meteorites, composed principally of iron and nickel. While on the other hand, in the case of stars of the third class, in which it seems excessively probable that we have both metalloids and compounds, and very little pure metal, that is to say, metal not in combination, in the reversing layer, we have also the large class of silicate meteorites, the origin of which is possibly due to such stars in exactly the same way as the origin of the iron meteorites would be due to stars of the second class.

If this be so, then it would seem that a comet is simply a meteorite which contains something which is volatile at a very low temperature. Amongst the vapours known to chemists, which are volatile at the lowest temperature, are the hydrocarbons. I have already pointed out to you that as far as observations have gone on comets we have been able to detect nothing but the possibility of a spectrum of carbon, or of a compound of carbon.

Here again dimly and darkly the prism is pointing us to a possible connection between all the stars in heaven and all the comets and all the meteors which flit through the celestial spaces and fall upon our own earth.

I have already referred to the verdict of the prism in connection with the nebulæ, and there can be very little doubt, I think, that before the world is very much older the prism will also be perfectly competent to connect nebulæ with stars as it may possibly have already connected comets and meteors with them; but this point certainly is at present one of great difficulty, and it is a difficulty which no student of science will care to get out of, since in matters of this kind a difficulty is a matter of the highest importance, showing you as it does that part of the field of nature which requires most study.

I quite feel that this enormous subject, which modern science is opening up, is one the importance of which is so great and the interest in which is so general that I am sorry that the task of talking about it has not fallen upon the shoulders of one who is more competent to do it than I am. I hope, however, that feeble as my advocacy may have been, you are prepared to agree that the time will come when Celestial Chemistry, as investigated by means of the prism, will be acknowledged to be one of the most important branches of modern science.

J. Norman Lockyer

SCIENTIFIC SERIALS

Journal of the Franklin Institute, February.—In this number Mr. Prindle has a paper (with numerous illustrations) On Recent Improvements in Construction of the Gunpowder Pile-driver.—A long and instructive paper by Mr. Loiseau, On Artificial Fuel, gives a *résumé* of what has hitherto been done in this direction; the author describing his own method, in which a mixture of 5 per cent. clay and 95 per cent. coal-dust, moistened with milk of lime, is moulded into oval lumps, which are then bathed in a waterproofing liquid (rosin dissolved in crude benzine) and dried. With 14 men only, a production of 150 tons per day can, it is said, be easily attained.—Prof. Houston announces the discovery of a new allotropic modification of phosphorus, obtained by boiling good phosphorus repeatedly in potassium hydrate (under certain conditions). This new modification retains for an indefinite time, apparently, the liquid state, even when exposed to temperatures considerably below the melting-point of ordinary phosphorus, from which it also differs in its non-oxidation on exposure to air, and, consequently, its not shining in the dark.—Mr. Chesebrough describes the construction of the Detroit River Tunnel; and Prof. Thurston has a note relative to the estimation of the chemical value of coals containing large quantities of ash.—Among the "Items and Novelties," it is stated that Prof. Thurston has gone very carefully into the subject of a scheme published by Mr. Chesebrough, for keeping canals open in winter by warming the water. The professor's calculations are given, and he finally arrives at an estimate of 5,412,500 dols. as the first cost of apparatus for a canal 350 miles long, 70 feet deep, in the latitude of Central New York; and 1,670,200 dols. for the maintenance per annum. He thinks the scheme deserving of investigation.

Astronomische Nachrichten, Nos. 1,976 and 1,977.—These numbers contain a paper by M. Lohse on the estimation of the depth of sun-spots, and at the same time to ascertain the influence of solar refraction. The principle of his method is as follows:—When a spot having its umbra concentric with penumbra, when seen from the vertical, is seen near the sun's limb, the umbra becomes excentric, and the depth of the umbra p' will be given by the formula $p' = \frac{\epsilon}{\cos \alpha}$ when ϵ is the excentricity and α the heliocentric position-angle of the spot from the axis, and assuming the spot steady, p' should remain constant as α and with it ϵ change. This, however, is found not to be the case, for p' gradually increases as the spot gets from the limb, showing it was raised by refraction at the limb, and therefore this change in the value of p' gives a measure of the sun's refraction. The same author also contributes a paper on the effect of the atmosphere of Venus in the transit over the sun, and he recommends the examination of its atmosphere with the spectroscope for absorption-bands.—J. Hortazzi gives the observations of transits for longitude of Nikolagew.—J. Palisa gives a large number of ring-micrometer observations on the minor planets and a few comets.—Dr. Holetschek gives the position of some seventy comparison-stars for planets and comets.—E. Stephan gives a list of ten new nebulæ discovered and observed at Marseilles; all seem excessively small. The elements of the new comet are given by Wilhelm as follows:—

