coat of the *Pitta* to attend a wedding, and did not return it. The disconsolate *Pitta* wanders through the jungle calling on the peacock to restore its dress—hence the cry, *ayittam, ayittam* (my dress, my dress). The cry of the hornbill (*Kandetta*) is inauspicious and a sure sign of drought. The bird is doomed to suffer intolerable thirst; not being able to drink from any stream or rill, it has the power only to catch the rain-drops in its bill to quench its thirst, and keeps continually crying for rain.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE following is the list of candidates successful in the competition for the Whitworth Scholarships, 1887:—James Whitaker, 21, engineer student, Burnley, £200; John Calder, 20, mechanical engineer, Glasgow, £150; John Smith, 22, carpenter, Belfast, £150; Nicholas K. Turnbull, 21, mechanical engineer, Glasgow, £150; James C. Talbot, 23, engineer, Southampton, £150; Arthur F. Horne, 25, mechanical engineer, Moreton-in-Marsh (formerly of Glasgow), £150; Edward J. Duff, 23, engineer, Glasgow, £150; Robert N. Blackburn, 20, engineer apprentice, Liverpool, £150; William Thomson, 20, engineer apprentice, Glasgow, £150; William W. F. Pullen, 20, engineer apprentice, Cardiff, £100; Edwin Griffith, 20, engineer apprentice, Glasgow, £100; Frederick C. Tipler, 23, assistant chemist, Crewe, £100; Thomas H. M. Bonell, 24, analytical chemist, Swindon, £100; Richard J. Redding, 22, metallurgist, Plumstead (Woolwich), and Arthur W. Sisson, 25, mechanical draughtsman, Lincoln (equal), £100 each; Arthur H. Abbott, 22, engineer, Great Yarmouth, £100; George Hough, 23, engineer, Wolverton, £100; Harry G. Christ, 19, engineer apprentice, London, £100; Harry D. Griffiths, 21, engineer apprentice, Cardiff, £100; Denholm Young, 24, engineer apprentice, Edinburgh, £100; Benjamin G. Oxford, 20, engineer apprentice, Liverpool, £100; Bernard H. Crookes, 21, engineer student, Liverpool, £100; George J. Wells, 23, engineer, London, £100; John Eustice, 23, engine fitter, Camborne, £100; Augustus H. H. Bratt, 24, engineer, Plumstead (Woolwich), £100.

SOCIETIES AND ACADEMIES.

LONDON.

Entomological Society, August 3.—Dr. D. Sharp, President, in the chair.—Mr. J. W. Peers and Mr. R. G. Lynam were elected Fellows.—Jonkeer May, the Dutch Consul-General, exhibited a pupa and two imagos of *Cecidomyia destructor* (Hessian fly) which had been submitted to him by the Agricultural Department.—Mr. W. White exhibited, and made remarks on, a specimen of *Philampelus satellitia*, Linn., from Florida, with supposed fungoid excrescences from the eyes. Mr. Stainton said he was of opinion that the supposed fungoid growth might be the pollinia of an Orchis. Mr. Poulton expressed a similar opinion, and the discussion was continued by Mr. Pascoe and Dr. Sharp.—Mr. White also exhibited a specimen of *Catephia alchymista*, bred from a pupa collected last autumn on the south coast.—Mr. McLachlan sent for exhibition a number of oak-leaves infested by *Phylloxera punctata*, Lichtenstein, which he had received from Dr. Maxwell Masters, F.R.S.—Mr. Champion exhibited two rare species of *Curculionidæ* from the Isle of Wight—viz. one specimen of *Baridius analis*, and a series of *Cathormiocerus socius*. He remarked that *C. maritimus*, Rye, had been placed in recent European Catalogues as a synonym of the last-named species, but that this was an error. He also exhibited a series of *Cicindela germanica*, from Blackgang.—M. A. Wailly exhibited, and made remarks on, a number of living larvæ of *Antheræa pernyi*, *A. mylitta*, *Telea polyphemus*, *Platysamia cecropia*, *Attacus cynthia*, *Callosamia promethea*, and other silk-producing species. He also exhibited imagos of the above species, imagos of *Antheræa yama-mai*, and a number of species of Diurni from Sarawak.—Mr. Poulton exhibited crystals of formate of lead obtained by collecting the secretion of the larva of *Dicranura vinula* on 283 occasions. The secretion had been mixed with distilled water in which oxide of lead was suspended. The latter dissolved, and the acid of the secretion being in excess the normal formate was produced. Prof. Meldola promised to subject the crystals to combustion, so that their constitution would be proved by the final test.

