savage marauders and pirates, the South Illyrians, four centuries B.C., had been thoroughly amalgamated with the Macedonian and Epirote nations, adopting the pre-Hellenic form of speech of those peoples, which still lingers in the spoken tongue of the modern Albanians. After the incursions of Finns and Slavs into the Balkan and Danube territories, in the sixth and seventh centuries, the remnant of Illyrian and other primitive races that escaped extermination were comprised under the general name of Albanians; and Dr. Zampa believes that in the mountainous districts of Scutari we find the purest representatives of the ancient Albanian race. In this region, therefore, he has sought the data necessary for the elaboration of the comparative anthropological researches of the ethnic relations and differences existing between the Italian and other branches of the Albanian peoples. The author gives at length the results of his measurements of several series of crania obtained in Dalmatia, comparing them with those taken from living subjects; and although it cannot be said that his researches decide the question whence the Albanian Italians derive their origin, they throw important light on the early history of the primitive races of the Balkan Peninsula, and on their gradual amalgamation with the numerous invaders and alien settlers who, in the course of ages, have occupied the lands of the ancient Illyrians.—On trephining, as practised in Montenegro, by M. Védrènes. The question of prehistoric trepanning, which first excited attention about ten years ago, has led to the consideration of the hitherto almost unnoticed fact that cranial trephining has been practised in Europe from the most remote ages to the present day. Indeed, according to M. Védrènes, the operation is also of frequent occurrence among the natives of Aurès, in Algiers, where it is held in high esteem as being both safe and beneficial. Here it is generally used to arrest the acute pains which are frequently experienced after severe injuries to the head; a portion of bone, about a centimetre in diameter, being cut out to admit of the introduction of a sponge for the removal of extravasated blood. A precisely similar operation is common in Montenegro, where, as at Aurès, it is performed by the members of certain families, amongst whom the profession of trephining has flourished for ages, and been respected as an hereditary distinction transmissible from father to son. The author draws attention to the curious circumstance that the practice of trephining and implicit faith in its efficacy have kept their ground, not merely in the semi-barbarous populations of Algiers and the Balkan mountain districts, but even among the miners of Cornwall, who have continued, to our own times, to regard this operation as the only adequate mode of treatment in various injuries to the head.—Contribution to the history of anomalies of the muscles, by M. Ledouble. The author considers that, while the pyramidalis abdomilis, peroneus, palmaris, plantaris, and psoas parvus are more usually absent than any of the other muscles, the last-named is so frequently missing, that some writers have even assumed that its presence was abnormal. It is more frequent in women than in men; but for this peculiarity, as well as for the variations observable in the mode of insertion of psoas magnus and parvus, the author does not attempt to offer any explanation; his paper giving simply the result of his own observations of muscular anomalies in the lower animals, as well as in man.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, November 25.—"On Jacobi's Figure of Equilibrium for a Rotating Mass of Fluid." By G. H. Darwin, M.A., LL.D., F.R.S., Fellow of Trinity College, and Plumian Professor in the University of Cambridge.

Jacobi was the first to prove that a mass of fluid in the form of an ellipsoid, with three unequal axes, is in equilibrium when rotating about the smallest of the three axes. The determination of the axes in terms of the angular velocity of the system has hitherto been left in an analytical form, not well adapted for numerical calculation. In the present paper the formulæ are brought into a shape involving elliptic integrals, and, by the aid of Legendre's tables, a table of solutions is calculated.

If σ be the density of the fluid, ω the angular velocity, and $\frac{4}{3}\pi\sigma$ the mass, then, when $\omega^2/4\pi\sigma = 0.09356$, the Jacobian ellipsoid is a revolutional figure with axes 1·1972, 1·1972, 0·6977. For smaller values of the angular velocity the first axis increases and the two latter diminish. For example, when $\omega^2/4\pi\sigma = 0.07047$, the axes are 1·899, 0·811, 0·694.

When the angular velocity is infinitely slow, the ellipsoid becomes infinitely long and thin, and tends to assume a figure of revolution about its greatest axis.

Although the angular velocity diminishes as the length of the ellipsoid increases, yet the moment of momentum continually increases, and becomes infinitely great when the ellipsoid is infinitely long.

The kinetic energy at first increases with the length, attains a maximum, and then diminishes, so that when the ellipsoid is infinitely long it vanishes.

The intrinsic energy, however, always increases, so that the total energy of the system has no maximum, and continually increases with the length of the ellipsoid.

Approximate formulæ are given, which assume a very succinct form when the ellipsoids are long.

December 9.—"A New Method for the Quantitative Estimation of the Micro-organisms present in the Atmosphere." By Percy F. Frankland, Ph.D., B.Sc. (Lond.), F.C.S., F.I.C., Assoc. Roy. Sch. of Mines.

