very extreme accuracy in the drawings, not being a practised draughtsman, but the sketch gives a very fair idea of the number, form, and arrangement of the immense cloudy mass, whose height was about 50″ and its length 330″ (22,500 miles by 1,350,000). The points *a* and *b* were very bright.

2. +135° small, but very bright at the base, of this form (Fig. 2).

3. −85° of this form (Fig. 3).

The dark spot, marked *c*, was very curious, reminding one strongly of the so-called fish-mouth in the nebula of Orion. I saw no change in it for 20 minutes. On the other hand, the first

Fig. 2.

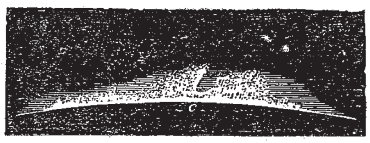

Fig. 3.

series mentioned were changing rapidly, so that at five o'clock the sketch which was drawn at two was quite inapplicable, only the general features remaining unaltered.

4. −128°, about 20″ high, forked, as in Fig. 4.

The structure was *cirrus* in every one but No. 3, which seemed more like a mass of cumulus.

Fig. 4.

To-day, for the first time, I saw b_1 reversed in the chromosphere when the slit was tangent to disc; 1474 was easy; the new line at 2602 cannot be detected as yet.

At 2.25, while examining the spectrum of a large group of spots near the sun's western limb, my attention was drawn to a peculiar double *knobbishness* of the F line (on the sun's disc, not at the edge), represented by Fig. 5, *a*, at the point *e*. In a very few moments a brilliant spot replaced the knobs, not merely interrupting and reversing the dark line, but blazing like a star near the horizon, only with blue instead of red light; it remained for about two minutes, disappearing, unfortunately, while I was examining the sun's image upon the graduated screen at the slit, in order to fix its position, which was at −82½, about 43″ from the edge of the limb, about 15″ inside of the inner edge of the spot-cluster. I do not know, therefore, whether it disappeared instantaneously or gradually, but presume the latter. Fig. 5, *b*, attempts to give an idea of the appearance. When I returned to the eye-piece, I saw what is represented at Fig. 5, *c*, &c. On the upper (more refrangible) edge of F there seemed to hang a little black mote, making a *barb*, whose point reached nearly to the faint iron line just above F. As given on Angström's atlas, the wave-length of F is 486·07, while that of the iron line referred to is 485·92 (the units being millionths of a millimetre). This shows an absolute change of 0·15 in the wave-length, or a fraction of its whole amount, represented by the decimal 0·00030, and would indicate an advancing velocity of about 55·5 miles per second in the mass of hydrogen whose absorption produced this barbed displacement.

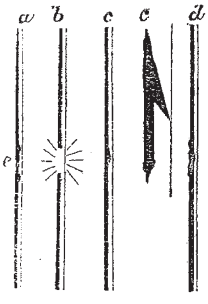

Fig. 5.

The barb continued visible for about five minutes, gradually resolving itself into three small lumps, one on the upper, and two on the lower line, Fig. 5, *d*. In about ten minutes more, the F line resumed its usual appearance. I did not examine the C line, as I did not wish to disturb the adjustments and risk losing some of the curious changes going on under my eye.

After the close of this strange phenomenon, I examined, with our large telescope of 6-inch aperture, the neighbourhood in which this took place, and found a very small spot exceedingly close to, if not actually *at*, the place. This was at 2.45. At 5.30 it had grown considerably.

Undoubtedly, the phenomenon seen was the same referred to by Mr. Lockyer when he speaks of often seeing the bright lines of the prominences not only at the sun's limb but on his disc. It is the only time I have had the good fortune to see it as yet.

GEOLOGY

Structure of Eophyton

THE *Geological Magazine* for the present month contains a paper by Mr. Henry Hicks, describing the structure of a fossil, from the Lower Arenig rocks of Ramsey Island, near St. David's, which he considers to be an *Eophyton*, resembling *E. Linnæanum* of Torell. The rocks in which this fossil occurs rest conformably upon Upper Lingula flags, and underlie rocks of the Skiddaw or Tremadoc series.

Mr. Hicks describes and figures the fossil under the name of *Eophyton* (?) *explanatum*. He describes it as a moderately convex stem, about four lines broad, jointed, and ribbed throughout its whole length. At one joint in the specimen described, the ribs bend outwards, as if to form a branch. The stem is covered by a very thin cortical substance, within which it is composed of minute tubular columns, lying close together, and running the whole length from one joint to another.

The *Geological Magazine* also contains papers by Mr. Ruskin on Banded and Brecciated Concretions, illustrated with a plate and several woodcuts; by Mr. Poulett Scrope, on the pretended raised Beaches of the Inland Slopes of England and Wales, severely criticising Mr. D. Mackintosh's recent volume on Geology and Scenery; by Prof. Harkness, on the middle *Pleistocene* deposits of Britain; by Mr. R. Tate, on additions to the list of British *Brachiopoda* of the secondary rocks, including a table showing the distribution of the British *Liassic Brachiopoda;* and by Mr. W. H. S. Westropp, on the occurrence of "albite" in the granite of Leinster. Lord Enniskillen contributes a catalogue of the type specimens of fossil fishes in his collection. The number also contains the usual notices, reviews, and abstracts of the proceedings of societies, correspondence, &c.

