

globe, were necessary to account for its present aspect. Now Mr. Lyell's reasoning goes to the destruction of this ingenious but visionary fabric. He considers that the operations *now* going on in the great workshop of nature are sufficient to show how the others that have preceded them have also moved. The changes in animated nature he refers to the circumstances in which the animals are placed. Some animals are extinct that were existing a few years ago; others are changed in their nature, habits and climate; thus, though unmarked except by the thoughtful eye of science, are changes now taking place very similar to those which have so long attracted the wonder and employed the attention of the sons of wisdom. The superentaceous groups form the subject of examination in the third volume. Mr. Lyell's account of fossil shells is more extensive and important than ever was given before."

The Post Office

"In my opinion," wrote Lord Brougham, "the teachers of the age of George III covered it with still greater glory than it drew from the statesmen and warriors that ruled its affairs." Brougham himself was one of the first public men to concern himself with national education, and he was the founder of the Society for the Diffusion of Useful Knowledge. To this Society was due the publication a century ago of the *Penny Magazine* and the "Penny Encyclopædia", to which many eminent men of science contributed. The *Penny Magazine* was issued weekly with a monthly supplement and the supplement for January 1834 was devoted to "The History and Present State of the Post Office". "In the advanced state of civilisation to which we have now attained in this country," the article says, "we possess many advantages of the highest importance which are indeed essential to our daily comfort, but which, presenting themselves with unfailling regularity, pass without observance and almost without our being conscious of enjoying them." Among the principal of them, it was said, may be reckoned an efficient and well-regulated system for the transmission of letters not only in Great Britain but also all over the world. For inland letters the charges were 4*d.* for 15 miles, 8*d.* for 50 miles, 10*d.* for 120 miles and, not exceeding 300 miles, 1*s.* 1*d.* When a letter weighed an ounce it was charged at four times the rate of a single letter. It cost 3*d.* to send a letter from Holyhead to Dublin and 6*d.* from England to the Isle of Man. Charges for overseas letters ranged from 1*s.* 2*d.* to France, to 2*s.* 2*d.* to America, 2*s.* 10*d.* to Gibraltar, 3*s.* 2*d.* to the Mediterranean and up to 3*s.* 6*d.* to Brazil. Peers and members of parliament could frank ten letters daily. The revenue of the Post Office, it was stated, amounted to £97,365 in 1754; £952,893 in 1804 and £1,457,132 in 1832. The number of persons employed in the post offices of the country in 1829 was 4,905.

Richard Lemon Lander

Richard Lemon Lander, the African explorer, died in Fernando Po on February 2 or 7, 1834. There is some doubt as to the actual date, as the accounts vary slightly in detail. He was born in 1804 and even as a youth travelled widely, being in the West Indies when only thirteen and he crossed Cape Colony as the servant of Major Colebrook, a commissioner of inquiry, in 1823. With Clapperton, Lander went to West Africa and he brought home

the news of Clapperton's death. He published the records of the expedition on his return to England. In 1830 Lander left England in charge of another expedition to the Niger. On his return in 1831, he was awarded the first Gold Medal of the then recently formed Royal Geographical Society of London. In 1832 a group of Liverpool merchants sent Lander on a new expedition to open up trade in the Niger basin. While on this expedition Lander was wounded in an encounter with the natives of the Brass River region and returned to Fernando Po, where he died.

Societies and Academies

LONDON

Royal Society, January 18. B. F. J. SCHONLAND and H. COLLENS: Progressive lightning. Eleven lightning flashes, comprising fifty separate strokes from two separate thunderstorms, have been photographed with a rotating lens camera based upon the design of C. V. Boys. The speed was fast enough to permit the study of the propagation of the discharge. The majority of the strokes were double and consisted of a dart-like downward-moving leader stroke, followed immediately upon arrival at the ground by a more intense flame-like upward-moving main stroke. The mean velocity of the leader strokes was 1.1×10^9 cm./sec. along the tortuous track in two dimensions and 7.0×10^8 cm./sec. in the vertical direction. The dart was less than 54 metres long. Corresponding mean velocities for the main strokes were 6.0×10^9 cm./sec. and 3.8×10^9 cm./sec. The leader strokes are identifiable with electron avalanches and the main strokes with thermally ionised channels. The cloud base was negative and the earth positive.