$$T = \text{March } 9{\cdot}8125 \text{ Berlin time.}$$
$$\Omega = 48^\circ\ 17'\ 37''{\cdot}6$$
$$\Pi = 309^\circ\ 27'\ 46''$$
$$i = 52^\circ\ 29'\ 52''{\cdot}3$$
$$\log. q = 8{\cdot}591600$$

Memorie della Soc. degli Spectroscopisti Italiani, Oct. and Nov. 1873.—These numbers contain an interesting paper by P. Rosa, assistant at the Observatory at Rome, on the variability of the sun's diameter. He discusses the observations at Greenwich and other places from the year 1750 to 1870, during which time some 13,000 measurements of the solar diameter were made. From these observations he has constructed curves showing the variation of diameter, together with the variation in the number of spots. The agreement of these two curves is not very strong, but on his constructing secondary curves from every fourth year of these primary curves, beginning with any year, the resemblance becomes striking. There are also monthly curves given, showing the mean variation in diameter of the sun for each month, taking a mean of ten years for each curve. These show two maxima in March and September, and two minima in January and June. On examining the curve of variation in diameter, a marked minimum occurs about the year 1792. The author sets forth a theory to account for this variation, that since a comet, when at its perihelion, throws off large quantities of matter, so the sun when at its periastre may throw off matter and become reduced in size, and if such is the case its periastre happened in 1792.—G. Lorenzoni contributes papers on observations on the chromosphere, and on observing contacts in eclipses of the sun with the spectroscope.—G. de Lisa gives observations on solar spots in September, October, and November 1873, made at Palermo, giving a mean of about ten spots a day.—Prof. Young gives a note on the use of M. Rutherford's gratings in the place of prisms for the spectroscope.

SOCIETIES AND ACADEMIES

London

Royal Society, March 19.—On the Attractions of Magnets and Electric Conductors, by George Gore, F.R.S.

Being desirous of ascertaining whether in the case of two parallel wires conveying electric currents the attractions and repulsions were between the currents themselves or the substances conveying them, and believing this question had not been previously settled, I made the following experiment:—

I passed a powerful voltaic current through the thick copper wire of a large electromagnet, and then divided it equally between two vertical pieces of thin platinum wire of equal diameter and length (about six or seven centimetres), so as to make them equally white hot, the two wires being attached to two horizontal cross wires of copper.

On approaching the two vertical wires symmetrically towards the vertical face of the one pole of the horizontally placed magnet, and at equal distances from it, so that the two downward currents in them might be equally acted upon by the downward and upward portions respectively of the currents which circulated round the magnet-pole, the one was strongly bent towards and the other from the pole, as was, of course, expected; but not the least sign of alteration of relative tempe-

rature of the two wires could be perceived, thereby proving that not even a small proportion of the current was repulsed from the repelled wire, or drawn into the attracted one, as would have occurred had the attraction and repulsion taken place, even to a moderate degree, between the currents themselves; and I therefore conclude that *the attractions and repulsions of electric conductors are not exerted between the currents themselves, but between the substances conveying them.*

Some important consequences appear to flow from this conclusion, especially when it is considered in connection with Ampère's theory of magnetism, and with the molecular changes produced in bodies generally by electric currents and magnetism.

As every molecular disturbance produces an electric alteration in bodies so, conversely, the discoveries of numerous investigators have shown that every electric current passing near or through a substance produces a molecular change, which is rendered manifest in all vessels, liquid conductors, and even in the voltaic arc by the development of sounds, especially if the substances are under the influence of two currents at right angles to each other. In iron it is conspicuously shown also by electro-torsion, a phenomenon I have found and recently made known in a paper read before the Royal Society.

