SOCIETIES AND ACADEMIES.

London.

Royal Society, February 12.—"On the Organization of the Fossil Plants of the Coal-Measures. Part XVIII." By Prof. W. C. Williamson, LL.D., F.R.S., Professor of Botany in the Owens College, Manchester.

On three preceding occasions the author has directed attention to the existence in the older Carboniferous rocks of a remarkable form of fructification which seemed to belong to the Calamarian family of plants, though presenting features distinct from any that had hitherto been described. In the first instance, in 1871, he placed this fructification in Sternberg's provisional genus *Volkmannia*, under the name of *V. Dawsoni*. Some small fragments of the same type, obtained at a later period by the late Prof. Weiss, of Berlin, led him to identify the plant with Binney's hitherto very obscure genus *Bowmanites*, an identification which is accepted by Prof. Williamson. Still more recently, a number of additional specimens have been obtained from the Ganister Carboniferous beds of Lancashire and Yorkshire, which not only throw further light upon the plant, but have made it possible to re-write its history in an almost complete form.

Like all the other Calamariæ, *Bowmanites* was a plant with a distinctly articulated stem, each node of which bore a verticil of lateral appendages. In the vegetative organs each of these nodal appendages consisted of a verticil of the linear, uninerved leaves characteristic of the old, ill-defined genus *Asterophyllites*. In the fructification these foliar verticils are replaced by a broad circular disk, the margin of which sustained a verticil of leaf-like "disk-rays." These rays can scarcely, at present, be identified with true leaves, since they have not only no midrib, but they seem to contain no traces whatever of a vascular bundle.

The centre of the axis of the strobilus is occupied by a conspicuous bundle of barred and reticulated tracheids of the scalariform type, the transverse section of which bundle is triangular, with concave sides. Each of the three prominent angles is abruptly and broadly truncated. A thin inner cortex seems to have originally surrounded this bundle, but all traces of its tissues have disappeared. The thick outer cortex is composed of a mixture of rather coarse, strongly defined parenchymatous and prosenchymatous cells. At each node this cortex expands into the lenticular disk already referred to. This disk is thickest at its inner border, thinning gradually towards its outer margin, where it subdivides into the verticil of elongated disk-rays already mentioned. Though no vascular bundles can be discovered connecting the central axial one with the surrounding disk, some such must have once existed, since we find them both in the cortex of the internodes and in the nodal disks.

The entire upper surface of each disk has given off numerous very slender sporangiophores, destined to reach three or four concentric circles of sporangia, which were arranged in a single plane in the internodal interval between each two disks. Each sporangiophore, unlike what is usual amongst the Calamariæ, only sustained a single sporangium. In order to reach the more external ranges of the latter organs, the sporangiophores were prolonged outwards in a distinct layer between the upper surface of the disk and the sporangia which rested upon it. Not only was this the case, but when each sporangiophore reached the sporangium with which it was destined to become organically united, it did not at once do so; but it passed under, and even beyond that organ, where it bent back upon itself and became united to the sporangium on its distal side. The outer, or epidermal, layer of the sporangium was merely an extension of that of the sporangiophore.

The numerous spores of *Bowmanites* have also a distinctive form. Each has a rather thin exosporium, but this is thickened along a few reticulate lines, and from each junction of these reticulations a strong radiating spine is projected. It is in the very distinctive features of these reproductive organs that the marked generic individuality of *Bowmanites* chiefly resides.

The second plant described in the memoir, under the name of *Rachiopteris ramosa*, is one of the several fern-like organisms which the author has included in his provisional group of Rachiopterides. Considerable doubt exists respecting the true affinities of at least some of these plants. The one now described may prove to be a less hirsute, more fully developed condition of the *Rachiopteris hirsuta* described by the author in his Memoir XV.