EDINBURGH.

Royal Society, July 15.—Special Meeting.—Dr. J. Murray, Vice-President, in the chair.—Prof. Tait submitted a communication by Sir W. Thomson on the stability of the steady motion of a viscous fluid between two parallel planes.—Sir W. Turner communicated a note by Mr. George Brook on the epiblastic origin of the segmental duct in teleostean fishes, and birds.—Prof. T. R. Fraser read a preliminary note on the chemistry of strophanthin.—Mr. J. J. Coleman described a new diffusimeter and other apparatus for the study of liquid diffusion.—A paper by Mr. Frank E. Beddard was communicated by Prof. Sir W. Turner.—Dr. Murray read a paper on the mean height of the land of the globe. The lower limit he gives is, in round numbers, 1900 feet. The higher limit, which he believes to be more nearly correct, is about 2100 feet.—Mr. J. T. Cunningham, of the Scottish Marine Station, read a paper on the *Chætopoda sedentaria* of the Firth of Forth.

July 18.—Sheriff Forbes Irvine, Vice-President, in the chair.—The Chairman intimated the foundation by Dr. Gunning of the Victoria Jubilee Prize, and the conditions of award which have been approved by the donor. The first award of the prize was made to Sir W. Thomson, for a remarkable series of papers on hydrokinetics which he has communicated to the Society.—Mr. W. Durham read the second part of his paper on the laws of solution.—Prof. Tait communicated a paper by Prof. W. Burnside on the partition of energy between the translatory and rotational motions of a set of non-homogeneous elastic spheres. The rotational energy is equal to two times the translational energy.—Dr. H. R. Mill submitted a paper on the salinity, temperature, &c., of the Firth of Forth.—Prof. Tait communicated a paper by Mr. Albert Campbell on the direct measurement of the Peltier effect. Mr. Campbell has experimented with three pairs of metals. His results agree in every case with Prof. Tait's thermo-electric diagram. The agreement in the case of iron and nickel is of special importance.—Dr. Alex. Scott communicated a paper on vapour-densities at high temperatures.—Prof. Tait read a paper by Dr. G. Plarr on the determination of the curve, on one of the co-ordinate planes, which forms the outer limit of the positions of the point of contact of an ellipsoid which always touches the three planes of reference.—Mr. Buchan read a paper by Mr. A. Rankin on the mean temperatures of the various winds at Ben Nevis Observatory.—Prof. Crum Brown read a paper on ferric ferricyanide as a reagent for detecting traces of reducing gases. This reagent gives a test depending on the production of colour, which is a more delicate test than one which depends on its disappearance.—Prof. Tait communicated some results on the compressibility of water, of mercury, and of glass. The average compressibility of a 20 per cent. aqueous solution of common salt per atmosphere for the first 100 atmospheres is 0·0000316. It diminishes rapidly with the percentage of salt in solution. The compressibility of common lead glass is 0·0000027 at a temperature of 19° C.—Prof. Berry Haycraft submitted a description of experiments to show the truth of Sir J. Lister's theory of coagulation.—Dr. Murray communicated a paper by Mr. Adam Dickie on the chemical analyses of sea-water from the Clyde sea-area.—The Chairman mentioned the number of papers read during the session, classifying them under various heads. He also read the Jubilee address which had been presented to Her Majesty by the Secretary of State on behalf of the Society.

PARIS.

Academy of Sciences, August 8.—M. Janssen in the chair.—Observations of the minor planets, made with the great meridian instrument of the Paris Observatory during the first quarter of the year 1887, communicated by M. Mouchez. The right ascensions and polar distances are given of Leto, Sophrosyne, Undine, Hebe, and nine other minor planets at various dates with Paris mean time, all comparisons being referred to the ephemerides published by the Berlin *Jahrbuch*, except those of Undine, which are referred to those published in No. 288 of the circulars of the Berlin *Jahrbuch*. The observations were made by M. O. Callandreau.—Fresh documents on the relations existing between the chemical and mechanical work of the muscular tissue, by M. A. Chauveau,