Numerous facts also support the conclusion that the molecular changes referred to last as long as the current. De la Rive has shown that a rod of iron, either transmitting or encircled by an electric current, emits, as long as the current lasts, a different sound when struck; and we know it also exhibits magnetism. The peculiar optical properties of glass and other bodies with regard to polarised light discovered by Faraday also continue as long as the current. A rod of iron also remains twisted as long as it transmits and is encircled by electric currents; and in steel and iron the molecular change (like magnetism) partly remains after the currents cease, and enables the bar to remain twisted.

That the peculiar molecular structure produced in bodies generally by the action of electric currents also possesses a definite direction with regard to that of the current, is shown by the rigidly definite direction of action of magnetised glass and many other transparent bodies upon polarised light; also by the difference of conductivity for heat and for electricity in a plate of iron parallel or transverse to electric currents; by the stratified character of electric discharges in rarefied gases, and the action of electric currents upon it; and especially by the phenomenon of electro-torsion. In the latter example an upward current produces a reverse direction of twist to a downward one, and a right-handed current developes an opposite torsion to a left-handed one; and the two latter are each internally different from the former. As each of these four torsions is an outward manifestation of the collective result of internal molecular disturbance, and possesses different properties, these four cases prove the existence of four distinct molecular movements and four corresponding directions of structure; and the phenomena altogether are of the most rigidly definite character.

As an electric current imparts a definite direction of molecular structure to bodies, and as the attractions and repulsions of electric wires are between the wires themselves and not between the currents, repulsion instead of attraction must be due to *difference of direction of structure* produced by difference of direction of the currents.

Although the Ampèrean theory has rendered immense service to magnetic science, and agrees admirably with all the phenomena of electro-magnetic attraction, repulsion, and motion, it is in some respects defective; it assumes that magnetism is due to innumerable little electric currents continually circulating in one uniform direction round the molecules of the iron; but there is no known instance of electric currents being maintained without the consumption of power, and in magnets there is no source of power; electric currents also generate heat, but a magnet is not a heated body.

If, however, we substitute the view that the phenomena of attraction and repulsion of magnets are due, not to continuously circulating electric currents, but (as in electric wires) to definite directions of molecular structure, such as is shown by the phenomena of electro-torsion to really exist in them, the theory becomes more perfect. It would also agree with the fact that iron and steel have the power of retaining both magnetism and the electro-torsional state after the currents or other causes producing them have ceased.

According to this view, a magnet, like a spring, is not a source of power, but only an arrangement for storing it up, the power being retained by some internal disposition of its particles acting like a "ratchet," and termed "coercive power." The fact that a magnet becomes warm when its variations of magnetism are great and rapidly repeated, does not contradict this view, because we know it has then, like any other conductor of electricity, electric currents induced in it, and these develop heat by conduction-resistance.

According also to this view any method which will produce the requisite direction of structure in a body will impart to it the capacity of being acted upon by a magnet; and any substance, ferruginous or not, which possesses that structure has that capacity; and in accordance with this we find that a crystal of cyanite (a silicate of alumina) possesses the property, whilst freely suspended, of pointing north and south by the directive influence of terrestrial magnetism, and one of stannite (oxide of tin) points east and west under the same conditions.

