

## SOCIETIES AND ACADEMIES.

LONDON.

**Geological Society**, May 12.—Prof. W. J. Sollas, F.R.S., president, and afterwards Dr. J. J. H. Teall, F.R.S., vice-president, in the chair.—The Hartfell-Valentian succession around Plynlimon and Pont Erwyd (North Cardiganshire): O. T. Jones. The stratigraphical succession and the geological structure of an area lying in the hilly district east of Aberystwyth are dealt with. The rocks within the district are divided into three stages, which are further subdivided into groups and zones. The Plynlimon stage is developed in the northern part of the district, the Pont Erwyd stage along the two valleys of the Rheidol and the Castell, while the Ystwyth stage is developed on the plateau-like tract extending from the Castell Valley to the Ystwyth Valley. The palæontological evidence is in entire accord with the stratigraphical evidence. Three types of structure are dealt with, (1) folding, (2) strike-faulting, and (3) normal faulting, but the first is predominant. Evidence is given for assigning to the "Aberystwyth Grits" of earlier observers a position much higher in the geological sequence than has hitherto been attributed to them. The paper concludes with a tabular list of fossils, correlation tables, and a description of two species of graptolites of zonal importance.—The geology of the neighbourhood of Seaford (Sussex): J. V. Elden. This paper deals with a portion of the South Downs lying between Eastbourne and Newhaven. The inland outcrops of the uppermost zones of the Chalk are mapped. On the east of the Cuckmere River, the beds examined are found to be nearly horizontal. On the west side they are bent into a sharp unclinal fold, striking east and west. Seaford Head represents a remnant of this fold. The low ground between Seaford and Chyngton occupies the trough of the fold. The complete disappearance of the fold on crossing the Cuckmere cannot be satisfactorily explained by the normal process of dying-out. It is suggested that a transverse fault may exist beneath the alluvium of that river. The fault, if it exists, seems to die away northwards, since no trace of it has been detected higher up the valley. The relation of the Seaford fold to the main flexures of the south coast is considered. Certain existing physiographical features are ascribed to the influence of this flexure, which facilitated the retention of the Eocene cover in the synclinal hollow thus formed. A brief comparison is made between the fossils of the inland exposures and those of the cliff-section, the most notable difference being the evidence in the former of a *Conulus* band at the top of the zone of *Micraster cor-anginum*.

**Physical Society**, May 14.—Dr. C. Chree, F.R.S., president, in the chair.—A bifilar vibration galvanometer: W. Duddell. The paper describes a new type of vibration galvanometer and a series of tests made upon it. Vibration galvanometers may be divided into two types:—(1) those in which the moving part consists of a piece of iron or steel, and the current to be measured flows round fixed coils, as in the case of the Thomson galvanometer; (2) those in which the current to be measured flows round a moving coil placed in a fixed magnetic field, on the syphon recorder principle. The vibration galvanometers of Max Wien and Rubens belong to the first class, while Mr. Campbell's vibration galvanometer and the one described in the paper belong to the second. In the instrument described the mass of the moving parts is reduced to a minimum, the moving coil being reduced to the two wires forming its two sides, similar to a bifilar oscillograph, but with this difference: whereas the bifilar oscillograph is designed so as to make the damping aperiodic, the vibration galvanometer is designed so as to keep the damping as small as possible. A series of tests made upon the instrument showed that the total range of frequency was very large, namely, from about 90 ~ per second up to 1900 ~ per second. The damping is very small, so that the resonance is very sharp.—Effect of temperature on the hysteresis loss in iron in a rotating field: W. P. Fuller and H. Grace. The rotating field was produced by means of two phase currents. One phase was connected to a coil of long rectangular section and of sufficient length to produce a uniform field within a radius of 2 cm. from