SOCIETIES AND ACADEMIES

LONDON

Chemical Society, December 2.—Dr. A. W. Williamson, F.R.S., in the chair. Sir Roderick Murchison, Bart., F.R.S., Messrs. M. H. Cochrane, Edward Smith, T. Walton, M.R.C.S., G. M. Hopwood, John Wiggin, Thomas Gibb, and George Harrison were elected Fellows. A paper on some points of the Chemical Nomenclature of Salts by Mr. H. G. Maden was read. The author advocated the use of the prefixes "proto" and "per" instead of the terminations "ous" and "ic" in the nomenclature of salts, and expressed his preference for the systematic names formed from English words, as "copper sulphate." Dr. Attfield recommended an adherence to trivial names like "calomel" and "corrosive sublimate," when possible, as changes in theory necessarily led to inconvenient alterations in nomenclature. Dr. Williamson objected to Mr. Maden's proposal to revert to the use of the prefixes "proto" and "per," on the ground that they had formerly produced great confusion, particularly in the nomenclature of the chlorides of mercury. He advocated an extension of the use of the terminations "ous" and "ic," which indicated the places of compounds in a series without binding chemists to particular views of constitution. He thought Mr. Maden's preference for English words might be carried too far and produce such terms as "brimstonic acid" and "charcoalic oxide." Mr. Vernon Harcourt expressed his general concurrence with the author. Dr. Odling pointed out that in certain names, such as "ferricyanide of iron," it was advantageous to use both English and Latin names. Dr. Voelcker thought that the employment of different names for the same substance familiarised chemists with different views of constitution. A communication from Mr. J. Hunter on the analyses of sea-water from different depths was read. The author gave the results of observations made during the recent scientific expedition of the *Porcupine*.

Zoological Society, November 25.—Mr. John Gould, F.R.S., V.P., in the chair.—Mr. Sclater made some remarks on the condition of various zoological gardens on the Continent recently visited by him, and on rare animals observed in those establishments. The secretary exhibited on behalf of Mr. John Brazier, C.M.Z.S., the eggs of a megapode (*Megapodius*) from Banks Island, New Hebrides, indicating the existence of a species of this genus in that group of islands. A letter was read from Mr. W. T. Fraser, C.M.Z.S., giving some confirmatory facts

respecting the alleged existence of the rhinoceros in Borneo. Mr. R. B. Sharpe exhibited a specimen of *Alcedo grandis*, a rare species of kingfisher from the Terai of Darjeeling. Mr. Andrew Murray exhibited specimens of some articles of food sold in the markets of Old Calabar. These consisted of examples of a frugivorous bat (*Pteropus*) ready trussed, specimens of a rare crustacean (*Callianassa turnerana*), and the larvæ of a Longicorn beetle found in decayed palm-trees. A letter was read from Mr. E. L. Layard, of Cape Town, F.Z.S., containing some remarks as to priority of discovery of the remarkable nesting-habits of the hornbills. Mr. H. J. Elwes, F.Z.S., exhibited a fine pair of horns of the Sinaitic Ibex (*Capra nubiana*), and Mr. H. E. Dresser, F.Z.S., some eggs of the little gull (*Larus minutus*) recently taken in Russia. A communication was read from the Rev. O. P. Cambridge, containing notes on some spiders and scorpions recently collected in St. Helena by J. C. Melliss, Esq. Judging from this collection, which, however, was of small extent, the character of the *Araneidea* of St. Helena appeared to bear a thoroughly European stamp. A communication was read from Dr. O. Finsch, C.M.Z.S., and Dr. G. Hartlaub, F.M.Z.S., on a small collection of birds recently received by the Museum Godefroyanum from the Tonga Islands. The species contained in this collection were eleven in number, one of which was believed to be new to science, and was proposed to be called *Myiolestes Heinei*. A communication was read from Surgeon Francis Day, F.Z.S., containing the second portion of his critical remarks on the fishes in the Calcutta Museum. Two papers were communicated by Mr. J. Brazier, C.M.Z.S., on the localities of certain species of land-shells and volutes found in Australia and the neighbouring islands, and on the species of cones met with in Port Jackson, N.S.W. Mr. R. B. Sharpe read a paper on the birds of Angola collected by J. J. Monteiro, Esq., which were accompanied by the notes of the collector. The present collection contained twenty-nine species, many of which were of great interest. A communication was read from Mr. D. G. Elliot, F.Z.S., containing a monograph of the genus *Pelecanus*. The species of pelicans recognised by Mr. Elliot were nine in number. Mr. Sclater exhibited a specimen of a new species of Mexican wren from the Berlin Museum, which he proposed to describe under the name of *Thryothorus nisorius*. Mr. Sclater also read some notes on the identification of two mammals recently described by Dr. Gray from specimens living in the Society's Gardens. A paper was read by Messrs. Sclater and Salvin on Peruvian birds collected by Mr. Whitely, being the fifth of a series of communications on this subject. Mr. John Gould, F.Z.S., exhibited and described a new species of kingfisher from North-Western Australia, which he proposed to call *Dacelo occidentalis*.

London Mathematical Society, November 25.—Prof. Hirst, and subsequently Prof. Sylvester, V.P., in the chair.—The Rev. James White was admitted into the Society, and the Rev. Percival Frost proposed for election. Dr. O. Henrici exhibited a model of the cubic surface $xyz - (\frac{2}{3})^3 (x+y+z-1)^3 = 0$, which has three biplanar nodes; it was constructed in cardboard to a scale of $2\frac{1}{2}$ inches, as unit. A sufficient number (eleven) of sections $x+y+z-1=$ constant, cut out in cardboard, are connected in a horizontal position, and kept at their proper distance by three vertical sections $y=z$, $z=x$, $x=y$, with regard to which the surface is symmetrical. The model contains the central part of the surface with the three nodes, and is bounded by a sphere of 8 inches radius, with its centre at the origin, large enough to show the position of the three straight lines in the surface (each counting for nine), and to give an idea how the surface extends to infinity. The interstices between the cardboard are intended to be filled up with plaster of Paris, so as to form a solid model. Mr. Clifford gave an account of an extension of a theorem of Serret's illustrated by tables, one of which, designated A, is annexed, with its explanation.

