Jurassic characters predominate in Nos. 1 and 2; No. 3 is rather cretaceous; hence the divisional line, *if drawn at all*, will fall between Nos. 2 and 3. But the author is of opinion that there is no necessity for drawing this line, and he remarks that the whole of the four stages are combined by strong palæontological analogies. Species pass from 1 to 2, from 2 to 3, and from 3 to 4; Nos. 2 and 3 especially, which would be separated by the line of demarcation of the two periods have about one-third of their species in common. This line would therefore be a very feeble one, and we should have to admit that in this Tithonian basin at any rate the separation of the cretaceous from the jurassic periods is singularly compromised.

[We have given so long an analysis of the argumentative part of Professor Pictet's paper, that we cannot refer to his concluding remarks, except to say that they contain some important observations on the method to be followed in geological investigations.]

PHYSIOLOGY

Reaction of Nerve-Substance.

FUNKE some years ago affirmed that nerve, like muscle, became acid after work, and at death. In this he was supported by Heidenhain, and opposed by Ranke and others. He now reasserts his former statement, using the delicate reagent *cyanin* instead of litmus, and finds strong proofs of the correctness of his views. The matter is not unimportant, as it is one of the few bases on which rests the broad general assertion that nervous [and mental] action is accompanied by material changes. [Centralbt. med. Wissensch. 1869, No. 46.]

Action of Muscarin.

SCHMIEDEBERG and KOPPE have published an account of the pharmacy and physiological action of *muscarin*, the active constituent of *agaricus muscarius* (*amanita muscaria*). This mushroom poison seems to be not unlike the Calabar bean in its action, and belladonna is in many respects antagonistic to it.

MAX SCHULTZE'S *Archiv für Microscopische Anatomie* v. 4, contains, among other papers:

"Ueber die Nervenendigung in der Netzhaut des Auges bei Menschen und bei Thieren." Von Max Schultze. Description of certain fibrillæ ensheathing the rods and cones of the vertebrate retina, and believed by Max Schultze to be the real nerve endings. An important memoir, tending to harmonise the results obtained from the study of invertebrate and vertebrate eyes. "Untersuchungen über den feineren Bau des Pancreas." Von Dr. Giovanni Saviotti aus Turin. Description by a pupil of Köllicker's, of fine intercellular passages in the pancreas, similar to those discovered by Hering in the liver. "Die haaretragenden Sinneszellen in der Oberhaut der Mollusken." Von Dr. W. Flemming in Rostock. A detailed description of certain fimbriated cells in the epidermis of acephalous mollusks, and gasteropods, not wholly unlike, and occuring in the midst of, ciliate cells, but believed by Flemming to be organs of sense. "Ueber Radiolarien und Radiolarien-artige Rhizopoden des süssen Wassers." Von Dr. Richard Greeff, Privatdocenten in Boon. Description of species of *Clathrulina*, *Acanthocystis*, and several species of new genera *Astrodisculus*, *Hyalolampe*, with discussion of their habits, anatomy, &c.

PFLUGER'S *Archiv*, ii. 9 and 10, contains:—"Quecksilberluftpumpe." Von H. Busch. A modification of the mercurial pump employed by Pflüger. The chief novelty is the occlusion of the orifices of the various parts by means of mercurial shoulder cups. "Das Unterscheidungsvermögen des Geschmacksinnes für Concentrationsdifferenzen der schmeckbaren Körper." Von Fr. Keppler in Tübingen. Keppler found it easiest to distinguish by taste variations of strength in "saline" solutions, less easy in "acid" or "sweet" liquids, and least easy in "bitter" liquids, though bitter substances (such as quinine) are those which require the smallest quantity to make a definite impression. "Ueber die Abhängigkeit der Leber von dem Nervensystem." Von E. Pflüger. Nebst Tafel II. und III. An important memoir in which Pflüger extends to the liver, the observations already made by him on the salivary glands and pancreas, affirming the direct continuation of the nerve fibres with the secreting cells. "The hepatic cell is a nucleated swelling of the axis cylinder of a nerve." Contains also many other points of interest, touching the structure of the liver, and strongly supports the views of Dr. Beale. "Ueber den Einfluss des Cyangases auf Haemoglobin nach spectroscopischen Beobachtungen." Von E. Ray Lankester. A short note affirming, in opposition to some German observers, that cyanogen forms a definite compound with Haemoglobin analogous to those of carbonic oxide, &c. "Zur Kenntniss der Wirkungen des Weingeistes." Von Dr. F. Obernier, Privatdocent und Assistenzarzt der medic. Klinik zu Bonn. A somewhat polemic paper contesting the views of Bouvier, &c., noticed in NATURE, No. 2.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, November 30.—Anniversary Meeting.—The President delivered his annual address, in which he touched upon several points of interest. One of the first subjects to which he drew attention was the Royal Society's Catalogue of Scientific Papers, the printing of which proceeds satisfactorily. He remarked: "While the aid to be derived to scientific research from the index according to authors' names is fully recognised, there can be no doubt that the value of the Catalogue will be greatly enhanced by the fulfilment of the second part of the plan announced in the preface, namely, by the publication of an *Alphabetical Index of Subjects*. The preparation of such an "*Index Rerum*" as is contemplated, has been for some time a subject of anxious, as well as careful, consideration by the Library Committee, and they have at length arrived at what, they have reason to hope, will be a most satisfactory solution of the question through a communication with Professor Julius Victor Carus, of Leipsic, who they found would be willing himself to undertake the task. I am happy to announce that the Council, acting on the recommendation of the Library Committee, have entered into a very satisfactory arrangement with Professor Carus, who will be able to commence his labours in the ensuing spring. From the well-known scientific accomplishments of Professor Carus, and his extensive experience in the peculiar work to be performed, as well as the confidence which will be reposed in him by all acquainted with the nature of the undertaking and interested in its success, we may consider the Society most fortunate in securing his services." The Meteorological Department of the Board of Trade, superintended by a Committee of the Royal Society, was next referred to; it is stated to be making good progress. Concerning the great Melbourne telescope the President remarked: "Its performance since erection does not appear to have given the same satisfaction at Melbourne that it did at Dublin; but the defects complained of may arise partly from an imperfect knowledge of the principles of the instrument and inexperience in the use of so large a telescope, partly from experimental alterations made at Melbourne, and partly from atmospherical circumstances. Those who are acquainted with the difficulties which Sir J. F. W. Herschel experienced at the Cape, will not be surprised that they should be felt at Melbourne to a much greater extent, on account of the far greater size of the speculum. But I have no doubt that if the instrument be kept in its original condition and as carefully adjusted as it was at Dublin, it will perform as well in ordinary observing weather. The high impression of its power produced by the trials which were made of it when at Dublin, is maintained by a sketch of a portion of the Great Nebula near η Argus, made by M. Le Sueur during two nights in June last. Some change in this nebula from the time when it was described by Sir J. F. W. Herschel had been indicated by Mr. Powell and other observers, though with instruments so much inferior in power to his 20-foot reflector, that little reliance could be placed on them; however, here the evidences of change are indisputable. The peculiar opening in the nebula which Sir John Herschel has compared to a Lemniscate, is still very sharply marked, but its shape and magnitude have altered. Its northern extremity is opened out into a sort of estuary; one of the remarkable constrictions seen in 1834 has disappeared, and the other has shifted its place. Two stars which were then exactly on the edges of the opening are now at some distance within the bright nebulosity; the nebula has become comparatively faint near η Argus. Another remarkable change is the formation of a V-shaped bay south and preceding the Lemniscate, whose edges are so bright that if it had then existed it could not have been overlooked in the 20-foot reflector. Another feature, which, however, was perhaps not within reach of that telescope, is an oval which M. Le Sueur describes as 'full of complicated dark markings and pretty bright nebular filaments.' The angular magnitude of the

