murdered by Indians. Fawcett's previous work had included many explorations in Eastern Bolivia, and he had acted as chief commissioner on the Bolivia-Brazil boundary commission in 1906.

March 9, 1914.—Capt. Shakespear in the Arabian Peninsula

Capt. Shakespear reached the Malham oasis, previously unvisited by Europeans. He left Koweit in February, determined to penetrate into the heart of the desert peninsula of Arabia and to cross it from the Persian Gulf to Egypt. He covered some 1200 miles of unknown country, and for the whole of his journey he kept up a continuous route traverse, checked by observations for latitude; he also took hypsometric readings for altitude. Thus for the first time a complete traverse of the lower Wadi er Rumma was achieved, the first reliable map of the Tuwaik settlements was made, and a new route from Buraida to Jauf followed. From 1909, when he was appointed political agent at Koweit, Shakespear had made annual excursions into the comparatively unknown hinterland, and these paved the way for his last journey. In 1915 he was killed in a skirmish between the forces of Ibn Saud and his rival Ibn Rashid.

Societies and Academies

LONDON

Royal Society, Feb. 25.—**D. M. Needham, J. Needham, E. Baldwin, and J. Yudkin**: A comparative study of the phosphagens, with some remarks on the origin of vertebrates. Arginine phosphate exists in all the invertebrate phyla of which representatives were studied, though in the cœlenterates it was only found in a ctenophore. This compound may be associated with ciliary as well as muscular movement. Creatine phosphate is not confined to the vertebrates, but was found in echinoderm jaw muscle and enteropneust tissues. If any evolutionary significance may be attached to these findings, it is probable that they support the echinoderm-enteropneust theory of vertebrate descent (Bateson: MacBride: Garstang).—**G. Phillips**: Myotatic reflexes in sympathectomised muscle. After excision of its sympathetic innervation, skeletal muscle exhibits quantitative changes in proprioceptive reflex activity. Simultaneous myotatic contractions of two soleus muscles when subjected to the same passive stretch have been recorded by a 'double' isometric myograph and a twin string galvanometer. Three conditions of stretch-stimulation have been regarded as essential in making comparable records. These are, a small passive increment of length, performed at an even rate, from an initial posture of minimal tension. Under such conditions the latent period of the myotatic reflex determined by the time of onset of the first action current wave is shorter in the sympathectomised muscle. Soleus muscle deprived of its sympathetic innervation some weeks previously loses in great degree its power of maintenance of any postural contraction of other than low tension. The available evidence denies the existence of any sympathetic nervous mechanism responsible for the direct qualitative control of postural reactions; and suggests quantitative changes following sympathectomy are produced by a disturbance of the excitability of proprioceptive end-organs in sympathectomised muscle.—**J. C. Eccles and H. E. Hoff**: The rhythmic discharge of motoneurones. The events during the rhythmic cycle are described in terms of the 'activity' of the rhythmic centre, by which is meant the propensity of the rhythmic centre to set up a reflex discharge.

Geological Society, Jan. 13.—**F. B. A. Welch**: The geological structure of the eastern Mendips. The area discussed comprises the Beacon Hill pericline, the most southerly situated of the four echeloned Mendip periclines and that bordering the Radstock coalfield. As in the other three cases, the structure is anticlinal with a steeply folded north limb: the core is formed of Old Red Sandstone and Silurian, the Avonian outcropping on the flanks. The south limb is much concealed by Mesozoic strata, which also stretch across the eastern part of the area, so that the Avonian can only be seen in deep ravines. The whole sequence of events appears to have been the northward drive of the east-and-west pericline against the southern 'nose' of the coal measure basin (with a north-and-south axis). Maximum resistance was offered to this movement along the line of this axis, and in this line lies the central fault block.—**E. S. Hills**: Upper Devonian fishes from New South Wales. The greater part of the material comes from Harvey's Range, north-north-east of Parkes, but there is a single specimen from the Jemalong Gap, another single specimen from the western flank of the Canoblas Mountains, and a few plates preserved in limestone from an unknown locality. The faunal list is enumerated. *Remigolepis* is a new genus lately erected by Stensiö to embrace remains found in East Greenland, and its presence in the collection was recognised by him. Not only does the present record of Upper Devonian fishes from New South Wales greatly extend the known range of these forms in south-eastern Australia, but also it affords valuable evidence for the correlation of the Devonian rocks of that district. It is suggested that the shallow marine deposits of the Lambian (Upper Devonian) series may be, in the main, older than the continental deposits of that epoch, and that the Upper Devonian rocks of Victoria may be the equivalent of only the top of the series as it is developed in New South Wales.