Power.	2	3	4	5	6	7	8	9	10
Conic	6	8	11	13	16	18	21	23	26
Cubic	—	10	12	15	19	21	24	28	30
Quartic	—	—	15	17	20	24	29	31	34
Quintic	—	—	—	21	23	26	30	35	41
Sextic	—	—	—	—	28	30	33	37	42
Septic	—	—	—	—	—	36	38	41	45
Octavic	—	—	—	—	—	—	45	47	50
Nonic	—	—	—	—	—	—	—	55	57

The tables, for convenience, refer to points instead of lines, and curves of given order instead of curves of given class. The meaning of them will best appear from an example. Thus, in the Table A above, opposite the word quartic and under the power 8 we find the number 29. This means that if the eighth powers of the equations of 29 points are connected by a syzygy, the points are all on a quartic curve. There are, moreover, intersections of the quartic by an octavic, which, in virtue of a theorem of Jacobi's, is an additional piece of information. Mr. Clifford also exhibited a second Table B, constructed in a similar manner for surfaces. Mr. Roberts made a statement of a theorem in invariants, which, however, is so mixed up with other considerations and details, that it cannot well be isolated and its limiting circumstances explained without going into further details than the limits of this notice permit.

EDINBURGH

Geological Society, December 2.—Mr. Geikie, F.R.S., president, in the chair. The first paper was on the Succession of the Laurentian, Cambrian, and Lower Silurian Rocks on the Shores of Loch Broom, being a letter addressed to the president by Sir Roderick Murchison.

Sir Roderick Murchison, in his paper, after alluding to his previous researches in Scottish geology, and especially to the order which he had been enabled to establish among the rocks of the north-west Highlands, proceeded to give the results of a visit which he had paid last summer to the west of Ross-shire. Along the shores of Loch Broom he found clear sections confirmatory of his previously published views. Among the Summer Isles at the mouth of that loch the Laurentian gneiss is found with its usual characteristic petrographical character. It throws off the dull red or chocolate-coloured sandstones which in one mountain, Ben More, must attain a thickness of several thousand feet. These strata are inclined gently towards the east, and are overlapped unconformably by the quartz rock and limestone which form the lowest portions of the Lower Silurian series. From the upper part of the uppermost quartz rock there is a perfect ascending passage with the upper flaggy gneiss, which rolls eastward over the rest of the Highlands. By this fresh appeal to the natural sections of the north-west Highlands, Sir Roderick had been again able to confirm the now established order of succession among these ancient rocks.—Mr. Geikie, F.R.S., afterwards communicated a series of notes for a comparison of the volcanic geology of central Scotland with that of Auvergne and the Eifel. The author began by alluding to the labours of Boué, Forbes, Scrope, Daubeny, and others. He then sketched the area occupied by rocks of volcanic origin between the Grampians and the silurian uplands of the southern counties. The rocks which he proposed to make the subject of more special remark in this paper were of carboniferous age.

They were capable, he said, of being broadly treated under two groups—1st, plateaux; and 2d, points of local eruption. 1. Plateaux of carboniferous volcanic rocks are extensively developed in the western part of the midland valley. They form the range of the Campsie and Kilpatrick fells, and, crossing the Clyde into Renfrewshire, sweep for many miles through the north and north-east of Ayrshire. They occur likewise as fragments on the Clyde islands, Arran, Bute, and Cumbrae. Extensive as the present area of these rocks is, there can be no doubt that it once covered a much greater surface, and that one great plateau of lavas and tuffs stretched from the Ochil Hills to the south of Cantyre. Throughout the wide district where the rocks still remain they retain a remarkable horizontality. They consist of various porphyrites, melaphyres, and tuffs, arranged in beds, which are placed over each other with great regularity. Hence the hillsides wear a terraced appearance from the alternation of harder and softer beds. This feature characterises the Campsie fells and the hills south-westwards to Ardrossan, but it is most conspicuously displayed in some of the valleys at the south end of Bute. One of the distinguishing features of these plateaux is the comparative infrequency with which any vent or true point of eruption can now be detected. Occasionally such a vent is found as a boss of coarse volcanic agglomerate, or of porphyrite or melaphyre; but, as a rule, all the foci of eruption are now buried under the materials which they emitted. Another feature which runs through the plateaux is the apparent continuity of the several beds. Viewed from a little distance, the terraces of trap seem each perfectly continuous for long distances. A closer exami-

nation often shows that though the terrace may run on, the rock of which it consists is formed of different sheets, which, though lying on the same plane, have proceeded from different vents. Mr. Geikie then pointed out the structure of some of the volcanic plateaux of central France as illustrative of those features of the Scottish plateaux to which he had referred. (2) While the western half of the Scottish carboniferous area is characterised by the wide extent of its volcanic plateaux, the eastern half is as strikingly distinguished by the abundance of its points of local eruption. Traces of these independent but closely segregated vents are scattered over almost the whole extent of Fife and the Lothians. They belong as a whole to the lower division of the carboniferous formation. The evidence by which their position can now be ascertained consists of masses of stratified tuff, frequently associated with contemporaneous outflows of melaphyre. The number of the vents in some parts of the country must have been very great. During the deposition of the lower carboniferous rocks, the area of Linlithgowshire and great part of Fife and East Lothian was dotted over with little volcanoes, each throwing up its cone of ash, or here and there emitting also a short current of lava. In some places the vents were so closely placed together, that their ejections formed in the end one long volcanic bank, such as the Garlton Hills and the range of heights between Bathgate and Linlithgow. The vents were singularly local in their development. Thus, while they continued in activity throughout Linlithgowshire and Fife, as well as in Haddingtonshire, the intervening area of Edinburghshire remained almost without them. Their long continuance in the districts where they had once broken out is remarkable. During the time represented by the deposition of many hundred feet of strata, the area of Linlithgowshire continued to be the theatre of a wonderful volcanic activity, new cones breaking out as the old ones were washed down. Yet the county of Edinburgh, only a few miles to the east, remained during that long period almost wholly unaffected by any volcanic action. Reference was then made at some length to the extinct volcanoes of Auvergne and the Eifel, and it was shown that in their form and distribution, their small size, the nature of their products, and the protracted period during which they had been in activity, they enable us to realise vividly what was the condition of a great part of central Scotland during the earlier ages of the carboniferous period. The concluding portion of the paper dwelt upon the denudation of the volcanic rocks of Auvergne and of Scotland. Mr. Scrope had shown conclusively that the wide and deep valleys of the Loire, the Dordogne, and other streams of central France had been carved out of volcanic rocks and fresh-water strata by subaërial erosion alone. The form and structure of these valleys were compared with those of valleys which have been excavated out of volcanic rocks in Scotland, and it was argued that the similarity of result was in all probability due to a similarity of cause. In the Scottish valleys the influence of ice, and perhaps, in some cases, also of the sea, had come into play to augment or modify that of the subaërial forces. Yet there was every reason to believe that in Scotland, as in France, the main share of the work had been done by rains, frosts, and streams.

