dibutyryl morphine, $C_{34}H_{36}(C_4H_7O)_2N_2O_6$, is formed, and at the same time a non-crystalline base isomeric with this latter body is produced. Butyric anhydride heated with morphine forms a tetrabutyril derivative, which is decomposed on long-continued boiling with water into the dibutyryl derivative. The authors next treat of acetyl-butyryl-morphine, obtained by heating the alkaloid with a mixture of the acids. Benzoic anhydride gives with codeine a di-derivative, and with morphine a tetra-derivative, which is decomposed by water into dibenzoyl-morphine. Benzoic acid gives, with morphine, an α-di-derivative. The action of benzoic anhydride on α-diacetyl-morphine has been studied, and likewise the action of benzoic and acetic anhydrides on tetra-acetyl-morphine and on tetra-benzoyl-morphine.—The last paper communicated to the Society in the present number is by E. A. Parnell, on the use of potassium permanganate in volumetric analysis, and on the estimation of iron in iron ores.

Gazzetta Chimica Italiana, fascicolo ix. and x.—These parts contain the following papers:—On the dilatation of phosphorus, by G. Pisati and G. de Franchis; Action of sulphur on water and on calcium carbonate, by Brugnatelli and Pelloggio; Researches on the nature and constitution of tannic acid, by Hugo Schiff; Refractive indices of cymene, benzene, and of some derivatives of natural and synthetical thymol, by G. Pisati and E. Paterno. A. Casali contributes a paper on chrome green. Search for amylic alcohol in spirits of wine, by C. Bettelli. J. Macagno describes a volumetric process for determining phosphoric acid.—The concluding paper is by Grassi, on the fermentation of must.—The part contains also a number of abstracts of papers published in other journals.

Memorie della Societa degli Spettroscopisti Italiani, November 1874.—This number contains a discussion of the coincidence of the lines in the spectrum of Jupiter with that of our atmosphere, by Father Secchi, in which he appears to disagree with the conclusions arrived at by Vogel as to the coincidence of the lines and the brightness of the same.—The same author contributes a note on the comparison of the spectra of the compounds of carbon with the spectrum of Coggia's Comet; and for reasons given by him he considers the spectrum of the oxides of carbon best correspond to that of the comet; and further, he considers one of the spectra of the electric arc most similar, for he has observed two spectra superposed when viewing that arc. On examining the spectrum of the comet with a polariscope the continuous spectrum disappeared, leaving only that of the bands, proving apparently that the continuous spectrum is reflected light only. Drawings of the chromosphere for July, August, September, October, and November, by Secchi, accompany this number.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Feb. 11.—"On the Structure and Development of *Myriothela*," by Prof. Allman.

The endoderm of the body is shown to be composed of numerous layers of large spherical cells of clear protoplasm. Externally it is continued in an altered form into the tentacles, while internally it forms long thick villus-like processes which project into the cavity of the body.

Interposed between the endoderm and the ectoderm is the *fibrillated layer*. It consists of longitudinal muscular fibrillæ, closely adherent to the outer surface of a structureless hyaline membrane—the "Stützlamelle" of Reichert.

The *ectoderm* is composed of small round cells containing yellowish granules. Among these the thread-cells may be seen, lying chiefly near the outer surface of the body.

The deeper part of the ectoderm consists of cells, each of which is prolonged into a tail-like process, so that they assume a claviform shape.

The male and female sporosacs are borne by the trophosome.

The generative elements, whether male or female, originate in a special cavity (gonogenetic chamber), which is formed in the substance of the endoderm of the sporosac.

Immediately after its expulsion it is seized by the sucker-like extremities of certain remarkable organs (claspers), which are developed among the blastostyles and resemble long filiform and very contractile tentacles.

The actinuloid, on its escape from its capsule, is provided not only with long arms but with short scattered clavate tentacles. The short clavate tentacles become the permanent tentacles of the fully developed hydroid; the long arms, on the other hand, are purely embryonic and transitory.

