

Societies and Academies.

LONDON.

Royal Society, March 27.—W. A. Bone, A. R. Pearson, and R. Quarendon: Researches on the chemistry of coal. Part III.—The extraction of coals by benzene under pressure: A new form of apparatus is described for the extraction of coals by means of benzene under pressure up to 700 lb. per square inch under "Soxhlet" conditions. A large proportion of the benzene extracts from bituminous and sub-bituminous coals (except the Morwell brown coal from Victoria, Australia) always comprises an important group of nitrogenous "humic" bodies, mainly responsible for the coking propensities of bituminous caking coals, of which they constitute 4.5 to 7.0 per cent. The amount of "resins" ordinarily contained in bituminous coals does not exceed 1 per cent of the whole coal substance, and they contribute in minor degree only to the coking propensities. The benzene extracts of all the bituminous and sub-bituminous coals examined contain important amounts of neutral wax-like non-nitrogenous bodies, of very low oxygen content, which do not, however, contribute at all to their coking propensities. The residues left after extraction of bituminous coking coals are *per se* all practically devoid of coking propensities. The extract from the Morwell brown coal consists chiefly of non-nitrogenous unsaponifiable resenes, resene-esters, and aliphatic or alicyclic acids (and esters), of which the last two are highly oxygenated substances.—R. V. Southwell and Sylvia W. Skan: On the stability under shearing forces of a flat elastic strip: The investigation relates to a flat elastic strip, of uniform breadth, thickness, and material, upon which a uniform shear is imposed by tangential tractions applied at its edges and in its plane. These tractions affect both the modes and the frequencies of the free transverse vibrations. If sufficiently intense, they will bring about a condition of limiting elastic stability, since they will neutralise in certain types of distortion the restoring effects of the flexural stresses. Rotatory inertia is neglected. For purposes of comparison, approximate results are obtained by Lord Rayleigh's method, in which the frequency is calculated from the energy equation for a displacement of an assumed type. The correspondence is close, and supplies further confirmation of this method.—J. E. P. Wagstaff: Experiments on the duration of impacts, mainly of bars with rounded ends, in elucidation of the elastic theory: A method depending on duration of discharge of a condenser through a circuit of known resistance and self-inductance has been developed for the accurate determination of duration of collision of steel bars. Variation of time of impact t with initial relative velocity of approach v has thus been studied for a large variety of bars, and a relation of form $t = Av^\gamma$ represents the results: γ varies with the length l and radius r of the bar according to an equation $-1/\gamma = A'' + kl/r$ where A'' and K are constants. The time of impact is not strictly a linear function of length, for short bars, and shows considerable variation with diameter. From results obtained with steel bars, the time of impact for very long bars is extrapolated and compared with the Saint-Venant wave-formula. The result apparently emerges that the pulse, intense and probably largely adiabatic, travels along the bars, about 50 per cent. faster than an isothermal wave. Bars of brass and aluminium are also tested. An extended series of experiments was undertaken with bars of the same cross-section, of unequal lengths, and of masses equalised by loading. Relationships of the form $t = Av^\gamma$ were

found as before, but they break down for large initial velocities.—E. V. Evans and H. Stanier: Sulphur studies in coal gas. I.—The removal of carbon bisulphide by a nickel catalyst. In removing the sulphur present as carbon bisulphide, the gas is passed over heated nickel. The products are mainly carbon and hydrogen sulphide. In most cases in which nickel is used as a catalyst in promoting combination with hydrogen, sulphur acts as a poison. The apparently anomalous behaviour of carbon bisulphide is probably due to the fact that the actual catalyst is nickel subsulphide, Ni_3S_2 .—N. Ahmad: Absorption of hard γ -rays by elements. By means of a balance method the absorption in a large number of substances of γ -rays from radium B+C, filtered through 1 cm. of lead, has been measured. The results indicate that the laws of absorption of these penetrating radiations are of the same type as for X-rays. The apparent atomic absorption (μ_A) can be represented by $\mu_A = 1.68 \times 10^{-25}z + 1.60 \times 10^{-31}z^4$, where z is the atomic number of the absorber. The first term represents the part of absorption due to scattering, the second term that due to "true" absorption. For elements of low atomic weight, the apparent absorption is almost entirely due to scattering, and for those of high atomic weight at least one-half. Estimates of wave-length, based on the two terms in the above formula, lead to values 0.015 and 0.019 Å.U. for the *mean effective wave-length* of the radiation employed.