The author commences by describing some of the more important methods which have been elaborated for the bacterioscopic examination of air. In these he includes the experiments of Pasteur, Tyndall, Freudenreich and Miquel, Koch, and Hesse. After pointing out the several advantages and disadvantages which attend these processes, he describes a new method which he has devised, in which he has endeavoured to overcome some of the objections to which the others are open. The following is a brief description of the author's method:—

A known volume of air is aspirated through a glass tube containing two sterile plugs, consisting either of glass-wool alone, glass-wool and fine glass-powder, glass-wool coated with sugar, or sugared glass-wool and fine sugar-powder. The plugs are so arranged that the first one through which the air is drawn is more pervious than the second. After a given volume of air has been aspirated, the two plugs are transferred respectively to two flasks, each containing melted sterile gelatine-peptone, which are then plugged with sterile cotton-wool stoppers. The plug is then carefully agitated with the gelatine until it has become completely disintegrated, care being taken to avoid any frothing of the gelatine; and the latter is then slowly congealed so as to form an even film over the interior surface of the flask.

On incubating these flasks at a temperature of 22° C., in the course of from four to five days the colonies derived from the organisms contained in the plugs make their appearance, and can be readily counted and further examined. A very large number of experiments are recorded which were made to test the accuracy of the "flask-method." For this purpose experiments were made, in which sometimes single, and sometimes double plugs were employed, and it was almost invariably found that all the organisms were deposited on the first plug; the second plug, in the very exceptional cases when it did yield anything, rarely gave rise to more than a single colony.

It was also found that, whereas in out-of-door experiments a *blank* Hesse-tube, exposed side by side with the one through which air was being aspirated, contained a number of organisms,—thus creating an important source of error in the quantitative results obtained by Hesse's method,—in the "flask-method" such blank tubes rarely contained any organisms; and even when such was the case, but a very small proportion of those present in the actual tube.

This shows that, whereas in Hesse's apparatus any disturbance of the air during the experiment vitiates the accuracy of the result, in the "flask-method" no such effect is produced.

On the other hand, in the absence of aërial currents, the blank Hesse-tube contained only a few organisms, and a remarkable uniformity was found in the results obtained by Hesse's method and that of the author. This is important, not only as showing the quantitative accuracy of the "flask-method," but in clearly demonstrating that the organisms present in the air exist in an *isolated* condition, and not in aggregates, as suggested by Hesse, for it will be remembered that the plug is violently agitated with the gelatine-peptone in the flask, during which operation such aggregates would undoubtedly be broken up wholly or at least partially. It would therefore be reasonable to expect that the "flask-method" would yield a larger number, and possibly a far larger number, of colonies than found in Hesse's tubes; but since, on the contrary, the numbers agreed under the circumstances described in so striking a manner, it is shown convincingly that they exist in an isolated condition.

The paper is illustrated by photographs and drawings.

Of the numerous experiments recorded in the paper, the following series made at St. Paul's may be specially referred to, both as illustrating the quantitative accuracy of the process, as well as showing how it may be employed in ascertaining the distribution of micro-organisms in the atmosphere :—

November 19, 1886		Number of micro-organisms found in 10 litres of air
St. Paul's Churchyard		47
Stone Gallery	No. 1	40
	No. 2	35
Golden Gallery	No. 1	10
	No. 2	11
	No. 3	11

The following are the principal advantages which the author claims for the "flask-method" :—

(1) The process possesses all the well-known advantages attaching to the use of a solid cultivating medium.

(2) The results, as tested by the comparison of parallel experiments, can lay claim to a high degree of quantitative accuracy.

(3) The results, as tested by control experiments, are not appreciably affected by aërial currents, which prove such a disturbing factor in the results obtained by some other methods.

(4) The collection of an adequate sample of air occupies a very short space of time, so that a much larger volume of air can be conveniently operated upon than is the case with Hesse's method. Thus, whilst the aspiration of 10 litres of air through Hesse's apparatus takes about three-quarters of an hour, by the new method about 48 litres can be drawn through the tube in the same time ; whilst a better plan is to take two tubes and alternately draw a definite volume of air through each, as by this means duplicate results are obtained.

(5) As the whole plug upon which the organisms from a given volume of air are deposited is submitted to cultivation without subdivision, no error is introduced through the multiplication of results obtained from aliquot parts, and all the great difficulties attending equal subdivision are avoided.

(6) The risk of aërial contamination in the process of *flask-cultivation* is practically *nil*.

(7) The apparatus required being very simple and highly portable, the method is admirably adapted for the performance of experiments at a distance from home, and in the absence of special laboratory appliances.

"Further Experiments on the Distribution of Micro-organisms in Air (by Hesse's method)." By Percy F. Frankland, Ph.D., B.Sc., F.C.S., F.I.C., and T. G. Hart, A.R.S.M.