The long embryonic arms originate in the spheroidal *Planula*. They are formed by a true invagination, and at first grow inwards into the body-cavity of the *Planula*. It is only just before the escape of the actinuloid from its capsule that they evaginate themselves and become external.

After enjoying for one or two days its free existence, during which it moves about by the aid of its long arms, the embryo fixes itself by its proximal end, the long arms gradually disappear, the short permanent tentacles increase in number, and the essential form of the adult is soon acquired.

Linnean Society, Feb. 18.—Dr. G. J. Allman, F.R.S., president, in the chair.—The following papers were read:—On the structure, affinities, and probable source of the large Human Fluke, *Distoma crassum*, Busk, by Dr. T. S. Cobbold, F.R.S. The author commenced by recording all the facts he could gather respecting the original discovery of the parasite by Prof. Busk, dwelling especially on the circumstance that an interval of thirty years had elapsed since the first examples were made known to science. He next referred to other singular instances of the supposed rarity of certain human helminths, adducing the cases of *Tænia nana* and *Distoma heterophyes;* and he also remarked upon the long lapse of time occurring between the periods of discovery and verification of particular species of Entozoa, instancing the cases of *Stephanurus dentatus* and *Distoma conjunctum*. He was indebted to Dr. George Johnson, F.R.S., for having brought the new hosts on bearers of *Distoma crassum* under his observation. The patients, a missionary and his wife, had been four years resident in China, most of their time being spent at Ningpo, where they had partaken freely of fish, oysters, and salads. The author of the paper had secured seven parasites, two from the lady and five from her husband. Only two of the seven specimens supplied him with such new facts as he had been able to make out in respect of the organisation of the animal. The only example which gave the best results Dr. Cobbold had since deposited in the University Museum at Oxford (Prof. Rolleston's department). He found the vitelligene glands to be largely developed, and he believed that in place of there being two testes, as had hitherto been conjectured, there was only one large compound gland, with remarkably large and conspicuous seminal ducts. These ducts were well seen in the dried specimen exhibited to the Society. The hitherto supposed upper testis turned out to be the ovary, and there was a special and smaller organ in front of the ovary which he regarded as an unusually developed shell-gland. The intestinal tubes are simple and unbranched, but on the other hand the uterine organ appeared not to consist of a single continuous tube, but to be partly branched, as obtains in *D. lanceolatum*, and in some other less known flukes. The remainder of the communication was taken up with remarks on the affinities of the parasite, and with a brief *résumé* of the hitherto known facts of trematode development, in so far as they tended to throw light on the source of *Distoma crassum*. In particular he referred to the labours of Mr. Moseley in connection with the land planarians of Ceylon, to the contributions of Giard, Claparède, Pagenstecher, and others in respect of *Bucephalus*, and to the still more recent discoveries of Dr. Ernst Zeller as regards the destiny of *Leucochloridium*. From a general review of all the data thus obtained, Dr. Cobbold believed that the *Distoma crassum* had been obtained by the consumption, on the part of the missionary and his wife, either of Ningpo oysters or of fish insufficiently cooked. After the reading of the paper Mr. G. Busk and Dr. G. Johnson added a few more facts respecting the parasite.—On the external anatomy of *Tanais vittatus*, by Dr. M'Donald.

Mathematical Society, Feb. 11.—Prof. H. J. S. Smith, F.R.S., president, in the chair.—Prof. Cayley communicated two short notes: on a point in the theory of attractions, and on the question of the mechanical description of a quartic curve.—Prof. Sylvester exhibited a new sort of lady's fan, and briefly indicated its mode of construction and properties. With the fan it is possible to divide any angle into any assigned equal number of parts, and the trajectories of points taken in the several links connecting together the sticks of the fan have finite nodes whose numbers are successively, $1, 2^4, 3^4, 4^4 \ldots$. He then dwelt in detail on the expression of the curves generated by any given system whatever of linkwork under the form of an irreducible determinant. The author stated: That parallel motions exist at