with the co-operation of M. Kaufmann. In order to complete his series of preparatory determinations on the mechanical work of the muscular tissue, the author has attempted to determine the quantity of heat produced by the muscles which function effectively in the physiological conditions of the normal state. By the methods and new processes here described he claims to have overcome the great difficulties inherent to studies of this nature. His experiments show once more that a large amount of heat is generated while the muscle operates, and of this only a small quantity is absorbed by the work performed. Repeated experiments will be needed accurately to determine this quantity. From the experiments already made, he infers that it mostly ranges from one-seventh to one-eighth of the total, the coefficient of the latter being 0·000323 calories, and that of the heat transformed into work generally from 0·000041 to 0·000034 calories.—New fluorescences with well-defined spectral rays, by M. Lecoq de Boisbaudran. Here the author studies alumina with the earth $Z\alpha_2O_3$; but as this earth has not yet been obtained in a pure state, he has been compelled to employ a substance still mixed with some other rare earths, notably $Z\beta_2O_3$; $Z\alpha$, however, being greatly in excess of $Z\beta$. Alumina containing 1/1200 of $Z\alpha_2O_3$ impure, heated with sulphuric acid and moderately calcined to a red (between the fusions of silver and copper), yields a greenish-yellow fluorescence, faint and without measurable spectrum. With 1/50 of $Z\alpha_2O_3$ in the alumina, a green fluorescence is obtained, slightly yellow and dull. The spectrum consists chiefly of the bands of $Z\beta$, which apparently differ but little from those obtained by reversion with a solution of $Z\beta Cl_6$. The presence of $Z\alpha$ is indicated to the right of the two yellow and blue bands; but the green band of $Z\beta$ is the strongest in the spectrum, having two nebulous maximums, of which that to the right is the most intense. The author also announced that he had obtained some very fine fluorescences by highly calcining alumina containing a little didymium or praseodymium.—The partial lunar eclipse of August 3, observed at the Observatory of Bordeaux, by M. G. Rayet. Under a three-prismed spectroscope, mounted on the great equatorial (0·38 metre) the transition from the adumbrated to the luminous part of the disk appeared very abrupt. While the spectrum of the former was limited by the lines D and F, with a maximum of intensity towards E, that of the part in transition extended abruptly towards the red as far as Ångström's atmospheric group α. But the spectrum of the moon especially near the eclipsed part, was too pale to permit the use of a slit narrow enough to show the atmospheric lines. The α group and the very numerous lines near D were alone distinctly visible under the form of bands.—On the tides of the Tunisian coast, by M. Héraud. The observations made during the hydrographic survey of this coast have enabled the author to study the tidal movement, the existence of which in the Gulf of Gabes and on the adjacent seaboard has long been demonstrated. These tides appear to be the most important and regular in the whole Mediterranean basin; but they are perceptible only on the section of the coast to the south of Mehediah. They continually increase in magnitude as far as Gabes, where they acquire a maximum of 2 metres at the mean spring-tides, thence decreasing to 1 metre at Zarzis and on the Tripoli frontier. The tidal wave appears to come from the east, the mean period being apparently about 24 hours. All the observed circumstances would seem to show that the relation of the lunar to the solar wave is less than that of the absolute actions of the sun and moon.—A comparative study of the old, eruptive and sedimentary rocks of Corsica and the Eastern Pyrenees, by M. Ch. Depéret. During a recent trip to Corsica the author had an opportunity of determining some very close analogies between these two geological systems. Thus the central part of the granitoid mass at Ajaccio is formed of a porphyroid granite disseminated with black mica, passing thence on either side insensibly to a granulitic granite, a true transitional formation between the granulite type and granite. Analogous formations occur in the Eastern Pyrenees, as, for instance, in the granitoid mass stretching east and west between the valleys of the Aude, Têt, and Boulsane. Here also the central part, extending from the forest of Salvanère to Belesta, consists of a porphyroid granite passing on both sides imperceptibly over to a granite with two micas and granulitic texture. A comparative study of the eruptive and sedimentary rocks in both regions reveals similar resemblances. In Corsica the Cambrian limestone everywhere worked as marble is absolutely identical with that of the Pyrenees.

BERLIN.