the centre. The second phase was connected to a similar coil enclosing this one, and causing a flux at right angles to it. The resultant field at the centre was uniformly rotating. The results of the experiment show that the effect of increasing the temperature of iron is to reduce the hysteresis loss at a given induction and to cause the maximum loss to occur at a lower value of the induction. In one specimen the maximum value of the loss at 220° C. was 12,300 ergs per cu. cm. per cycle at an induction of 16,000 C.G.S. units. At 580° C. the maximum loss was 2600 ergs at an induction of 10,700. The frequency of the experiments was 42 cycles per sec.—A method of testing photographic shutters: A. Campbell and T. Smith. The authors described a simple and rapid method of testing the speeds and efficiencies of photographic shutters, with a maximum error of 0.0001 second at the highest speeds. A vibrating beam of light falling through a narrow slit on to a moving plate serves to measure the time. This beam is obtained by reflecting the light of a Nernst lamp from the mirror (area 50 sq. mm.) of a vibration galvanometer actuated by a current of fixed frequency (say 100 or 500 ~ per sec.) obtained from a microphone hummer. The use of the vibration galvanometer, in which the amplitude is enormously increased by resonance, greatly facilitates the measurements. When the total duration of exposure only is required, the vibrating beam of light is passed through the shutter, tracing a sine curve on the moving plate. The duration of exposure is immediately found by counting the number of ripples recorded on the plate. Ten records of the various speeds of a shutter can be taken side by side on one 5×4 in. plate in one minute. When the efficiency in addition to the duration of exposure is required, the method adopted is essentially that of Sir Wm. Abney, but the time measurements are made with the vibrating beam of light instead of a screen.

**Zoological Society**, May 25.—Dr. S. F. Harmer, F.R.S., vice-president, in the chair.—The anatomy of the olfactory organ of teleostean fishes: R. H. Burne. The chief structural variations were described in some fifty genera, mostly of common British species, the anatomical facts being illustrated by a series of coloured diagrams.—Description of a new species of the decapod crustacean genus *Alpheus*, Fabr., from the Bay of Batavia: Dr. J. G. de Man.

CAMBRIDGE.

**Philosophical Society**, May 3.—Mr. H. F. Newall in the chair.—A specimen of the cone *Calamostachys binneyana*, Carruthers: H. H. Thomas.—Note on two new leeches from Ceylon: W. A. Harding. The leeches described in this paper were collected in Ceylon by Miss Muriel Robertson. The material comprised examples of two species hitherto unrecorded, of which a brief description is given.—Note on an abnormal pair of appendages in *Lithobius*: L. Doncaster.—A property of summable functions: Dr. A. C. Dixon.

May 17.—Sir J. J. Thomson, vice-president, in the chair.—Phenomena of X-ray transmission: C. G. Barkla. By the use of homogeneous beams of X-rays the author investigated the variations in the relative ionisations in different gases due to changes in the penetrating power of the primary beams used. It was found that as the primary radiation passing through a gas was made more penetrating, within well-defined limits, the ionisation in that gas was approximately proportional to the ionisation produced by the same beam in air. When, however, the primary beam became just more penetrating than the secondary homogeneous radiation characteristic of one of the elements in the gas, the ionisation in that gas increased rapidly. The connection between ionisation in the gas, intensity of secondary radiation from the elements in the gas, and the absorption of the primary rays in those elements was exhibited. It was shown that the apparent irregularities recorded by many investigators in the various phenomena of X-ray transmission—absorption, secondary radiation, ionisation—may be explained in terms of a few simple laws.—Phenomena of the cathode discharge: J. A. Orange. The paper deals with the phenomena of the Crookes's dark space,