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changes which have been observed, is so great as to suggest a strong probability that this nebula is *much nearer* to us than the stars which are seen along with it. It may be also noticed that M. Le Sueur saw nothing to make him believe in any development of stars in addition to those seen by Sir J. F. W. Herschel." The Council of the Society believes that an attempt to encourage and aid spectroscopic researches is an object in full unison with the highest purpose of the Royal Society's existence; and they have, therefore, after most careful deliberation, resolved to act on this conviction. A telescope of the highest power that is conveniently available for spectroscopy and its kindred inquiries is being constructed, and will be entrusted to such persons as, in their opinion, are the most likely to use it to the best advantage for the extension of this branch of science; and, in the first instance, there can be but one opinion that the person so selected should be Mr. Huggins. The President said: "The execution of this project was much facilitated by the receipt of £1,300 from a bequest made to the Society by the late Mr. Oliveira; and in the beginning of the year proposals were received from the chief opticians of the time, of which that of Mr. Grubb was accepted last April. The conditions proposed were, that the object-glass of the telescope should be of 15-inches aperture, and not more than 15-feet focus, that the arrangements of its equatorial should be such that it could be easily worked by the observer without an assistant, and that the readings of its circles could be made without leaving the floor of the observatory. Mr. Grubb was fortunate enough to secure two discs which had been exhibited by Messrs. Chance at the French Exhibition. They are of first-rate transparency, and as the construction which has been adopted admits of the lenses being cemented, this object-glass will transmit an unusual portion of light. The respective indices of the glasses were determined by making facets on their edges at an angle of 60°, and observing spectral lines through the prisms thus formed with a spectroscope of such magnitude as to admit of their being placed on its table. The distinctness with which even faint lines are seen through 12 inches of the glass is a most satisfactory proof of its purity and clearness. From these Professor Stokes computed the curves for the lenses, and his numbers were almost identical with those which Mr. Grubb had obtained. I may mention that some fears had been entertained that the equality of curvature in the adjacent surfaces might *call up a ghost*, if the lenses were used uncemented, and that this has been tried and no such effect was visible. Subsequently a rather novel addition has been made, bearing upon the radiation of heat from the stars. An object-glass intercepts so much of the heat-rays that, to economise the infinitesimal effect which is expected, a metallic mirror is more promising. The equatorial is, therefore, at the suggestion of Mr. De la Rue, provided with the means of changing the 15-inch achromatic for an 18-inch reflector; and this has been accomplished by means notable for their facility and their safety. The instrument will be ready for trial in December of the present year." The rest of the address referred to the recent dredging expedition. The President then proceeded to the award of the Medals. The Copley Medal was awarded to M. Victor Regnault for the second volume of his "Relation des Expériences pour déterminer les lois et les données physiques nécessaries au calcul des Machines à Feu," including his elaborate investigations on the Specific Heat of Gases and Vapours, and various papers on the Elastic Force of Vapours. The President remarked that the name of M. Victor Regnault had been associated for the last quarter of a century with the most refined and delicate experimental inquiries connected with the measurement of heat. The amount of labour involved in his researches upon the specific heat of simple and compound bodies, upon the dilatation of gases and vapours, upon the comparison of the air-thermometer with the mercurial thermometer, upon the elastic force of aqueous vapour, upon the determination of the density of gases, and upon hygrometry, must excite the astonishment of all who could estimate the difficulty of the problems attacked, the precision of the results attained, and the fundamental character of the data which he had determined. The Council has awarded a Royal Medal to Sir Thomas Maclear, Astronomer Royal at the Cape of Good Hope, for his measurement there of an arc of the meridian. The President reminded his audience that our sole knowledge of the figure of the southern hemisphere rested on the arc of the meridian measured by La Caille, and now remeasured and extended by Maclear. The original measurement, notwithstanding the well-known ability of the great astronomer under whose superintendence it was executed, had not commanded confidence. Maclear's arc has an amplitude nearly four times as great as that of La Caille, and is, on this account, as well as on account of the greater accuracy in detail, far more deserving of confidence. The degree which is derived from it is 1,133 feet shorter than that of La Caille; and as La Caille's is 1,051 longer than that given by the spheroid, which, according to Airy, represents the average of northern arcs, it is evidently a near approximation to the truth. This is even more distinctly shown by the close agreement of the latitudes computed from the geodetic measurements with those given by the sector—that of the north extremity being 0″·4 in defect, that of the south extremity 0″·5 in excess.—A Royal Medal has been awarded to Dr. Augustus Matthiessen, F.R.S., for his researches on the electrical and other physical properties of metals and their alloys. The President remarked that these researches embraced the determinations of the specific gravities, the expansion due to heat, the thermo-electric properties, the electric conducting-power, and the effects of temperature upon the electric conducting-power. Dr. Matthiessen's investigation of the electric conducting-power of commercial copper had resulted in very great improvement of the conducting-power of the copper wire used in submarine telegraphy. Closely connected with this branch of his researches were the investigations which Dr. Matthiessen carried out for the Electrical Standard Committee of the British Association, of which he was one of the most active members. The resistance-coils issued by that Committee, which had been very generally adopted as standard instruments, were all constructed of an alloy of platinum and tin, which, after a long series of experiments, Dr. Matthiessen recommended as specially fitted for that purpose. Under the auspices of the British Association, Dr. Matthiessen undertook, a few years ago, the investigation of the chemical constitution of cast-iron, and of the influence exerted upon the physical properties of that metal by the several other elements which generally occur in association with it. He had lately elaborated a method of producing pure iron, which promised to be fruitful in interesting and important results in the hands of himself and the other chemists with whom he has been associated in this inquiry. Dr. Matthiessen's researches published in the *Philosophical Transactions*, on the action of oxidising agents upon organic bases and on the chemical constitution of narcotics (the latter investigation having been conducted in conjunction with Professor G. C. Foster), furnished proofs of the success of his labours in organic chemistry. His researches were distinguished as well for their diversity as for their uniformly complete and trustworthy character. — The following officers are elected for the ensuing year:—President: Sir Edward Sabine, L.L.D.; Treasurer: W. Allen Miller, M.D., LL.D. Secretaries: W. Sharpey, M.D., LL.D.; and G. Gabriel Stokes, LL.D. Foreign Secretary: Professor W. Hallows Miller, LL.D. The other members of the Council are: Frederick Currie, M.A.; Warren De la Rue, Ph. D.; Sir P. de M. Grey Egerton, Bart.; Professor W. H. Flower, F.R.C.S. Eng.; William Huggins; J. Gwyn Jeffreys; John Marshall, F.R.C.S. Eng.; Augustus Matthiessen, Ph. D.; Captain Henry Richards, R.N.; the Marquis of Salisbury, M.A.; C. W. Siemens; John Simon, F.R.C.S.; Archibald Smith, M.A.; Professor H. I. Stephen Smith, M.A.; Professor John Tyndall, LL.D.; and Professor Alexander W. Williamson, Ph.D.

