ductive cycles of both animals and plants, and so close is their correspondence, amid a host of complex structural details, that it is in the highest degree improbable that the two series of phenomena can have been independently evolved; and whatever the synapsis may eventually turn out to be, it is evidently a cellular metamorphosis of a profoundly fundamental character, which would appear to have been acquired before the animal and vegetable ancestry went apart, and to have existed ever since.—Notes on the fecundation of the egg of *Sphærechinus granularis*, and on the maturation and fertilisation of the egg of *Phallusia mammillata*, by M. D. Hill (plate 17). In these forms there is no egg astrosphere or egg centrosome; both these structures are brought into the ovum by the spermatozoon, and they give rise by division to all the subsequent astrospheres and centrosomes throughout ontogeny. There is consequently no such thing as a "quadrille."—Further remarks on the cell-theory, with a reply to Mr. Bourne, by Adam Sedgwick, F.R.S.

*Symons's Monthly Magazine* for December contains a climatological table and summary for various selected stations of the British Empire, for the year 1894. Australia records the highest shade temperature, viz. 107°·0 at Adelaide, on November 26, and it was the dryest station. In the twelve years for which the annual summaries have appeared, this station has yielded the highest maximum in ten years, Melbourne in one, and Calcutta in one. The lowest temperature in the shade was recorded at Winnipeg, −46°·1 on January 24. This station has never been equalled for lowness of absolute shade temperature, and has only twice failed to record the greatest mean daily range; the variation during the year amounted to 141°·9. The dampest station was Esquimalt, where the mean humidity was 88 per cent.; London comes next, being 81 per cent., and both these places were the most cloudy, the average amount being 6·3. The least cloudy stations were Bombay and Grenada, where the average amount was 4·0. The greatest annual rainfall, 77·5 inches, occurred at Colombo, and the least, 18·1 inches, at Winnipeg. The Cape of Good Hope observations were unfortunately missing.

*L'Anthropologie*, 1895, Tome vi. No. 4.—Quatenary deer of Bagnères-de-Bigorre (Hautes-Pyrénées), by Édouard Harlé.—A careful examination of the mandible has led the author to the conclusion that the animal to which it belonged was neither a reindeer nor a stag, but that it must be considered a variety of the fallow-deer; and its presence in conjunction with *Elephas primigenius*, *Rhinoceros tichorinus*, and the reindeer, at the foot of the Pyrenees, is a fact of some interest.—Note on the age of metals in the Ukraine, by Baron de Baye. The progress of civilisation was not uniform in the north and south of Russia in Europe. In the district south of a line which corresponds very closely with the 50th parallel of latitude, it has been found that the use of metals was known at a very early date, whilst the Stone Age continued for a much longer period in countries to the north of this line. Baron de Baye is careful to explain that the term "Scythian," which he uses freely in connection with the mounds and the various bronze articles found in them, does not express an anthropological unit, but is used in a purely geographical and ethnological sense. The numerous tribes, however, comprehended under this name had the same civilisation, practised the same arts and the same funeral rites, and left behind them similar archæological remains.—Anthropological observations on the tumuli and worked flints of the Somali and the Danakil, by Dr. Jousseaume. The tombs are constructed of rough stones, more or less spherical or ovoid in shape, and of various sizes. The flints are arranged by the author in four groups, the first of which is represented by a single specimen in the form of a wedge. The second group is spatulate, rather long, very thick, and always larger at one end than at the other. The flints included in the third group are discoidal, and of various sizes; while the fourth group includes all those that are lance-shaped.—Infantilism, feminism, and the hermaphrodites of the ancients, by Henry Meïge. In this section of his paper the author treats of feminism, of which a very beautiful example came under the observation of Prof. Charcot at La Salpêtrière.

*Bollettino della Società Sismologica Italiana*, vol. i., 1895, No. 6.—Earthquake of Paramythia (Epirus) during the night of May 13–14, 1895, by G. Agamennone (see p. 205).—The Guzzanti microseismoscope, by G. Guzzanti.—Notices of Italian earthquakes (April–May 1895), referring chiefly to the Florentine earthquake of May 18, and to the pulsations of the earthquake of Paramythia of May 13–14.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, November 28, 1895.—"The Expansion of Argon and of Helium as compared with that of Air and Hydrogen." By Dr. J. P. Kuenen, Professor of Physics in University College, Dundee, and Dr. W. W. Randall, Lecturer in John Hopkins University, Baltimore, U.S.A.