kathode rays, and canal rays associated with double kathodes (as devised by Goldstein), and pairs of simple kathodes. The conclusions of Goldstein and Kunz with respect to the form of beams of canal rays are controverted. Remarkably well-defined beams of kathode rays were obtained with some arrangements. Schuster's relation between thickness of dark space and strength of current was confirmed. The records are photographic throughout.—Some fatigue effects of the kathode in a discharge tube: R. **Whiddington**. The kathode phenomena vary with time of running in such a way as to suggest that the emitted kathode rays become more homogeneous in velocity and more slowly moving. Restoration of the kathode cannot be effected by causing the absorption of hydrogen, oxygen, nitrogen, carbon dioxide, carbon monoxide, or helium, even at the temperature of liquid air. A transient recovery occurs on momentarily running the fatigued kathode as anode. Kathodes of carbon, platinum, and aluminium were tried. The kathode fall of potential shows a falling off with the time.—The influence of dilution on the colour and the absorption spectra of various permanganates: J. E. **Purvis**. Dilute solutions of the permanganates of barium, zinc, and potassium were compared in tubes of different lengths, and so that each tube contained the same amount of dissolved salt. The highly diluted solutions gradually changed from the well-known permanganate colour to reddish-brown and to yellow colours. At the same time several of the absorption bands became narrower, and others wider, until, when the colour had become quite yellow, the bands disappeared and only marked general absorption remained. These changes took place, not only when the solutions were subjected to the influence of light, but the phenomena were observed after the solutions had remained in the dark, although light appeared to accelerate the changes. The changes also occurred when the solutions were kept out of contact with the atmosphere and light. The explanation was that the  $MnO_4$  ion broke down with the production of  $MnO_2$  and  $O_2$ , and the  $MnO_2$  was dissolved in the colloidal condition.—Note on the histology of the "giant" and ordinary forms of *Primula sinensis*: R. P. **Gregory**.

## GÖTTINGEN.

**Royal Society of Sciences**.—The *Nachrichten* (physico-mathematical section), part i. for 1909, contains the following memoirs communicated to the society:—

January 9.—The representation of unsaturated cyclic acids and carbohydrates with semi-cyclic connection: O. **Wallach**.

February 6.—*In memoriam* Hermann Minkowski. A proof that integers may be represented by a fixed number of  $n$ th powers (Waring's problem): David **Hilbert**.—Ordinary linear differential equations with singular regions and their particular functions: H. **Weyl**.—The concept of deformation-work in the theory of elastic solids: J. **Weingarten**.

February 20.—The uniformisation of algebraic curves by means of automorphous functions with imaginary substitution-groups: P. **Koebe**.

March 6.—The decomposition of matrices: J. **Wellstein**.

March 20.—Molecular free vibrations: E. **Madelung**.

## DIARY OF SOCIETIES.

## THURSDAY, JUNE 3.

ROYAL INSTITUTION, at 3.—A Modern Railway Problem: Steam *v.* Electricity: Prof. W. E. Dalby.

LINNEAN SOCIETY, at 8.—On the Alcyonaria of the *Sealark* Expedition: Prof. J. A. Thomson.—On the Cephalochorda of the *Sealark* Expedition: H. A. S. Gibson.—Report on the Porifera collected by Mr. C. Crossland in the Red Sea: R. W. Harold Row.

RÖNTGEN SOCIETY, at 8.15.—Annual General Meeting

INSTITUTE OF ACTUARIES, at 5.—Annual General Meeting.

## FRIDAY, JUNE 4.

ROYAL INSTITUTION, at 9.—Researches in Radiotelegraphy: Prof. J. A. Fleming, F.R.S.

GEOLOGISTS' ASSOCIATION, at 8.—The Fossiliferous Lower Keuper Rocks of Worcestershire: L. J. Wills.

## SATURDAY, JUNE 5.

ROYAL INSTITUTION, at 3.—The Vitality of Seeds and Plants: (1) A Vindication of the Vitality of Plants: Dr. F. F. Blackman, F.R.S.

## TUESDAY, JUNE 8.

ROYAL INSTITUTION, at 3.—Biological Chemistry: Dr. F. Gowland Hopkins, F.R.S.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—Prehistoric Human Remains from Various Parts of England: Dr. A. Keith.

## WEDNESDAY, JUNE 9.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The Estimation of Iron by Permanganate in Presence of Hydrochloric Acid: G. C. Jones and John H. Jeffery.—On Jaffé's Colorimetric Method for the Estimation of Creatinine: A. C. Chapman.—The Estimation of the Alkalinity of Bleaching Powder Solutions: Dr. K. J. P. Orton and W. J. Jones.—(1) The Sabatier-Senderens Test for Distinguishing between Primary, Secondary and Tertiary Alcohols: (2) Note on a New Test for the Halogens: Dr. G. B. Neave.

## THURSDAY, JUNE 10.

ROYAL SOCIETY, at 4.30.—Croonian Lecture: The Functions of the Pituitary Body: Prof. E. A. Schäfer, F.R.S.

ROYAL INSTITUTION, at 3.—A Modern Railway Problem—Steam *v.* Electricity: Prof. W. E. Dalby.