Geological Society, March 11.—John Evans, F.R.S., president, in the chair.—The following communications were read:—On the relationship existing between the *Echinothuridæ* Wyville Thomson and the *Perischoechinidæ* McCoy, by R. Etheridge, jun. In this paper the author referred in the first place to the peculiar characters of the genera *Calveria* and *Phormosoma* Wyville Thomson, and especially to those in which they approach the cretaceous genus *Echinothuria* S. P. Woodward, and which led Prof. Wyville Thomson to include these three forms in his group Echinothuridæ. He remarked that an overlapping of the interambulacral plates, more or less like that occurring in these three genera, is met with also in *Archæocidaris* McCoy, and *Lepidechinus* Hall, belonging to the group of palæozoic Echini which McCoy proposed to call Perischoechinidæ, and which is characterised by the presence of more than three rows of plates in the inter-ambulacral areas. As there is no overlapping of these plates in the other genera referred to this group, it includes two types of structure. The author then discussed the characters presented by the test in the genera of the Perischoechinidæ (namely, *Archæocidaris*, *Palæchinus Perischodomus*, *Lepidechinus*, *Eocidaris*, *Melonites*, and *Oligoporus*), and pointed out that although we have no conclusive evidence of the presence of membranous interspaces along with the overlapping plates in *Archæocidaris*, the fragmentary condition in which the remains of that form are usually found would lead us to infer their existence. No known palæozoic genus exhibits the want of distinction between the ambulacra and interambulacra on the ventral half of the test seen in the recent genus *Phormosoma*. In *Melonites* and *Oligoporus* the author described an increase in the number of rows of plates in the ambulacra, and he indicated that all the Perischoechinidæ differ from the later Echini by the increased number of perforations in the ocular and genital plates.—On the discovery of Foraminifera, &c., in the boulder-clays of Cheshire, by William Shone, jun. In this paper the author described the occurrence of Foraminifera, Entomostraca, and some other small organic bodies in the boulder-clay at Newton by Chester and at Dawpool. They were found partly in the interior of specimens of *Turritella terebra*, and partly free in the boulder-clay.—On the occurrence of a Tremadoc area near the Wrekin in South Shropshire, with description of a new fauna, by Charles Callaway. The author stated that in an exposure of light green, micaceous shales dipping south-east at 50° at Shineton near Cressage, which are represented as of Caradoc age in the Geological Survey Map, he found a series of trilobites and other fossils which induced him to regard these Shineton shales as belonging to the Lower Tremadoc series. He described as new species:—*Asaphus eos*, *Conocoryphe salteri*, *C. angulifrons*, *Platypeltis croftii*, *Conophrys salopiensis*, *Lichapyge cuspidata*, *Lingulella nicholsoni*, *Meloptoma sabrinæ*, and *Theca lineata*. The author regarded these shales as the equivalents of beds containing *Dictyonema*, found near Malvern and at Pedwardine.

Anthropological Institute, March 24.—Prof. George Busk, F.R.S, president, in the chair.—The President exhibited and described an Ashanti skull. The specimen, with other bones of the body, was taken by Surgeon-Major Gore from an outlying camp which had been deserted on the approach of the British troops. It presented the characteristics rather of a female than a male skull, but Mr. Gore affirmed that he had never heard of the Ashantis carrying about the bones of a woman. Women, in fact, held such an inferior position, that it could scarcely be believed that the Ashantis would take trouble in the preservation of their remains. If the skull exhibited belonged to a man, he could not have been a military leader, but he might have had

such a rank in his tribe as entitled him to the honours that were evidently bestowed on his remains. The paper gave full descriptions and detailed measurements.—A paper was read by Rev. Dunbar I. Heath, On the Origin and Development of the Mental Function in Man. He thought that in the ordinary view the mind is considered as a central essence. Around it is the brain, and still further on the outside the world surrounds the brain. It would conduce towards explaining the facts of mental function if we supposed a material film to coincide with the outside surface of the brain, which might be specialised under the name of Psychoplasm. To that film he would confine mental, as distinguished from cerebral, function; so that the mind would be imaged, not as being the centre, but between brain and world. The paper explained mental growth on that hypothesis.—Mr. W. L. Distant read a paper On the Mental Differences between the Sexes. The question discussed in the paper was—Is there clearly proved to be mental difference between the sexes, and is that difference one of kind or only of degree? Authorities were quoted to show the undoubted physical differences, such as weight of brain, form of skull, &c., also the now moderately well-established fact that in primitive races the hair of women approximates more closely to that of man than obtains in a higher state of civilisation. But it having been clearly proved that the advance of man is shown by a higher form of skull and increase of the cranial capacity, an attempt was made to show some of the conditions that had retarded woman in the mental struggle. The result seemed to prove that the mental divergences might be greatly accounted for—firstly, by sexual selection, difference of education, and force of custom; secondly, by physiological conditions; and that as the race progresses, the cranial capacity of the sexes, though not becoming identical, which is a physical impossibility, will yet become much less distinct and divergent, which is a moral certainty if based on moral conclusions.