DUBLIN

Royal Irish Academy, November 30.—The Earl of Dunraven, F.R.S., V.P., in the chair. The minutes of the former meeting, having been read and approved of, were signed. The chairman briefly expressed his regret and that of the Academy at the resignation of their former president, Lord Talbot de Malahide, and stated that he was ready to receive the names of any candidates for the vacant office. The Rev. Dr. Lloyd, F.R.S., Provost of Trinity College, proposed that Professor Jellett should be elected president. Among all the members of the Academy he knew of none save one (Rev. Dr. Salmon, F.R.S.), who, in his opinion, from his great scientific attainments, was so eligible for this important post; and his friend Dr. Salmon had announced his determination to withdraw his claims in favour of Mr. Jellett's. Mr. Jellett was distinguished not only for his knowledge of the higher branches of mathematics, but also for his knowledge of their application, a combination not often to be met with in the same individual. He felt sure that Mr. Jellett's presidency would be as distinguished as that of any of his predecessors. Dr. Stokes, F.R.S. (in the absence of the Rev. Dr. Russell, President of the Royal College of Maynooth), seconded Mr. Jellett's nomination. He reminded the Academy of the importance of having for its president one who was well versed in its affairs, and Mr. Jellett, when secretary of the council of the Academy, had acquired this knowledge. He would not refer to Mr. Jellett's position as a man of science, but he would remind that large and influential section of the Academy, the antiquaries, how much assistance they could have, and were constantly having, from science. Archæology was intimately connected with the natural sciences. Even the laws relating to the flow and ebb of the tides were shown by Professor Haughton to be thus connected, for he had calculated the hour of low tide in the Bay of Dublin on the day of the battle of Clontarf, and his hour absolutely coincides with that named in the written record as translated by the late lamented Dr. Todd. Sir William Wilde said that the provost had spoken of Mr. Jellett's position as a man of science, and Dr. Stokes had spoken of his general attainments and knowledge of the Academy's affairs; but he wished to speak of him as a colleague with whom he had been associated for many years, and as an honest, straightforward man, who, irrespective of all party feeling, did what he considered right without fear, prejudice, or favour. The Academy had had "antiquarian" presidents; it was now time to have one scientific president, and so win back many scientific wanderers. He felt sure Mr. Jellett would never forget the interests of the antiquarian party in the Academy, and he looked forward to a bright career for the Academy under Professor Jellett. Dr. Stewart, as a very old member of the Academy, supported Mr. Jellett's claims. There being no other candidate proposed, the ballot was opened and scrutineers appointed. The chairman announced that there appeared, for Professor Jellett, 55 votes; for Sir R. Kane, 1. He therefore declared Mr. Jellett duly elected as president. The chairman then, with a few graceful remarks, in which he congratulated the Academy on its choice, resigned the chair to the new president.—Sir W. Wilde exhibited a number of antiquities found in the counties of Dublin, Londonderry, and Queen's County, among which were a spirally twisted gold torque, either used as a finger ring or a head ornament, three bronze mammillary brooches, some fragments of bronze rings and bracelets, and a semicircular brooch of beautiful decoration and unique form. The remainder of the collection was chiefly of iron, and consisted of three very fine swords with hilts. Sir William also exhibited a collection of antiquities and casts from North and South America.—Professor Apjohn, M.D., read a paper "On a new step in the analysis of sugar." He stated that crude sugar and syrups generally contained three varieties of saccharine matter, and in the case of such a mixture, the method hitherto in use only accomplished the estimation of one of these, that usually known under the name of Cane Sugar. The means of obtaining its amount, by the optical saccharometer alone, or by Barreswil's solution, each being applied before or after conversion, he then briefly explained, pointing out at the same time that neither the optical nor the chemical method could give any information in relation to the amount of inverted sugar or of grape sugar (crystallised glucose) which might happen to be present. This problem, however, he thought could be completely solved by a combination of the processes adverted to, and this he demonstrated by drawing attention to two equations—the one expressing the result of an observation with the saccharometer, the other that obtained by operating on the solution of copper with the syrup both before and after its inversion. These equations involved three unknown quantities, but one of the three (the cane) might be determined by a preliminary observation with the saccharometer, and as by this contrivance the number of unknown quantities would be reduced to two, the problem admitted of a complete solution. This method of analysis he had recently applied to several saccharine substances, and with satisfactory results.

Royal Geological Society, November 10.—Dr. W. Stokes, F.R.S., in the chair.—Rev. Professor Haughton read a paper on the discovery of crystals of Albite in the Dalkley granite; the mineral was found by Mr. W. H. S. Westropp, in small crystals mixed with crystals of fluorspar. The existence of this felspar in the Leinster granite was predicted by Professor Haughton some years since, but it had not been found in a separate crystalline form until these specimens were discovered. This fact adds a new link to the chain of observations made by Professor Haughton relative to the classification and origin of granites, and shows the connection between the three great granite masses of Mourne, Leinster, and Cornwall, in all of which now the presence of albite has been distinctly ascertained.—Dr. Macalister exhibited some human and canine bones brought by Mr. H. Ormsby, Esq., Geological Survey, India, from the celebrated cave Uaimh Fraing, Island of Eigg, the remains of

some of the Macdonald clan, who were smothered there in the sixteenth century.—Dr. Foot exhibited human bones from the cave of Dunmore, county Waterford, the remains of an Irish tribe suffocated there in the tenth century.—Specimens of the gold-bearing quartz of South Australia were sent for exhibition by Mrs. Gray, of Nareebnareeb, and of the gold-bearing quartz of the Rocky Mountains by Dr. Trevor, of Mentena.—Mr. Harte, County Surveyor of Donegal, exhibited some specimens of polished red granite from that county, which were of great beauty, similar in appearance to that of Peterhead, Aberdeenshire.