all is a paradox more wonderful than ever, now that his method gives the means of determining the conditions to be satisfied and comparing their number with that of the disposable constants. The orders for 3, 5, 7 bars are 6, 20, 72. Formerly the existence of *one* was doubted; now a finite number for *every* order of linkwork is rendered highly probable.—The Secretary then read portions of papers by Rev. W. H. Laverty, Mr. E. J. Routh, F.R.S., and Mr. J. Griffiths. Mr. Laverty's paper discussed a particular case of Peaucellier's problem. Mr. Routh discussed Laplace's problem of three particles. Laplace showed that if three particles be placed at the corners of an equilateral triangle and be properly projected, they will move under their mutual attractions so as always to remain at the angular points of an equilateral triangle. On the supposition that the law of attraction is the inverse kth power of the distance, Mr. Routh arrives at the following results:—1. The motion cannot be stable unless k is less than 3. 2. The motion is stable, whatever the masses may be, if the law of force be expressed by any positive power of the distance, or any negative power less than unity. For other powers the stability will depend on the relation between the masses. 3. The motion is stable to a first approximation if $\frac{(M+m+m')^2}{Mm+Mm'+mm'} > 3\left(\frac{1+k}{3-k}\right)^2$ where M, m, m' are the masses. This agrees with a result given by M. Gascheau (in a paper not seen by the author), if $k=2$, or the law of force be the law of nature. 4. When two of the masses are much smaller than the third, the inequality in their angular distances, as seen from the large body, has a much greater coefficient than their linear distances from the same body. 5. On proceeding to a second approximation it would seem that the form of the triangle joining the three particles is very little altered by any disturbance, but in certain cases, depending on the nature of the disturbance, the size of the triangle may be subject to very considerable variations. As a supplement, Mr. Routh generalises the reasoning of the problem of the three bodies so as to obtain the form of the determinantal equation to find the periods of oscillation of any dynamical system about a state of steady motion in which the *vis viva* is constant. Two limitations are made: first, the system must be under a conservative system of forces; and, secondly, the *vis viva* can be expressed in terms of the co-ordinates, so as not to contain the time explicitly. The equation is then shown to be always of an *even* order, and the condition of stability is that all the roots should be real and negative.—The results arrived at in Mr. Griffiths' note on some relations between certain elliptic and hyperbolic functions may be thus stated:—Let E, F, H stand for the integrals

$$\int \sqrt{1-e^2\sin.^2\theta}\,d\theta, \quad \int \frac{d\theta}{\sqrt{1-e^2\sin.^2\theta}}$$

$$\int \sqrt{e'^2\,\mathrm{cosec.}^2\theta - 1}\,\mathrm{cosec.}\,\theta\,d\theta$$

respectively, the limits in each case being θ_0 to θ, and $e\,e'=1$, then

$$eH + E - (1-e^2)F + \left(\sqrt{1-e^2\sin.^2\theta}\cot.\theta\right)_{\theta_0}^{\theta} = 0$$

and

$$\frac{E+E'}{H+H'} = e^3\sin.\theta\sin.\phi\sin.\theta_0\sin.\phi_0$$

where the limits in E', H' are ϕ_0 to ϕ, determined from the equation—

$$\cos.\theta\cos.\phi - \sin.\theta\sin\phi\sqrt{1-e^2\sin.^2\mu} = \cos.\mu$$
$$= \cos.\theta_0\cos.\phi_0 - \sin.\theta_0\sin.\phi_0\sqrt{1-e^2\sin.^2\mu},$$

μ being a constant.

