (probably *S. ciliatum*), an Australian genus with the radical leaves in a Crassula-like tuft; flowering specimens of *Cunonia capensis* from Syon House; and a “grape-rail,” a contrivance by which grapes could be preserved through the winter. The pieces of cane to which the grapes were attached were inserted into holes in long zinc rod-like boxes which contained a mixture of fuller’s earth, starch, sugar, charcoal, and water. It was remarked by Mr. Jennings that *Vanda cœrulea* was fast disappearing from its native localities. At the present rate the ruthless removal of the plant must determine its extermination at any rate in the Khasia hills.

Anthropological Society, Nov. 18.—Dr. R. S. Charnock, president, in the chair. Extracts from letters from foreign correspondents were read, one of which announced an alleged discovery of a Phœnician inscription of the 4th century, B.C., near Rio de Janeiro, and one from Captain Burton, mentioning the discovery at Maeshowe, in Orkney, of Scandinavian inscriptions, in Arabic letters.—Personal observations of the Sælics or Flat-head Indians of North America, by J. Simms, M.D., of New York. The discourse treated of the manner of fashioning or deforming the head, the customs, dress, diet, disposition of the dead, &c. Dr. Simms also gave a brief description of the Quatsino Indians, who inhabit the north-western coast of Vancouver Island, the mode of fashioning their peculiar, sugar-loaf form of heads, their superstitions, food, &c. He also gave a very interesting account of the Digger Indians of California, the ircolour, form,

dress, manner of living, general habits, including badges of mourning, food, &c. The Snakes, Utes, Piutes, Foxes, Siouxs, and other tribes were briefly described.

CAMBRIDGE

Philosophical Society, Nov. 17.—“On a suspected forgery in the Vatican Manuscript Record of the Trial of Galileo before the Inquisition,” by Mr. Sedley Taylor, late Fellow of Trinity College. The object of the paper was to show, in accordance with the views of recent German and Italian authorities, that the sentence pronounced against Galileo in 1633 was based on a spurious document fabricated for the express purpose of securing his condemnation. The evidence adduced to support this conclusion was taken partly from the works and letters of Galileo, and partly from the contemporary records of the trial preserved in the Archives of the Inquisition, portions of which have been lately published for the first time. The result of the paper was to exonerate Galileo completely from the charge of contumacy which all his biographers have hitherto either advanced or tacitly admitted.

MANCHESTER

Literary and Philosophical Society, Nov. 4.—R. Angus Smith, F.R.S., vice-president, in the chair.—“On the Bursting of Trees and Objects struck by Lightning,” by Prof. Osborne Reynolds, M.A. The results of the experiments referred to in this paper were exhibited to the meeting. The suggestion thrown out by Mr. Baxendell at the last meeting—that the explosive effect of lightning is due to the conversion of moisture into steam—seemed to him to be so very probable, that he was induced to try if he could not produce a similar effect experimentally. He tried various experiments by sending a discharge through pieces of damped wood, and through glass tubes with and without water. The pieces of wood, which varied in size, yielded various results, and the glass tubes, which also were of various sizes, were shivered to pieces.—The Rev. W. N. Molesworth, M.A., brought under the notice of the Society some Roman and Celtic antiquities, to which he thought that sufficient attention had not been given in this country.

Nov. 18.—E. W. Binney, F.R.S., vice-president, in the chair.—“On the Bursting of Trees and Objects struck by Lightning,” by Prof. Osborne Reynolds, M.A. In a paper on this subject read at the last meeting I stated that the tube which was burst by a discharge from a jar would probably withstand an internal pressure of from 2 to 5 tons on the square inch; and I made use of the expression the tube might be fired like a gun without bursting. These statements were based on the calculated strength of the tube, and with a view to show that there was no mistake, I have since tried it in the following manner.—I made 3 guns of the same tube. No. 1, which was 6 inches long, had its end stopped with a brass plug containing the fuze hole. No. 2 and No. 3 were 5 inches long and had their breeches drawn down so as only to leave a fuze hole. These tubes were loaded with gunpowder and shotted with slugs of wire which fitted them, and which were all $\frac{3}{4}$ inch long. No. 1 was first fired with $\frac{1}{2}$ inch of powder, the shot penetrated $\frac{1}{4}$ inch into a deal board, and the gun was uninjured. No. 2 was then fired with $1\frac{1}{2}$ inches of powder, and the shot went through the 1-inch deal board and $\frac{1}{2}$ inch into some mahogany behind, thus penetrating altogether $1\frac{1}{2}$ inches; the tube, however, was burst to fragments. Some of these were recovered, and although they were small they did not show cracks and signs of crushing like those from the electrical fracture. No. 3 was then fired with $\frac{3}{4}$ inch of powder, and the shot penetrated $\frac{1}{2}$ inch into the deal board. It was again fired with 1 inch of powder, and the shot penetrated 1 inch into the deal. Again it was a third time fired with $1\frac{1}{4}$ inches of powder, when it burst, and the shot only just dented the wood. These experiments seem to me to prove conclusively the great strength of the tube and the enormous bursting force of the electrical discharge.—On the colour of Nankin cotton by Edward Schunck, Ph.D., F.R.S.—An improved method for preparing Marsh Gas, by C. Schorlemmer, F.R.S. The author found that by heating an intimate mixture of anhydrous sodium acetate with more than twice its weight of lime and sodium carbonate, a very regular and quiet evolution of marsh gas took place. The gas thus obtained always contains some acetone, which is easily removed by shaking it with water, or, better still, with a solution of acid sodium sulphite.

