SCIENTIFIC SERIALS

THE *Journal of the Franklin Institute*, November 1873.—In this number Mr. Richards, mechanical engineer, communicates the first part of a treatise on "The Principles of Shop Manipulation for Engineering Apprentices;" the points dealt with being these: plans of studying (and here he advocates the order, first, machine functions, next, plans or adaptations of machines, third, construction of machines), nature of mechanical engineering, engineering as a calling, and the conditions of apprenticeship.—Dr. Coolley, in a lecture-extract, shows how convection may be usefully applied in detection of heat. He has an instrument somewhat like a Coulomb electrometer; in a glass case, a thin glass tube with black pith ball at one end is suspended horizontally by a silk fibre over a graduated disc. A heated body is introduced near the ball, which immediately swings towards it; while a cold body will repel the ball; these effects being due to air currents. The experiments Dr. Coolley makes, show that this forms a very sensitive thermoscope.—An account is furnished of the Cleveland Waterworks Tunnel, just completed, and which is similar to the one at Chicago. The shore section and lake section were carried on simultaneously, 40 ft. to 70 ft. below the bottom of the lake; the starting-points being a mile and a quarter apart. The work was somewhat disturbed by quicksands, but the sections met on an exact level. The capacity of the tunnel is 60 to 70 million gallons daily; though the average daily consumption is at present only about 6 million gallons.—A new process is described for utilising coal waste. The inventor uses, as a cement, only yellow clay with some milk of lime, but no bituminous or resinous matter; merely waterproofing the surface with a solution of rosin. From first to last no handling is required; and the lumps are delivered, in shape and size like hen's eggs. The process is highly commended.—We find notes on American machinery abroad, friction of screw propellers in water, &c., and, among other novelties of construction described, a planing bar, a compound beam engine, an antifriction journal, an irrigating machine, and a new optical toy (Prof. Dolbear).

Annalen der Chemie und Pharmacie. Band 169, Heft 1, u. 2.—We notice that in this number Liebig's name disappears from the list of editors, and the title is changed to *Justus Liebig's Annalen der Chemie und Pharmacie.* The following papers are published:—Hubner and Post on the constitution of bromtoluol in relation to its hydrogen atoms. The authors give a collection of minor papers by various authors, dealing with the substitution of different hydrogen atoms in the formula by various radicles.—On the estimation of nitrogen, by S. W. Johnson. The author finds that a mixture of sulphate or carbonate of sodium with slaked lime can be employed instead of the soda-lime usually used in Varrentrapp's and Will's processes. The mixture, when heated, of course, yields sodic hydrate and sulphate or carbonate of calcium. Experiments made with such mixtures are described.—On the nitro derivatives of naphthalin, by F. Beilstein and A. Kuhlberg. The mono-, di-, and tri-nitro compounds are described.—On atacamite, by E. Ludwig. The author proposes some alteration in the ideas of the constitution of this mineral advocated by Rammelsberg and others, his suggestions being based upon the way in which the substance gives up its water at different temperatures; he also makes some suggestions as to formula of brochantite.—On the action of sulphocarbonyl chloride on amidogen compounds, by B. Rathke and P. Schäfer.—Note on a polyacetone, by W. Heintz.—On the production of talanin by means of potassic cyanide, and on a by product of the reaction by W. Heintz. The author gives details of the preparation of alanin, the by product is lactyt-urea.—On the constitution of natural silicates, by Dr. K. Haushofer, is a lengthy paper dealing with the probable constitutional and graphic formulæ of these bodies.—On the polyolenes and on the change of ethylene into ethyl alcohol, by W. Goriainow and A. Butlerow.—On protein substances, by H. Hlasiwetz and J. Habermann.—On the compounds of the camphor group, by J. Kachler. The author describes pimelinic acid, $C_7H_{12}O_4$, and many of its salts.—On the isomers of amylene obtained from the amylic alcohol of fermentation, by F. Flavitzky.—On the synthesis of anthracene and dimethyl-anthracene, by W. A. van Dorp.—On cœrulignon and its derivatives, by C. Lieberman. The author regards cœrulignon as a quinone.—On pentabrom resorcin and pentabromorcin, by C. Lieberman and A. Dittler.—The number concludes with an abstract from M. L. d'Henry's late paper in the *Comptes Rendus*, on the use of the sodium flame for observing litmus tints in alkalimetry.