Physical Society, Jan. 15.—**Shih-Chen T'ao and William Band**: Some thermomagnetic effects in nickel and iron. The paper relates to the production of an e.m.f. in nickel and iron wires by the simultaneous application of a longitudinal magnetising field and a temperature gradient.—**W. A. Leyshon**: On periodic movements of the negative glow in discharge tubes. The effect is produced when traces of hydrocarbon vapour are present in the tube in addition to the filling gas (neon, in most of the experiments here described). The jumping glow may be due to internal flashing at that part of the surface of the cathode which is not covered by negative glow. The flash may be caused by the electrical breakdown of a partially insulating hydrocarbon layer, as a result of the collection of positive ions, or by a surface chemical action occurring when the reaction products of the discharge have reached a certain concentration at that surface. It is supposed that the electron emissivity of the surface is increased by the flash, and that the main glow jumps to the activated surface. The process is reversible and hence may be periodic.—**G. I. Finch and R. W. Sutton**: A cathode-ray oscillographic method of measuring inductance. The voltage fluctuations across the condenser in a damped oscillatory circuit, comprising inductance, capacity, and resistance, are recorded by means of a cathode-ray oscillograph.—**H. R. Nettleton and F. H. Llewellyn**: On the measurement of electrical resistance in terms of a mutual inductance and a period. It is shown that if the ratio a/a of the radii of the concentric circles forming a simple inductometer is $0{\cdot}50607_8$, the mutual inductance is so accurately proportional to the angle through which the turning coil is displaced that the rising deviation from a linear law is

less than 5 parts in a million at 7° of deflexion. If the outer circle is replaced by two twin circles which are separated symmetrically with regard to the turning coil, the ratio a/a must be increased to bring about a similar approach to linearity. If a heavy dynamometer is constructed on this principle, then, over the range indicated, the deflecting couple is strictly proportional to the current-products.