Geological Society, Feb. 10.—Mr. John Evans, F.R.S., president, in the chair.—The following communications were read:—The phosphorite deposits of North Wales, by Mr. D. C. Davies. The deposit of phosphate of lime described by the author is a bed varying from ten to fifteen inches in thickness, which occurs at the top of the Bala limestone over a considerable district in North Wales, having been detected in various localities from Llanfyllin to the hills north and west of Dinas Mawddy. The bed is rendered black by the presence of graphite, and appears to consist of concretions of various sizes cemented together by a black matrix. The concretions are richest in phosphate of lime, some of them containing 64 per cent.; the average amount in the bed, including the matrix, is 46 per cent. The deposit is underlain by a bed of crystalline limestone, and sometimes divided by thin beds of similar limestone into two or three layers. The author noticed the principal fossils occurring in the Bala limestone below the phosphorite beds, and stated that many of those in the overlying shales, up to a certain distance above the bed, are phosphatised. The author referred to the presence of phosphate of lime in the inner layers of Unio and Anodonta to the amount of as much as 15 per cent., and thought that the phosphate of lime in the deposit was probably of organic origin. It may have been an old sea-bottom on which the phosphate of lime of Mollusca and Crustacea was accumulated during a long period, and seaweeds may also have contributed their share. It probably represented the remains of an ancient Laminarian zone. The author suggested that the phosphatic nodules of the so-called coprolite beds in other parts of England might have been derived from the denudation of similar deposits.—On the bone-caves in the neighbourhood of Castleton, Derbyshire, by Rooke Pennington, LL.B.; communicated by Prof. W. Boyd Dawkins, F.R.S. The author described as a prehistoric cave the Cave Dale Cave, situated in Cave Dale, just below the keep of Peveril Castle. The upper earth in this cave contained fragments of late pottery mixed up (by rabbits) with bits of rude prehistoric pottery, a tooled piece of stag's horn, an iron spike, two worked flints, a piece of jet, part of a bone comb, and a bronze celt of peculiar form, many bones of *Bos longifrons* and goat, broken to get out the marrow, and remains of hogs; charcoal and human teeth also attested the occupation of the cave by man. There were also remains of fox, badger, cat, water-rat, dog, red deer, duck, fowl, and hare. Lower down were remains of *Bos longifrons*, hog, red deer, wolf, and horse; and lower still, next the rock, more human teeth, remains of animals, and a good flint. The cave seemed to have been occupied from time to time during a lengthened period, probably from the Neolithic age into those of bronze and iron. A cave in Gelly or Hartle Dale contained, in blackish mould, bones (some broken) of goat, pig, fox, and rabbit, and pieces of very rude prehistoric pottery. Of Pleistocene caves and fissures the author described several. One in Hartle Dale furnished remains of rhinoceros, aurochs (*Bison priscus*), and mammoth, lying in yellow earth. The bones were probably carried in by water. A fissure near the village of Waterhouses, in Staffordshire, is six feet wide, and filled with the ordinary loam. Bones of mammoths and the skeleton of a young bison have been obtained from it, and the author supposes the animals to have fallen into the fissure while making for the river to drink. The Windy Knoll fissure is situated near Castleton, in a quarry near the top of the Winnetts, and close to the most northern boundary of the mountain limestone of Derbyshire. The author described particularly the situation of this fissure and drainage of the district in which it is situated. The fissure itself is filled with the ordinary loam, containing fragments of limestone, and enclosing an astonishing quantity of bones of animals confusedly mixed together, those lowest down near the rocks being coated with and sometimes united by stalagmite. The author supposes that this was a swampy place into which animals fell from time to time, and in rainy seasons their remains might be washed into it from the neighbouring slopes.—The Mammalia found at Windy Knoll, by Prof. W. Boyd Dawkins, F.R.S. This paper contained an enumeration of the remains of Mammalia found in the Windy Knoll fissure described by Mr. Pennington. They were stated to belong to the following species: bison, reindeer, grisly bear, wolf, fox, hare, rabbit, and water-rat. Great quantities of bones and teeth were found, the number of individuals represented by the remains being given roughly by the author as follows:—

Bison	40–60
Reindeer	20–30
Grisly bear	4–5
Wolf	7

From the great excess of herbivorous forms, and the position of the fissure, the author assumed that the latter lay in the line of the annual migrations of the bison and reindeer, during which some individuals might fall in; and he explained the presence of the carnivores by their having followed the migratory herds in order to prey upon stragglers, as is now the case with the reindeer in Siberia and the bison in North America. He further showed, from the examination of the young teeth of the bison and the reindeer, that these animals must have passed this way at different seasons of the year, and indicated that the deposit must be regarded as of Pleistocene age, though whether pre- or post-glacial is an open question.