The gas-thermometer used for these experiments was such as could be easily heated by means of a "Ramsay and Young" vapour-jacket. It consisted of a bulb sealed on to a capillary tube, which in turn was sealed on to a wider tube, provided with a mark. This mark is situated just outside the heating arrangement, immediately below the capillary tube. The inner mercury-surface is made to coincide with this mark, and both this one and the outer surface are read on a scale with a telescope. The readings were duly corrected for capillary action, expansion of glass and mercury, and the part of the gas that is not heated. The results show that up to 240° C., the highest temperature that was employed, the expansion of both argon and helium is very nearly the same as that of air and hydrogen.

December 5, 1895.—"Studies in the Morphology of Spore-producing Members. Part II. Ophioglossaceæ." By F. O. Bower, F.R.S. Preliminary Statement on the Sorus of *Danæa*, by F. O. Bower, F.R.S.

In Part I. of these studies it had been shown on comparative grounds to be probable that septation of sporangia, previously in the race simple, had taken place among the Lycopodineæ. It appeared, however, important to show that such a process of septation has taken place elsewhere; examples of it are found in the anthers of many Angiosperms of the orders Mimoseæ, Onagraceæ, Loranthaceæ, Rhizophoreæ, &c. The development has been studied in certain cases, and it is seen that a partial sterilisation of sporogenous cells results in the formation of sterile septa, which may vary greatly in thickness from a broad band of tissue to a narrow one; sometimes the septum may be represented by a single layer of cells of the nature of a tapetum, or the septum may be incomplete. A comparison of these cases with plants of Pteridophytic affinity shows that similar structural and developmental details are found: the most conspicuous case is that of *Danæa*, in which large synangia are found on the under-surface of the leaf; these, though attached along the leaf surface, have a structural similarity to the spike of *Ophioglossum*. It is not uncommon to find in them, as in the Angiosperms quoted, great variety of size of the loculi, and of thickness of the septa, while incomplete septa are also common: the close parallel as to these characters is a very striking feature, and raises the probability of their having resulted from a similar mode of evolutionary progress, *i.e.* by septation.

The second part of the "studies" refers to the Ophioglossaceæ, and the suggestion made by various writers (Mettenius, Strasburger, Celakovsky, and others), that they are related to the Lycopods is upheld; it is supported on grounds of comparison of external form, of anatomy, of the characters of the Gametophyte and embryology, as far as known. From these various sources a general support of the relationship has been traced, the nearest point of comparison appearing to be between *O. Bergianum*, and *Phylloglossum Drummondii*. It is contended that the external similarity of these plants, long since recognised, is not a case of mere mimicry, but of real relationship, though this probably dates from an unknown common ancestry.

Such a relationship involves the idea of septation; but it has been shown that septation of a very similar nature has taken place in the anthers of Angiosperms. *Danæa* among Pteridophytes shows very similar characters, and, finally, a minute study of development in *Ophioglossum* has elicited facts which are compatible with such a view. From simple types of *Ophioglossum* a progression may be traced to the larger and more complex species, *e.g.*, *O. palmatum*; while a somewhat parallel sequence would lead from such a plant as *Botrychium simplex* onwards to the larger, elaborate species of the genus. *Helmin thostachys* appears to hold a somewhat independent position.

December 12, 1895.—"On the Formation and Structure of Dental Enamel." By J. Leon Williams, D.D.S., L.D.S.

The special points in the formation and structure of enamel,

which I have attempted to elucidate in this paper, may be summarised as follows:—

(1) The existence of a very thin membrane, or a structure of membrane-like appearance, lying between the ameloblasts and the forming enamel, and also between these cells and those of the stratum intermedium. I have also, in many specimens, seen a similar membrane covering the odontoblasts.

(2) The formation of enamel by deposit, and not by cell calcification. This deposit probably consists of two distinct cell products—a granular plasm and spherules of calcoglobulin.