Chemical Society, January 15.—Dr. W. J. Russell, F.R.S., President, in the chair.—The following papers were read:—On magnetic rotation, by W. Ostwald. The magnetic rotation of organic compounds, according to Perkin, is an additive function of their composition, and equal to the sum of the rotations of the components, but this is not the case with the rotation of inorganic compounds, which is usually found greater than that calculated on such an assumption. The author points out that these exceptional values are only obtained in the case of electrolytes, and that they must therefore be referred to a fundamental difference between the constitution of electrolytes and that of non-conductors. The author claims that the facts established with regard to magnetic rotation are in perfect accordance with Arrhenius's theory of electrolytic dissociation, and that any exceptional values in the magnetic rotation of electrolytes are due to the occurrence of electrolytic dissociation.—The vapour density of ammonium chloride, by Frank Pullinger and J. A. Gardner. The authors have made experiments on the vapour density of ammonium chloride at various temperatures. The apparatus used was that of Victor Meyer. The ammonium chloride was vaporized into an atmosphere of ammonia and into air. At a moderate red heat, and at 448° C., complete dissociation took place; at 360° C. in an atmosphere of ammonia it was not wholly dissociated. It was found impossible to vaporize the salt into ammonia at 300° C.—Chlorinated phenylhydrazines, by J. T. Hewitt.—A new modification of phosphorus, by H. M. Vernon. Observations on the rate of rise of temperature of phosphorus and other experiments have led the author to the conclusion that one or other of two different modifications of phosphorus may result when fused phosphorus solidifies.

February 5.—Dr. W. J. Russell, F.R.S., President, in the chair.—It was announced that the following changes in the Council list were proposed by the Council: President, Prof. Crum Brown, *vice* Dr. Russell; Vice-Presidents: Mr. S. Pattinson and Prof. Tilden, *vice* Profs. Crum Brown and Mallet; Foreign Secretary: Prof. Meldola, *vice* Prof. Japp; Members of Council: Dr. Atkinson, Mr. Boverton Redwood, Prof. Perkin, and Dr. J. Voelcker, *vice* Mr. Cross, Prof. Dunstan, Prof. Meldola, and Dr. Plimpton.—The following papers were read:—On the formation of an explosive substance from ether, by Prof. P. T. Cleve. The author describes a remarkable explosion occasioned by impurities in commercial ether. On distilling about 250 c.c. of the ether, it was noticed that a viscid residue remained; after drying on the water-bath, this formed a transparent, amorphous mass. Prof. Cleve states that, having poured a little water on to the substance, he proceeded to stir it gently with a rounded glass rod; this occasioned a most violent explosion. The explosive substance was probably ethyl peroxide, as it gave the well-known perchromic coloration, besides liberating iodine and discharging oxygen from silver oxide; it was at once destroyed by reducing agents.—Does magnesium form compounds with hydrocarbon radicles?, by Prof. Orme Masson and U. T. M. Wilsmore, University of Melbourne. The authors state that they have in vain endeavoured to prepare magnesium ethide (1) from magnesium and ethyl iodide; (2) from magnesium-copper couples and ethyl iodide; (3) from an alloy of magnesium and sodium and ethyl iodide; (4) from magnesium and zinc ethide; (5) from magnesium and mercury ethide; and (6) from anhydrous magnesium iodide and zinc ethide.—Compounds of the oxides of phosphorus with sulphuric anhydride, by R. H. Adie. The author has endeavoured to prepare compounds of phosphorus similar to those which the other elements of the group form with sulphuric anhydride. By the action of sulphuric anhydride on H_3PO_3, he obtained a compound very nearly of the composition

$$H_3PO_4 \,.\, 3SO_3 = (SO_3H)_3PO_4.$$

Sulphuric anhydride and phosphorus were found to interact violently to form a compound represented by the formula $3P_2O_4 \,.\, 2SO_3$.—The combustion of magnesium in water vapour, by G. T. Moody. The author describes a way in which the combustion of magnesium in water vapour may be performed as a lecture experiment, by carrying out the operation in a piece of hard glass tube, about 10 mm. wide and 250 mm. long, bent at an angle of 120°, so as to leave one arm nearly twice as long as the other. The shorter arm is inserted through a cork closing the mouth of a "tin can" or other convenient vessel in which steam can be generated; and the longer arm, which contains a few strips of magnesium ribbon, is connected by a fairly wide delivery-tube with the pneumatic trough, at which the liberated