A. O. RANKINE: A simple method of demonstrating the paramagnetism and diamagnetism of substances in magnetic fields of low intensity. The instrument described is the result of an attempt to construct a magnetic gradiometer capable of measuring small distortions of the earth's magnetic field in the same way that the Eötvös torsion balance measures non-uniformities of gravity. Although this purpose has not yet been achieved, the first model of the instrument has revealed itself as a means of demonstrating the paramagnetism or diamagnetism of substances of small susceptibility. Moreover, the magnetising fields employed are much smaller than has hitherto been customary, being of the order of 50 gauss or less. The system used also provides a basis for the construction of a new form of very sensitive galvanometer.

C. W. GILBERT: The production of showers by cosmic radiation. Experiments made with triple coincidence counters showed that the frequency of showers produced in lead by the passage of cosmic radiation is proportional to the general cosmic radiation. The transition curves for air to lead were obtained at 3,500 m., and it was found that there the energy of the shower particles was greater than at sea-level. To explain the curves obtained, three types of radiation are needed, a primary radiation, a shower-producing radiation and the shower particles.

PARIS

Academy of Sciences, December 18 (*C.R.*, 197, 1545-1704). The president announced the death of Georges Friedel, *Correspondant* for the Section of Mineralogy.

G. PERRIER: The fifth general meeting of the Inter-

national Geodesic and Geophysical Union at Lisbon, September 1933. A short account of the matters under consideration at the meeting. L. BLARINGHEM: 'Fever' in *Arum*. The work of Garreau on the rise of temperature for some hours during the flowering of *Arum* is confirmed. The seat of oxidation is in the male flowers and their support. These consume 5-10 times as much oxygen as the female tissues. ANDRÉ BLONDEL: Observations on terminology in new discoveries. Examples are quoted to which objection may be made on linguistic grounds. It is suggested that the various international commissions in existence should determine as soon as possible international words appropriate to the definition of new phenomena, but only after consultation with linguists. W. VENADSKY, B. BRUNOVSKY and C. KUNAŠEVA: γ -Mesothorium in *Lemna*. *Lemna* concentrates the isotopes of radium (Ra, MsThI, ThX) but does not contain the isotopes of thorium. Hence the living material does not contain thorium. HENRI LAGATU and LOUIS MAUME: The alimentary variations of cultivated plants, apart from the intervention of manure, under the conditions of practical agriculture. SERGE ROSSINSKI: A case of deformation of isotropic congruences with persistent conjugated system. P. VINCENSINI: Associated systems and their transformations. AL. PANTAZI: Couples of stratifiable congruences. MANDELBROJT: Some theorems on Fourier's series. ROBERT GIBRAT: A fairly general type of singular integral equations. FLORENT BUREAU: Systems of two uniform functions of two complex variables. ARNAUD DENJOY: Integration along closed rectifiable ensembles. N. ARONSZAJN: The invariants of transformations in the domain of n complex variables. A. MÉTRAL: Precession in gyroscopic phenomena. SILVIO MINETTI: Integration with a single quadrature of the movement of regular precession. SIMON DE BACKER: Atmospheric turbulence. D. RIABOUCHINSKY: Lines of emission. MAX SERRUYS: The rôle of peroxides in the knocking of petrol motors. From the experiments described, the authors conclude that peroxides are not the sole cause of detonation, but only one element favourable to its appearance. BERNARD LYOT: A monochromator with a large field utilising interference in polarised light. L. GOLDSTEIN: The complex process of materialisation. L. BOUCHET: Dry batteries with a solid radioactive electrolyte and ionised air. M. M. CHENOT: The discharge produced by the superposition of a constant field and a high frequency field. E. CABANEL and J. CAYREL: The point effect and crystal detection. Although the use of a metallic electrode in the form of a point is favourable when used with sensitive galenas, the point effect cannot be considered as the cause of the detection, but acts only as a secondary factor.