(3) The relation of the cells of the stratum intermedium to true secreting tissue; this relation being especially marked in the enamel organs of the rat and mouse.

(4) An intricate vascular network in the stratum intermedium. I should also mention that I have seen a free distribution of blood vessels in the odontoblastic layer of cells in the mouse, rat, and calf, as well as in human embryos, thus conclusively proving that these cells are not calcified.

(5) The fibrous character of enamel in many of the lower animals, and the change of these fibres into more or less regularly arranged granules in the monkey and in man.

(6) That the varicosities of the enamel rods are not caused by acids (although often rendered more clear to view by acid treatment), but represent a true structural peculiarity of this tissue. That these varicosities, which often continue in an uninterrupted line across large fields of view, correspond with the course of one set of fibres. The varicosities may, therefore, be caused by the presence of this set of cross fibres. The only alternative explanation which has occurred to me is that there may be a rhythmic, simultaneous action of all the ameloblasts concerned in the deposit of the material for enamel building. The last theory seems to be less reasonable than the first.[1]

(7) The Retzius bands are often as distinctly marked in forming as in mature teeth, and in teeth which have been kept constantly moist, as they are in dried specimens. The enamel rods are often seen to pass without break across several of these bands. The bands are principally due to a deposit of pigment, and not to imprisoned air or gas, as claimed by von Ebner.

**Chemical Society**, December, 5, 1895.—Mr. A. Vernon Harcourt, President, in the chair.—The following papers were read:—Researches on the terpenes, VI. Products of the oxidation of camphene; camphoic acid and its derivatives, by J. E. Marsh and J. A. Gardner. Camphoic acid, $C_{10}H_{14}O_6$, is the chief oxidation product of camphene; a number of new derivatives of the camphopyric acids, $C_9H_{14}O_4$, are described.—New derivatives from α-dibromocamphor, by M. O. Forster. On treating α-dibromocamphor with nitric acid, a lactone, dibromocampholidid, $C_{10}H_{14}Br_2O_2$, is obtained; on reduction it yields an unsaturated acid, bromocamphorenic acid, $C_{10}H_{15}BrO_2$. Camphorenic acid, $C_{10}H_{16}O_2$, and campholidid, $C_{10}H_{16}O_2$, have been prepared.—Isomeric π-bromo-α-nitrocamphors, by A. Lapworth and F. S. Kipping. π-bromo-α-nitrocamphor is obtained, together with a bromocamphoric acid, by heating π-dibromocamphor with nitric acid; it is converted into an isomeride by crystallisation from hydrochloric acid. These two substances are probably cis- and trans-isomerides.—Derivatives of π-bromocamphoric acid, by F. S. Kipping. π-bromocamphoric acid, when treated with alkalis, yields first a lactonic acid, $C_{10}H_{14}O_4$, and then π-hydroxycamphoric acid, $C_{10}H_{16}O_5$; it probably contains the group $CH_2Br$.—π-dibromocamphoric acid and its derivatives, by F. S. Kipping. π-dibromocamphoric anhydride, $C_{10}H_{12}Br_2O_3$, is prepared by the action of bromine and red phosphorus on π-bromocamphoric acid; it yields π-dibromocamphoric acid, $C_{10}H_{14}Br_2O_4$, when heated with nitric acid, and π-bromocamphanic acid, $C_{10}H_{13}BrO_4$ on boiling with water.—ω-bromocamphoric acid, by F. S. Kipping. ω-bromocamphoric acid, isomeric with π-bromocamphoric acid, is obtained by hydrolysing Wreden's bromocamphoric anhydride.—π-chlorocamphoric acid, by F. S. Kipping and W. J. Pope. π-chlorocamphoric acid, $C_{10}H_{15}ClO_4$, is prepared by oxidising π-dibromocamphor with nitric acid.—Derivatives of α-hydrindone, by C. Revis and F. S. Kipping. Dibromohydrindone is obtained by the action of a soda solution of bromine on α-hydrindone at ordinary temperatures, whilst at 100° a condensation product of the composition $C_{18}H_{12}O_3$ is obtained. When monobromohydrindone is dissolved in cold alcoholic potash, a condensation product of the composition $C_{18}H_{13}BrO_2$ is deposited.—The alkaline reduction of metanitraniline, by R. Meldola and E. R. Andrews. Alkaline reducing agents convert metanitraniline into an azoxy-compound, $NH_2.C_6H_4.N\cdot\rangle O$; the corresponding azo-compound has also $NH_2.C_6H_4.N\rangle$ been prepared.—The chemistry of dibromopropylthiocarbimide; and the action of bromine and iodine upon allylthiourea, by A. E. Dixon.