Natural History Society, December 1.—Mr. W. Andrews, V.P., in the chair. Dr. A. W. Foot read a paper entitled "Notes on Irish Lepidoptera collected during the past summer." These notes were chiefly records of a pleasant summer's excursion in which no very great rarities were met with. *Colias edusa* was found abundant in the County Kilkenny, and *Vanessa polychloros* was mentioned on the authority of a friend as having been seen in the County Wicklow. Mr. Williams, Mr. F. W. Kirby, Mr. Montgomery, and Dr. Haughton made remarks on the interest of many of the facts recorded in these notes. Mr. W. Andrews, the chairman, stated that it was a mistake to call *Chrysophanus dispar* the scarce copper; that *C. virgaureæ* was the scarce copper. He asserted that *C. dispar* was not rare in England, and that he had met with it in Kerry. He also said that the *Limenitis* which he had exhibited some years ago as from Tarbert, was neither *L. sibilla* nor *L. camilla*, but something quite different from either; and that those who thought it was *L. camilla* were quite wrong. He said he would bring all these facts before the society at another time. [Perhaps some of our entomological readers will enlighten us on these points. Is it possible that *C. dispar* is not a scarce butterfly? Is not *C. virgaureæ* a continental insect? If the *Limenitis* referred to is not, as competent authorities assert, the *L. camilla* of the Continent, what species is it?]

NEWCASTLE-UPON-TYNE

Chemical Society, October 28. Annual Meeting.—Mr. I. Lowthian Bell, F.C.S., President, in the chair. After the transaction of the business of the Society, the President read his address, in which he referred to the more important subjects which had engaged the attention of the Society at the evening meetings. He dwelt at length upon Mr. Pattinson's paper on the relations between English and Foreign Alkalimetry and Chlorimetry, which pointed out the fallacious results arising from the retaining of the old atomic weight of soda. He also called attention to the importance of Mr. B. S. Proctor's paper on the Root of the Rhubarb Plant, which exposed the fallacy which had led druggists and the medical profession, for the sake of mere appearance, to reject the portion of the drug richest in the active principle. The following extract from the address, alluding to the relations of science to the public health, is particularly interesting:—"Among the manifold applications of the truths revealed by means of chemical research, there is none more gratifying to the philosopher or to the philanthropist than that whereby chemistry is rendered subservient to the protection and promotion of the public health. It has been reserved almost for our own time to have it demonstrated that the observance of certain so-called sanitary regulations is connected by the closest bonds with the rate of mortality. This has been proved repeatedly in several large cities, at one time conspicuous for the high annual death-rate among their inhabitants, but which, by the authorities dealing with the causes of offence, now escape from the penalty which never fails to attend on the transgression of any great natural law. We need not, indeed, go far for an example in illustration of the doctrine I am enforcing, for in the very town in which we are now assembled, the rapid increase of population had outgrown as it were some of those means and appliances which must accompany the crowding together of a vast number of human beings on a small area of ground. The municipal authorities of Newcastle were no sooner properly impressed with the gravity of their position, and convinced that the remedy and responsibility rested in their own hands, than the most vigorous measures were resorted to in order to grapple with the evil, and we have, in consequence, to congratulate ourselves on a remarkable alteration in the death-rate of this town. It may not be unworthy of mention that the first quarter of 1866 exhibited a mortality corresponding to 48·4 for every thousand of the inhabitants, and that the average for the whole of that year was a mere fraction within 40, viz., 39·7. Taking 10 years, ending with 1860, it was 35·4 per 1000. It cannot be otherwise than satisfactory to compare this with the three quarters of the present year, which is only 26·2, and for the last quarter the deaths only amounted to 23·3 per 1000; in short, from having held a most unenviable position among the most unhealthy towns of the empire, we are now conspicuous among those in which the mortality is the lowest. I am glad to be able to state that the condition of our atmosphere, as affected by the burning of coal and the emission of objectionable vapours, is now engaging the attention of a Committee, with the Mayor at its head, appointed to inquire into the subject. I trust, now that the public mind has been directed to the evil of a smoke-obscured sky, or poisoned air, before long, the inhabitants will experience a happy change from the result of the labours of those charged with the investigation. It is only, however, due to our chemical manufacturers to state that they are fully alive to the importance of not permitting any unnecessary escape of vapours, having an actual value to themselves, and very inconvenient to others when set at large, and therefore, that they do not intend to rest content with the occasional visit of the Government inspector, or of their own superintendents, but are making arrangements for the permanent and continuous sampling of the gases after they have passed their condensing apparatus. Their observations in this direction, will, I feel assured, be much lightened by a very ingenious aspirator, constructed by one of our members, Mr. Swan, now on the table, to which I would invite inspection. I have, myself, been engaged for some time in an examination of the state of combustion experienced by the fuel in our blast-furnaces, and I am so satisfied that a proper study of the phenomena attending it involves considerations of the utmost importance to the iron-smelter, that I intend availing myself largely of the facilities which the apparatus of Mr. Swan is capable of affording." The officers of last year were re-elected by a large majority.