Royal Astronomical Society, November 12.—First Meeting of Session. Mr. Warren De la Rue, F.R.S., vice-president, in the chair. The Chairman opened the meeting by referring to the illness of Admiral Manners, the president of the society, an announcement which was heard by all present with much regret. The minutes of the last meeting having been read and confirmed, and upwards of 100 presents announced, Mr. Carrington read a paper descriptive of his observatory near Farnham, Surrey, and of a variety of ingenious contrivances for securing its efficiency, and especially the correct measurement of time. Mr. Carrington intends observing with an alt-azimuth, which he has designed to ensure the comfort and consequent accuracy of the observer. The telescope-tube rotates freely on its axis, which is always horizontal; it carries the vertical circle, and in front of the object glass a right-angled prism, the front face of which may be directed on any object by the axil rotation of the tube of the telescope.—The Astronomer-Royal was then invited by the Chairman to describe his recent invention of a method of correcting the chromatic dispersion of the atmosphere. He described the various contrivances by which that object might be secured.

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The simplest method of all was the employment of a series of different angles suited to the altitude of the object; but as this has some inconveniences Mr. Simms suggested the employment of an adjustable prism, as, for example, adjustable tilting of the field-glass of the eye-piece. This method, though simple, introduced undesirable optical effects. It appeared necessary, therefore, that the correction should be effected outside the eye-piece; and the best method seemed to be the combination of a convexo-concave and a convexo-plane lens, the convexity of the latter fitting into the concavity of the former, and admitting of being rotated within it, so as to vary the corrective effect according to the state of the air or the position of the object observed. Mr. Cayley, F.R.S., afterwards noticed that the desired effect could be secured by combination of two prisms, in one of which there is a convex, and in the other a concave cylindrical surface of the same curvature; when these cylindrical surfaces are made to rotate on each other, the opposite faces of the combination can assume any relative position between parallelism and an inclination equal to the sum of the refracting angles of the component prisms. Both contrivances are described in Brewster's Optics; and it is satisfactory to consider that the troublesome effect of atmospheric chromatic dispersion can be corrected effectually by contrivances so well known.—The Astronomer-Royal then invited the attention of the meeting to a proposition which had been made by the American observers, that the passage of Venus over the solar chromosphere should be observed by spectroscopists during the transit of 1874, for the purpose of determining the solar parallax. Mr. Huggins described the methods of observation available for the purpose. Mr. Proctor expressed doubts as to the accuracy of the suggested method, remarking that the phenomenon, to be observed to the best advantage, would require other stations than those selected for observing internal contacts, and that the effect of parallax, by causing Venus to cross different parts of the chromosphere, as seen from different stations, would be a fatal objection, since we have no reason for believing that the chromosphere is uniformly deep. He remarked also that we are not merely ignorant of the exact point at which Venus will cross the sun's limb, but of the angle at which her path will be inclined to the limb. Mr. Stone intimated his belief that we should find a number of difficulties cropping up around the new method, which might render observations as unsatisfactory as those made in 1769 upon the internal contact.—After some remarks by the Chairman upon the advantages of applying photography to the coming transits, a paper by Mr. Alexander Herschel, on the November meteors, was read to the meeting. Mr. Herschel shows that there is evidence of a triplicity in the meteoric stream, since in 1868 three distinct maxima were observed in England, America, and China. In 1867 and 1866 also, three maxima were observed, but they were not separated by so wide an interval.—Mr. Proctor then read a paper on the application of photography to the transit of 1874. The paper was illustrated by a chart exhibiting the passage of the earth through the shadow-cone of Venus, and showing along what lines stations should be placed, at any time, so that the relative displacement of Venus might be along a radial line of the sun's disk. By so selecting stations (or times) he remarked, the whole question would become simply one of parallax, no appreciable error would come in through misplacement of the fiducial cross-lines, and so photography would do the best work it was capable of, for determining the sun's distance. In reply to Mr. Proctor's comments on the importance of the coming transits, Mr. Stone pointed out the close correspondence of the results he has deduced from the observations in 1769., with the various other determinations of the sun's distance, and expressed his doubts whether any important improvement can be made in 1874 and 1882.—Mr. Birt then read a paper on the spots which are visible on the floor of the lunar crater Plato, of which he exhibited an interesting drawing.—Mr. Browning read a paper on the changes of colour which the equatorial belt of Jupiter has recently exhibited; and indicated the importance of a careful series of observations directed to the determination of any periodicity which may exist in these changes.—In describing the American photographs of the eclipse of last August, Mr. De la Rue remarked that they confirm the evidence already afforded by his own observations in 1860, and those of Major Tennant in 1868, that the corona, in part at least, is a solar phenomenon.—The meeting closed with an announcement on the part of the Chairman, that a medal had been struck at the Imperial Mint of France in honour of Hind, Goldschmidt, and Luther, on the occasion of the discovery of the hundredth planetoid in 1868.