**Linnean Society**, December 5, 1895.—C. B. Clarke, F.R.S., President, in the chair.—Messrs. Bernard Arnold and Rupert Vallentin were admitted, and the following were elected Fellows of the Society: W. M. Christy, Rev. H. P. Fitzgerald, A. W. Geffeken, Rev. E. A. Peacock, Rev. T. R. Stebbing, and W. O. Stentiford.—The President called attention to a portrait of the late Prof. Babington, of Cambridge, which had been lately presented by his widow to the Society. On the motion of Dr. Murie, seconded by Mr. A. W. Bennett, a vote of thanks to Mrs. Babington was unanimously accorded.—Prof. Stewart offered some remarks on the types of the axes of certain Gorgonaceæ, in which he referred chiefly to the importance or otherwise of the presence of spicules in the axes, and exhibited the following species in illustration of his remarks: *Paragorgia arborea*, *Melitodes ochracea*, *Suberogorgia suberosa*, *Corallium rubrum*, *Caligorgia verticillata*, *Verrucella guadalupensis*, *Isis hippuris*, *Plexaurella crassa*, and *Eunicella verrucosa*. Some criticism was offered by Dr. Murie, chiefly in relation to the structure of *Gorgonia flabellum* and *Gorgonia setosa*.—Mr. Martin Woodward exhibited and made remarks on a living specimen of *Ouramaba*, which he thought should be regarded as a common Amœba attacked by a parasitic fungus.—Mr. G. C. Druce communicated a paper on a new species of *Bromus* in Britain, which was said to differ from others of the genus in its inflorescence, having single, short, stiff pedicels arising alternately right and left of the main rachis, each bearing at its extremity 3–5 sessile, or in some cases shortly stalked spikelets, giving an interrupted and compact appearance to the whole inflorescence, which is made up of two rows of clustered groups of 3–5 spikelets. This peculiar feature being absent in its nearest allies, the name *interruptus* was proposed to distinguish it; another feature being that the palea was split to the base, and not merely bifid. It appeared to have been described or referred to by Prof. Hackel as *Bromus mollis*, var. *interruptus*, but Mr. Druce considered that it was sufficiently distinct to be entitled to specific rank. He had found it growing abundantly in a field of vetches near Upton, Berkshire, and specimens had been examined from Headington, Oxford, and Dartford, Kent. In a discussion which followed, Dr. O. Stapf reviewed the literature of the subject, and gave reasons for regarding the so-called new species as merely an abnormal growth of *Bromus mollis*. Critical remarks were made also by Mr. H. Groves and Mr. A. B. Rendle, who were inclined to share the opinion of the last speaker.—A paper was then read by Mr. W. F. Kirby, on some new or little-known *Phasmidæ* in the collection of the British Museum, with illustrative specimens.

**Mathematical Society**, December 12, 1895.—Major P. A. MacMahon, R.A., F.R.S., President, in the chair.—Prof. Hill, F.R.S., gave a sketch of a note on the convergency of series, by Dr. R. Bryant.—Lieut.-Colonel Cunningham, R.E., communicated at some length a paper on the criterion of 2 as a $16^{ic}$ residue. A discussion followed the reading, in which Messrs. Bickmore, Kempe and the President took part.—Dr. Hobson, F.R.S., read a short note on the distribution of electricity induced on an infinite disc with a circular hole in it, by Mr. H. M. Macdonald.—A paper by Dr. R. Lachlan, on the double foci of a bicircular quartic, and the nodal focal curves of a cyclide, was taken as read.