NORWICH

Geological Society, November 11, Anniversary Meeting.—The Rev. John Gunn, F.G.S., President, in the Chair. The President and Hon. Secretaries (Mr. J. E. Taylor, F.G.S., and Mr. John King) were re-elected. In his opening address Mr. Gunn alluded to the death of one of the hon. members of the Society, Mr. Bernard B. Woodward. Referring to a paper by Mr. Harmer, F.G.S., on the Chillesford clay and the crag containing *Tellina balthica*, he stated that he had himself published a diagram of the coast and inland sections of Norfolk, and a description of what seemed to him a downthrow of Chillesford clay, or an upthrow of the chalk. He had also instituted a series of measurements of the various levels at which this bed appeared above the water, with a view to determining the amount of disturbance, and had found the heights ranging from fourteen to thirty-two feet. He thought that the difference between the coast and inland sections might be due to this disturbance. Mr. Gunn then noticed an excursion which had been made by the Society to Aldborough, where the Norwich crag had been found near the railway station, associated with undoubted red crag forms. He also adverted to the paper by Mr. Tylor (read before the Geological Society of London) on Valley Gravels. In the discussion which followed the President's remarks, Mr. Harmer gave an outline of the theory he had put forth in his Paper with reference to the bed of shells containing *Tellina balthica*. Both he and Mr. Searles Wood held this to be the base of the lower drift beds, and contended that a great change in the physical geography of the Eastern counties had taken place between the period when the upper and lower Norwich crags had been formed, and the time when the *Tellina balthica* bed had been deposited. The former had been deposited in an estuary opening to the south, the latter in a similar one opening to the north. This argued an oscillation of level in the meantime. Mr. Harmer also expressed himself against the theory that so-called valley gravels were of fluviatile origin, and pointed to Lopham Ford, where the height of the ground was only twenty feet above water level; and yet which was the point of departure for two streams whose much higher banks at some distance were covered with valley gravels containing flint implements. With regard to the opinion that many of the flint implements had been rolled down or transferred to the lower levels, Mr. J. E. Taylor stated that at Sainton Downham these implements were found in their most perfect and totally unaltered condition at the lowest levels. The chippings and edges were as fresh as when the weapons left the hands of their makers. He suggested that the vicinity of Lopham Ford might have been

denuded by atmospherical action since the origin of the present rivers. Mr. Taylor then gave an account of a recent visit to Chillesford, in Suffolk, where he had studied the typical section, and taken an inventory of the commonest fossils and their mode of occurrence. The crag intercalated between the Chillesford clay contained great quantities of *Mactra solida*. This was the shell found so abundantly at Arminghall, near Norwich, in a bed resting on a portion of the Chillesford clay. The usual beds which, in the neighbourhood of Norwich, were found underlying this clay, were absent at Arminghall, so that the clay rested on the solid chalk. He had no doubt, therefore, that the intercalated crag at Chillesford was represented at Arminghall by the *Mactra solida* bed.

PARIS

Academy of Sciences, November 29.—The following mathematical papers were read:—On a potential of the second kind which solves the equation with partial differences of the fourth order, expressing the interior Equilibrium of elastic, amorphous, non-isotropic substances, by M. de Saint-Venant, and a note on a certain class of differential equations of the second order by M. Laguerre. A note found among the papers of the late M. Léon Foucault on the construction of the optical plane was read. It gave a description of the method adopted by M. Foucault to obtain a perfectly plane surface of glass, and was supplemented by some remarks of M. A. Martin on his experience in the employment of the same method.—M. P. Gervais presented a note accompanying preparations relating to the anatomy of the Great Anteater.—M. Melsens communicated a memoir on the Passage of Projectiles through Resisting Media, in which he treats of the conveyance of air by projectiles moving through it, and the effect of the compression of the air upon the course of the projectile.—M. Scoutetten presented a note on the Preservation and Improvement of Wines by Means of Electricity. He stated that by the application of a current of electricity generated by a battery, and passed into the wine by means of platinum electrodes, its quality is greatly improved.—M. A. Gerardin remarked upon the unhealthy conditions produced by the discharge of the water of starch manufactories into rivers, and maintained that he had restored some rivers into a healthy condition by causing the water containing albuminous and other organic refuse to be discharged upon well-drained arable land. A paper on a very simple system of floodgates with a constant yield under variable pressure, by M. Maurice Lévy, was communicated, as also a note by the same author on a peculiar system of skew-bridges. MM. P. Desains and E. Branly communicated some investigations on solar radiation. They have found that the calorific action of the sun increases in intensity with the altitude of the place of observation, but that the transmissibility of the rays through water diminishes with the altitude. The transmissibility of the solar heat through water and alum was found to be greater in the morning than at noon, but this was not so strikingly the case in October as in August. The authors stated that their spectroscopic observations were in accordance with the preceding results. A paper by M. J. Moutier on the expansion of gases was presented, as also a note on molecular actions in chlorine, bromine, and iodine, by M. C. A. Valson. In the latter the author described his experiments to ascertain the amount of molecular action in chlorine, bromine, and iodine, by determining the height to which solutions of precisely equivalent quantities of their salts would rise by capillary action. From his results he inferred that if chlorine and iodine could easily be brought into a liquid state, the capillary elevations of the three bodies abovementioned in a tube 1 millimetre in diameter would be respectively 6, 5·5, and 5 millimetres. The author suggested that the capillarity of substances may be made available in chemical analysis, and remarked that in its physical properties bromine stands nearly midway between chlorine and iodine. MM. Odet and Vignon presented an account of a new method of preparing anhydrous nitric acid, founded upon that proposed by Gerhardt for obtaining the anhydrous monobasic organic acids. They prepared chloride of azotyle by the action of oxychloride of phosphorus upon nitrate of lead or silver. The vapours of this chloride of azotyle were directed upon dry crystals of nitrate of silver at a temperature of 140°—158° F; the products of the reaction were conveyed into a tube immersed in a mixture of ice and common salt, where they furnished colourless prismatic needles presenting all the properties described by H. Sainte-Claire Deville. The authors described a simplified form of apparatus in which the acid may be produced without the preliminary preparation of chloride of azotyle, and indicated the reactions which take place. M. J. Roussin communicated a paper on the preparation of hydrate of chloral and on its characters when pure. His process consisted in submitting the crude crystalline mass obtained by passing dry chlorine through absolute alcohol to strong pressure until it is quite dry, then placing it in a retort with a little powdered chalk and distilling it. M. Dubrunfaut presented a paper on inverted sugar, in which he declared the results lately communicated to the Academy by M. Maumené to be erroneous.—A memoir by M. E. Van Beneden on the mode of formation of the ovum and the embryonic development of the *Sacculinæ* was read; to this we shall probably advert elsewhere.—M. Marié-Davy presented a third note on lunar radiation, containing the results of his observations on this subject during the month of November. The following papers were also communicated:—On a new means of diagnosis and extraction of iron projectiles and leaden projectiles with an iron nucleus, by M. Milliot; on a new electrical explorer for detecting foreign (especially metallic) substances in the tissues of the human body, by M. Trouvé; on a system of aërial navigation (title only), by M. A. Vaillant; a description of clinical experiments upon the therapeutic effects of bromide of morphine and atropine, and bromide of digitaline (title only), and an indication of a mode of curing stings by cauterisation (by the use of phenic and sulphuric acids), by M. Delagrée; and a note on the supposed influence of subterranean marshes in the development of intermittent fevers, by M. Colin.