Physical Society, March 21.—Dr. J. H. Gladstone, F.R.S., in the chair.—J. H. Fleming, read a paper On the new contact-theory of the Galvanic Cell. After discussing the most recent views regarding the contact and chemical theories, Mr. Fleming exhibited the action of his new battery in which metallic contact of dissimilar metals is completely avoided. The battery consisted of thirty test-tubes of dilute nitric acid alternating with the same number of tubes of sodium pentasulphide, all well insulated. Bent strips of alternate lead and copper connected the neighbouring tubes. By this device the terminal poles are of the same metal. On connecting with a coarse galvanometer, the needle was violently and permanently deflected. Tested by the quadrant electrometer the potential was shown to increase regularly with the number of cells. The sixty cells on first immersion showed an electromotive force exceeding that of Daniell's cells. The principle upon which the action depends is that in the acid lead is positive to copper; in the sulphide it is negative. Mr. Fleming further showed how by using the single fluid nitric acid and the single metal iron, a similar battery could be constructed, provided one-half of each iron strip was rendered passive. In this form also no metallic contacts occurred.—Prof. F. Guthrie illustrated by experiment the distribution of a current of electricity in passing from one pole to another across a conducting medium. This was shown in the case of solids by the stratification of iron filings in the sheets of tin-foil and lead. A current of electricity was passed between two points in a horizontal line lying on the surface of metal placed vertically in the magnetic meridian, and the distribution explored by means of a freely suspended magnet needle. As the needle was gradually lowered its direction of deflection was observed to change at a certain point from east to west. This point was ascertained by experiment to be at a distance below the horizontal line, in which the current entered and left the plate, equal to one-third of the interval between the poles. A similar effect was shown in a liquid conductor.—Prof. G. C. Foster, Dr. Wright, and Dr. Gladstone took part in the discussion of the communications.

Royal Horticultural Society, March 18.—Scientific Committee. Dr. Hooker, P.R.S., in the chair.—The Rev. M. J. Berkeley brought for exhibition Montagne's original drawings of *Artotrogus*. He pointed out that this was only the $\frac{1}{111}$ inch in diameter, while *Volutella*, with which Mr. W. G. Smith had supposed it might be identical, was from $\frac{1}{350}$ to $\frac{1}{100}$ inch in diameter. Montagne had also found a second species of *Artotrogus*, and of this he showed a drawing. He also remarked that a knowledge of the resting spore of *Peronospora infestans* was a great desideratum. It was to be hoped that, as 100*l.* had been presented to Prof. de Bary to investigate the whole subject, that that would be a matter on which he would throw some light.—Mr. Smee communicated a paper on a disease at present very destructive to *Daphne indica*. Numerous diseased plants were exhibited, and the opinion of the Committee was requested upon them. Prof. Westwood said that as the young leaves of the Daphne were entirely free from acari or the young larvæ of *Coccidæ* or *Aphidæ*, although the adjoining full-grown leaves were much diseased, he was not inclined to regard the disease as originating from the attacks of any of these insects, although it might be due to punctures of some flying species of *Capsidæ*, such as *Phytoxoris campestris*, which attacks the buds and young foliage of the common Chrysanthemum, flying from plant to plant.—Prof. Westwood adverted to the Tea Bug of Assam, which he believed to be identical in Upper India, Java, and Ceylon, and not a new species. The insects of Java were often identical with those of Assam, but he supposed that in this case the insect might have been conveyed from one to the other. Dr. Hooker said that this was very probable. The Ceylon tea-plant was the so-called "hybrid variety" introduced from Assam, and was probably sent from Ceylon to Java.—Prof. Thiselton Dyer exhibited a specimen of an Acacia with a curious white balaniform exudation of insect origin, from the Botanic Garden at Cape Town. Prof. Westwood stated that the insect upon the Acacia was quite new to him, and was closely allied to the *Cionops cataphractus*, a rather rare British insect, allied to the *Coccidæ*; the specimens were females, which had emitted a mass of waxy matter, striated in ridges; the waxen mass was in many places covered with minute larvæ, differing in form from the ordinary larvæ of the *Coccidæ*.

General Meeting.—Mr. H. Little in the chair.—The Rev. M. J. Berkeley called attention to pods ripened in the gardens of Mr. W. Terry, of *Vanilla aromatica* (it has fruited this year abundantly in the Victoria house at Kew); a charming specimen of *Aloe plicatilis*—a miniature tree in form, with fine flowering spikes—came from Mr. J. T. Peacock's collection.