Verhandlungen der k. k. geologischen Reichsanstalt. Nos. 1 to 6. (1873.) Amongst many other papers of interest contained in these numbers of the Proceedings we note the following:—On the occurrence of a new genus and new species of palm seed-vessel (*Lepidocaryopsis Westphaleni*) in the cretaceous sandstone of Kaunitz in Bohemia, by D. Stur.—Notices of the earthquake at Vienna on the 3rd January, by Dr. G. Stache.—Hugo Rittler's sketches of the rothliegende in the environs of Rossitz, by D. Stur.—On the analogies of the three carboniferous resins, anthracox, middletonite, and tasmanite, and their probable origin, by O. Feistmantel.—On the geological position and distribution of the silicified woods in Bohemia, by the same author.—The usual literary notices and other matters accompany each part of the Proceedings.

Ocean Highways, December. This number commences with an appreciative memoir of the late Sir Robert Maclure. An article entitled "The Straits of Magellan" contains some very interesting information concerning the little known region in that quarter of the world, and what has been done recently for the settlement of the mainland-coast of the straits. The paper recommends to emigrants Sandy Point, the Chilian settlement at which most of the steamers touch on their way to and from the West Coast, and which "is admirably situated on Brunswick Peninsula, nearly on the line of demarcation between the dense forests which cover the whole western end of the Straits, and the naked, rolling Pampas, which spread uninterruptedly northward to the very shores of the river Plate."—H. H. Giglio sends a letter, with some remarks from Dr. Beccari, on the latter's Exploration of Papuasia. Three small maps of parts of New Guinea illustrate the discoveries of Beccari, D'Albertis, Moresby, Cerruti, and Meyer.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Dec. 11.—"On the Action of Heat on Gravitating Masses," by William Crookes, F.R.S.

The experiments recorded in this paper have arisen from observations made when using the vacuum-balance, described by the author in his paper "On the Atomic Weight of Thallium,"* for weighing substances which were of a higher temperature than the surrounding air and the weights. There appeared to be a diminution of the force of gravitation, and experiments were instituted to render the action more sensible, and to eliminate sources of error.

After discussing the explanations which may be given of these actions, and showing that they cannot be due to air-currents, the author refers to evidences of this repulsive action of heat, and attractive action of cold, in nature. In that portion of the sun's radiation which is called heat, we have the radial repulsive force possessing successive propagation required to explain the phenomena of comets and the shape and changes of the nebulæ. To compare small things with great (to argue from pieces of straw up to heavenly bodies), it is not improbable that the attraction now shown to exist between a cold and a warm body will equally prevail when, for the temperature of melting ice is substituted the cold of space, for a pith ball a celestial sphere, and for an artificial vacuum a stellar void. In the radiant molecular energy of cosmical masses may at last be found that "agent acting constantly according to certain laws," which Newton held to be the cause of gravity.

Dec. 18.—"On Double Refraction in a Viscous Fluid in motion," by Prof. J. Clerk Maxwell, F.R.S.

According to Poisson's† theory of the internal friction of fluids, a viscous fluid behaves as an elastic solid would do if it were periodically liquefied for an instant and solidified again, so that at each fresh start it becomes for the moment like an elastic solid free from strain. The state of strain of certain transparent bodies may be investigated by means of their action on polarised light. This action was observed by Brewster, and was shown by Fresnel to be an instance of double refraction.

In 1866 I made some attempts to ascertain whether the state of strain in a viscous fluid in motion could be detected by its action on polarised light. I had a cylindrical box with a glass bottom. Within this box a solid cylinder could be made to rotate. The fluid to be examined was placed in the annular space

* Phil. Trans. 1872.