**Zoological Society**, December 17, 1895.—Sir W. H. Flower, K.C.B., F.R.S., President, in the chair.—Dr. Donaldson Smith offered some remarks on some of the animals observed by him during his recent journey to the Lakes Rudolph and Stephanie, and alluded especially to the species of zebras and antelopes encountered during his journey.—Mr. Sclater exhibited and made remarks on the head of an antelope obtained in Kavirondo, British East Africa, by Mr. E. Gedge. This antelope had been hitherto usually identified with the "kob" of Western Africa, but appeared to belong to a distinct species, to which the name *Cobus thomasi* had been given by Herr Neumann.—Mr. G. F. Hampson read a paper on the classification of two sub-families of the moths and of the family

[1] Since the above was written, I have demonstrated that there is a simultaneous deposit of the spherical bodies over the entire surface of forming enamel.—J. L. W.

Pyralidæ, the *Schœnobiinæ* and *Crambinæ*.—A communication was read from Mr. Oldfield Thomas, on *Cænolestes*, a still-existing survivor of the Epanorthidæ of Ameghino, and the representative of a new family of recent Marsupials.—Mr. Walter E. Collinge read a paper on the sensory and ampullary canals of *Chimæra*, and the innervation of the same.—Mr. F. A. Bather read a paper on the fossil crinoid *Uintacrinus*. The paper attempted a complete morphological description of *Uintacrinus socialis*, based on specimens from the Upper Cretaceous Beds of Western Kansas, now in the British Museum.—A communication from Dr. C. Brunner von Wattenwyl gave a list of the Orthoptera of the Hawaiian islands.

**Royal Meteorological Society,** December 18, 1895.—Mr. R. Inwards, President, in the chair.—Mr. R. H. Scott, F.R.S., read a paper on some of the differences between fogs, as related to the weather systems which accompany them. In this it was shown that there are at least two distinct classes of phenomena described under the generic name of "fog." In the case of anticyclonic fogs, no rainfall takes place; the temperature is low in the morning, and there is a considerable rise of temperature during the day; while in the case of cyclonic fogs, rainfall does take place, and the temperature is high in the morning, frequently approaching or even equalling the maximum for the day. Mr. Scott also investigated the cases of several well-marked fogs in London, and found that there was no direct relation traceable between the temperature accompanying them and the death rate.—Major H. E. Rawson described the results of his analysis of the Greenwich barometrical observations from 1879 to 1890, with special reference to the declination of the sun and moon.—A paper by Mr. S. C. Knott was read, giving the results of his meteorological observations taken at Mojanga, Madagascar.—Mr. Scott also exhibited some specimens of the illustrations in the "International Cloud Atlas," which is now being prepared for publication.

PARIS.