Newcastle

Chemical Society, Feb. 26.—Dr. Lunge, president, in the chair.—A paper was read by Mr. J. Pattinson On the rate at which bleaching powder loses its available chlorine. The examination of a number of samples of bleaching powder, from time to time, during about twelve months, was undertaken with the view of making a contribution towards the solution of this question, "How much available chlorine does bleaching powder lose in a given time?" and also to the further one, "Does weak bleaching powder, say containing 32 per cent. of chlorine, retain its strength better than a stronger bleaching powder?" Three sets of samples were obtained from different manufactories on the Tyne, each set consisting of three samples. It was intended that the three samples of each set should be taken from the same portion of lime—one when it contained about 33 per cent. of available chlorine, one when it contained about 35 per cent., and the third when it contained about 37 per cent.—and with this object the lime was placed in a box in the chlorine chamber, so that it could be easily removed in order to take out the samples at each stage. On examining the tables given in the report it is seen that, with reference to the question as to the relative stability of weak and strong bleaching powder, there is practically no difference in the rate at which they lose available chlorine.

Glasgow

Society of Field Naturalists, March 20.—Annual Meeting.—Mr. J. Allan, vice-president, in the chair.—Mr. P. Cameron, jun., exhibited two sawflies new to Britain: *Blennocampa aterrima* Klug, taken by Dr. Buchanan White at Braemar; *Hoplocampa pectoralis* Thomson, taken by the Rev. T. A. Marshall, F.L.S., at St. Albans. The only recorded locality is Gothland, where it was captured for the first time by Prof. Boheman.—Mr. Cameron also exhibited the two new sawflies described by him in the last number of the *Entomologists' Monthly Magazine*: *Taxonus glottianus*, of which a single specimen was taken at Kenmuir Bank near Glasgow in May; and *Nematus graminis*, a not uncommon species in the district, the larva of which feeds on grasses. The Annual Reports of the Secretary and Treasurer having been read and adopted the Officers and Council for the ensuing year were elected.

Philadelphia

Academy of Natural Sciences, December 2, 1873.—Dr. Ruschenberger, president, in the chair.—Fertilisation of Yucac.

Mr. Thomas Meehan detailed at length the discoveries of Dr. Engelmann and Prof. Riley in regard to the fertilisation of the Yucca by the aid of a small night moth, *Pronuba yuccasella* of Riley, and observed that in this region the fertilisation was effected by this insect every year. In the Rocky Mountains of Colorado in 1871, he saw the *Yucca angustifolia* everywhere seeding in great abundance; but in his journey in 1873 he saw not a solitary seed-vessel in any of the plants, and he suggested that perhaps some periodical insect might take the place of the *Pronuba* in that country.—Note on a Fungoid Root Parasite. Mr. Thomas Meehan exhibited a small Norway spruce, in which the branches and leaves were all of a golden tint. He explained that when plants had little food, or lost their fibres in wet soil by which they could not make use of food, the yellow tint was generally exhibited in the leaves of plants. The similarity of the appearances suggesting, he examined and found the roots thickly enveloped by the mycelia of a fungus, which destroyed the young fibres as fast as they were developed. He had supposed it was one of the small microscopic forms of fungi; but in October of the present year the mycelia developed into a brown agaric with a pileus about two inches broad, but the exact species of which he could not positively determine.

Dec. 9.—Mr. Vaux, vice-president, in the chair.—On the Expansion of the Coma in *Asclepiadaceæ*. Mr. Thomas Meehan exhibited some seed-vessels of *Gonolobus obliquus*, and remarked that, though the hairy appendage to the seed known as the coma in asclepiadaceous plants was of course well understood, he knew of no one who had placed on record any observation in regard to the suddenness of the expansion after the seed left the capsule. It was indeed so very rapid, that the common expression of "like a stroke of lightning," was scarcely an exaggeration. It was only with difficulty that the eye could follow the motion. In the seed-vessel each set of long silky hair was drawn up into a close linear fascicle; but on the instant of the seed being relieved from its case, the coma expanded into a perfect hemisphere. Some of the hair formed a right angle, and others more or less acute ones, each seeming to have its fixed place to fall back to. It was generally supposed that these hairy appendages, and others of a similar character in seeds, were for the express purpose of aiding in seed distribution by wind; but he had failed in so many instances to see the advantages, that it often seemed as if it were the seed profiting by developed organs, rather than that these were especially formed for an express purpose. In the case of the *Gonolobus*, it did seem as if there were better grounds than perhaps in any other case for believing that the hairy appendage is designed expressly to facilitate distribution by wind or air currents. The seeds are heavy, and are borne on the plant but a few feet from the ground; they would fall there in a few seconds on the opening of the capsule, if the mass of hair remained long in its closely compact condition.—On Lingula in a Fish of the Susquehanna. Prof. Leidy.