MATHEMATICAL SOCIETY, at 5.30.—On the Behaviour at the Poles of a Series of Legendre's Functions representing a Function with Infinite Discontinuities: F. J. W. Whipple.—An Analogue of Pascal's Theorem in Three Dimensions: W. H. Salmon.

## FRIDAY, JUNE 11.

ROYAL INSTITUTION, at 9.—Problems of Helium and Radium: Sir James Dewar, F.R.S.

PHYSICAL SOCIETY, at 8.—The Arthur Wright Electrical Device for evaluating Formulæ and solving Equations: Dr. A. Russell and Arthur Wright.—The Echelon Spectroscope, its Secondary Action and the Structure of the Green Hg line: H. Stansfield.—The Proposed International Unit of Candle Power: C. C. Paterson.—Inductance and Resistance in Telephone and other Circuits: Dr. J. W. Nicholson.—Note on Terrestrial Magnetism: G. W. Walker.—On the Form of the Pulses constituting White Light: A. Eagle.

ROYAL ASTRONOMICAL SOCIETY, at 5.  
MALACOLOGICAL SOCIETY, at 8.—Diagnoses of new Trochoid Shells from North Queensland: H. B. Preston.—Notes on some of the Ampullariidæ in the Paris and Geneva Museums: G. B. Sowerby.—On the Radulæ of British Helicidæ: Rev. E. W. W. Bowell.

## SATURDAY, JUNE 12.

ROYAL INSTITUTION, at 3.—The Vitality of Seeds and Plants: (2) The Life and Death of Seeds: Dr. F. F. Blackman, F.R.S.

## CONTENTS.

PAGE

The Evolution of the Vascular System in Ferns. By D. H. S. . . . .	391
Electrical Engineering. By Prof. Gisbert Kapp . . . . .	392
Why Leaves are Green. By H. W. . . . .	393
The Foundations of Geometry. By G. B. M. . . . .	394
Valency. By J. C. P. . . . .	395
Economic Geology in British Guiana and South Africa. By J. W. G. . . . .	395
Our Book Shelf:—	
Bateson: "The Method and Scope of Genetics."— J. A. T. . . . .	396
Boulanger: "Hydraulique Générale" . . . . .	396
Scott-Moncrieff: "The Chadwick Lectures, University of London, Session 1907-8" . . . . .	397
Letters to the Editor:—	
The Temperature of the Upper Atmosphere.—Dr. C. Chree, F.R.S. . . . .	397
An Optical Phenomenon.—V. P. . . . .	398
The Oldest Remains of Man. ( <i>Illustrated</i> .) By Dr. William Wright . . . . .	398
A Great Endowment and its Influence. By Prof. John Edgar . . . . .	399
Germany and the Patents and Designs Act, 1907 . . . . .	401
Dr. von Neumayer, For Mem.R.S. By Hy. Harries . . . . .	402
T. Mellard Reade. By H. B. W. . . . .	404
Notes . . . . .	404
Our Astronomical Column:—	
Astronomical Occurrences in June . . . . .	409
The Dispersion of Light in Interstellar Space . . . . .	409
A Remarkable Transit of Jupiter's Third Satellite . . . . .	409
The Spectrum of Magnesium in Hydrogen . . . . .	410
The Perturbations of Brooks's Comet (1889 V) by Jupiter in 1886 . . . . .	410
Recent Observation of Daniel's Comet, 1907 <i>d</i> . . . . .	410
The Variable Star 6.1909 Ursæ Majoris . . . . .	410
Polar Magnetic Storms. By G. W. W. . . . .	410
Rock-Engravings in South Africa. ( <i>Illustrated</i> .) . . . . .	411
Centenary of the Physico-Medical Society of Erlangen . . . . .	411
The International Congress of Applied Chemistry . . . . .	412
Education and Research in Applied Chemistry. By Prof. Raphael Meldola, F.R.S. . . . .	413
The Campaign against Malaria. By Prof. Ronald Ross, F.R.S. . . . .	415
University and Educational Intelligence . . . . .	418
Societies and Academies . . . . .	419
Diary of Societies . . . . .	420