Geological Society, March 12.—Prof. W. W. Watts, vice-president, in the chair.—Jane Longstaff (*née* Donald): Descriptions of Gasteropoda, chiefly in the late Mrs. Robert Gray's Collection, from the Ordovician and Lower Silurian of Girvan. By far the greater number, namely, twenty-five species and one variety, belong to the Pleurotomariidae; of these twenty-one are new to science. Three species previously placed in the genus *Raphistoma* Hall are transferred to *Liospira* Ulrich, as the possession of a sinual band distinguishes them from members of the former. Among other new species described are two of *Clisospira*, which are not only new to science, but the genus itself does not appear to have been recorded before from the British Isles.—A. Heard and R. Davies: The Old Red Sandstone of the Cardiff district. A new fish-band was discovered in the Red Marl Group. This Coed-y-Coedcæ Fish-Bed contains innumerable fragments of Cephalaspis and Pteraspis, together with *Pachytheca* and obscure plant-remains. The petrological investigation revealed a rich assemblage of pebbles and minerals. Three definite mineralogical zones are established, corresponding roughly with the stratigraphical groups. The Old Red Sandstone represents estuarine and deltaic deposits derived mainly from a pre-Cambrian massif on the north-west. The Silurian rocks of the Cardiff district are entirely different and distinct from the Old Red Sandstone. No pebbles from the Silurian have been observed in the lowest Old Red Sandstone beds. The definite petrological break represents a non-sequence; the hypothesis of the "Welsh Lake" is untenable. A probable connexion with the Devonian of North Devon is suggested.

EDINBURGH.

Royal Society, March 17.—Prof. F. O. Bower, president, in the chair.—R. Kidston and W. H. Lang: (1) Notes on fossil plants from the Old Red Sandstone of Scotland. No. 2, *Nematophyton Forfarense*, Kidston, sp. The specimen from Reswallie, in Forfarshire, previously described under the name *Cryptoxylon Forfarense*, Kidst. sp., on re-examination proves to be a species of *Nematophyton*, and the name