PARIS

Academy of Sciences, Jan. 18.—E. Jouguet: Cooled diffusors.—**L. Cayeux**: The interpretation of the deposits of magnesian limestone of Bimont (Oise) and of Étretat (Seine-Inférieure). The magnesian formations at Bimont and Étretat have important characters in common. Both appear to have been caused by a local modification of the submarine medium. The hypothesis of modifications of the original limestones by the action of mineral springs charged with magnesium salts can be dismissed.—**Charles Achard and Maurice Piettre**: Some physical and chemical properties of the mucine of the synovial articulations.—**André Blondel**: Calculations concerning high voltage lines with use of transformers.—**A. Recoura**: New researches on the hydrated chromic chlorides. Starting with ordinary chromic chloride, usually considered to be $[Cr(H_2O)_4Cl_2]\,Cl\,.\,2H_2O$, and drying in a vacuum for three to four days, anhydrous ether extracts a brown chloride which is probably $[Cr(H_2O)_3\,.\,Cl_3]$. A second method, using acetone, is also given for preparing the brown chloride.—**René Maire and Louis Emberger**: The vegetation of the Anti-Atlas.—**Ch. Porcher and L. Jung**: The intensity of the mammary circulation in the goat during lactation.—**Gaston Julia**: The structure of multiple convex areas.—**Radu Badescu**: Certain uniform transcendentals represented by series of rational functions.—**Jean Pierre Robert**: The generalisations of a singular integral equation of H. Lebesgue.—**Lars Ahlfors**: A generalisation of Picard's theorem.—**Henri Poncin**: Elliptic cavitations.—**A. Guerbilsky**: Recording the deformations and vibrations of the wing of an aeroplane in flight.—**A. Danjon**: The apparent displacement of the stars in the neighbourhood of the eclipsed sun. A discussion of the observed results compared with those predicted by the theory of generalised relativity.—**Ernest Esclangon**: Remarks on the preceding paper. The deviation observed is the result of an extrapolation, and the question cannot be regarded as definitely settled without many additional observations.—**L. Brillouin**: The statistics and magnetism of the free electrons.—**Paul Le Rolland and Tchang Te Lou**: A new electrical method for the determination of the dew point, applicable to thermal machines. The method is based on the fact that when water vapour is condensed on the surface of an insulator, the latter becomes conducting. The change in the resistance of the surface can be arranged to produce a sound in a telephone or to illuminate a neon tube.—**M. Pauthenier and Mme. M. Moreau-Hanot**: The study of the motion of a heavy sphere in an ionised electric field.—**L. Néel**: The magnetic susceptibility of iron some degrees above the Curie point.—**Félix Esclangon**: The realisation of monochromatic sources of red and yellow light. With tubes without electrodes containing mercury, sodium, or cadmium, the high frequency discharge takes place at temperatures of 80° C., 250° C., and 260° C. respectively. If some argon (pressure of the order of 0·1 mm.) is introduced into these tubes, mercury lights up at the room temperature, sodium at 180° C., and cadmium at 200° C. These facts can be applied to simplify the production of monochromatic light.—**J. P. Mathieu**: The optical properties of 1·4-naphthalene-bisimino-camphor.—**Constantin Salceanu**: The variation with the temperature of the magnetic double refraction of some aromatic compounds in the fused state.—**Mme. Irène Curie and F. Joliot**: The emission of protons of high velocity by substances containing hydrogen under the influence of very penetrating γ-rays.—**M. Haïssinsky**: The electrolytic deposit of polonium in an alkaline medium.—**Desmaroux and Mathieu**: The structure of nitrocellulose films.—**Henri Muraour**: A theory of explosive reactions.—**Jean Challansonnet**: The constitution, spontaneous graphitisation, and thermal hysteresis of low carbon cast iron containing titanium. Silicon and titanium modify the characters of cast iron in the same direction. Both favour the formation of graphite on solidifying and on annealing. They also reduce the thermal hysteresis of the change (α-iron $-$ C) $\rightarrow$Fe $+$ Fe_3C.—**M. and Mme. Leclère**: The separation of the thiophene hydrocarbons contained in oils with high sulphur. A method of controlled sulphonation followed by hydrolysis of the thiophene sulphonic acids was found to be the best method of separation.—**R. Lespieau**: Study of a method of preparation of true acetylenic primary alcohols. Description of the properties of the alcohol $HC:C\,.\,(CH_2)_2\,.\,CH_2OH$ and of some compounds derived from it.—**Roger Dolique**: The influence of some impurities on the critical temperature of the solution of phenol in water. Impurities in the phenol of the order of 0·1 per cent may cause differences of 0·2°-0·66° C. in the critical solution temperature.—**Houllier**: The formation of travertine and peat in the Somme valley.—**H. Arsandoux**: The morphological evolution of the dome of Mt. Pelée.—**Francis Ruellan**: The transversal deformations in the relief of the Japanese Archipelago.—**Henri Coupin**: Loss of sexuality by a fungus.—**Bogdan Varitchak**: Nuclear evolution in *Pericystis apis*.—**Obaton**: Mannitol as food for *Sterigmatocystis nigra*.—**D. Montet**: The action of weak radioactivity on the germination of seeds. Black oxide of uranium was used as the radioactive material. Each kind of seed showed an effect, with an optimum varying with the nature of the seed and its surface.—**A. Perrier**: Researches on the fermentation of coffee. From the results of experiments detailed it is concluded that the fermentation of coffee is not essential for the preparation of a fine product. On the contrary, if the fermentation is prolonged there is a prejudicial effect on the colour and aroma. Hence the fermentation of coffee is on a different footing from cocoa and tobacco, where the fermentation would appear to be indispensable.—**N. Liatsikas**: The presence of brown steppe soils in the plain of Thessaly.—**A. Demolon and Mlle. J. Brigando**: The fixation of proteins by the soil.—**Louis Fage**: The seasonal vertical migration in the Mysidaceæ.—**Mlle. M. Gex**: Remarks on the neutralisation curves of biological systems, and of sera in particular.—**R. Legroux and Kemal Djemil**: Transmissible lysis.—**A. Trillat**: Attempts at vaccination through the air (chicken cholera).—**Jean Régnier, Robert David, and Mme. Alice Kaplan**: Contribution to the numerical study of microbial multiplication. The existence of the latent phase.—**C. Levaditi, J. Bardet, A. Tchakirian, and A. Vaisman**: The therapeutic properties of indium in trypanosomiases and in experimental syphilis. Indium resembles gallium in its active therapeutic action in certain trypanosomiases and experimental syphilis. Its preventive and curative activity is satisfactory in the infection produced in mice by *Trypanosoma Evansi*, but is uncertain in the treponemosis of the rabbit (*Treponema pallidum*).