**Academy of Sciences,** December 23, 1895.—Annual public meeting.—M. Marey in the chair.—The President delivered an address, in which reference was made to the celebration, in October last, of the centenary of the Institute of France. The members and associates deceased during the year—MM. Pasteur, Verneuil, Larrey, Cayley, Dana, Vogt, Ludwig, Huxley, Lovén, Hellriegel—were referred to, and a brief *résumé* given of the life-work of each. The President then announced that a biennial prize (20,000 fr.), which is in rotation in the gift of each of the five Academies, and which this year fell to the Academy of Sciences, has been awarded to M. Raoult for his discovery of the numerical relations between the molecular weight of a substance and the lowering of the freezing point and vapour pressure of its solvent. The other prizes were awarded as follows: The Francœur prize to M. J. Andrade, the Poncelet prize to M. G. Robin, for his contributions to mathematical physics. In Mechanics, the extraordinary prize of 6000 fr. was divided between M. Mottez (2500 fr.), for his work on the correction of ships' compasses; M. Houette (1500 fr.), for his aids to navigation; M. Gosselin (1500 fr.), for his method of studying the velocity of projectiles; and M. Baucher (500 fr.), for his study of the action of sea-water upon metals. The Montyon prize was given to M. Galliot, for a new application of electric traction on canals; and the Plumey prize to MM. Pollard and Dudebout. The Fourneyron prize was divided between M. G. Marié and M. Lecornu, for their experimental and theoretical work on steam governors. In astronomy, the Lalande prize fell to M. M. Hamy; and the Valz prize to Mr. Denning (of Bristol), for his work on comets and shooting stars. In Physics, M. E. Bouty was accorded the La Caze prize for his numerous researches in electricity and magnetism; in Statistics, the Montyon prize was divided between M. A. Martin and M. C. Baltet, whilst honourable mention was accorded to MM. Hovelacque and Hervé. In Chemistry, the Jecker prize was divided between M. Tanret (6000 fr.), M. Renard (2000 fr.), and M. Burcker (2000 fr.); whilst the La Caze prize was given to M. Le Chatelier for his researches on the combustion of explosive mixtures, pyrometry, and thermodynamics of chemical processes. In Mineralogy and Geology, the Grand prize for the physical sciences was adjudged to M. C. Brongniart for his researches in palæontology; the Delesse prize to M. Delafond for his stratigraphical studies; whilst the Bordin prize is equally divided between M. de Pousargues and M. Barrat. In Botany, the Desmazières prize was awarded to M. Borzi, the Montagne prize to M. F. Renauld, and the De la Fons-Mélicocq prize (900 fr.) to M. G. de la Marlière. In Anatomy and Zoology, the Thore prize fell to M. P. Mégnin, the Savigny prize being not awarded. In Medicine and Surgery, three Montyon prizes were given, to MM. Gangolphe, Imbert, and Teisser; mentions and minor awards went to MM. Chipault, Gouguenheim and Glover, Polaillon, Bellini, and Parant. The Barbier prize was divided between M. Bœckel and M. Dupuy, the Bréant prize being left unawarded. M. E. Reymond was adjudged the Godard prize, M. Lancereaux the Chaussier prize, and M. Vaillard the Bellion prize, with honourable mention to M. Vincent and M. Rouget, M. Mauclaire and M. Detroye. The Mège prize was awarded to M. Baudron, and in connection with the Dusgate prize (not given) honourable mention was accorded to M. Icard. The Lallemand prize was divided between M. Toulouse and M. Halipré, with mention of MM. Chervin and Debierre. In Physiology, the Montyon prize was given to M. Artus (with mention of M. Tissot), the La Caze prize to M. Dastre, the Pourrat prize to M. Charrin, the Philipeaux prize to M. Chabrié, the Martin-Damourette prize being divided between M. Besson and M. Cristiani, with honourable mention of Dr. de Keating Hart. In Physical Geography, the Gay prize was awarded to M. Angot, a second prize (1000 fr.) being given to a paper by an anonymous author. General prizes: The Montyon prize (unhealthy industries) was given to M. Gérardin, the Trémont prize to M. B. Renault, the Gegner prize again to M. Paul Serret, the Petit D'Ormoy prize to M. Albert Ribaucour, for the mathematical sciences, and to M. Pomel for the natural sciences. The Leconte prize was awarded to Lord Rayleigh and Prof. Ramsay for their work on the constitution of atmospheric air. The Tchihatchef prize was adjudged to Dr. Radde, the Gaston Planté prize to MM. J. and P. Curie, the Saintour prize to M. Termier. The Cahours prize was divided between MM. Lebeau, Simon, and Varet, the Alberto Levi prize (50,000 fr.) between MM. Behring and Roux; to the former for his discovery of the antidiphtheric serum, and to the latter for the happy application which he has made in France of this discovery. The Kastner-Boursault prize was awarded to M. Baudot for his improvements in multiplex telegraphy, the Laplace prize to M. Bachellery, and the Felix Rivot prize to MM. Bachellery, de Ruffi de Pontevès Gevaudan, Delemer, and Labordère. Details of the prizes announced for 1896, 1897, 1898, and 1899 are given.

BERLIN.