is altered to *N. Forfarensis*, Kidst. sp. The tissue, though almost entirely altered and pseudo-cellular, is found in places to retain clear traces of the characteristic tubular structure. It is a form of Nemato-phyton with "medullary spots." No. 3. On two species of *Pachytheca*, based on the characters of the Algal filaments. Two new species of *Pachytheca* with well-preserved structure are described. Both have the algal filaments which inhabited the spherical fossil preserved; specific distinctions can only be satisfactorily based on such specimens. The description of *P. sphaerica*, Hk., and *P. (Æthetotesta) devonica*, Dawson, do not afford such diagnostic characters. Preservation of the algal filaments has previously been known only for specimens of Wenlock age which are here named *P. Hookeri*. This, like the two new species described, shows a distinction of medulla, cortex composed of radial tubes and an outermost clear layer that was presumably mucilaginous. In *P. media* from Balruddery the algal filaments are more slender than those of *P. Hookeri*, but are of the same type, and only one is contained in each cortical tube. In *P. fasciculata* from beds of black shale at Stob Dearg, Glencoe, the algal filaments are much more slender, and a number of them are contained in each cortical tube. The filaments emerge from the ends of the tubes in a bundle, and can be traced across the clear mucilaginous zone. This is a very distinct type of construction in the genus. (2) On the presence of tetrads of resistant spores in the tissue of *Sporocarpion furcatum*, Dawson, from the Upper Devonian of America. Specimens of dark, thalloid, bilobed structures, obviously incomplete at the lower undivided end, occur in large numbers in the black shale of Upper Devonian age at Columbus, Ohio. They were described and figured by Dawson under the name *Sporocarpion furcatum*, but no spores were found in them. A re-investigation has shown that there are tetrads of spores in some of the specimens, within the parenchymatous cellular tissue. They are usually placed parallel to the concavity between the two lobes. The spores resist the action of ammonia, following treatment with Schultze's macerating fluid, and thus agree in their behaviour with cuticularised walls. The same holds for a cuticle that is sometimes preserved on the outside of the thalloid tips. The spores have a tri-radiate marking separating the three planes of contact with the other spores of the tetrad. The plant is of great morphological interest even though only its forked tips are known. It is most probably a thalloid alga, but the resistant cuticle and spores are features not known in any other plants of this group. On the less likely view that it was a thalloid Pteridophyte the occurrence of the spores as isolated tetrads in the tissue would be a unique feature. Plants showing such a combination of characters make it difficult to draw a sharp line between algae and Pteridophyta. —C. W. Wardlaw: Size in relation to internal morphology. I. The vascular system of *Psilotum*, *Tmesipteris*, and *Lycopodium*. The detailed examination of the stelar structure in the *Psilotales* and *Lycopodiaceæ* reveals a general similarity of behaviour on increase of size. The changes in form of the xylem are comparable in one respect. In neither is the larger stele merely the magnified image of the smaller, but in both the xylem becomes increasingly disintegrated on passing from smaller to larger size. The surface of the xylem in contact with the thin-walled living tissue may be regarded as a surface of interchange. In the sporeling the proportion of surface to bulk of the xylem is high, and by the principle of similar structures, if the form be unchanged this proportion will decrease as size

increases. In both *Psilotum* and *Lycopodium* it has been shown by actual measurements that the changes which accompany increase in size of the xylem are such as to maintain a relatively high proportion of surface to bulk. This is much higher than it would have been supposing the simple structure in the sporeling had been retained throughout. It has been achieved in both classes of plants by progressive decentralisation and disintegration of the xylem. Structural evidence of this nature indicates that size is a factor in determining the internal morphology of the stele in these plants.

PARIS.

Academy of Sciences, March 3.—M. Guillaume Bigourdan in the chair.—F. E. Fournier: The cause and the origin of cyclones and typhoons. It is suggested that these have their cause and origin in a cyclonic vortex of cirrus clouds.—Charles Moureu and Charles Dufraisse: Autoxidation and anti-oxidising action. The catalytic properties of iodine and its compounds: the generalisation of the phenomenon. In a previous communication the authors have given a general theory of the catalysis of autoxidation. The present note has for its object the establishment of the generality of the phenomenon in the case of iodine and its compounds. The general behaviour of iodine is in agreement with the results predicted.—G. Tzitzéica: The affine geodesic representation of surfaces.—Bertrand Gambier: The polygons of Poncelet.—J. Haag: A problem of probabilities.—E. Jouguet: The internal potential of elastic bodies.—Mlle. Suzanne Veil: The evolution of the molecule of nickel hydroxide in the presence of water. Measurements of the magnetisation coefficients of nickel hydroxides and of the oxides of nickel obtained by their ignition. The magnetisation co-efficient of the nickel oxide depends on its methods of preparation.—Victor Henri: The absorption of ultra-violet light by acrolein. The ultra-violet absorption bands produced by acrolein have been compared with those given by propaldehyde, trimethylethylene, and acrylic acid. A series of narrow bands given by the liquid are resolved, in the vapour, into a number of fine bands and lines. This indicates that the molecule of acrolein possesses an electrical polarity, the CO group and the ethylene group presenting opposite electrical charges.—Arnold Lassieur: The rapid electro-analytical separation, by graded potentials, of silver, copper, and bismuth.—A. Damiens: A new re-agent for carbon monoxide. The re-agent proposed is a suspension of finely divided cuprous oxide in strong sulphuric acid: the compound formed by absorption of carbon monoxide is $\text{Cu}_2\text{SO}_4 \cdot 2\text{CO}$.—G. Chesneau: Chemical study of the stained glass from the Church of Saint-Remi at Rheims.—B. Bogitch: The removal of sulphur from metals in the solid state. Details of the proportions of sulphur removed from nickel and cobalt after prolonged heating with carbon to 1100°C .—P. Gaubert: The orientation of crystals of ammonium iodide by the cleavage plates of mica. The researches of Frankenheim, Wolleront, and Mügge on the relations between the crystallisation of potassium iodide on micas have been extended. Ammonium iodide was found to be more suitable than potassium iodide: the orientation of the crystals readily distinguishes not only the micas between themselves, but their decomposition products.—J. Thoulet: The density of sea-water: its rôle in the study of oceanic circulation and marine fishing.—René Souèges: The embryogeny of Graminaceæ. Development of the embryo in *Poa annua*.—A. Maige: Variations of the limit of amylogenic condensation of the plastids in the hypocotyl