† Journal de l'Ecole Polytechnique, tome xiii. cah. xx (1829).

between this cylinder and the sides of the box. Polarised light was thrown up through the fluid parallel to the axis, and the inner cylinder was then made to rotate. I was unable to obtain any result with solution of gum or syrup of sugar, though I observed an effect on polarised light when I compressed some Canada balsam which had become very thick and almost solid in a bottle.

It is easy, however, to observe the effect in Canada balsam, which is so fluid that it very rapidly assumes a level surface after being disturbed. Put some Canada balsam in a wide-mouthed square bottle; let light, polarised in a vertical plane, be transmitted through the fluid; observe the light through a Nicol's prism, and turn the prism so as to cut off the light; insert a spatula into the Canada balsam in a vertical plane passing through the eye. Whenever the spatula is moved up or down in the fluid, the light reappears on both sides of the spatula; this continues only so long as the spatula is in motion. As soon as the motion stops, the light disappears, and that so quickly that I have hitherto been unable to determine the rate of relaxation of that state of strain which the light indicates.

If the motion of the spatula in its own plane, instead of being in the plane of polarisation, is inclined 45° to it, no effect is observed, showing that the axes of strain are inclined 45° to the plane of shearing, as indicated by the theory.

I am not aware that this method of rendering visible the state of strain of a viscous fluid has been hitherto employed; but it appears capable of furnishing important information as to the nature of viscosity in different substances.

Among transparent solids there is considerable diversity in their action on polarised light. If a small portion is cut from a piece of unannealed glass at a place where the strain is uniform, the effect on polarised light vanishes as soon as the glass is relieved from the stress caused by the unequal contraction of the parts surrounding it.

But if a plate of gelatine is allowed to dry under longitudinal tension, a small piece cut out of it exhibits the same effect on light as it did before, showing that a state of strain can exist without the action of stress. A film of gutta percha which has been stretched in one direction has a similar action on light. If a circular piece is cut out of such a stretched film and warmed, it contracts in the direction in which the stretching took place.

The body of a sea-nettle has all the appearance of a transparent jelly, and at one time I thought that the spontaneous contractions of the living animal might be rendered visible by means of polarised light transmitted through its body. But I found that even a very considerable pressure applied to the sides of the sea-nettle produced no effect on polarised light, and I thus found, what I might have learned by dissection, that the sea-nettle is not a true jelly, but consists of cells filled with fluid.

On the other hand, the crystalline lens of the eye, as Brewster observed, has a strong action on polarised light when strained, either by external pressure, or by the unequal contraction of its parts as it becomes dry.

I have enumerated these instances of the application of polarised light to the study of the structure of solid bodies as suggestions with respect to the application of the same method to liquids so as to determine whether a given liquid differs from a solid in having a very small "rigidity," or in having a small "time of relaxation,"* or in both ways. Those which, like Canada balsam, act strongly on polarised light, have probably a small "rigidity," but a sensible "time of relaxation." Those which do not show this action are probably much more "rigid," and owe their fluidity to the smallness of their "time of relaxation."

"On the Period of Hemispherical Excess of Sun-spots, and the 26-day Period of Terrestrial Magnetism." By J. A. Broun, F.R.S.

It appears from the interesting communication to the Royal Society, June 19, by Messrs. De La Rue, Stewart, and Loewy,† that the difference of the area of spots on the visible northern and southern quarter-spheres of the sun seems, during periods of considerable solar disturbance, to obey a law such that the difference is a maximum in the same quarter-sphere during several successive rotations of the sun, the difference being a maximum alternately in the northern and southern hemispheres; the time from maximum to maximum, for the same hemisphere, being variable between 18 and 32 days, but having a mean value of about 25·2 days.

It occurs at once that if the variations of the mean terrestrial magnetic force are connected in any way with the solar spots, or the causes which produce them, we might here find some explanation of the magnetic period of 26 days, the difference of spot area in one hemisphere from that in the other being related to a difference of the solar magnetic action.