The authors record a number of experiments, made with Hesse's apparatus, on the prevalence of micro-organisms in the atmosphere. The results are intended to form a supplement to those already obtained by one of the authors, and published in the last number of the Society's *Proceedings*. The greater number of the experiments have been performed on the roof of the Science Schools, South Kensington, the air of which has now been under observation at frequent intervals during the present year. The authors point out the variations, according to season, which have taken place in the number of micro-organisms present in the air collected in the above place. The average results obtained were as follows :—

1886	Average number of micro-organisms found in 10 litres of air by Hesse's method
January	4
March	26
May	31
June	54
July	63
August	105
September	43
October	35

Experiments are also recorded showing the enormous increase in the number of micro-organisms present in the air of rooms consequent on crowding. In illustration of this point the authors cite a series of experiments made in the library of the Royal Society during the evening of the *conversazione* in June last, when the following results were obtained :—

Royal Society's Library	Number of micro-organisms found in 10 litres of air
June 9, 1886, 9.20 p.m.	326
,, 10.5 ,,	432
June 10, 1886, 10.15 a.m.	130

In addition to determining the number of organisms present in a given volume of air, the authors have also, in each case, roughly estimated the number falling on a given horizontal surface by exposing dishes filled with nutrient gelatine and of known superficial area, as in the experiments previously published.

Society of Antiquaries, December 9.—Dr. John Evans, President, in the chair.—Mr. J. Allen Brown, F.G.S., F.R.G.S., read a paper on his discovery of a Palæolithic workshop floor of the Drift period near Ealing. He pointed out that the discovery of this Palæolithic working site fully confirmed his previous observations of the higher river-drift deposits in North-West Middlesex, *i.e.* that such old floors or former land surfaces are often discernible therein, and that such habitable spots have been preserved in different parts of the Thames Valley, though they have frequently been disturbed, removed, and re-deposited in other places by the changing course and curves of the wider river of the past, and by floods and other conditions of the severer climate which then prevailed. This Palæolithic workshop floor, which is about 100 feet above the present bed of the Thames, and about two miles distant from it, is situated near the junction between the Creffield Road and Mason's Green Road, Acton ; the floor is here about 6 feet from the surface, with a steeper slope to the river than the present surface ; it is covered to this extent with sand, brick earth, and trail deposits. At this site, on an area of about 40 feet square, were found nearly 600 unabraded worked flints, including long spear or javelin heads from 5 to 6 inches long, neatly trimmed to a point, and of the same form as those of obsidian, &c., now employed by the natives of New Caledonia, the Admiralty Islands, and Australia, for insertion into the shafts of their spears, to which they were fixed by lashings, &c. There were also shorter ones, not only wrought along the sides to the point where the flake required trimming, but also neatly chipped at the butts into rough rudimentary tangs. Such spear-heads have not only been described by Messrs. Lartet and Christy from the cave of Le Moustier, in the Dordogne, but have been met with in the alluvial deposits of the Somme at Abbeville, the Seine, and other French rivers, as well as by Dr. J. Evans, from Mildenhall, &c. Roughly wrought hatchets, axes, or choppers formed from flakes chipped on one or both faces to a cutting edge were also found rather abundantly on the floor. They are probably some of the earliest rude celt forms, and have been found also in other gravel deposits of the district. At the Creffield Road site they were discovered both finished and unfinished, and correspond with similar tools described by Dr. Evans from the high-level deposits at High Lodge, Mildenhall, Santon Downham, and Fisherton, near Salisbury, &c., as well as in the high-level Quaternary drift at Sauvigny (Loire) described by Dr. H. Jacquinot, and in the deposits of Le Moustier (Dordogne), &c. Some of the specimens exhibited were worked on both faces and pointed, thus approaching the Saint Acheul types, which M. G. de Mortillet considers as belonging to the earliest drift series, that of the Chelléen epoch ; they have also been described from other places in North-West Middlesex, as well as by Prof. Boyd-Dawkins from Wookey Hole, and by Dr. Evans from Biddenham, Bedford, Thetford, &c. Among the most interesting implements exhibited were borers, awls, or drills, some being large enough for boring wood ; while others were sufficiently small for piercing bone needles, and also flints with neatly chipped symmetrical depressions, which it is believed were used as shaft-smoothers, or spokeshaves, like those lately exhibited in Mr. Dunn's collection of Bushman and Hottentot stone implements at the Colonial and Indian Exhibition. Large numbers of knives formed from flakes, often neatly worked on the edge with fine secondary work, and also saws chipped with a distinctly serrated edge, were exhibited from this site, with other tools apparently intended to be used as chisels, &c. Large numbers of waste flakes, as well as blocks of flint which had been worked upon, were also found at this spot ; and in Ealing, about two miles distant, in a deposit of about the same age, a large boulder of metamorphic rock, concave on both faces and roughened and scored in the hollows from use, was met with ; it is 7½ inches long : and a quartzite boulder which fits the hollows was found near it, in fine gravel. They are the first pounding-stones discovered in the drift deposits. The author—after describing the various typical forms of the flint implements from the river-drift deposits of Ealing, Acton, Hanwell, Dawley, &c., in his large collection, and their respective ages, as educed from the position or level at which they have been found, as well as their condition,