BERLIN

Academy of Sciences, October 11.—Professor Magnus read a paper on the alteration of the radiation of heat by roughening of the radiating surface, in which he described a series of experiments made by him to determine the cause of this alteration, and stated that in his opinion the increased radiation of a roughened surface depends essentially upon the refraction which the heat undergoes in issuing from the surface of the radiating body.—Professor W. Peters communicated a notice of a new species of Lizard, *Phyllodactylus galapagensis*, from the Galapagos Islands. He remarked that only five species of reptiles were previously known from these islands—one tortoise, three lizards, and one snake. The last he identified with *Dromicus chamissonis*, which also occurs on the continent of America, and with this Dr. Günther's *Herpetodryas biserialis*, from the Galapagos group, may be synonymous. If it be distinct, the number of reptiles from these islands will only be seven.—Prof. Pringsheim read an elaborate memoir on the conjugation of swann-spores, the morphological primary form of reproduction in the vegetable kingdom, and a communication was presented by Dr. K. Schultz-Sellack on the diathermancy of a series of substances for dark heat. The author stated that he had found that many more substances than is generally supposed allow a considerable amount of the dark heat radiated by lampblack at 212° F. to pass through them. He enumerates binary compounds of chlorine, bromine, fluorine, and iodine, and a number of sulphides, and shows their behaviour in this respect by means of percentage tables.

German Chemical Society, November 12.—The following papers were read:—Otto on Mercuric Phenylide.—Kolbe: Lecture Experiment to demonstrate the increase of weight of burning substances.—Kempf on Carbonate of Phenyl.—Carstanjen on the Action of Oxychloride of Chromium on Hydrocarbons.—Henry on Chlorosulphide of Phosphorus.—Radizewsky on the Wax contained in the Straw of Cereals.—A. W. Hofmann on the Action of Iodine on Thiobenzamide.—Friedel: Paris Correspondence.—Richter: Petersburg Correspondence.

BONN

Natural History Society of Rhenish Prussia and Westphalia.—The autumnal gathering of this society took place on the 11th October, the day so widely observed as the centenary of the birth of Humboldt; and the proceedings were naturally inaugurated by a discourse in commemoration of the great philosopher of whom the Germans are so justly proud. The following are the more important communications submitted to the society:—The veteran Prof. Nöggerath gave an account of the earthquakes, four in number, which since November 1868 have visited the Rhine province, specifying the extent of country subject to their influence, and glancing at the general physical characters of earthquake phenomena. He was followed by Prof. Troschel, who showed the importance of a study of the geographical distribution of animals as indicating the configuration of the earth's surface, and the distribution of land and water

at the time of the commencement of the existing period of geological history. The Professor's illustrations were chiefly derived from his investigations of the distribution of sea-fish and land-snails. Professor F. Zirkel, of Kiel, made some communications on the mineralogical constitution of the basalt-lavas of Laacher See and the Eifel. Professor von Rath described a new mineral from Laacher See, which he proposes to call Amblystegite, in allusion to the extreme obtuseness of some of its angles. It is of a reddish brown colour; hardness almost equal to that of quartz; specific gravity 3·454; melts with great difficulty, forming a black glass insoluble in hydrochloric acid. In composition it is allied to hypersthene, but is distinguished from that mineral by the absence of the characteristic cleavage. Extracts from a paper by Professor Fuhlrott on the caves of Grevenbrück and the Hönnethal were then read; and Professor Schaffhausen availed himself of the opportunity of insisting upon the desirableness of a systematic exploration of the bone-yielding caves in which Westphalia is so rich. We are glad to hear that steps are being taken to raise funds for this purpose among the members of the society. The most important finds in the Grevenbrück cave are coprolites of hyæna, and two human lower jaws of primitive form.

VIENNA

Imperial Academy of Sciences, November 18.—Professor Unger communicated a memoir on the anthracite deposits in Carinthia. He stated that nineteen species of plants, chiefly ferns, have been detected in the shales accompanying this deposit. They agree with those of the coal-measures, and eight of them occur also in the anthracite deposits of Styria, Switzerland, and the French Alps. Two undescribed Fern-stems were particularly noticed by the author, who took the opportunity of opposing the ordinary notion that the *Stigmariæ* are the roots of *Sigillariæ*. Of the latter he regarded those species which have not furrowed stems, as ferns.—Dr. C. Jelinek presented a preliminary communication upon the hurricane-like storm which visited Vienna on the 14th November. The greatest velocity of the wind was 46·6 Paris feet per second, about noon; the diminution of barometric pressure continued until 6 P.M., when the mercury had fallen 7·17 lines, the velocity of the wind being 36·5 feet per second.—Director Tschermak communicated a memoir on a new salt from Hallstadt. This mineral, to which the author gives the name of Astrakanite, occurs mixed with common salt, anhydrite, and a mixture consisting chiefly of sodium sulphate in the Christina gallery at Hallstadt. It forms a bluish layer, the colour being due to enclosures containing iron, and the crystals, which are very small and occur in druses, being frequently colourless. Its composition is expressed by the formula, $MgSO_4$, Na_2SO_4, 4aq, so that it is the third natural magnesium-sodium sulphate with which we are acquainted. M. Tschermak also presented a paper by M. P. Hausenschild, giving an account of his microscopic examination of the minerals called Predazzite and Pencatite. By the examination of thin slices of the most homogeneous looking specimens, the author found that two minerals may be distinguished in them with certainty, namely, calcite and brucite.—Dr. Samuel Stern presented a memoir entitled "Contributions to the theory of ordinary (not musical) sounds, as an objective character, with reference to the special requirements of medical diagnosis."—Prof. E. Ludwig presented a paper by himself and Dr. J. Hein upon the synthesis of hydroxylamine, which, they said, may be effected by the direct addition of nascent hydrogen to pure nitrous oxide as follows:—