In order to determine whether such a connection existed, I projected first the curves of excess of spot-area given in the paper of Messrs. De La Rue, Stewart, and Loewy, and below them the daily mean horizontal force of the earth's magnetism during the same periods. The conclusion from these projections is, that there is *no relation whatever between the two classes of curves*. The maxima and minima of the one agree in no ways with those of the other; the greatest excesses of sun-spot area in the one hemisphere over those in the other occur when the earth's magnetic force is the most constant; the greatest variations of the earth's magnetic force from the mean occur in several instances when the sun-spot area is equal in the two visible quarter-spheres.

It should be remembered, in considering the curves of sun-spot excess, that the minima and maxima are in some cases only relative; sometimes the one, sometimes the other being really cases in which there is neither maximum nor minimum; that is to say, cases in which the sun-spot area is equal, or nearly so in the two visible quarter-spheres.

It would be hasty to conclude from this comparison that the variations of the mean magnetic force are really unconnected with the mode of distribution of the sun-spots. Other methods of grouping the spots may perhaps be employed with advantage relatively to this and other questions, for example, were the position of the centre of gravity of the sun-spots determined for the visible quarter-spheres and hemisphere, giving each spot a spot-weight in proportion to its area, the variation of these positions in latitude and longitude and their weights, might give a more satisfactory base for this comparison and for other deductions.

It will be obvious also that this investigation refers only to one *visible* hemisphere of the sun; an approximation to the spot-distribution on the other hemisphere will, however, be frequently possible.

"On the Nervous System of *Actinia*," Part I., by Prof. P. Martin Duncan, F.R.S.

"On certain Discrepancies in the published numerical value of π," by William Shanks.

Mathematical Society, Dec. 11.—Prof. Cayley, F.R.S., V.P., in the chair.—Prof. Clifford gave an account of his paper on the graphic representation of the harmonic components of a periodic motion. The paper was an application of a theorem of Fourier's, which asserts that any motion having the period P may be decomposed into simple harmonic motions having periods P, $\frac{1}{2}$ P, $\frac{1}{3}$ P, &c., and assigns the amplitudes and phases of these motions by means of definite integrals.—Prof. Cayley next spoke on the subject of Steiner's surface. The author stated that he had constructed a model and drawings of the symmetrical form of Steiner's surface, viz. that wherein the four singular tangent planes form a regular tetrahedron, and consequently the three nodal lines (being the lines joining the middle points of opposite edges) a system of rectangular axes at the centre of the tetrahedron. He then described the general form of the surface, and finally discussed its analytical theory.—Lord Rayleigh, Mr. Roberts, Prof. Clifford, and Prof. Cayley made further extempore communications to the Society.

Linnean Society, Dec. 18.—G. Bentham, F.R.S., president, in the chair.—Dr. Hooker exhibited a magnificent zoophyte from Bermuda, sent by General Lefroy; also a six-lobed Seychelles cocoa-nut (*Lodoicea Seychellarum*) and two tazzas made from the shell of a Seychelles cocoa-nut sent from the Seychelles by Mr. Swinburne Ward to the Kew Museum; also some small boxes from Mauritius and Madagascar made from some grass-haulm; and two walking-sticks from Bermuda made of the "cedar-wood" of commerce (*Juniperus bermudiana*).—Mr. Bowring exhibited an inflorescence of an orchid with a remarkable smell, probably a *Bulbophyllum*.—The following papers were then read, viz.:—"Contributions to the Botany of the *Challenger* Expedition," No. 2, by H. N. Moseley, M.A. On the Vegetation of Bermuda and the surrounding sea. About 160 species of flower-

* The "time of relaxation" of a substance strained in a given manner is the time required for the complete relaxation of the strain, supposing the rate of relaxation to remain the same as at the beginning of this time.