whether abraded or unrolled, with other surface features of the specimens—showed that the flint implements from the Thames Valley may be divided into three groups, decreasing in age from the highest beds of drift to those lower in the valley as the process of erosion and part infilling of the valley continued. The implements and flakes found at the Creffield Road working site, which are as sharp and unabraded as on the day they were struck from the cores, were compared both as to their forms and associated Quaternary fauna with those from the upper drift of England and France. When considered in reference to M. G. de Mortillet's classification of four divisions—*i.e.* the Chelléen or Acheuléen, with which remains of the older Quaternary fauna, such as *E. antiquus*, *Rhinoceros hemitœchus*, hippopotamus, large cave-bear, &c., are associated; the Moustierien characterised by lance-heads, chopping-tools, &c., formed, from flakes, with the later Quaternary fauna, such as the *E. primigenius*, *Rhinoceros tichorhinus*, reindeer, &c.; and the less ancient divisions of the Solutréen and Magdalénien—Mr. Allen Brown showed, from the discovery of *Rhinoceros hemitœchus*, of hippopotamus, and an older form of deer, &c. (though at the mid-terrace stage of the erosion of the valley), by Colonel Lane-Fox and others, that the fabricators of the human relics discovered at the workshop site at Creffield Road lived contemporaneously with some of the older Quaternary fauna, and that they may therefore be considered as older than the epoch Moustierien, and may perhaps belong to the Chelléen period; but it is evident most of them were intended for mounting in handles or shafts, as such implements are hafted now by Australians and others, and not as "the *coups de poings*," or fist-strikers, of M. de Mortillet; and that, since they were made, the vast mass of matter represented now by the space between the 100-foot contour and the present bed of the Thames, two miles away, has been eroded. A large collection of objects from the workshop floor were exhibited, and many other flint implements from North-West Middlesex, illustrating the author's classification.