ROME

Royal National Academy of the Lincei: Communications received during the vacation, 1931.—**G. A. Crocco**: Aerothermodynamic bodies.—**N. Parravano**

and **V. Caglioti**: Alloys of zinc and manganese. X-ray investigation of these alloys reveals the existence of γ, ϵ, and η phases with structural characteristics analogous to those of the brasses. The hexagonal ϵ phase is stable at ordinary temperature over the range 33·24 per cent of manganese, and the cubic γ phase, with 52 atoms in the unit cell, has a region of existence between 22·26 and 8·09 per cent of manganese and is stable at the ordinary temperature. The η phase, composed of solid solutions of manganese (about one per cent) in zinc, is unstable and, as it ages, undergoes de-mixing with formation of a eutectic of zinc with another phase (γ' or β'), probably cubic.—**P. Rondoni** and **G. Mezzadroli**: Action of ultra-short electromagnetic waves on the transplantable adenocarcinoma of the rat. These waves accelerate the growth of the tumours considerably.—**G. Barba**: Generalised parallelism in a V_3 (2).—**G. Krall**: The adiabatic invariant in the free motion of gyroscopes.—**A. Rosenblatt**: The stability of laminar movements of viscous liquids (2). Exponential damping at infinity.—**E. Oddone**: A contribution of seismometry to the history of the earth. Seismometric evidence supports G. H. Darwin's hypothesis of the birth of the moon by tidal action exerted by the sun on the earth.—**V. Ricca**: Raman spectrum of ammonia in solutions of different concentrations. Aqueous solutions of ammonium salts exhibit no Raman line attributable to the NH_4 ion, and aqueous ammonia shows a Raman spectrum identical with that furnished by liquid ammonia. It may, therefore, be concluded that, in aqueous solution, ammonia exists partly as NH_3 and partly as NH_4OH, the reaction $NH_3 + H_2O \rightarrow NH_4OH$ representing an equilibrium.—**F. De Carli**: Viscosity of mixtures of stannic chloride with aromatic hydrocarbons (2). At ordinary temperatures, homologues of benzene exhibit a distinct tendency to associate with stannic chloride. Such associations, which are detectable only in the liquid state and are almost completely destroyed at 30°, behave similarly to the compounds of the same hydrocarbons with sulphur dioxide. Confirmation is obtained of the view that the substituent groups of the benzene ring contribute markedly to the greater stability of the complexes formed by derivatives of aromatic hydrocarbons.—**V. Famiani**: The beri-beri quotient (Qb) in nutrition with polished rice and autoclaved grain. Experiments with the same experimental animals (pigeons) fed with polished and washed rice, or grain autoclaved either dry or moist or in presence of alkali, reveal no substantial differences in the values of the beri-beri quotient or in the symptoms observed.—**G. Amantea** and **V. Famiani**: The possibility of obtaining permanent beri-beri phenomena in the pigeon by deprivation of the β factor.—**A. Baroni**: Solid solutions between alkali halides. X-ray investigation of the system KCl-KI fails to show even partial miscibility between the two salts in the solid state. The results of thermal and X-ray analysis of the systems KCl-KBr and KBr-KI confirm those of other authors and show that a metastable equilibrium is reached, true equilibrium being attained only from aqueous solutions.—**V. Zagami**: The effects on albino rats of feeding with seeds of *Lathyrus sativa L.* alone. These seeds form an incomplete or a qualitatively deficient food for growing rats. Although no nervous or motor phenomena related to those described as lathyrism were observed, the young rats displayed diminished resistance, torpor, and pronounced slowness in growth, more particularly of the genital organs and skeleton.—**G. B. Cacciamali**: Contortions of the Ercinian in Alpine orogeny.—**G. Mezzadroli** and **E. Vareton**: Influence of Italian radioactive soils on the development of silkworms. Exposure of silkworms to these soils exerts a favourable action on the development of the worms, their growth being enhanced so as to increase the weight by 32-45 per cent, and the weight of the cocoons increased by 5·8 per cent.—**Celso Guareschi**: Fusion of otocysts in xenoplastic grafting between Anura and Urodela.—**Teodoro Perri**: Behaviour of optical vesicles of *Triton* grafted on to embryos of *Rana esculenta* (destructive processes and power of recovery) (2).—**M. Curzi**: Cases of pedal gangrene from *Sclerotium* observed in Italy.