† Proc. Royal Soc. vol. xxi. p. 399.

ing plants were gathered on the island; but of these, not more than 100 were certainly native. Those of West-Indian origin were probably brought, as Grisebach had suggested, by the Gulf-stream or by cyclones, there being no winds blowing directly from the American coast which would be likely to carry seeds, which might, however, be conveyed from the Continent by migratory birds. A note by Prof. Thiselton Dyer appended to the paper stated that 162 species sent over by Mr. Moseley had been determined at the Kew Herbarium, of which 71 belong to the Old World, while 2, an *Erythræa* and a *Spiranthes*, were plants hitherto known as confined to single localities in the United States.—"Changes in the Vegetation of South Africa, caused by the introduction of the Merino Sheep," by Dr. Shaw. The original vegetation of the colony is being in many places destroyed or rapidly deteriorated by over-stocking and by the accidental introduction of various weeds. Among the most important of the latter is the *Xanthium spinosum*, introduced from Europe, the achenes of which cling to the wool with such tenacity that it is almost impossible to detach them, and render it almost unsaleable. It spreads with such rapidity that in some parts legislative enactments have been passed for its extirpation; and where this is not done, it almost usurps the place of the more useful vegetation. The president stated that the *Xanthium* has in the same manner deteriorated the pastures in Queensland; whilst in the south of Europe, where it is equally abundant, it does not appear to cause such injurious results. Though generally distributed through Europe, the plant is probably of Chilian origin.—Extract from a letter from Osbert Salvin, F.R.S., to Dr. Hooker, dated Guatemala, Oct. 6. Mr. Salvin is engaged in collecting plants on the slopes of the Volcan de Fuego, 5,000 ft. in elevation, and within an easy ride of a volcano 13,000 ft. above the level of the sea. He hopes to secure all the plants between the elevations of 3,500 and 8,500 ft. Many of the species appear to have a vertical range of as much as from 2,000 to 3,000 ft.

Meteorological Society, Dec. 19.—Dr. R. J. Mann, president, in the chair.—The following papers were read:—"On an improved form of aneroid for determining heights with a means of adjusting the altitude scale for various temperatures," by Mr. Rogers Field. In this aneroid the scale is adjustable for different temperatures. The principle of the adjustment depends on the fact that when the scale is shifted it becomes inaccurate for the temperature for which it was laid down, and therefore practically accurate for some other temperature, so that the scale has only to be shifted into certain different fixed positions to obtain a series of different scales suitable for different temperatures of the air.—"On the North Atlantic hurricane of August 20 to 24, 1873, which did much damage at Halifax, Nova Scotia, and elsewhere," by Capt. H. Toynbee, F.R.A.S. The author alluded to various data which had come into the Meteorological Office respecting this gale, especially to a chart of its track, and important remarks from Mr. J. R. H. Macfarlane, R.N., Naval Sub-Lieut. H.M.S. *Plover*. This data proved that it was a hurricane, and its route was traced from a position to the south-east of Bermuda to Halifax, showing its probable track for four days. The author then went on to say that if the circular theory for hurricanes were correct, little more could be done, though it would be very interesting to trace so hard a gale from its formation to its breaking up. But he said if Mr. Meldrum's "Notes on the form of Cyclones in the Southern Indian Ocean"* were correct, then it was incumbent on the meteorologists of the northern hemisphere to institute a similar inquiry, as the form of cyclones in the southern hemisphere worked out from facts by Mr. Meldrum, made it necessary to modify the rules in use amongst seamen for avoiding their centres. An enlarged copy of Meldrum's diagram (reversed to adapt it to the northern hemisphere) was exhibited. The paper concluded with a suggestion that the August gale of 1873 would afford the means for inquiry into the shape of the northern hemisphere cyclones, and that data for that month should be collected from all parts of the North Atlantic, and worked up into daily synoptic charts, which suggestion the author hoped would be carried out either by America or England.—On a mercurial barometer for the use of travellers, filled by the spiral-cord method, by Staff-Commander C. George, R.N.