Geological Society, December 1.—Prof. J. W. Judd F.R.S., President, in the chair.—Henry Howe Arnold-Bemrose, Richard Assheton, Francis Arthur Bather, Rev. Joseph Campbell, John Wesley Carr, Thomas J. G. Fleming, Thomas Forster, Edmund Johnstone Garwood, George Samuel Griffiths, Dr. Frederick Henry Hatch, Robert Tuthill Litton, Frederick William Martin, Richard D. Oldham, Forbes Rickard, Albert Charles Seward, Herbert William Vinter, and Charles D. Walcott were elected Fellows of the Society.—The President announced that he had received from Prof. Ulrich, of Dunedin, New Zealand, the announcement of a very interesting discovery which he had recently made. In the interior of the South Island of New Zealand there exists a range of mountains, composed of olivine-enstatite rocks, in places converted into serpentine. The sand of the rivers flowing from these rocks contains metallic particles, which, on analysis, prove to be an alloy of nickel and iron in the proportion of two atoms of the former metal to one of the latter. Similar particles have also been detected in the serpentines. This alloy, though new as a native terrestrial product, is identical with the substance of the Octibeha meteorite, which has been called octibehite. Prof. Ulrich has announced his intention of communicating to the Society a paper dealing with the details of this interesting discovery—which is certainly one of the most interesting that has been made since the recognition of the terrestrial origin of the Ovifak irons.—The following communications were read:—On a new genus of Madreporaria—*Glyphastræa*, with remarks on the *Glyphastræa forbesi*, Edw. and H., sp., from the Tertiaries of Maryland, U.S., by Prof. P. Martin Duncan, M.B., F.R.S.—On the metamorphic rocks of the Malvern Hills, part 1, by Frank Rutley, F.G.S., Lecturer on Mineralogy in the Royal School of Mines. Part 1 is the result of conclusions arrived at in the field; part 2 will be devoted to a microscopic description of the rocks. The author referred especially to the paper by the late Dr. Holl, whose work he, in the main, confirmed. Dr. Holl's object was to demonstrate that the rocks which had hitherto been treated as syenite, and supposed to form the axis of the hills, were in reality of metamorphic origin, and belonged to the pre-Cambrian. Mr. Rutley restricted his observations to the old ridge of gneissic syenite, granite, &c., which constitutes the main portion of the range, and, reversing the order of his predecessor, commenced at the north end of the chain. He considers that the beds of crystalline rock, mostly of a gneissic character, in the old ridge have been disposed in a synclinal flexure, which stretched from the north end of the chain to the middle of Swinyard's Hill, where they receive an anticlinal flexure, and are faulted out of sight. The length of this synclinal fold would be over 5½ miles. The lithological evidence is in favour of the rocks forming the north part of Swinyard's Hill being a repetition of those on the Worcestershire Beacon. We might expect to find the older beds having the coarsest granulation, and being even devoid of foliation, and this is what occurs on the Malverns, where the northern hills are made up of the coarsest rocks, with finer schistose beds towards the south; the exception is at Swinyard's Hill; hence there are two groups of coarsely crystalline rocks at either extremity of the presumed synclinal. The contrast between these and the fine-grained rocks of the other portions of the range has already attracted attention. The most northern of the coarse-grained masses is cut off towards the south by a fault near the Wych, while the other lies between a fault on the north side of the Herefordshire Beacon and the before-mentioned fault on Swinyard's Hill. The metamorphic rocks of the Malverns seem, therefore, to be divisible into three series, extending from the North Hill to Key's End; a Lower, of coarsely crystalline gneissic rocks, granite, syenite, &c.; a Middle, of gneissic, granitic, and syenitic rocks of medium and fine texture; and an Upper, of mica-schist, finely crystalline gneiss, &c. A diagrammatic section shows the distribution of these: the northern block, extending as far as the Wych, consists of the Lower and the lower part of the Middle; the central block, from the Wych to the fault in Swinyard's Hill, consists chiefly of the Lower and upper Middle, but with a portion of the Lower at the south end; the southern block, south of the fault on Swinyard's Hill, consists wholly of the Upper series. How far the foliation of these rocks and their main divisional planes represent original stratification must, the author thought, remain an open question. It has been held that the strike of foliation lies parallel to the axes of elevation; but this is far from being the case in the Malverns. Still a once uniform strike may have been dislocated by repeated faulting. The author further discussed the general question of how far foliation may or may not coincide with planes of sedimentation. He admitted that the absolute conversion of one rock into another by a process of shearing has been shown to occur, but doubted its application in this case. Although he is inclined to believe that the divisional planes, with which the foliation appears to be parallel, may be planes of original stratification, yet, as a matter of fact, they are nothing more than *structural planes of some sort*, between which the rocks exhibit divers lithological characters.—On fossil chilostomatous Bryozoa from New Zealand, by Arthur Wm. Waters, F.G.S. The fossil Bryozoa described in the present paper are from the localities of Petane, Waipukurau, Wanganui, and some simply designated as from the neighbourhood of Napier. The first three represent deposits of a well-known position, which was considered Miocene by Tenison-Woods, but which Prof. Hutton (*Quart. Journ. Geol. Soc.*, vol. xli.) has more recently called Pliocene. Some others, sent over as from "Whakati," are thought to be from Waikato. The genus *Membranipora*, which is largely represented from near Napier, is not one of the most useful palæontologically, because the shape of the opesial opening only, and not the oral, is preserved, and also the appearance of the zoœcia is often remarkably modified by the ovicells, which, however, are frequently wanting, and in many well-known species have never been found. The author pointed out that in the commoner and best-known species of Bryozoa the amount of variation is recognised as being very great, and considered that in the face of this there is too great a tendency to make new species on slight differences which may be local variations, and that even in some cases, instead of the description referring to a species, it may be that only a specimen has been described. A list of New Zealand Bryozoa has been drawn up by Prof. Hutton, and our knowledge of the New Zealand and Australian Bryozoa is being constantly increased by MacGillivray, Hincks, and others; nevertheless, enough is not yet known to fix the exact age by means of the Bryozoa alone, but the large number of species entirely identical with those living in the neighbouring seas, and the general character of the others, show that the deposits must certainly be considered as of comparatively recent date. Out of the seventy-eight species or varieties, sixty-one are known living, twenty-nine of these from New Zealand seas, forty-eight from either New Zealand or Australian waters, and twenty-eight have been found fossil in Australia. Judging from these alone, it would

seem that some authors have assigned too remote an age to the deposits. The new forms described were:—*Membranipora occultata*; *Monoporella capensis*, var. *dentata*, *M. waipukurensis*; *Micropora variperforata*; *Mucronella tricuspis*, vars. *waipukurensis* and *minima*, *M. firmata*; *Porina grandipora*; *Lepralia semiluna*, var. *simplex*, *L. bistata*; *Schizoporella cinctipora*, var. *personata*, *S. tuberosa*, var. *angustata*; *Cellepora decepta*, *Cellepora* sp.