Geological Society, November 24.—Prof. T. H. Huxley, LL.D., F.R.S., President, in the chair.—Robert Arnold Barker, M.D., Civil Medical Officer, Cachar, Bengal, was elected a Fellow of the Society.—The following communications were read:—(1), On the Dinosauria of the Trias, with observations on the Classification of the Dinosauria," by Prof. Huxley, LL.D., F.R.S., President. The author commenced by referring to the bibliographical history of the Dinosauria, which were first recognised as a distinct group by Hermann von Meyer in 1830. He then indicated the general characters of the group, which he proposed to divide into three families, viz.:—

I. The MEGALOSAURIDÆ, with the genera *Teratosaurus*, *Palæosaurus*, *Megalosaurus*, *Poikilopleuron*, *Lælaps*, and probably *Euskelosaurus*;

II. The SCELIDOSAURIDÆ, with the genera *Thecodontosaurus*, *Hylæosaurus*, *Pholacanthus*, and *Acanthopholis*; and

III. The IGUANODONTIDÆ, with the genera *Cetiosaurus*, *Iguanodon*, *Hypsilophodon*, *Hadrosaurus*, and probably *Stenopelys*.

Compsognathus was said to have many points of affinity with the Dinosauria, especially in the ornithic character of its hind limbs, but at the same time to differ from them in several important particulars. Hence the author proposed to regard *Compsognathus* as the representative of a group (*Compsognatha*) equivalent to the true Dinosauria, and forming, with them, an order to which he gave the name of ORNITHOSCELIDA. The author then treated of the relations of the Ornithoscelida to other Reptiles. He indicated certain peculiarities in the structure of the vertebræ which serve to characterise four great groups of Reptiles, and showed that his Ornithoscelida belong to a group in which, as in existing Crocodiles, the thoracic vertebræ have distinct capitular and tubercular processes springing from the arch of the vertebra. This group was said to include also the Crocodilia, the Anomodontia, and the Pterosauria, to the second of which the author was inclined to approximate the Ornithoscelida. As a near ally of these reptiles, the author cited the Permian *Parasaurus*, the structure of which he discussed, and stated that it seemed to be a terrestrial reptile, leading back to some older and less specialised reptilian form. With regard to the relation of the Ornithoscelida to birds, the author stated that he knew of no character by which the structure of birds as a class differs from that of reptiles which is not foreshadowed in the Ornithoscelida, and he briefly discussed the question of the relationship of Pterodactyles to birds. He did not consider that the majority of the Dinosauria stood so habitually upon their hind feet as to account for the resemblance of their hind limbs to those of birds, by simple similarity of function. The author then proceeded to notice the Dinosauria of the Trias, commencing with an historical account of our knowledge of the occurrence of such reptilian forms in beds of that age. He identified the following Triassic reptilian-forms as belonging to the Dinosauria:—*Teratosaurus*, *Platæosaurus*, and *Zanclodon* from the German trias; *Thecodontosaurus* and *Palæosaurus* from the Bristol conglomerate (the second of these genera he restricted to *P. cylindrodon* of Riley and Stutchbury, their *P. platyodon* being referred to *Thecodontosaurus*); *Cladyodon* from Warwickshire; *Deuterosaurus* from the Ural; *Ankistrodon* from Central India; *Clepsysaurus* and *Bathygnathus* from North America; and probably the South African *Pristerosaurus*.—Sir Roderick Murchison, who had taken the chair, inquired as to the lowest formation in which the bird-like character of Dinosaurians was apparent, and was informed that it was to be recognised as low as the Trias, if not lower.—Mr. Seeley insisted on the necessity for defining the common plan both of the Reptilia and of the ordinal groups before they could be treated of in classification. He had come to somewhat different conclusions as to the grouping and classification of Saurians from those adopted by the President. This would be evident, in so far as concerned Pterodactyles, from a work on Ornithosauria which he had just completed, and which would be published in a few days.—Mr. Etheridge stated that the dolomitic conglomerate, in which the Thecodont remains occurred near Bristol, was distinctly at the base of the Keuper of the Bristol area, being beneath the sandstones and marls which underlie the Rhætic series. There were no Permian beds in the area. He regarded the conglomerates as probably equivalent to the Muschelkalk. It was only at one point near Clifton that the Thecodont remains had been found.—Prof. Huxley was pleased to find that there was such a diversity of opinion between Mr. Seeley and himself, as it was by discussion of opposite views that the truth was to be attained. He