(To be continued.)

SYDNEY

Royal Society of New South Wales, Oct. 4. ADOLPH BOLLIGER: Volumetric determination of methylene blue and picric acid. Small amounts of methylene blue and picric acid can be titrated against each other with a high degree of accuracy. The sparingly soluble compound formed, namely, methylene blue picrate, can be readily removed with chloroform, in which it is very soluble. The end point is reached when the watery layer becomes colourless. L. W. O. MARTIN: Quantum numbers and valency. On the

basis of London's generalisation of the non-ionic bond and Pauli's exclusion principle, the principal quantum numbers (n, l) of the electron pair bond between two elements are determined. It is shown, in the cases examined, that the element of higher atomic number determines the value for n , and therefore that the electron belonging to the atom of lower atomic number must be promoted. A connexion between the degree of promotion and the strength of the bond is shown to exist. The chemical reactivity is also connected with this promotion.

WASHINGTON, D.C.

National Academy of Sciences (*Proc.*, 19, 879-938, Oct. 15). DONALD H. MENZEL and ROY K. MARSHALL: Neon absorption lines in stellar spectra. A list of identifications is given, indicating that neon is comparatively abundant in the universe. EDWIN B. WILSON: Transformations preserving the tetrad equations. DIETRICH C. SMITH: Colour changes in the isolated scale iridocytes of squirrel fish, *Holocentrus ascensionis*, Osbeck. Observations similar to those made by Foster on iridocyte aggregations beneath the scales of *Fundulus* (see NATURE, 132, 456, Sept. 16, 1933) have also been made on the iridocytes in the scales of the squirrel fish. EARL H. MYERS: Multiple tests in the Foraminifera. Observations on living Foraminifera show that in many families the occurrence of two or more shells cemented together with the apertures approximately opposed (multiple tests) is the result of the union of two or more individuals for reproductive purposes (plastogamy) with the production of 'zoospores'. J. L. WALSH: An extremal problem in analytic functions. EINAR HILLE and J. D. TAMARKIN: (1) On moment functions. (2) On the theory of Laplace integrals. JOSEPH MILLER THOMAS: A lower limit for the species of a Pfaffian system. MORGAN WARD: A property of recurring series. M. H. JOHNSON, JR.: Intensities in atomic spectra. A theoretical discussion leading to the determination of the electric moment with a definite scheme of coupling of the orbital and spin angular momenta, from which the electric moment matrix in intermediate coupling is derived. The components of the latter determine the intensities of the spectral lines. THOMAS WAYLAND VAUGHAN: The biogeographic relations of the orbitoid Foraminifera. Related living Foraminifera are characteristic of shoal water of the tropics and sub-tropics, suggesting a similar environment for the orbitoids. Since the orbitoids were bottom dwellers, wide geographical distribution requires planktonic larval stages, indirect evidence of which is provided by the observation by Myers of the production of floating 'zoospores' from certain living Foraminifera (see above). Such distribution would probably require a number of sub-oceanic peaks and ridges where there is now deep ocean. Hydrographic and other data suggest that the routes of migration were (a) Upper Cretaceous, between Europe and India by way of Tethys and between Europe and America across the Atlantic, (b) Eocene, along Tethys, across the Atlantic and from east to west of America, (c) Oligocene and most of Miocene, across Central America between the Atlantic and Pacific, thence to the Pacific islands probably to the East Indian region, as well as across the Atlantic and possibly round the southern end of India, but not round the south of Africa.