Royal Microscopical Society, November 10.—Rev. Dr. Dallinger, F.R.S., President, in the chair.—A microscope, with case of apparatus and a cabinet of objects, bequeathed to the Society by the late Miss Tucker, was laid on the table.—Amongst the exhibits was a microscope for examining minute aquatic organisms under very high pressures; Leeuwenhoek's microscopes; objectives made of the new glass by Zeiss and by Powell, which were very highly spoken of by the President and others; and some gold-plated diatoms.—Mr. S. O. Ridley read a paper on the classification and spiculation of the monaxonid sponges of the *Challenger* Expedition; drawings and specimens illustrative of the various typical forms were shown.—Mr. A. Dendy also read a paper on the anatomy and histology of the monaxonid sponges of the *Challenger* Expedition, the subject being illustrated by drawings and specimens.—Dr. Crookshank read a paper on flagellated Protozoa in the blood of diseased and apparently healthy animals. He described a disease known in India as "Surra," occurring among horses, mules, and camels. A parasite was discovered in the blood of these by Dr. Evans, and was referred to Dr. Lewis for an opinion as to its nature, who concluded that it was not identical with, but closely allied to, the flagellated organisms which he had observed in Indian rats. Five years later an outbreak of the same disease occurred in British Burmah, and the report of an investigation was published by Veterinary Surgeon Steel, who observed the same parasite, but regarded it as closely allied to the Spirillum of relapsing fever in man, and named it *Spirochæta evansi*. This opinion was not accepted by Dr. Evans, who placed blood, stained preparations, and material for section cutting, in Dr. Crookshank's hands for further opinion. Dr. Crookshank at once dispelled the idea of the parasite being a Spirillum, and gave a full account of his observations. These had led him to discover an anterior flagellum, a longitudinally-attached undulating membrane, and a posterior, acutely-pointed, rigid filament, from which characters he recognised that the parasite was a flagellated monad, probably absolutely identical with the parasite discovered by Mitrophanow in the blood of the carp, and named by him *Hæmatomonas carassii*. Dr. Crookshank consequently observed that the Surra parasite should rather be called *Hæmatomonas evansi* than *Spirochæta* as suggested by Steel. Lewis's observation with regard to the flagellated organisms in Indian rats led Dr. Crookshank to investigate the species obtainable in England, which resulted in his discovering flagellate parasites in 25 per cent. of apparently healthy rats from the London sewers. These organisms proved to be morphologically identical with the Surra parasite and the parasite described by Mitrophanow in the blood of the carp, and were also recognised by a photo-micrograph made by Lewis to be identical with the organism observed by him in Indian rats, though Lewis's description and figures presented material differences.

Entomological Society, December 1.—Robert McLachlan, F.R.S., President, in the chair.—Messrs. W. H. Miskin, R.E. Salwey, and F. W. Biddle, M.A., were elected Fellows.—Mr. Howard Vaughan exhibited a long series of *Gnophos obscurata*, comprising specimens from various parts of Ireland, North Wales, Yorkshire, Berwick-on-Tweed, the New Forest, Folkestone, Lewes, and the Surrey Hills. The object of the exhibition was to show the variation of the species in connection with the geological formations of the various localities from which the specimens were obtained.—Dr. Sharp showed a series of drawings of New Zealand Coleoptera, by Freiherr von Schlereth, which, though executed in pencil, were remarkable for their delicacy and accuracy.—Mr. R. Adkin exhibited specimens of *Cidaria reticulata*, recently bred by Mr. H. Murray, of Carnforth, from larvæ collected near Windermere, on *Impatiens noli-me-tangere*. Mr. Adkin said that, as the food-plant was extremely local, Mr. Murray had endeavoured to get the larvæ to feed on some other species of balsam, including the large garden species usually known as Canadian balsam, but that he had not succeeded in doing so.—Mr. Billups exhibited a number of living specimens of *Aleurodes vaporariorum*, obtained from a greenhouse at Snaresbrook, where they had caused great havoc amongst tomato-plants (*Lycopersicum esculentum*). He remarked that the species had been first figured and described by Prof. Westwood in the *Gardener's Chronicle*, 1856.—Mr. Poulton exhibited the blood of a larva of *Smerinthus tiliæ*, and demonstrated, by means of a micro-spectroscope, the existence of chlorophyll therein.—Mr. G. T. Porritt exhibited forms of *Cidaria suffumata* from Huddersfield, and a series of small bilberry-fed *Hypsipetes elutata* from the Yorkshire moors, showing green, red-brown, and black forms.—Mr. S. Stevens exhibited forms of *Camptogramma bilineata* and *Emmelesia albulata* from the Shetland Isles, and a variety of *Chelonia caja* from Norwich.—Mr. H. Goss read a letter from the Administrator-General of British Guiana, on the subject of the urticating properties possessed by the larvæ and pupæ of certain species of Lepidoptera collected in Demerara.—Mr. McLachlan read a note concerning certain *Nemopteridæ*.—Miss E. A. Ormerod communicated a paper on the occurrence of the Hessian Fly (*Cecidomyia destructor*) in Great Britain. It appeared from this paper that there could be no longer any doubt as to the occurrence of the insect in this country, specimens obtained in Hertfordshire having been submitted to, and identified by, Prof. Westwood, and by Mr. W. Saunders, of Ontario. Prof. Westwood said the specimens agreed exactly with Austrian specimens in his possession, sent to him some years ago by M. Léfèvre, who had received them from the late Dr. Hammerschmidt, of Vienna. A discussion followed, in which the President, Mr. C. O. Waterhouse, Mr. Theodore Wood, and others took part.