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accepted Mr. Etheridge's statement as to the age of the Bristol beds.—2. The Physical Geography of Western Europe during the Mesozoic and Cainozoic periods, elucidated by their coral faunas, by P. Martin Duncan, M.B.Lond., F.R.S., Secretary. The author commenced with a notice of the typical species of the coral fauna of the deep seas which bound continents remote from coral-reefs, and then made some remarks upon the littoral corals. The peculiarities of reef, lagoon, and shallow-water species were then explained, with the relations of the two faunas to one another. The author then referred to certain exceptional species, indicated the genera, the species of which constitute the existing reefs, and contributed to form those of the past, and noticed the representatives of some modern genera in old reefs. He pointed out that a correspondency of physical conditions during the deposition of certain strata was indicated by their containing analogous forms—the presence of compound cœnenchymal species indicating neighbouring reefs, and their absence in places where simple or non-cœnenchymal Madreporaria are found being characteristic of deep-sea areas remote from the coral-seas. By applying the principles thus elaborated to the evidence as to the condition of the seas of the European area from the Triassic period to the present time, the author then showed what must probably have been the physical condition of this part of the world at different periods. —Prof. Alex. Agassiz accounted for the circumscribed area of many corals in the Atlantic from the young of many coral species attaching themselves within a few hours of their becoming pelagic. He traced to the great equatorial current which must have traversed the Isthmus of Panama and the Sahara in a pre-cretaceous period, the distribution of certain forms, which the rising of the Isthmus of Panama eventually checked. He thought that the limits of the depth at which true reef-building corals existed would be considerably extended in consequence of recent discoveries by means of dredging. He mentioned the formation of a reef at the present time off the coast of Florida, which threw light on the manner in which mudflats were formed, and the sea eventually filled.—Mr. J. Gwyn Jeffreys objected to the term deep sea being applied to a depth of ten fathoms only, when the tide in some places rose to that extent, and the laminarian zone extended to fifteen. He suggested fifty fathoms as a more appropriate measure. He remarked on the great vertical range of some simple species of corals, such as *Caryophyllia*, amounting to at least 150 fathoms from low-water mark. In deep-sea water it frequently was attached to various shells, such as *Ditrypa* and *Aporrhais*. The only other simple coral of our seas was never found at a depth of less than seventy-five fathoms. The compound corals occurred only at great depths. Dr. Duncan drew a distinction between coral-reef areas and those in which different conditions prevailed. His argument had not so much been based on the depth of the sea as on the presence or otherwise of coral-reefs. The term deep sea had been given by Professor Forbes to depths of ten fathoms and upwards. For such depths as those explored at the present day no term short of "abyssal" was appropriate. Specimens illustrative of his paper were exhibited by Professor Huxley.—The President called the attention of the Fellows of the Society to a proposed memorial to the late Baron von Humboldt, and another to the late Prof. J. B. Jukes, in aid of which contributions were desired. He referred to circulars and letters which were laid on the table, and recommended these memorials to the favourable consideration of the Fellows.

Edinburgh

Royal Physical Society, November 24.—This was the first meeting of the session. Dr. Stevenson Macadam, the President, delivered an address on the subject of Chemical Geology, in which he stated that chemistry had much to do in the explanation of geological phenomena, and though not a believer in the chemical doctrine of volcanic action as generally understood, yet he trusted to show that the geologist must accept the hand of the chemist in climbing up to an intelligent explanation of geological changes on the surface of the globe. The day has now gone by for either Plutonists or *firemen*, or Neptunists or *watermen*, to hold undisputed sway in the interpretation alike of ancient and modern changes; and the truth lies in the golden mean, and may be best sought for in the earnest endeavours to cull knowledge from all the contending elements. The first lesson which chemistry teaches us is to proceed cautiously and modestly to work. The geologist, with hammer in hand and a good share of physical force, is almost taught by the nature of his vocation to expect the same results from the same causes, operating in much the same way, and he becomes bold in theory and difficult to dislodge in his opinion; but the chemist is taught by the very nature of his science to proceed with slow and cautious steps, not only in experimenting, but also in theorising, and he learns soon that the same results need not necessarily proceed from the same causes, and that slight alterations in the mode of working may produce different results. More than that, the same results can be achieved by several modes of working. The President then alluded to chemical reaction as affecting geological phenomena; the weathering of rock masses; the influence of water holding certain gases and salts in solution on mineral substances; the production of limestone and other rocks; and the formation of coal. The effect of heat as well as water in the production of crystalline forms was alluded to, as well as the artificial formation of precious minerals, such as the ruby and sapphire. The cause of volcanic phenomena was neither solely connected with the existence of internal molten masses capable of being squeezed or blown through the external crust of the globe, nor to the presence of large quantities of the alkaline and other metals ready to be burned and ignited on the approach of water; but the President believed that the spheroidal theory of the earth's crust, propounded by himself years ago, coupled with the doctrine of the correlation of the physical forces, was sufficient to account for all volcanic phenomena. The earth is constantly under magnetic and electrical disturbance, and knowing, as can now be proven, that the physical magnetism and electricity can become heat, there seems no necessity for fancying the existence of reservoirs of molten matter waiting for ages to be discharged through the crust, or regions of uncombined chemical elements longing for water to quench their thirst. The President showed experimentally the passage of magnetism into electricity and heat, by means of large magneto-electric apparatus, which heated and fused various metals. The address concluded with reference to spectrum analysis, as indicating the composition of the sun and other stars, and as demonstrating that there is a brotherhood of matter and force throughout the universe.

The following gentlemen were elected:—As foreign members on the recommendation of the Council—Mr. C. Hitchcock, State Geologist, Vermont, U.S.; Premier Lieut. Dr. C. F. Lutken, assistant in the Zoological Museum, Copenhagen; Dr. O. A. Loweson Morch, University Museum, Copenhagen. As resident members—Mr. R. Scott Skirving, Camptown—proposed by J. M'Bain, M.D., R.N.; Mr. H. Budge, C.A., 7, Hill Street—proposed by M. R. Brown.