PARIS

Academy of Sciences, March 23.—M. Bertrand in the chair.—The following communications were read:—Thermal study of the phenomena of solution; reaction of water upon nitric acid, by M. Berthelot. As the result of his investigations the author finds that the heat evolved by the addition of an equivalent of water to acids and bases generally decreases in accordance with a law analogous to a geometrical progression when the equivalents of water (n) increase in arithmetical progression. A formula is obained approaching $Q = \frac{A}{\rho^n}$ where the quantity of heat is Q and ρ, a number near unity. The author discussed the relationship between this formula and the analogous one obtained by M. Becquerel for the electromotive force of acid and alkaline solutions, viz., $= x \frac{a}{r^n}$.—On an operation of transfusion of blood performed by M. Béhier at the Hôtel Dieu: note by M. Bouley.—On the origin of the Muscado mace and of mace in general, by M. H. Baillon.—On the pathogenetic rôle of ferments in surgical maladies; new method of treatment for amputations: note by M. A. Guérin.—On the plane distribution of pressures in the interior of isotropic bodies in the state of limited equilibrium; mode of integration of the differential equations: note by M. J. Boussinesq.—On the law of astronomical attraction on the masses of the different bodies of the solar system, and particularly on the mass and duration of the sun, by M. E. Vicaire. The author seems to think it far from being demonstrated that the number called the *mass* of the sun is a real measure of the quantity of matter contained in it.—Programme of a system of geography founded on the exclusive use of decimal measures, of an international meridian 0°, and of stereoscopic and gnomonic projections, by M. B. de Chancourtois.—On the refraction of compressed water, note by M. Mascart.—Reply to the critical observations of M. H. Sainte-Claire Deville, on a method for the determination of vapour densities, by M. Croullebois. The author attempted to defend the apparatus, of which a description had previously been communicated to the Academy.—On the compounds of hydrogen with the alkaline metals, by MM. L. Troost and P. Hautefeuille. The authors have obtained compounds of potassium and sodium with hydrogen, having the formulæ K_2H and Na_2H, and have studied the tensions at every 10° of the hydrogen evolved on heating these compounds from 330° to 430°. K_2H dissolves a further quantity of hydrogen; Na_2H dissolves only a very small quantity of this gas. The authors find that lithium heated to 500° in hydrogen gas at 760 mm. pressure absorbs seventeen times its volume of the gas, while thallium under the same conditions absorbs only three times its volume.—On some bronzes from China and Japan, by M. H. Morin.—On the exotic terrestrial lombricians of the genera Urocheta and Pericheta, by M. E. Perrier.—On some general facts which arise from comparative androgenesis, by M. A. Chatin.—Atmospheric dusts, by M. G. Tissandier. The author has determined the suspended matter in the air of Paris and made analyses of atmospheric dust.—Researches on the formation of superphosphate of lime, by M. J. Kolb.—On the systems of curve-planes, algebraical or transcendental, defined by two characteristics, by M. Fouret.—Explicit condition that a conic may have a fifth-order contact with a given curve, by M. Painvin.—Two new theorems on the wave surface, by M. A. Mannheim.—On a Greek sundial found by M. O. Rayet at Heracleum of Latmos.—On the magnetisation of steel, by M. E. Bouty.—Calorific effects of magnetism in an electro-magnet with several poles, by M. A. Cazin.—Researches on trichloracetates and their derivatives, by M. A. Clermont. The author has obtained trichloracetyl-urea, by acting upon trichloracetateof ureawith p hosphoric anhydride, and also by the action of trichloracetyl chloride upon urea. The same substance was obtained by this last reaction by Tommasi and Meldola in this country in January.—On some endosmotic properties of the membrane of the shell of birds' eggs, by M. U. Gayon.—On the red colouring-matter of the blood, by M. Béchamp.—On the employment of potassium bisulphate for the distinction of native sulphides, by M. E. Jannettaz.—Observations on the spermatophores of decapod crustacea, by M. Brocchi.—Differentiation of induced and spontaneous movements.—Study of the action of some reputed anæsthetic agents on the functional irritability of the stamens in *Mahonia*, by M. E. Haeckel.—Experimental study upon "ammoniémie," by MM. V. Feltz and E. Ritter.

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