Geologists' Association, Dec. 5.—Henry Woodward, F.R.S., president, in the chair.—"On the Yorkshire Oolites," by W. T. Hudleston, F.G.S. The district occupied by beds of Oolitic age in north-east Yorkshire, constitutes a mass of elevated land divided into two very unequal lobes by a triangular depressed area known as the Vale of Pickering, towards which the beds incline. A diagonal of thirty-one miles, from N.E. to S.W., exhibits the beds of the Moorland range resting on the Lias of Robin Hood's Bay, whence they incline towards the Vale of Pickering, newer beds being continually met with as far as the "Kimmeridge Clay" of the vale. Crossing this vale towards the Howardian Hills, the previous beds or their equivalents are repeated in inverse order, until the Lias of the Vale of York is reached. Dealing with the Lower Oolites only, the group is essentially arenaceous. At the eastern termination of the moorland range (coast section) these beds have a thickness of 700 ft., mostly sands and shales, nearly devoid of marine mollusca, but rich in plant remains. There are, however, four distinct zones of marine life (well pointed out by Dr. Wright in 1859) which may be made out on the coast and identified in the transverse valleys of the moorland range. (1) The Dogger and its associated Land-rock, magnificently developed at Blue Wyke a sandy oolite, altered into an iron-stone, calcic carbonate being replaced by ferrous carbonate in the case of the shells, the original material being now replaced by siderite, very unequally developed, sometimes resting on 40 ft. of "striatulus beds," sometimes directly on the Upper Lias. (2) "The Millepore Bed." At the point of their maximum development 300 ft. of sands and shales intervene between the Dogger and this bed, which, north of Scarborough, is usually an arenaceous ironstone, but a few miles south of that town becomes the most important calcareous member of the Lower Oolites. (3) 100 ft. of sands succeed and then we have the "Scarborough Limestone" series, consisting of grey marly limestones alternating with marly shales and varying in thickness from 50 ft. at Mundall to 3 ft. at Gristhorp (distance 9 miles). Above the Scarborough Limestone series occurs 160 feet of shales and sandstones; some of these beds exhibit casts of myaciform shells. (4) The fourth fossiliferous zone is usually referred to the cornbrash. More complete marine conditions are apparent. Brachiopoda are abundant. *Ammonites Herveyi* plentiful in this bed, which yielded a fine suite of fossils. It forms the last of the Lower Oolites. In the inland chain south-west of the Vale of Pickering, the Lower Oolites are much attenuated, amounting to no more than 150 feet in the Derwent Valley. The types, too, are much altered.

Chemical Society, Dec. 18.—Dr. Odling, F.R.S., president, in the chair.—A paper on the preparation of standard trial plates to be used in verifying the composition of the coinage was read by the author, Mr. W. C. Roberts, Chemist of the Royal Mint. After giving a sketch of the variation in composition of the English gold and silver coins from the earliest times, he noticed the various trial plates which had been prepared since 1660, showing that they sometimes varied considerably from the standard of 916·66 parts in 1,000 for the gold and 925·0 for the silver. He then proceeded to describe the process employed and the difficulties to be overcome in the preparation of the new standard trial plates. These were exhibited at the meeting, and also a magnificent specimen of pure crystallised gold.—Researches on the action of the couple on organic bodies, Part iv., on iodide of allyl, by Dr. G. H. Gladstone and Mr. A. Tribe, being a continuation of their investigations on this subject.—On tetranickelous phosphide, by Dr. R. Schenck.—On ferrous anhydrosulphate, by Mr. T. Bolas. The compound, which is crystalline, is precipitated on mixing an aqueous solution of green vitriol with about nine times its volume of concentrated sulphuric acid.—On the hydrochloride of narceine, by Dr. C. R. A. Wright.

Royal Horticultural Society, Dec. 3.—Scientific Committee.—A. Smee, F.R.S., in the chair.—Dr. Masters, F.R.S., exhibited part of a poplar (sent by Mr. G. T. Saul), which, while apparently healthy, had during the past summer, within twenty-four hours, shed the whole of its leaves and never recovered. The Rev. M. J. Berkeley pointed out that the specimen was visibly attacked by fungus mycelium. No doubt, the tree had long been diseased unsuspected; the healthy bark would probably be reduced to a narrow strip, and when this failed the tree would die apparently quite suddenly.—Prof. Thiselton Dyer exhibited a drawing of a luminous *Didymium* from St. Kitt's.—Mr. McLachlan, F.L.S., inquired as to the possibility of introducing humble-bees into New Zealand; the red clover, which had also been introduced, was not fertilised for the want of them

* Mr. Meldrum's paper has been published as "Non-official, No. 7" by the Committee of the Royal Society who manage the Meteorological Office.