Forthcoming Events

FRIDAY, MARCH 4

SOCIETY OF PUBLIC ANALYSTS AND OTHER ANALYTICAL CHEMISTS (at Chemical Society) (Annual General Meeting), at 3.—Presidential Address.

INSTITUTE OF MARINE ENGINEERS, at 6.—Annual General Meeting.

GEOLOGISTS' ASSOCIATION (in Architectural Theatre, University College), at 7.30.—Prof. W. G. Fearnsides: The Carboniferous Rocks of Derbyshire Derwent (Lecture).—W. Pulfrey: On the Occurrence of Radiolarian-bearing Nodules at the Base of the Edale Shales, near Calver, N. Derbyshire (In Abstract).

ROYAL INSTITUTION OF GREAT BRITAIN, at 9.—Sir Harold Hartley: Michael Faraday and Electro-Chemistry.

SATURDAY, MARCH 5

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Lord Rutherford of Nelson: Discovery and Properties of the Electron (2).

MONDAY, MARCH 7

ROYAL INSTITUTION OF GREAT BRITAIN, at 5.—General Meeting.

UNIVERSITY OF LEEDS, at 5.15.—Prof. H. J. Fleure: Races and their Evolution (Lecture).

UNIVERSITY COLLEGE, LONDON, at 5.30.—M. Jacques Maritain: Quelques Aspects de la philosophie Thomiste (Lecture) (*in French*).

ROYAL SOCIETY OF ARTS, at 8.—A. E. L. Chorlton: Oil Engine Traction (Howard Lectures) (1).

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Sir Douglas Mawson: The B.A.N.Z. Antarctic Research Expedition, 1929–31.

TUESDAY, MARCH 8

ROYAL COLLEGE OF PHYSICIANS OF LONDON, at 5.—Dr. L. J. Witts: The Pathology and Treatment of Anæmia (Goulstonian Lectures) (3).

INSTITUTION OF PETROLEUM TECHNOLOGISTS (at Royal Society of Arts), at 5.30.—Annual General Meeting.

INSTITUTION OF ELECTRICAL ENGINEERS (North-Eastern Centre) (at Literary and Philosophical Society, Newcastle-upon-Tyne), at 7.—Prof. J. K. Catterson-Smith: Everyday Uses of Electricity (Faraday Lecture).

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN, at 8.30.—F. Wokes: The Importance of Ergot in Pharmacy (Lecture).

WEDNESDAY, MARCH 9

INSTITUTE OF METALS (Annual General Meeting) (at Institution of Mechanical Engineers), at 10 A.M.—Reading and Discussion of Papers.

SCHOOL OF ORIENTAL STUDIES, at 5.15.—H. J. Braunholtz: The Craft of the African Potter (Lecture).

UNIVERSITY COLLEGE, LONDON, at 5.30.—E. A. Savage: Recent Changes in the Classification of Books in General and Special Libraries (Lecture).

ROYAL SOCIETY OF ARTS, at 8.—Prof. E. P. Stebbing: The New Afforestation Work in the Central Plateau of France.

THURSDAY, MARCH 10

INSTITUTE OF METALS (Annual General Meeting) (at Institution of Mechanical Engineers), at 10 A.M.—Reading and Discussion of Papers.