Meteorological Society, Feb. 17.—Dr. R. J. Mann, F.R.A.S., president, in the chair.—The following communications were read:—Report of the Conference on the Registration of Phenological Phenomena. The Council of the Society resolved during last session that it was expedient that observations of natural phenomena connected with the return of the seasons, as well as of such branches of physical inquiry as tend to establish a connection between meteorological agencies and the development of vegetable life, should be organised on a more systematic and scientific basis than heretofore. Application was made to other societies interested in the matter to nominate delegates to form a committee for the purpose of drafting complete instructions and organising in an efficient manner this branch of investigation. Delegates were appointed by the Royal Agricultural, Royal Horticultural, Royal Botanic, Royal Dublin, Marlborough College Natural History, and the Meteorological Societies; and meetings of this joint committee have been held, when the subject was fully discussed, and reports, prepared by the Rev. T. A. Preston, M.A., and Prof. T. Dyer, F.L.S., on plants; Mr. McLachlan, F.L.S., on insects, and Prof. A. Newton, F.R.S., on birds, were adopted.—On the weather of thirteen summers, by R. Strachan, F.M.S. This paper is in continuation of others read before the Society on the different seasons of the year.—On a universal system of meteorography, by Prof. Van Rysselberghe. This paper gave a description of a recording apparatus by means of which the indications of a great number of meteorological instruments of any kind can be registered, whether they are placed near to or far from it, so that simultaneous readings of several instruments at various distant stations can be recorded at a central observatory. The chief feature in this recorder is, that it engraves automatically on metal the different curves, thus furnishing a plate graduated by the apparatus itself, from which as many copies as may be desired can be struck off. Another feature is, that a single burin, put in motion by a simple electro-magnet, can engrave successively, on the same metallic plate, the elements of all the curves.

Zoological Society, Feb. 16.—Mr. George Busk, F.R.S., vice-president, in the chair.—Dr. Sclater exhibited a drawing of a supposed new Rhinoceros from the Terai of Bhootan, which had been forwarded to him from Calcutta, by Mr. W. Jamrach, who had the animal there alive, and intended bringing it to England.—Mr. Sclater exhibited and made remarks on a living specimen of the Peguan Tree Shrew (*Tupaia peguana*), which had been presented to the Society by the Hon. Ashley Eden, Chief Commissioner at Rangoon, British Burmah. This was believed to be the first specimen of a living *Tupaia* of any species that had reached Europe.—Mr. A. H. Garrod read a paper on a point in the mechanism of the bird's wing, which renders it so specially adapted for flight.—Mr. Sclater read remarks on the Cassowaries now living in the Society's Gardens, amongst which were representatives of five different species. One of them from the south of New Guinea was believed to be new to science, and proposed to be called *C. picticollis*. Mr. Sclater also gave notice of a new Cassowary obtained in the Aroo Islands by Signor Beccari, and transmitted to the Museo Civico of Genoa, which he proposed to call *Casuarius beccarii*.—Prof. Owen, C.B., communicated a note on the discovery of the remains of various species of *Dinornis* in the province of Otago, New Zealand.—Mr. Edward R. Alston read a paper on *Anomalurus*, its structure and position, in which he came to the conclusion that this peculiar form of Rodents should be either referred to the Sciurine group of Rodents as a distinct sub-family, or placed next to it as a separate family—*Anomaluridæ*.—Mr. H. E. Dresser read some notes on the nest and eggs of *Hypolais caligata*, and on the egg of *Charadrius asiaticus*, and made remarks on the latter species, and on *Charadrius veredus*.—Mr. R. Bowdler-Sharpe communicated a paper on the birds of Labuan, in which was given an account of a collection made in that island by Mr. John Low.