The chairman thought there could be no difficulty about it; the Rev. Mr. Cotton had taken bees out to New Zealand by keeping them at a low temperature, and consequently in a dormant condition, by means of ice.—Mr. McLachlan further wished the opinion of the committee with respect to another New Zealand inquiry by Captain Hutton; Aphides were now becoming very common in New Zealand, but were probably not indigenous. Could the golden-winged fly (*Chrysopa*) be advantageously introduced to check them. The chairman thought that it would be far better to send out dormant lady-birds (*Coccinella*). Mr. Wilson, F.R.S., pointed out the necessity of caution in these introductions; sparrows and hares were far from a boon in Australia.—Prof. Thiselton Dyer read a letter from Mr. Scott, F.R.S., Director of the Meteorological Office, with respect to a change in the climate of Scotland recently insisted on by Mr. McNab. He stated that it was an opinion too general to be lightly disregarded that our winters are warmer and summers cooler, on an average, than in the last century, but did not know where to find records which could be quoted with confidence in a discussion of the question.—Dr. Voelcker, F.R.S., mentioned that there was no doubt that it was quite possible to make wine from grapes ripened in this country; the often-repeated argument that our summers must be cooler because wine was not now made was manifestly fallacious.—Mr. A. W. Bennett, F.L.S., communicated a paper on pollen-eating flies of the group *Syrphidæ*.—Mr. Baker, F.L.S., sent capsules of *Lilium auratum* and *L. speciosum*.

Anthropological Institute, Dec. 9.—Mr. F. G. H. Price, F.G.S., in the chair.—Mr. J. Park Harrison gave a detailed description of two incised tablets, from Easter Island in the South Pacific, discovered by the French missionaries in one of the stone houses supposed to be formerly occupied by the chiefs. The signs appeared to be principally iconographic and to represent forms of life and incidents connected with islands several thousand miles to the west.—Prof. T. McK. Hughes described the results of his exploration of the rock-shelter known as Cave Ha, near Giggleswick, Settle, Yorkshire. In the upper deposits flakes and scrapers of chert and flint and other ancient remains in stone and iron were mixed up with the most recent works of art by the operations of badgers, rabbits, &c. In these beds the bones were found by Prof. Busk to be all of recent species, still, or till quite lately, common in the district. In the older deposits, which were composed chiefly of angular fragments of limestone, and, therefore, were not disturbed by burrowing animals, the remains of bear occurred associated with ox, goat or sheep, and dog; but as yet no traces of men. A point to which the author called special attention was the explanation found here of the occurrence in many ossiferous caves of such immense quantities of the bones of mice. The floor was in places strewn with broken up pellets of owls with here and there a few retaining their form, which, when the hair had decomposed away would exactly correspond to the layers and little bunches of the bones of mice in the underlying beds.—Prof. Hughes also read a joint paper by himself and Rev. D. R. Thomas, "On the occurrence of Felstone implements, of the Le Moustier type, in Pontnewydd Cave near St. Asaph, North Wales," After explaining by reference to sections, the position of the cave and of the deposits in it, the authors described a series of implements of felstone as similar to the common forms of Le Moustier as would be expected, allowing for the difference of material. They exhibited also a collection of bones from the same deposit which were referred by Prof. Busk to *Ursus spelæus, U. ferox, Hyæna spelæa, Rhinoceros hemistœchus*, and others, including a human molar which Prof. Busk pointed out was remarkable for its large size. As the rock, of which the implements were manufactured, occurred in that river basin in the boulder clay only, as the implements seemed to have been made from fragments such as occur in the drift, and are found associated with remanié drift mixed with tumble from the roof of the cave, the authors inferred that the deposit was post-glacial, while the forms of the implements, and the animal remains found with them would refer the beds to the earliest cave deposit in which human remains have been found.—A communication was made by Prof. Busk on a human fibula of unusual formation discovered in Victoria Cave, Settle, Yorkshire. The fragment lay at a considerable depth in the cave and beneath a thick layer of Boulder Clay, and was associated with bones of the two large species of cave Bear, *Hyæna, Rhinoceros tichorhinus, Bison* and *Cervus*. From its position, accompaniments, and other considerations, the deposit in which the specimen was found, had been regarded as of pre-glacial age.