**Meteorological Society,** November 5, 1895.—Prof. Hellmann, President, in the chair.—Dr. Zenker gave an abstract of a lengthy paper on the thermal constitution of climates. He explained how, from the solar radiation which he had previously calculated out for the outer boundary of the atmosphere, he had deduced that which takes place at the inner; and how from the latter, taking into account the radiation from the earth, and the existence of clouds, he had determined the annual and monthly temperatures for areas of each two degrees of the earth's surface. In part two of his paper, he had compared the temperatures calculated as above with those actually recorded for many places in India, Africa, America, and Australia.—Mr. Archenhold exhibited the negative of a photograph of a lightning-flash taken on August 24 last. The negative showed one narrow black flash on the dark field of the heavens above the brightly illuminated tree-tops, and a second much broader, bright flash, which was brighter than the tree-tops. The opinion was expressed that probably the great intensity of the possibly multiple flash may have led to the solarisation of its own image.

**Physiological Society,** November 8, 1895.—Prof. du Bois Reymond, President, in the chair.—Dr. Hausemann spoke on the large interstitial cells of the testis. He had found that they occur somewhat rarely in the connective tissue between the tubules in hibernators during their winter sleep, but are, on the other hand, extremely numerous after they awake. In man they are plentiful in the newly-born and children, less numerous at puberty and during manhood, and increase again largely in numbers in old-age.—Dr. Rawitz had repeated Loeb's experiments on the normal development of exovates, and the remains of impregnated sea-urchin's eggs after treatment with dilute sea-water. In most cases the exovates succumbed as well as the eggs; in only one case had he observed that while the exovate succumbed, the

egg developed into a complete gastrula. From this it appeared that the exit of a portion of the contents of the egg had no influence on the development of the remaining part.—Prof. Zuntz criticised a recent paper by Filehne and Kiouka, in which they attempted to disprove his view that the increased respiratory frequency during muscular exertion is due to the action on the respiratory centre of some product formed during the activity of the muscles. He showed that their objections do not hold good, and that their experiments do not upset his conclusions.

November 29, 1895.—Prof. du Bois Reymond, President, in the chair.—Dr. René du Bois Reymond spoke on the opposition of the thumb, a point on which very scanty and insufficient information is contained in text-books of anatomy. He had studied in detail the theory of saddle-joints, and on the assumption that the movements take place about two axes at right angles to each other and passing through the point of contact of the two bones, he had arrived by construction at a mathematical formula corresponding to the ideal saddle-joint. This formula shows that a certain very limited amount of rotation is possible in this joint. He had further investigated, by the horopter and photographically, the actual movements of the thumb, the hand being firmly fixed, and gave the several phases of the movements which occur in the joint between the metacarpus and trapezium, and between the phalanx and the metacarpus during opposition.—Dr. Schultz demonstrated on the humerus of a duck the connection between the lungs and the bone cavities.

**Physical Society**, November 15, 1895.—Prof. von Bezold, President, in the chair.—Prof. Warburg gave a short account of experiments, by W. J. Wäggener, on the temperature of the flame of a Bunsen burner. The measurements were made with carefully-tested Le Chatellier's thermo-electric elements. The accuracy of the measurements was further tested in two directions. Firstly, with reference to the effect of high temperature on the E.M.F. of the element, it was found that prolonged heating makes the platino-iridium wire more markedly irregular than it does the platinum; hence the element was exposed to the flame for a short time only. Secondly, with reference to the disturbing effect of heat conduction, it was found with wires of 0·5, 0·2, 0·1 and 0·05 mm. diameter, that when they are coiled up so that they can be almost completely enveloped in the zone of active combustion the three thicker wires recorded the same temperature, whereas, when not so coiled up, the thicker wires gave a lower temperature. The thinnest wire gave the highest values in the outer edge of the flame and in the zone of active combustion, in the inner cone a lower value than that given by the wire of 0·1 mm. The highest temperature recorded was 1704° C. Taking the highest records of the above four wires, and representing them graphically, a curve was obtained which gave the value 1750° C. for a wire of zero thickness, a temperature not much below the melting point of platinum, 1780° C.—Prof. Thiesen spoke on the formulæ which make it possible to obtain a perfect image with a simple lens.

AMSTERDAM.