of the bean.—Edmond Gain : Anomalies in *Helianthus* obtained from seeds previously heated to temperature between 120° C. and 150° C.—R. Anthony and (Mlle.) F. Coupin : The brain of the bear at birth. The small weight and slight differentiation of the brain of the newly-born bear are in proportion to its reduced stage of growth.—E. F. Terroine, R. Bonnet, R. Jacquot, and G. Vincent : Comparative energy yields in the development of moulds at the expense of carbohydrates or of proteids and specific dynamical action. The experiments described lead to the conclusion that in any living being the formation of a carbohydrate results in a very small energy loss if it is made at the expense of another carbohydrate, more if it arises at the expense of fat, and considerable loss if derived from proteids.—Henry Cardot and Henri Langier : Diffusion and generalisation of stimulation in the centres during prolonged effort.—J. Athanasiu and A. Pézard : The influence of castration on motor nerve energy.—Anna Drzewina and Georges Bohn : The expulsion of the green algæ symbiotic in *Convolvula roscoffensis*, under the influence of carbonic acid.—M. de Luna : Remarks on the note on the participation of a peroxydase in the appearance of the pigment in *Drosophila melanogaster*.—Jacques Benoit : The endocrinal activity of the testicle before puberty in the Gallinaceæ.—H. Hérissé and R. Sibassié : Biochemical researches on the nature and quantity of the principles hydrolysable by invertin and by emulsion, contained in some leguminous seeds.—Henri Labbé and B. Theorodesco : The action of insulin on hyperglycæmia due to caffeine.—A. Maubert, L. Jaloustre, P. Lemay, and C. Guilbert : The influence of X-rays on the catalase of the liver. X-rays exert a progressive paralysing action on catalase of the liver, which increases with the time and intensity of the irradiation.—A. Boquet and L. Nègre : The action of the various constituents of the Koch bacillus on the evolution of experimental tuberculosis in the rabbit and the guinea-pig. The fatty material and the lipoids of the Koch bacillus exert opposed effects in experimental tuberculosis. The fats accelerate the extension and generalisation of the lesions, whilst the lipoids, insoluble in acetone and soluble in methyl alcohol, slow down the course of infection, retard the invasion of the lungs, and in certain cases favour the appearance of a cicatricial process of sclerosis.—M. Mazé : The manufacture of Port-du-Salut cheese, and of Dutch cheeses (Edam and Gouda).—G. Guittonneau : The Microsiphonæ of the soil.—A. C. Guillaume : The functions of the blood capillaries.—Auguste Lumière and Henri Couturier : Anaphylactic sensibilisation through the eye.