DUBLIN

Royal Geological Society of Ireland, Nov. 12.—Prof. E. Hull, F.R.S., president, in the chair.—Mr. J. E. Gore, C.E.,

read a note on a bed of fossiliferous kunkar in the Punjab.—The president read a series of notes on the Microscopic Structure of Irish Granites:—1, Granite of Aillemore, Co. Mayo; 2, Granitoid Quartz Porphyry of Attithomasreagh, Co. Galway; 3, Granite of Ballynockan, Co. Wicklow.—Prof. Reynolds exhibited specimens of the new minerals Uranotite and Walpurgine.—Prof. Traquair exhibited specimens for the Rev. J. Emerson, of some coal fossils from the Jarrow Colliery, Co. Kilkenny, among which were noticed portions of the skeletons of *Urocordylus wandesfordii* and *Ichthyropteron bradleyi* described some time since as from a neighbouring colliery, by Huxley and Wright; also the palate tooth of *Ctenodon cristatus*, patches of scales of *Megalichthys hibberti*, and some vertebræ and scales of a Rhizodopsis.

Royal Irish Academy, Nov. 10.—Rev. Prof. Jellett, president, in the chair.—A paper was read by Messrs. Draper and Moss on some forms of Selenium, and on the influence of light on the electrical conductivity of this element.—Prof. Macalister read a paper on the anatomy of a species of *Aonyx* from the Upper Indus. The species had been sent by the late Earl of Mayo to the Royal Zoological Society of Ireland, but differed in no marked degree from the one described by Horsfield as *A. leptonyx*.—Mr. H. W. Macintosh read a paper on the myology of *Arctofithucus blainvillii*.

EDINBURGH

Royal Society of Edinburgh, Dec. 1.—Sir Robert Christison, vice-president, in the chair.

The following communications were read:—

1. Laboratory Notes, by Prof. Tait.—(1) First Approximation to a Thermo-electric Diagram. (2) On the Flow of Water through Fine Tubes.

2. Note on the use of ∇ in Curvilinear Co-ordinates, and on the Transformation of Double and Triple Integrals, by Prof. Tait.

3. On the Physiological Action of Ozone, by James Dewar and Dr. M'Kendrick.

4. On a Compound formed by the addition of Bromacetic Acid to Sulphide of Methyl, and on some of its Derivatives, by Prof. Crum Brown.

5. Note on the Expression for the Action of one Current-element on another, by Prof. Tait.

GLASGOW

Geological Society, Nov. 13.—Mr. E. A. Wüensch, vice-president, in the chair. A paper on the Post-tertiary Beds (Kyles of Bute), by the Rev. H. W. Crosskey and David Robertson, was read to the meeting. The succession of beds, as found at various parts of the Kyles, in proceeding from high to low water mark, is as follows:—(1) Boulder-clay, hard, compact, unfossiliferous, and red in colour; (2) A highly laminated clay, precisely similar to that which occupies the same position at Paisley and many other localities, has been found to contain the remains of some species of Foraminifera; (3) A bed of clay and sand, exceedingly rich in characteristic Arctic shells; (4) The *Pecten maximus* bed, has been found cropping out in various localities.—Mr. Jas. Armstrong read a paper on the Fossils found in the Carboniferous Shales of Gare and Westerhouse, illustrated by a series of finely-preserved specimens collected from these localities, about three miles to the north-east of Carlisle.—The Chairman exhibited some interesting specimens of the junction of granite and slate from the island of Arran, and made some remarks on the various theories which had been propounded regarding its origin.

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