Victoria (Philosophical) Institute, December 6.—A paper was read by the Rev. S. D. Peet on the religious beliefs and traditions of the aborigines of North America, which was followed by a discussion.

EDINBURGH

Royal Society, December 6.—Mr. J. Murray, Ph.D., in the chair.—The chairman gave an opening address. Among other points, he referred to the almost total absence of recognition by Government of scientific research in Scotland. The Ben Nevis Observatory, for example, instead of receiving support from Government, is, on the contrary, a source of considerable revenue to it.—The Hon. Lord Maclaren communicated astronomical tables for facilitating the computation of differential refraction for latitudes 56° and 57° 30′.—Prof. Tait communicated the second part of his paper on the foundations of the kinetic theory of gases. In this part he treats of gaseous viscosity, and conduction and diffusion of heat in gases. In his investigations he takes account of the fact that the mean free path of swift-moving particles is greater than that of slow-moving particles. This point has been wrongly introduced by all previous investigators.—Mr. R. T. Omond communicated an account of a fog-bow observed on Ben Nevis, October 22, 1886. He communicated also an account of experiments on the temperature at different heights above ground at Ben Nevis Observatory. He hopes to repeat them under more favourable atmospheric conditions, and also when the ground is covered with snow.

Mathematical Society, December 10.—Mr. George Thom, President, in the chair.—Mr. R. E. Allardice read a paper on the equiangular and the equilateral polygon; and Mr. J. S. Mackay communicated a solution and discussion, by M. Paul Aubert, of a geometrical problem.

PARIS

Academy of Sciences, December 13.—M. Jurien de la Gravière, President, in the chair.—Glycose, glycogen, and glycogeny in connection with the production of heat and mechanical force in the animal economy, by M. A. Chauveau. In this third and last contribution on the subject, an attempt is made to determine absolutely the extent to which the combustion of glycose co-operates in the development of animal heat and energy. The part played by the liver in these phenomena is specially studied, and it is shown generally that the glycose supplied by the liver to the blood constitutes the principal aliment of organic combustions, whence are derived animal heat and muscular energy.—Note on an epidemic of typhoid fever which prevailed at Pierrefonds during last August and September, by M. P. Brouardel. This outbreak is clearly traced to the polluted sources whence was derived the water consumed by the inhabitants of the Pierrefonds district.—On the formation of Bilobites during the present epoch, by M. Ed. Bureau. In order to