Physiological Society, July 1.—Prof. du Bois Reymond, President, in the chair.—Dr. Martius communicated the results of his researches, by the graphic method, on the movements of the heart. When a sound is passed into the œsophagus, and connected with a Marey drum, cardiopneumatic curves are obtained whose interpretation is still a matter of controversy. In order to arrive at an experimental decision on this point, Dr. Martius has recorded simultaneously on the same individual the cardiopneumatic curves from the œsophagus and the curve of impulse of the ventricular apex as obtained from the wall of the thorax. It appeared from this that the curve of ventricular impulse is of doubtful interpretation; its shape was always the same; but it was impossible to determine with any certainty which part of the curve corresponds to the systole, and which part to the diastole. Dr. Martius has therefore registered the occurrence of the heart-sounds by auscultation and making signals which were recorded on a rotating drum on which the curves of cardiac impulse were being registered, having first ascertained that his personal equation was without influence on the results. In this way he was able to show that the first sound of the heart, corresponding to the closing of the auriculo-ventricular valves, coincides with the first rise of the curve from the base-line, while the second sound, or closing of the semilunar valves, coincides with the second smaller rise of the curve. The *first* rise and fall of the curve corresponds therefore to the cardiac systole. The speaker explained the shape of the *whole* curve as follows:—At the commencement of the systole the auriculo-ventricular valves are shut, as also are the semilunar valves since the aortic blood-pressure has not yet been overcome. During this period the contracting cardiac muscles alter the shape of the heart, the apex moves forward, and so the curve rises. As soon as the pressure in the ventricle is greater than that in the aorta, the semilunar valves open and the blood begins to pour out of the ventricle; as the result of this the apex of the heart moves back, and the curve falls till it reaches the base-line at the conclusion of the systole and commencement of the diastole. At this instant the semilunar valves close and the shock thus produced is communicated to the heart, and makes itself evident on the curve as the second or valvular rise. Thus finally the first rise of the curve of cardiac impulse corresponds to that period of systole during which all the valves are closed; the first apex of the curve marks the instant at which the semilunar valves open; the first fall of the curve indicates that portion of the systole during which blood is flowing out of the ventricle; the systole ends with the commencement of the second or smaller rise in the curve. Dr. Martius has been able to strengthen this analysis of the cardiac movements, so important both physiologically and pathologically, by observing that the duration of the rise and fall of the curve of systole varies in different individuals: thus he finds, conformably with the explanation given above, that in patients with low aortic blood-pressure, the rising portion of the curve of cardiac impulse is very short, while the falling part is considerably lengthened, resulting from the low aortic pressure allowing the semilunar valves to open sooner. On the other hand, in a case of arterial sclerosis, he found the rising part of the curve considerably lengthened, since the aortic blood-pressure was greater, and was only overcome at a later period of the systole.—Dr. Goldschneider presented and explained plates illustrating the topography of the sense of temperature. The sense of heat and cold was determined for the whole surface of the body, and arranged in a series corresponding to twelve degrees of intensity. As a general result, it was found that the sense of cold is more extended than that of heat; that both senses are more developed on the trunk than on the extremities; that the sense of temperature is less acute in the median line of the body; that the distribution of this sense over the surface of the body is quite different from that of the sense of touch; and that the points of exit of the nerves possess little or no sense of temperature.

July 15.—Prof. Munk, President, in the chair.—Dr. Jacobsen gave an account of some acoustical experiments which he has carried out with a view to determining the law according to which the amplitude of vibration of a tuning-fork diminishes as it gradually comes to rest. According to theory, the diminution in the amplitude of vibration takes place in geometrical progression; Hensen had, however, found that the logarithmic decrement at first diminishes, and then, when the vibrations have become extremely small, increases