March 10.—M. Guillaume Bigourdan in the chair.—F. E. Fournier : The variations of the fall of the barometer and rotating winds in cycles and typhoons.—M. de Broglie : The change of wavelength by diffusion in the case of the K lines of tungsten. The lines arising from diffusion were registered simultaneously on the same plate with fluorescence lines. The observed deviations were of the order of magnitude predicted by the theory of Compton and Debye.—Alexandre Degrez was elected a free Academician in the place of the late M. A. de Gramont.—R. Gosse : The equations $s + f(x, y, z, p, q, r) = 0$ which are of the first class.—Th. Varopoulos : Functions having a finite number of branches.—F. H. van den Dungen : The *a priori* determination of the vibrations of the blades of turbines.—M. Galerkin : Thin elastic plates, limited by two arcs of concentric circles and two radii under the action of concentrated forces.—Louis Kahn : The apparent diminution of the resistance of a wing

agitated in a current of air, and its application to the theory of the flight of birds.—Louis Breguet : The conditions to be fulfilled by a glider for best utilising the fluctuations of the wind favourable to hovering flight.—Ernest Esclangon : Observations of the eclipse of the moon of February 20, 1924, made at the Observatory of Strasbourg. Observations were made under very favourable atmospheric conditions. Details of the photometric results will be published in a later communication.—Pierre Auger : The β secondary rays produced in a gas by the X-rays. The trajectories of the electrons forming the secondary rays were simultaneously photographed in a Wilson apparatus in two directions at right angles to each other.—Adolphe Lepape : The search for thorium emanation (thoron) in thermal springs by the method of induced activity. Out of 200 springs in Colorado, Lester found only one containing thoron. This might be due to the rarity of thoron or to the difficulty of detecting its presence owing to its short life. The author describes a sensitive method of detection based on the study of the deposit of induced activity. Five springs in the Pyrenees gave negative results for thoron : three springs in the Central Plateau showed traces only.—André Charriou : The electrolytic purification of precipitates. Chromic acid carried down by alumina is completely removed by prolonged electrolysis from the precipitate suspended in water. Adsorbed sulphuric acid and permanganic acid are also removed under this treatment.—Mlle. Paule Collet : The paramagnetism of iron in potassium ferrocyanide.—A. Boutaric and M. Vuillaume : The influence on the properties of sols of arsenic sulphide of some physical factors intervening during their preparation. The factors studied were concentration of the solution of arsenious anhydride, temperature, velocity of the current of sulphuretted hydrogen, and excess of the latter.—André Kœhler : A new method of examination for detecting adulteration in cocoa fat.—E. Pitois : The differentiation of steels by the examination of the sparks produced by friction in air and in oxygen.—L. J. Simon and M. Frèrejacque : The methylation of tertiary amines and of alkaloids by means of sulphomethyl esters derived from phenols. The sulphonic ester used in this reaction may be $(1:4)C_6H_4(OCH_3)(SO_3CH_3)$, or the corresponding cresol derivatives. These react with bases such as urotropine, pyridine, and other tertiary bases giving compounds insoluble in chloroform or benzene. Precipitates are also given by alkaloids.—Charles Dufraisse and Alfred Gillet : Stereochemical researches in the benzalacetophenone series. Some derivatives of dibenzoylmethane and of benzalacetophenone.—Louis Longchambon : The rotatory dispersion of tartaric acid.—Jacques Bourcart : Recent movements in western Albania.—Gabriel Guilbert : The abnormal trajectories of cyclonic centres.—A. de Puymaly : The vacuome of the green Algæ adapted to life in air.—A. Lebediantzeff : The modifications undergone by arable soil after drying in air.—Mme. L. Randoïn and H. Simonnet : The food problem regarded from the point of view of the ratios existing between the fundamental elementary substances (vitamins) and the energy-producing substances.—Henri Piéron : The question of the energy minimum in the luminous stimulation of the retina by short light exposures.—Jousset de Bellesme : The conditions of aerial locomotion in insects.—Jacques Pellegrin : The Salmonideæ of Morocco.—Maurice Manquat : The oxidising power of the nuclei of the epithelium of the renal caniculi of *Perca fluviatilis*.—A. Vandell : The determinism of the development of the oostegites of isopods and the temporary secondary sexual characters of the Crustacea.