Dublin

Statistical and Social Inquiry Society, Nov. 23.—Robert McDonnell, M.D., F.R.S., read a paper on Patronage and Purchase in making Hospital Appointments. Dr. McDonnell condemned the system of purchase, adducing many reasons for doing so. In discussing the question he avoided all personalities, not alluding to the practice of any one hospital, but relying solely on the importance of appointments being made, not on account of the amount of money that a candidate could produce, but on account of his general ability and merits.

Paris

Academy of Sciences, November 22.—M. Becquerel communicated an eighth memoir upon electro-capillary phenomena, in which he treated of respiration, and the nutrition of the tissues, and of the muscular currents and the current of the other tissues. The author stated his principle as follows: Two different liquids, separated by a tissue, that is to say, a porous body capable of being soaked by the liquids, give origin to electrical currents resulting from the recomposition of two electricities set free in the reaction of the liquid, the walls of the capillary spaces acting as solid conducting bodies. These currents the author denominated *electro-capillary*, and the object of his paper was to demonstrate their action in the vital phenomena above mentioned, in order to establish an electro-chemical theory of life. —The dispute about wine-heating was advanced a stage by the presentation of a note from M. Vergnette-Lamotte in answer to M. Pasteur's last communication.—Of two astronomical papers by Father Secchi, the first related to the spectrum of the planet Neptune, and to some facts in spectrum analysis, and the second described a new arrangement for the observation of the spectra of the smaller stars, and referred also to the meteors of the 14th November. The author stated that the spectrum of Neptune, like that of Uranus, presents bands of absorption which do not occur in the solar spectrum. Of the three principal bands, one occurs at the limit of the geeen and yellow, about

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half-way between D and b; a second in the place of the line b in the solar spectrum, and the third, which is fainter, in the blue. Beyond the yellow, in the opposite direction, the spectrum suddenly terminates. The author remarked upon the accordance of this spectrum with the colour of the planet, and upon the indistinctness of its outline under high magnifying powers. The author also indicated a means of obtaining two superposable spectra, and stated that he had observed that the spectra furnished by Geissler's tubes were essentially different according as the light was taken from the tubes, the bulbs, or the luminous sheaths of the wire. In his second paper Father Secchi stated that in order to observe the spectra of the smaller stars, he had adopted the plan of placing a large prism before the object-glass of his telescope, and obtained favourable results, some of which he communicated.—A note by M. F. Massieu, supplementary to a paper presented by him on the 18th October, was read. It related to characteristic functions in thermodynamics.—M. P. Gauthier communicated an essay on the movement of a projectile in the air; M. J. Carvallo, an investigation of the stability of beacon towers: M. E. Roger, a note on some general properties of curved surfaces; MM. Curie and Vigier communicated the results of some experiments upon animals, indicating that turpentine is not, as was supposed by M. Personne, an antidote for phosphorus. They also remarked that the hypothesis that the toxical action of phosphorus is due to its depriving the blood of oxygen was not compatible with the small doses of phosphorus which may prove fatal.—A note from M. Zantedeschi on the calorific rays of the moon was read, in which he indicated that the heating effect of the moon's rays was demonstrated in 1685 by G. Montanari, and in 1781 by P. Frisi. The author also cited his own experiments.—A note on the calculation of the going of chronometers to determine longitudes, by M. H. de Maguay, was read, giving the results of observations upon these chronometers, and upon this M. Yvon Villarceau made some remarks.—A note by M. Bontemps on the coloration of glass under the influence of the solar light, was presented. In this paper the author adduces numerous examples of the production of a greater or less change in the colour of glass by long exposure to the sun's rays.—A note on the physical properties of arable soils, by M. Hervé-Mangon, was read, in which the author called attention to certain physical properties of soils, such as their calorific power, their power of condensing and holding gases, and especially their behaviour with regard to water and aqueous vapour, which are of as much importance as their chemical properties in estimating the qualities of the soils. He described the means by which these properties of soils may be investigated.—An extract from a letter by Mr. C. T. Jackson, of Boston, was communicated, giving an account of the copper-mines of Lake Superior, and of a new deposit of tin in the State of Maine. He mentioned a mass of native copper obtained at a depth of 480 feet in the Phœnix mine last June, measuring 65 feet long, 32 feet high, and 4 feet thick at the exposed end. He estimated that this mass would furnish about 1,000 tons of copper, and stated that it was contained in a true vein, cutting at right angles several beds of trap and other rocks. The gangue consisted of calc spar, quartz, and pretruite. The deposit of tin noticed by the author was said to be in the neighbourhood of the town of Winslow, where the mineral occurs in more than 40 little veins, varying in thickness from ¼ inch to 1 foot, occupying a space between the metamorphic limestone and gneiss which constitute the country. The author obtained from the rough mineral 46 per cent. of tin.—A letter from M. A. Rojas entitled "Echoes of a seismic tempest" was communicated. It contained an account of disturbances, chiefly manifested by the rise and fall of water, which occurred in various parts of South America simultaneously with the great Peruvian earthquake of the 13th August, 1868.—A letter by MM. E. Harny and F. Lenormant, dated at Thebes, was communicated, in which they announced the discovery of traces of the Stone Age in Egypt. They found an immense quantity of worked flints of all kinds upon a small space of the plateau separating the valley of Biban-el-Molouk from the escarpments which look over the ruins of Deir-el-Bahari. They compared the place to what is known in France as a "workshop of the Neolithic period."—M. Balbiani communicated an investigation of the development and propagation of *Strongylus gigas*, in which he described the production and structure of the egg, and the development of the embryo of that parasite, the embryo of which he said, remains in the egg for five or six months in winter, and may remain there for a whole year. The author described his experiments, from which it appears that this parasite does not pass directly from the egg into the animal in which it acquires its perfect development.—M. P. Fischer described the copulation and spawning of the *Aplysiæ* and *Dolabriferæ*, as observed by him in the aquarium at Arcachon. In the *Aplysiæ*, the same individual serves alternately as a male and as a female; and the author mentioned his having several times seen five or six individuals united to form a chain, each of them, except the first and last, performing the function of both sexes at once. In the *Dolabrifera*, which is likewise hermaphrodite, the copulation of the two individuals is reciprocal. The author described the emission and mode of attachment of the ribbon of eggs produced by the *Aplysiæ*, which, according to him, is sometimes as much as 120 times the length of the body of the Mollusk.—A note on the aanatomy of the Alcyonaria, by MM. G. Pouchet and A. Myèvre, was presented, as also some other papers of which the titles only are given.