Entomological Society, Feb. 1.—Sir Sidney Smith Saunders, C.M.G., president, in the chair.—Mr. Stevens exhibited a variety of *Noctua glareosa*, and Mr. Champion some specimens of *Amara continua*, a species recently detected in this country.—Mr. Herbert Druce exhibited a fine collection of *Rhopalocera* recently received from Santarem.—The President exhibited a nest of *Polistes gallica* taken on the esplanade at Corfu, of which the cells were partly constructed with coloured paper taken from some playbills posted in the vicinity, as alluded to in his anniversary address delivered at the last meeting.—Mr. Smith remarked on *Colletes cunicularia* having feen found a few years ago in the Isle of Wight and in Liverpool. In 1873 he had transported some specimens from the latter locality to Shirley Common, and he had reason to believe that he had succeeded in establishing a colony there, as the insect had been taken near the spot in 1874 by Mr. d'Arcy Power.—A paper was communicated by Mr. A. G. Butler on the *Rhopalocera* of Australia.—A paper was read by Mr. W. Arnold Lewis on "Entomological Nomenclature and the Rule of Priority."—The President nominated Messrs. Dunning, Pascoe, and Weir as vice-presidents for the ensuing year.

Feb. 15.—Sir Sidney Smith Saunders, C.M.G., president, in the chair.—Mr. Phipson exhibited a singular variety of *Strenia clathrata* from Basingstoke, the wings being nearly unicolorous.—Mr. F. Smith exhibited a second collection of *Hymenoptera* from Mr. Rothney, of Calcutta, containing 1,573 specimens, all in the finest condition. There were probably not more than twenty-five undescribed species, but from twenty to thirty species (which were hitherto represented in the British Museum by a single sex) were here represented by both sexes.—Mr. Verrall exhibited some living fleas taken two days previously from inside the ears of a rabbit near Lewes. They were gregarious in this situation, and in such a position that the animal was unable to dislodge them by scratching. He alluded to a communication made to him by Mr. M'Lachlan regarding a species from Ceylon which was gregariously collected in a very limited space on the neck of a fowl, and which had been exhibited at a recent meeting of the Microscopical Society. They were affixed to the skin of the fowl by the proboscis, so that only the tails were visible outwards. Mr. Cole said he had found fleas in a hedgehog, and Mr. W. Arnold Lewis had observed a species in a marmot in Switzerland.—Mr. Dunning called attention to a recent extract from a French paper in which it was stated that a paint could be manufactured from cockchafers.—The Rev. R. P. Murray stated that Mr. Edwards, of Virginia, was very desirous of obtaining pupæ of *Pieris napi*.

Royal Geographical Society, Feb. 22.—Sir H. Raw linson presided.—A paper was read by Capt. J. Moresby, giving an interesting commercial, political, and geographical description of discoveries in Eastern New Guinea, made by himself and the officers of her Majesty's ship *Basilisk* during a recent voyage, undertaken to substantiate and follow up a previous similar exploration. The practical outcome appears to have been the establishment of the fact that the D'Entrecastraux group of islands, sighted ninety-four years ago, consists of three large islands, separated from each other and the main land of New Guinea by narrow straits. These islands the captain and his crew were the first to visit and survey, and it may be said they are now politically appropriated in the British interest. The captain has named the islands Normanby, Fergusson, and Goodenough; while he calls the straits Ward Hunt, Goschen, Dawson, and Moresby. These islands, he states, extend north and south about ninety miles, and afford harbour and anchorage.

Institution of Civil Engineers, Feb. 16.—Mr. Thos. E. Harrison, president, in the chair. The paper read was on the erosion of the bore in heavy guns, and the means for its prevention, with suggestions for the improvement of muzzle-loading projectiles, by Mr. C. W. Lancaster, Assoc. Inst. C.E.