determine the true character of the doubtful fossil organisms still by many naturalists classed with the Algæ, the author has carefully studied the traces of all kinds observed especially at points on the coast of Brittany, where extensive tracts are exposed at low water. Impressions have been taken of marks due to animals, yet exactly resembling the forms occurring in Secondary and even Primary formations often described and figured as belonging to the vegetable kingdom.—On the means of reducing momentary accelerations of velocity in machines fitted with regulating gear acting indirectly, by MM. A. Bérard and H. Léauté. The object of this memoir is to supply trustworthy governors, applicable especially to machinery used in the manufacture of gunpowder. For the apparatus here described, it is claimed that, while giving the required uniformity of action, it checks all abnormal increase of speed, so dangerous in this industry.—Observations of Finlay's comet (1886), made at the 0·38 m. equatorial of the Bordeaux Observatory, by M. F. Courty. The tabulated results of these observations include the mean position of the stars taken as points of comparison borrowed from Schœnfeld's Catalogue, published in the eighth volume of the "Bonn Observations," 1886.—A practical demonstration of the existence of diurnal nutation, by M. Folie. The remarkable agreement of the results here recorded, deduced from observations made at various points of latitude and longitude, is considered sufficient to prove the existence of the diurnal nutation of the terrestrial axis, and to determine its constant at about 0·2″.—On certain problems of isochronism, by M. G. Fouret.—On a theorem relating to the permanent movement and flow of fluids, by M. Hugoniot. The curious relation which is shown to exist between the permanent movement of fluids and that of the propagation of sound is here investigated.—On the coefficient of explosion for a perfect gas, by M. Félix Lucas. Various arguments are advanced to show that this coefficient is 1·40, not 1·41, the number generally adopted. — On the coefficient of pressure for thermometers, and on the compressibility of liquids, by M. Ch. Ed. Guillaume. The probable coefficient resulting from M. Descamps' experiments is shown to approximate very closely to that of Regnault, and the coefficients of compressibility must be corrected accordingly.—On the nature of electric actions in an insulating medium, by M. A. Vaschy. Assuming that the reciprocal actions of two electrified bodies are exercised through the intermediary of the intervening medium, and not directly at a distance, the author endeavours here to determine the part played by this medium in the transmission of the electrostatic actions. The medium itself is regarded as a combination of the ether and ponderable matter in relations to be subsequently determined.—Note on an absolute electro-dynamometer, by M. H. Pellat. By means of this instrument, which has been constructed by M. Carpentier, the intensity of a current may be determined directly in absolute value with an error less than 1/2000.—Note on steno-telegraphy, by M. G. A. Cassagnes. By this combination of mechanical stenography and telegraphy the operator is enabled to record and transmit along a single wire a considerable number of words instantaneously. Numerous experiments on the French lines have yielded the following results for a single wire: (1) 400 words a minute to a distance of 350 kilometres (with two finger-boards 24,000 words an hour); (2) 280 words a minute to a distance of 650 kilometres (with two boards 16,000 to 17,000 words an hour); (3) 200 words a minute to a distance of 900 kilometres (with one board 12,000 words an hour). Messages may even be forwarded simultaneously in both directions, and the system offers other advantages greatly accelerating and simplifying telegraphic work.—On a process of rock-erosion by the combined action of the sea and frost, by M. J. Thoulet. Certain results observed on the Newfoundland coast are attributed to the combined action of liquid and frozen water.—On some coloured reactions of arsenic, vanadic, molybdic, and arsenious acids, as well as of the oxides of antimony and bismuth, by M. Lucien Lévy.—Thermic phenomena accompanying the precipitation of the bi-metallic phosphates and allied salts, by M. A. Joly. Here are studied the extremely complex relations of bicalcic, bibarytic, distrontianic, and other phosphates, bibarytic arseniates, and monobarytic hypophosphate.—Heat of neutralisation of glyceric and camphoric acids, by MM. H. Gal and E. Werner.—On the water-bearing apparatus of *Calophyllum*, by M. J. Vesque. A study of this highly specialised apparatus enables the author to classify the twenty-five known species of the genus *Calophyllum*.—Analysis of the Javanese mineral waters, by M. Stanislas Meunier. The specimens here examined were brought from the Kuripan district, near Boghor, and yielded 54·203 per cent. of chloride of calcium, 40·651 of chloride of magnesium, 2·860 of chloride of sodium, 1·104 of chloride of potassium, and 1·924 residue insoluble in water.—On a new locality containing the nummulitic formations of Biarritz, by M. de Folin.—On the importance and duration of the Pliocene period studied in connection with the Roussillon basin; fresh documents relating to the Pliocene mammiferous fauna of this district, by M. Ch. Depéret. In the discussion which followed the reading of this paper, both M. Gaudry and M. Hébert argued that the Pikermi and Léberon deposits should be referred, not to the Pliocene, but to the Upper Miocene epoch.—Note on the reptiles and fishes found in the caves of Mentone, by M. Emile Rivière.—On the storm of December 8, by M. Fron.—The Föhn and its cosmic origin, by M. Ch. V. Zenger. It is argued that this wind is a cyclonic movement of cosmic origin, allied to such phenomena as the aurora borealis, electric and magnetic storms, terrestrial currents, and the seismic waves which so often accompany violent tempests.

BOOKS AND PAMPHLETS RECEIVED

Crustacea and Spiders: F. A. A. Skuse (Sonnenschein).—The Queen's Jubilee Atlas of the British Empire: J. F. Williams (Philip).—A Concise History of England and the English People: Rev. Sir G. W. Cox (Hughes).—The Tea-Planter's Manual: T. C. Owen (Ferguson, Colombo).—Disease and Sin (Wyman).—Hours with a 3-inch Telescope: Capt. W. Noble (Longmans).—Proceedings of the Davenport Academy of Natural Sciences, vol. iv. (Davenport, Iowa).—Zeitschrift für wissenschaftliche Zoologie, Vierundvierzigster Band, Drittes Heft (Engelmann, Leipzig).—Differential Calculus: J. Edwards (Macmillan).—Proceedings of the American Philosophical Society, vol. xxiii. No. 123 (Philadelphia).—Report of the National Academy of Sciences, 1885 (Washington).—Bulletin of the U.S. Geological Survey, Nos. 27, 28, 29 (Washington).—Morphologisches Jahrbuch, 12 Band, 3 Heft: Prof. Gegenbaur (Engelmann, Leipzig).—Bulletin de la Société Impériale des Naturalistes de Moscou, No. 2, 1886 (Moscou).

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