ITALY

Royal Lombardy Institute of Science and Literature.

The following Prize Questions are proposed by this Institute:—

ORDINARY PRIZES OF THE INSTITUTE.

Class of Literature and of Moral and Political Science.

For 1870.—To what extent is it the right or duty of Government to interfere in the education of the people, and how ought this interference to be exercised?

1. To determine whether it is a right or a duty.
2. To inquire how the exercise of such right, or the performance of such duty, can be reconciled with the acknowledged and inalienable principle of liberty, civil, political, and religious. (To be delivered in Feb. 1870.)

Class of Mathematical and Natural Science.

For 1871.—Required an Essay on the physical and chemical nature of the various mineral combustibles of different epochs, with the view of determining whether there are any means of establishing a new classification thereof, which may serve to diminish, if not to remove, the ambiguities relating to the importance of the several deposits of mineral fuel, having regard to their quality, and to the extent of their deposits. (To be delivered in Feb. 1871. Prizes for this and the preceding question, 1,200 lire.)

TRIENNIAL MEDALS OF THE INSTITUTE.

The Royal Institute of Lombardy, according to the fifteenth article of its organic regulations, "adjudges every three years two gold medals, each worth 1,000 lire, for the promotion of agricultural and manufacturing industry; one of which is intended for those Italian citizens who have contributed to the progress of agriculture in Lombardy, by means of discoveries, or of methods not yet put in practice, the other to those who have conspicuously improved, or successfully introduced into Lombardy a given manufacturing industry."

Those who wish to compete for these medals are requested to present their claims, accompanied by the necessary documents, to the Secretary of the Institute, at the Palazzo di Brera in Milan, not later than the 1st of March, 1870.

ORDINARY PRIZES OF THE FONDAZIONE CAGNOLA.

For 1870.—Required a Memoir, treating of the attained or possible advantage to the agriculture of any of the provinces of the Kingdom of Italy, and especially of Lombardy, arising from the introduction, accomplished or possible, of the doctrines or practices recommended at the present day by the progress of Physics, Chemistry, or Meteorology. (For Feb. 1870. Prize, 3,000 lire, including a gold medal, worth 500 lire.)

For 1871.—A Monograph on the poisonous and explosive substances extracted from coal, and on the hygienic measures to be adopted in the preparation, commerce, and transport of these bodies. (To be delivered Feb. 1871. Prize, 1,500 lire, with a gold medal of the value of 500 lire.)

For 1872.—A Memoir giving, together with the necessary proofs by fact, a demonstration or a refutation of the curative or prophylactic efficacy of the alkaline and earthy sulphites or hypo-sulphites in intermittent fevers arising from malaria, comparatively with other means or remedies already known. (To be delivered in Feb. 1872. Prize, 1,500 lire, and a gold medal, worth 500 lire.)

The Memoirs to which prizes are awarded in the ordinary competitions of the Fondazione Cagnola remain the property of

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the authors; but the latter are bound to publish them within a year, consulting with the Secretary of the Institute as to the arrangements and characters, and consigning to the Institute fifty copies, after which only will the money be paid.

The Institute and the representative of the Fondazione Cagnola reserve the right of printing a larger number of copies at their own expense.

EXTRAORDINARY PRIZE OF THE FONDAZIONE CAGNOLA.

For 1870.—A prize of 1,500 lire, and a gold medal of 500 lire, to the author of any work, MS. or printed, in Italian, Latin, or French, and published since 1860, which shall satisfactorily demonstrate the efficacy of any means for the cure of Gout.

The Memoirs and printed works must be presented in Feb. 1870; of the latter, two copies must be presented, with precise indication of the passages in which the discovery in question is treated. The prize may be awarded in part, and the award will take place on the 7th of August, 1870. The printing or the custody of the manuscripts to be regulated as for the ordinary prizes of the Foundation.

PRIZES OF THE FONDAZIONE SECCO-COMNENO.

For 1870.—Chemico-microscopic investigation of the curd of milk, to determine whether its active principle resides in a biological ferment, or in any other chemical agent, so as to estimate exactly the quantity required in the making of cheese. (To be delivered Feb. 1870. Prize, 864 lire.)

For 1872.—To determine, on chemical principles, and by appropriate experiments, what are the best anti-fermentatives or antiseptic substances; also the best disinfectants and deodorizers, simple or compound, indicating their various uses and relative costs, with special reference to recent investigations. (To be delivered Feb. 1872. Prize, 864 lire.)

The prize-memoir to remain the property of the author; but he must publish it within a year from the date of award, consigning eight copies to the managers of the "Ospitale Maggiore di Milano," and one to the Institute, for comparison with the MS.; after which only will the money be paid.

PRIZES OF THE FONDAZIONE BRAMHILLA.

For 1870.—Prize of 3,000 lire and commemorative silver medal to any one who, by the 30th of Nov. 1869, shall have established in Lombardy a manufacture of phosphates, prepared for agricultural use, on a scale sufficient for the manuring of at least 200 hectares per annum. (To be delivered Jan. 1870.)

For 1871.—Prize of 4,000 lire to any one who has invented or introduced into Lombardy any new machine or industrial process, or other improvement from which the population may obtain a real and demonstrated advantage. (To be delivered Jan. 1871.)