CAMBRIDGE

Philosophical Society, Feb. 8.—The following communication was made:—On the centre of motion of the eye, by Prof. Clerk-Maxwell. The series of positions which the eye assumes as it is rolled horizontally have been investigated by Donders (Donders and Doijer, *Derde Jaarlijksch Verslag betr. het Nederlandsch Gasthuis voor Ooglijders*; Utrecht, 1862), and recently by Mr. J. L. Tupper (Proc. R.S., June 18, 1874). The chief difficulty in the investigation consists in fixing the head while the eyeball moves. The only satisfactory method of obtaining a system of co-ordinates fixed with reference to the skull is that adopted by Helmholtz (*Handbuch der Physiologischen Optik*, p. 517), and described in his Croonian Lecture. A piece of wood, part of the upper surface of which is covered with warm sealing-wax, is placed between the teeth and bitten hard till the sealing-wax sets and forms a cast of the upper teeth. By inserting the teeth into their proper holes in the sealing-wax the piece of wood may at any time be placed in a determinate position relatively to the skull. By this device of Helmholtz the patient is relieved from the pressure of screws and clamps applied to the skin of his head, and he becomes free to move his head as he likes, pro-

vided he keeps the piece of wood between his teeth. If we can now adjust another piece of wood so that it shall always have a determinate position with respect to the eyeball, we may study the motion of the one piece of wood with respect to the other as the eye moves about. For this purpose a small mirror is fixed to a board, and a dot is marked on the mirror. If the eye, looking straight at the image of its own pupil in the mirror, sees the dot in the centre of the pupil, the normal to the mirror through the dot is the visual axis of the eye—a determinate line. A right-angled prism is fixed to the board near the eye in such a position that the eye sees the image of its own cornea in profile by reflection, first at the prism, and then at the mirror. A vertical line is drawn with black sealing-wax on the surface of the prism next the eye, and the board is moved towards or from the eye till this line appears as a tangent to the front of the cornea, while the dot still is seen to cover the centre of the image of the pupil. The only way in which the position of the board can now vary with respect to the eye is by turning round the line of vision as an axis, and this is prevented by the board being laid on a horizontal platform carried by the teeth. If now the eye is brought into two different positions and the board moved on the platform, so as to be always in the same position relative to the eye, we have to find the centre about which the board might have turned so as to get from one position to the other. For this purpose two holes are made in the platform, and a needle thrust through the holes is made to prick a card fastened to the upper board. We thus obtain two pairs of points, $A\ B$ for the first position, and $a\ b$ for the second. The ordinary rule for determining the centre of motion is to draw lines bisecting $A\ a$ and $B\ b$ at right angles. The intersection of these is the centre of motion. This construction fails when the centre of motion is in or near the line $A\ B$, for then the two lines coincide. In this case we may produce $A\ B$ and $a\ b$ till they meet, and draw a line bisecting the angle externally. This line will pass through the centre of motion as well as the other two, and when they coincide it intersects them at right angles.

MANCHESTER

Literary and Philosophical Society, Feb. 2.—Mr. Alfred Brothers, F.R.A.S., president of the section, in the chair.—Results of meteorological observations taken at Langdale, Dimbula, Ceylon, in the year 1873, by Mr. Edward Heelis; communicated by Mr. Joseph Baxendell, F.R.A.S.

Feb. 9.—Mr. Edward Schunck, F.R.S., president, in the chair.—A method of finding the axes of an ellipse when two conjugate diameters are given, by Mr. J. B. Millar, B.E.; communicated by Prof. O. Reynolds.—Mr. E. W. Binney, F.R.S., V.P., presented to the Society a bust of the late James Wolfenden, of Hollinwood, one of the most noted mathematicians of the Lancashire school, who was born on the 22nd June, 1754, and died on the 29th March, 1841.

DUBLIN

Royal Irish Academy, Jan. 11.—William Stokes, F.R.S., president, in the chair.—The Secretary read a paper, by Mr. J. Rhys, of Rhyl, on Ogham inscriptions.—Dr. Edmund Davy read a paper on some newly observed properties possessed by certain salts of fulminic acid.—Dr. Doberck, astronomer at Col. Cooper's observatory, Markree, County Sligo, read a paper on the Comet I. of 1845.