**Royal Academy of Sciences**, October 26, 1895.—Prof. Van Sande Bakhuyzen in the chair.—Prof. Martin read a paper on Tertiary fossils from the Philippines. Basing his arguments upon a collection of fossils formed many years ago by Semper in the Philippines, the author showed that in Luzon, in the upper course of the Rio Grande de Cagayan, there appear neo-miocene strata, which must be considered equivalent to the typical neo-miocene of Java. Similar strata are also found in Cebú; moreover, neo-tertiary (miocene or pliocene?) fossils have been brought away by Semper from the hills of Aringay in Luzón, and finally pliocene ones from the Rio Agusan, Mindanáo. In the Philippines there occur tertiary and newer deposits, which correspond to the newer sediments in Java, both as regards the age and the petrographic structure and the fossil fauna of the said strata.—Mr. Jan de Vries presented a paper on a class of complete functions. Let W be a function of $\gamma$ of the $n$th degree, then the general formula is determined for a function that satisfies the equation $W_{n}-\gamma W_{n-1}+W_{n-2}=0$.—Prof. Kamerlingh Onnes communicated Dr. Zeeman's measurements on absorption of electrical vibrations in electrolytes, undertaken at the suggestion of Prof. Cohn of Strassburg, and carried out in the Leyden laboratory. The (as yet) preliminary results are: (1) the energy of the electric vibrations in pervading an electrolyte diminishes in the logarithmic ratio; (2) if the wave-length is 6·5 m., the energy has decreased to one-third of its original value when the wave has passed through 6·5 c.m. of a solution of common salt, the resistance of which is $3200\cdot10^{-10}$ that of mercury.—Prof. Lorentz presented, on behalf of Mr. A. Smits, a paper, entitled "A Description of the Micromanometer." By means of the instrument described, a difference of pressure equal to $\frac{1}{1500}$ m.m. of water or $\frac{1}{20250}$ m.m. of mercury, may, if all precautions possible are taken, be measured under the most favourable conditions.

## BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Gesammelte Abhandlungen über Entwickelungsmechanik der Organismen: Prof. W. Roux, Erster and Zweiter Bands (Leipzig, Engelmann).—Die Mikroskopische Thierwelt des Süsswassers: Dr. F. Blochmann. Abthg. 1. Protozoa (Hamburg, Gräfe).—Fauna der Gaskohle und der Kalksteine der Permformation Böhmens: Dr. A. Fritsch, Dritter Band (Prag, Rivnác).—Die Haustiere und Ihre Beziehungen zur Wirtschaft des Menschen: E. Hahn (Leipzig, Duncker).—The Story of the Solar System: G. F. Chambers (Newnes).—A Manual of Inorganic Chemistry: Dr. T. E. Thorpe, 2 Vols., new edition (Collins).—Die Spectralanalyse: Dr. J. Landauer (Braunschweig, Vieweg).—In Haunts of Wild Game: F. V. Kirby (Blackwood).—Dynamo-Electric Machinery: Prof. S. P. Thompson, 5th edition (Spon).

PAMPHLETS.—Dynamo Attendants and their Dynamos: A. H. Gibbings, 2nd edition (Rentell).—Submarine Telegraphy, &c.: J. Bell and S. Wilson (*Electricity* Office).—Pharmaceutical Society Museum Report for the Year 1893-4 (Bloomsbury Square).

SERIALS.—Proceedings of the Society for Psychical Research, December (Paul).—Popular Science Monthly, December (Paul).—American Naturalist, December (Philadelphia).—History of Mankind: F. Ratzel, Part 4 (Macmillan).—Bulletin of the Illinois State Laboratory of Natural History, Urbana, Ill., Vol. 4 (Springfield, Ill.).—Good Words, January (Isbister).—Sunday Magazine, January (Isbister).—English Illustrated Magazine, January (198 Strand).—Longman's Magazine, January (Longmans).—Economic Journal, December (Macmillan).—Astrophysical Journal, December (Wesley).—Contemporary Review, January (Isbister).—Century Magazine, January (Macmillan).—Natural Science, January (Rait).—Journal of the Chemical Society, December (Gurney).—Zeitschrift für Physikalische Chemie, xviii. Band, 4 Heft (Leipzig, Engelmann).—Fortnightly Review, January (Chapman).—The Humanitarian, January (Hutchinson).—Phonographic Quarterly Review, January (Pitman).—Journal of the Royal Microscopical Society, December (Williams).

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