The competitors for the prizes of this Foundation must present their claims, accompanied by the requisite documents, within the time specified, to the Secretary of the "Royal Lombardy Institute of Science and Literature," in the Palazzo di Brera at Milan.

General Regulations for all the Scientific Competitions.

These competitions are open to all persons, native or foreign, excepting the actual members of the Royal Institute; the Memoirs must be written in Italian, French, or Latin, and they must be sent, post-free, at the times specified, to the Secretary of the Institute, at the Palazzo di Brera in Milan; and, according to the academic regulations, they must be anonymous, and distinguished by a motto repeated in a sealed packet, containing the christian name, surname, and residence of the author.* Particular attention is recommended to this regulation, as in default of compliance therewith, the Memoirs will not be taken into consideration.

To avoid mistakes, the competitors are also requested to state clearly *for which* of the prizes proposed by the Institute they intend to compete.

All the manuscripts will be preserved in the archives of the Institute, authors being at liberty to have copies of them taken at their own expense.

Authors of Memoirs to which prizes are not awarded are at liberty to withdraw the corresponding packets within a year after the adjudication of the prizes, which will take place in solemn assembly on the 7th of August following the close of the competitions.

* This regulation does not apply to the competitions for the extraordinary prizes of the Fondazione Cagnola, or for the prizes of the Fondazione Bramhilla.

DIARY

THURSDAY, DECEMBER 2.

SOCIETY OF ANTIQUARIES, at 8.30.—A Chalice of the Fifteenth Century, and Chalices generally; Mr. Octavius Morgan, M.P., V.P.S.A.
LINNEAN SOCIETY, at 8.30.
CHEMICAL SOCIETY, at 8.30.
LONDON INSTITUTION, at 7.30.—Architecture: Prof. R. Kerr.

FRIDAY, DECEMBER 3.

GEOLOGISTS' ASSOCIATION, at 8.
PHILOLOGICAL SOCIETY, at 8.30.
ARCHÆOLOGICAL INSTITUTE, at 4.

MONDAY, DECEMBER 6.

ENTOMOLOGICAL SOCIETY, at 7.
MEDICAL SOCIETY, at 8.
VICTORIA INSTITUTE, at 8.
LONDON INSTITUTION, at 4.—Elementary Physics: Prof. Guthrie.
SOCIETY OF ARTS, at 8.—The Spectroscope and its Applications: Mr. J. Norman Lockyer.
ROYAL INSTITUTION, at 2.—General Monthly Meeting.

TUESDAY, DECEMBER 7.

CIVIL ENGINEERS, at 8.—On Public Works in the Province of Canterbury, New Zealand: Mr. Edward Dobson, Assoc. Instit. C.E.—On Ocean Steam Navigation, with a view to its further development: Mr. John Grantham, M. Inst. C.E.
PATHOLOGICAL SOCIETY, at 8.
ETHNOLOGICAL SOCIETY, at 8.—Report on the Prehistoric Remains in the Channel Islands: Lieut. S. P. Oliver, R.A.—On the Megalithic Monuments of Brittany: The Rev. W. C. Lukis.
SYRO-EGYPTIAN SOCIETY, at 7.30.—On the Obliteration of the Name and Figure of Amun, and the Restoration of both in the time of Rameses the Second: Mr. Bonomi.

WEDNESDAY, DECEMBER 8.

SOCIETY OF ARTS, at 8.—Prints and their Production: Mr. S. T. Davenport.
GEOLOGICAL SOCIETY, at 8.—Notes on the Brachiopoda hitherto obtained from the Pebble-bed at Budleigh Salterton, near Exmouth: T. Davidson, Esq., F.R.S.—On the Relation of the Boulder-clay without Chalk of the North of England to the Great Chalky Boulder-Clay of the South: Searles V. Wood, Esq., Jun.—On the Iron-ores associated with the Basalts of the North-east of Ireland: Ralph Tate, Esq., F.G.S., and J. S. Holden, M.D.
ROYAL MICROSCOPICAL SOCIETY, at 8.—On Deep-sea Dredgings from the Vicinity of China and Japan: Prof. Rymer Jones, F.R.S.
ARCHÆOLOGICAL ASSOCIATION, at 8.

THURSDAY, DECEMBER 9.

ROYAL SOCIETY, at 8.30.
SOCIETY OF ANTIQUARIES, at 8.30.
ZOOLOGICAL SOCIETY, at 8.30.
MATHEMATICAL SOCIETY, at 8.
LONDON INSTITUTION, at 7.30.

BOOKS RECEIVED

ENGLISH.—The Life and Letters of Faraday, 2 vols.: Dr. Bence Jones (Longmans).—Ornithosauria and Reptilia from the Secondary Strata: H. G. Seeley (Deighton, Bell, and Co.).—Proceedings of the Royal Physical Society of Edinburgh, 1862–6 (Williams and Norgate).—A System of Mineralogy: J. D. Dana and G. J. Bush (Trübner and Co).—More Light, a Dream in Science (Wyman and Sons).—The Best Method of Developing the National Talent for Music: H. L. Bellini (Mallett).—The Origin of Seasons considered from a Geological Point of View: Samuel Mossman (Blackwood and Sons).—The Advanced Atlas, Progressive Atlas, Primary Atlas (W. Collins, Sons, and Co.).

AMERICAN.—Annual Report of the Trustees of the Peabody Academy of Science (Trübner and Co).

FOREIGN.—Voyages Aeriens: Glaisher, Flammerion, W. de Fonvielle and Tissandier (Hachette).—Histoire de la Création: H. Burmeister.—La Chambre Noire et la Microscope, Photomicrographie practique: Jules Girard.—Ueber Thal- und See-Bildung: Prof. L. Rutimeyer.—Beobachtungen und Rechnungen über veränderliche Sterne von Dr. F. W. A. Argelander.—Allgemeine Himmelskunde.—Ueber das Zurückbleiben in den Naturwissenchaften.—Karl Ludwig Freiherr von Reichenbach: Dr. A. R. T. Schrötter.—Eierstock und Ei: Prof. W. Waldeyer. (Through Williams and Norgate.)

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