Jan. 25.—William Stokes, F.R.S., president, in the chair.—The Rev. Edward M'Clure read a paper on Irish popular names.—Samuel Ferguson, LL.D., vice-president, read a paper on an Ogham inscription at Mullagh, Co. Cavan; also notices of the Monataggart Ogham texts, from the Bishop of Limerick, Whitley Stokes, LL.D., and Rev. R. D. Haigh.—Rev. Dr. Reeves, vice-president, read a paper on the MS. in Marsh's Library called the "Codex Kilkennensis."—Mr. H. W. Mackintosh read a paper on the structure of the spines in the Diadematidæ.—Dr. A. Macalister read a paper on a few points in the cranial osteology of *Bradypus gularis*;" also a paper on the anatomy of insectivorous Edentates, Part I.

PARIS

Academy of Sciences, Feb. 15.—M. M. Frémy in the chair.—The following papers were read:—New researches on the mode of intervention of electro-capillary forces in the phenomena of nutrition, by M. Becquerel.—On the depth and the superposition of magnetic layers in steel, by M. J. Jamin.—M. Faye made some remarks on M. Jamin's paper.—M. de Lesseps then made a communication relative to the question of unification of the tonnage of vessels; after which M. Dupuy de Lome made some remarks on the same.—Experiments on the absorption by the root of plants of the red juice of *Phytolacca decandra*, by M. H. Baillon. These experiments are in continuance of those made by Biot, De la Baïsse, and Unger.—On the defective notes of string instruments, by M. A. Dien. This paper has special reference to the violin and violoncello, and treats of those harsh and buzzing notes commonly known by musicians as the *wolf*.—On the presence and the formation of *vibriones* in the pus from abscesses, by M. Albert Bergeron; researches made at the Charité Hospital, in Paris, in pursuance of M. Goselin's paper read at the meeting of Jan. 11 (NATURE, vol. xi., page 240).—On a dissemination apparatus of *Gregarina* and *Stylorhynchus*, and a remarkable phase of sporulation in the latter genus, by M. A. Schneider.—A memoir, by M. Ch. Antoine, on some mechanical properties of saturated steam.—A memoir, by M. A. Picard, on a new method to establish the equations of elasticity of solid bodies.—A note by M. M. Girard on the influence of cold temperatures upon Phylloxera, showing that these insects are not much affected by cold, and that it is useless to count upon their destruction by cold winters.—A note, by M. A. Demoget, on various improvements made upon Holtz's machine; these improvements ensure its perfect action even in the dampest weather.—The Secretary then read the following telegram received from M. Bouquet de la Grye, the chief of the expedition sent to Campbell to observe the Transit of Venus:—"Venus seen before ingress only; no contacts; all well." It is dated from San Francisco.—A note, by M. E. Rivière, on the quaternary deposits, superior to the ossiferous cavern of Nice, known as the superior cavern of Cuvier. The author considers that the red inferior deposit in the caverns of Mont-du-Chateau, of Nice, must be regarded as the true ossiferous breccia, and that the superior deposits were formed by accumulations of detrital matter. The animals whose bones originate from this deposit were contemporary to the human beings of which Cuvier described a jawbone.—On a case of dimorphism in the genus of Gramineæ, by M. E. Fournier.—On the discovery of true Batrachia in primary strata, by M. A. Gaudry.—On the discovery of a fossil species of Bovidæ, probably *Bubalus antiquus*, at Djelfa, Algeria, by M. P. Gervais. The same gentleman then showed some reproductions of flint implements found in the caves of Ousidan, near Tlemcen, Algeria.—A note by M. Chapelat, relative to a large bolide supposed to have been observed on the evening of Feb. 10. It was afterwards found that the supposed meteor was only the edge of a cloud brilliantly illuminated by the sun, which had already set.—A note, by M. de la Haye, on atmospheric electricity and the presence of hydrogen in the atmosphere.

BOOKS AND PAMPHLETS RECEIVED

AMERICAN.—Papers on Natural Erosion by Sand in the Western Territories; The Recency of certain Volcanoes of the Western United States; and the advantages of the Colorado Plateau Region as a Field for Geological Study: G. K. Gilbert (American Association for the Advancement of Science).—Report of the State Board of Education on the proposed Survey of the Commonwealth (Boston, Wright and Potter).—Monthly Report of the Department of Agriculture, Nov. and Dec. 1874 (Washington, U.S.)

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