$$NO + H^2 = NH^3O.!$$

The process consists in passing nitrous oxide through a mixture of tin and hydrochloric acid, freeing the fluid from tin by sulphuretted hydrogen, evaporating the filtrate from the sulphuret of tin to dryness, washing the residue in cold and dissolving it in hot alcohol, separating the ammonium chloride with platinum chloride, and precipitating the pure hydrochlorate of hydroxylamine by anhydrous ether. The analysis and measurement of the crystals thus obtained proved their identity with Lossen's salt.—The following memoirs were presented, but only their titles are given: By Prof. Hyrtl, "On a præcorneal vascular net in the human eye," and "On an insular intercalated bone in the parietal bone;" and by Prof. B. Lapschin, of Odessa, "On the specific gravity of the water of the Black Sea," and "On the conductibility of cork for heat, and its application to the construction of a barometer." Prof. Julius Wiesner also presented a memoir on the origin and increase of Bactria, the results of which had been communicated to the Academy on the 29th April last.

DIARY

THURSDAY, DECEMBER 9.

ROYAL SOCIETY, at 8.30.—Spectroscopic Observations of the Sun, No. V.: Mr J. Norman Lockyer, F.R.S.—Researches on Gaseous Spectra in relation to the Physical Constitution of the Sun, Note III.: Dr. Frankland, F.R.S., and Mr. J. Norman Lockyer, F.R.S.—On the Successive Action of Sodium and Iodide of Ethyl on Acetic Ether: Mr. J. A. Wanklyn.

SOCIETY OF ANTIQUARIES, at 8.30.—On a Faliscan Inscription: Padre Garrucci, Hon. F.S.A.

ZOOLOGICAL SOCIETY, at 8.30.—On the Fin Whale recently stranded in Langston Harbour: Prof. Flower, F.R.S.—On the Fresh Water Fishes of Burmah: Surgeon Francis Day.

MATHEMATICAL SOCIETY, at 8.—Gauss' Theorems and Napier's Analogies: Mr. Crofton.—On the Order of the Discriminants of a Ternary Form: Mr. S. Roberts.

LONDON INSTITUTION, at 7.30.—Architecture: Prof. R. Kerr.

FRIDAY, DECEMBER 10.

ROYAL ASTRONOMICAL SOCIETY, at 8.

CLINICAL SOCIETY, at 8.30.

QUEKETT MICROSCOPICAL CLUB, at 8.

SOCIETY OF ARTS, at 8.—Indian Conference. On a Gold Currency for India: Mr. A. Cassels.

SATURDAY, DECEMBER 11.

ROYAL BOTANIC SOCIETY, at 3.45.

MONDAY, DECEMBER 13.

SOCIETY OF ENGINEERS, at 7.30.—Annual Meeting.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.

MEDICAL SOCIETY, at 8.

ROYAL INSTITUTE OF BRITISH ARCHITECTS, at 8.

ROYAL INSTITUTION, at 2.—Monthly Meeting

LONDON INSTITUTION, at 4.—Elementary Physics: Prof. Guthrie.

SOCIETY OF ARTS, at 8.—The Spectroscope and its Applications: Mr. J. Norman Lockyer, F.R.S.

TUESDAY, DECEMBER 14.

INSTITUTION OF CIVIL ENGINEERS, at 8.

ROYAL MEDICAL AND CHIRURGICAL SOCIETY, at 8.30.

PHOTOGRAPHIC SOCIETY, at 8.

ANTHROPOLOGICAL SOCIETY, at 8.—Race Affinities of the People of Madagascar: Mr. C. Staniland Wake, F.A.S.L.

WEDNESDAY, DECEMBER 15.

SOCIETY OF ARTS, at 8.—On India-rubber—its History, Commerce, and Supply: Mr. J. Collins.

THURSDAY, DECEMBER 16.

ROYAL SOCIETY, at 8.30.

SOCIETY OF ANTIQUARIES, at 8.30.

LINNEAN SOCIETY, at 8.

CHEMICAL SOCIETY, at 8.

ZOOLOGICAL SOCIETY, at 4.

NUMISMATIC SOCIETY, at 7.

PHILOSOPHICAL CLUB, at 6.

LONDON INSTITUTION, at 7.30.

EDINBURGH GEOLOGICAL SOCIETY, at 8.

BOOKS RECEIVED

ENGLISH.—The Monthly Microscopical Journal, December 1869 (Robert Hardwicke).—Chemistry for Schools: C. Haughton Gill (James Walton).—Burton-on-Trent—its History, its Waters, and its Breweries: W. Molyneaux, F.C.S. (Trübner).—Outlines of Chemistry; or, Brief Notes of Chemical Facts: Dr. Odling (Longmans).—Earth and Sea: Louis Figuier (Nelson and Sons).—The Second Table of the Commandments: Dr. Rowland (Longmans)—Heads and Tails: Adam White (Nisbet).—Romance of Natural History, 2 vols.: P. H. Gosse (Nisbet).—Facts and Dates: Rev. A. Mackay (Blackwood).—Physical Ethics: A. Barratt (Williams and Norgate).—Womankind in Western Europe: J. Wright (Groombridge).

FOREIGN.—Les Pierres Précieuses: J. Rambosson.—Histoire des Météors: J. Rambosson.—Leçons sur la Respiration: P. Bert.—Die Blausäure: W. Preyer.—Landwirthschaftliche Zoologie: Dr. Giebel. (Through Williams and Norgate.)

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