again. The speaker has made experiments with tuning-forks, recording the vibrations of the arms by means of brushes writing on a rotating drum; in another series of experiments, which are not yet concluded, he has photographed the vibrations at equal intervals of time. The result of his work is that the vibrations diminish in geometrical progression, thus according with theory. —Dr. Wertheim gave an account of his experiments to determine the number of visual units in the central portions of the retina. In continuation of the experiments of Dr. Claude du Bois-Reymond, who has determined the number of visual units in the fovea centralis and found them equal in number to the cones, Dr. Wertheim, employing the same method, has determined the number of visual units to a distance of 2·5 millimetres from the centre. A sheet of tinfoil pierced with uniform holes was illuminated from behind, and then the distances were measured at which the holes began to be just visible as separate objects, as their image was made to fall on parts of the retina *successively* further and further towards the periphery. After having found in the fovea centralis the same number of visual units as had Dr. du Dois-Reymond, he then observed that their number decreases rapidly towards the periphery up to a distance of 1·5 millimetres, then remains constant for a short space, then diminishes again rapidly, and then gradually as far as the limits of the retinal area which he investigated. The speaker found that the first rapid decrease extends as far as the limits of the macula lutea. The anatomical statements respecting the limits of the yellow-spot and the number of cones outside this area did not permit of his drawing any conclusion, other than the above, from the optical experiments. The same numbers were obtained when red and green light was used.—Dr. Goldschneider has carried out a series of experiments to test Leyden's theory that ataxy, when not of central origin, is caused by injuries to centripetal nerves. By passing strong electric currents through the first phalanx of one finger he anæsthetized the second and third phalanx, and then found that the movements of flexion and extension of the finger no longer gave a regular curve of rise and fall as traced by the tip of the finger: the movements executed by the finger were irregular, sometimes going beyond and sometimes falling short of the desired extent. The sensation of passive movement was also considerably lessened. The speaker hence concluded that the ataxic movements are caused by the interference with the sensations arising from passive movements of the limbs. He added to this an hypothesis as to the nature of ataxy and the seat of the muscular sense in the limbs.

July 27.—Prof. Munk, President, in the chair.—Dr. Sandmann spoke on respiratory reflexes originating in the nasal mucous membrane. In order to study the possible connexion between asthma and diseases of the nose, which has been so often supposed to exist, the speaker has made experiments on the respiration in rabbits and cats whose nasal openings had been completely occluded. In addition to confirming the phenomena which had been already described by earlier observers, he found that the changes in volume of the thorax were the same as in normal animals, whereas the intra-thoracic pressure was considerably increased when breathing was carried on entirely by the mouth; similarly the respiratory undulations of the blood-pressure tracing were increased in amplitude. He next investigated more closely the respiratory reflexes which originate in the nasal mucous membrane; of these three are known—namely, inhibition of respiration, sneezing, and coughing, as a result of stimulation of the nose. Inhibition of respiration was observed to occur, according to the strength of the stimulation, either in the phase of expiration, or of inspiration, or merely as a more pronounced expiration. Sneezing was brought about by tickling the nasal mucous membrane, and was found to consist of a deep inspiration with simultaneous closing up of the pharynx and mouth by the application of the tongue to the palate, followed by an explosive expiration. When the stimulation is slight, only the deep inspiration is produced; if the stimulation is strong, the deep inspiration is followed by a somewhat lengthy inhibition of the same, which is frequently accompanied by slight expiratory movements; when the stimulation is of moderate strength an ordinary sneeze is the result. After section of the phrenic nerves the deep inspirations were no longer observed. Dr. Sandmann, by section and removal of the mucous membrane in rabbits, has further examined the various regional areas of the same, and found that sneezing can only be produced by tickling a limited area of the mucous membrane. On the rabbit this area is found in the entrance to the nose on the anterior surface of the lowest nasal muscle; but in addition to this place, the same reflexes may be produced by stimulation of the front part of the septum and roof of the nasal cavity. Sneezing cannot be produced by stimulation of any other portion of the nasal mucous membrane. In man the region of the posterior nasal openings is also connected with the reflexes involved in sneezing in addition to the regions mentioned above. An anatomical investigation of the areas whose stimulation leads to sneezing showed that they are supplied entirely by the ethmoid nerve. Stimulation of this nerve in the orbit was followed regularly by sneezing, which could therefore be produced to a certainty by stimulating the trunk of the nerve. The third kind of respiratory reflex—namely, coughing as a result of nasal stimulation—could not be experimentally produced in the cats and rabbits used in these experiments.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

The Distribution of Rain over the British Isles, 1886: G. J. Symons (Stanford).—First Lessons in Science: Dr. J. W. Colenso (Ridgway).—A Treatise on the Principle of Sufficient Reason: Mrs. P. F. Fitzgerald (Laurie).—Prolegomeni di Filosofia Elementare, Terza Edizione (Torino). —Bulletin de l'Académie Royale des Sciences de Belgique, No. 6, 1887 (Bruxelles).—Journal of the Royal Microscopical Society, August (Williams and Norgate).—Bulletin of the California Academy of Sciences, vol. ii. No. 6.—Boletin de la Academia Nacional de Ciencias en Cordoba, Junio 1886 (Buenos Aires).—Journal of the Anthropological Institute, May and August 1887 (Trübner).

CONTENTS.