The London Anthropological Society, Dec. 2.—Dr. R. S. Charnock, president, in the chair.—Causes which determine the Rise and Fall of Nations, by T. Inman, M.D. The paper embraced the whole historical range.—Western Anthropologists and Extra Western Communities, by J. Kaines, D.Sc. The paper shows what should be the moral attitude of the more civilised to the less civilised—what the latter has to teach the former—and the evils of western contact with the backward races.

Photographic Society, Dec. 9.—J. Spiller, F.C.S., V.P., in the chair.—On photo-collotype printing, by Capt. J. Waterhouse. The author recommended the use of citric acid as a clearing agent.—Lieut. Chermside, R.E., read a paper on photography in the Arctic Regions. Mr. Chermside accompanied Mr. Leigh Smith in his Arctic expedition last summer. The temperature at which pictures were actually taken was rarely less than 32° Fahr., but much difficulty was experienced in maintaining the solutions in proper order during excessive cold. The author gave some practical advice on the subject of overcoming actual difficulties inherent to photographic manipulations in high latitudes.

PARIS

Academy of Sciences, Dec. 15.—M. de Quatrefages, president, in the chair.—The following papers were read:—On the laws of the magnetisation of steel by currents, by M. Jamin.—An answer to a note read by M. Trécul at the meeting of the Dec. 8, by M. Pasteur. This was a reply to M. Trécul's criticism on the author's note on beer and displayed considerable acrimony, M. Pasteur of course sustained his well-known views of the nature of ferments.—M. Berthelot presented some new remarks on the nature of the chemical elements, which however could not be read on account of want of time. The author, it may be stated, admits the possibility of the elements being modifications of a fundamental substance, and stated that nothing renders it improbable that a discovery like that of the voltaic current might not give us power to still further simplify matter. His paper concluded thus:—We shall only be too happy if Mr. Lockyer, guided by stellar spectral analysis, can shed a new light upon these questions, and continue to investigate problems raised now forty years ago by M. Dumas in a work (*Leçons de Philosophie Chimique*) which has contributed so much to our scientific education.—Researches on new butyl derivatives by M. A. Cahours. The author dealt with the aluminium silicon tin and mercury compounds of butyl.—On the propagation of the *Phylloxera*, by M. H. Marès.—Report on Mr. Douglas Galton's paper "On the Construction of Hospitals," by M. Larrey, and General Morin:—Valuation in mechanical units of the quantity of electricity produced by an element in a battery, by M. Branly.—Hybernation of the *Phylloxera* on the branches and leaves of the vine, by M. Max. Cornu.—Action of the volcanic earth of the solfatara of Pouzzoles on the diseases of the vine, by M. S. De Luca.—On certain morphological changes observed in the genus *Cypripedium*, by M. R. Guérin.

BOOKS RECEIVED

AMERICAN.—Catalogue of Stars observed in the United States Observatory, 1845-71: Rear-Admiral Sands (Washington).—Daily Bulletin of Weather Reports for September 1872: War Department (Washington).—Annual Record of Science and Industry: Dr. Spencer F. Baird (Harper, New York).—Elements of Logarithms: Pierce (Ginn Bros.).

FOREIGN.—Annalen der Sternwarte in Leiden: Dr. F. Kaiser (Nijkoff).—Somario delle Lezioni di Fisica: Prof. Mombello (Foligno).—Zoologische Studien auf Capri: Dr. Theodore Eimer (Engelmann, Leipzig).

CONTENTS