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hydrogen may be collected. The air being displaced by a slow current of steam, the arm of the tube containing the magnesium is heated by means of a Bunsen burner; this is then replaced by a blowpipe flame, which is moved about so that the whole arm becomes very hot; then, on allowing the flame to impinge on a portion of the tube against which the magnesium rests, the metal takes fire and burns with great brilliancy.

Geological Society, February 20.—Annual General Meeting.—Dr. A. Geikie, F.R.S., President, in the chair.—The Secretaries read the Reports of the Council and of the Library and Museum Committee for the year 1890. In the former the Council once more congratulated the Fellows upon the continued prosperity of the Society, as evinced by its increasing number and by the satisfactory condition of its finances. The Council's Report also referred to the publication of the late Mr. Ormerod's Third Supplement to his Index to the Publications of the Society, to the editing of Nos. 183 and 184 of the Journal by Prof. T. Rupert Jones, to the deaths of the late Foreign Secretary and the late Assistant-Secretary, and in conclusion enumerated the awards of the various Medals and proceeds of Donation Funds in the gift of the Society. The Report of the Library and Museum Committee included a list of the additions made during the past year to the Society's Library, and announced the completion of the glazing of the Inner Museum.—After the presentation of the Medals and the balance of the Wollaston Fund, and the Murchison and Lyell Geological Funds, the President read his anniversary address, in which he first gave obituary notices of several Fellows, Foreign Members, and Foreign Correspondents deceased since the last annual meeting, including the late Foreign Secretary, Sir Warington W. Smyth, the late Assistant Secretary, Mr. W. S. Dallas, M. Edmond Hébert and M. Alphonse Favre (Foreign Members, both elected in 1874), Mr. Wm. Davies, Mr. Robert Wm. Mylne, Mr. Samuel Beckles, Dr. H. B. Brady, Mr. Samuel Adamson, and Prof. Antonio Stoppani (Foreign Correspondent, elected in 1889). He then dealt with the history of volcanic action in Britain during the earlier ages of geological time. He proposed to confine the term "Archæan" to the most ancient gneisses and their accompaniments, and showed that these rocks, so far as we know them in this country, are essentially of eruptive origin, though no trace has yet been found of the original discharge of any portion of them at the surface. Passing to the younger crystalline schists, which he classes under the term "Dalradian," he pointed to the evidence of included volcanic products in them throughout the Central Highlands of Scotland and the north of Ireland. The Uriconian series of Dr. Callaway he regarded as a volcanic group, probably much older than the recognized fossiliferous Cambrian rocks of this country. The Cambrian system he showed to be eminently marked by contemporaneous volcanic materials, and he discusssd at some length the so-called pre-Cambrian rocks of North Wales. He reviewed the successive phases of eruptivity during the Arenig and Bala periods, and described the extraordinary group of volcanoes in Northern Anglesey during the latter time. The volcanoes of the Lake District were next treated of, and reference was made to the recent discovery by the Geological Survey that an important volcanic group underlies most of the visible Lower Silurian rocks in the south of Scotland. The last portion of the address was devoted to an account of the volcanoes of Silurian time in Ireland, and it was shown that during the Bala period a chain of submarine volcanic vents existed along the east of Ireland from County Down to beyond the shores of Waterford; while in Upper Silurian time there were at least two active centres of eruption in the extreme west of Kerry and in Mayo.—The ballot for the Council and Officers was taken, and the following were duly elected for the ensuing year:—Council: Prof. J. F. Blake; W. T. Blanford, F.R.S.; Prof. T. G. Bonney, F.R.S.; James Carter; James W. Davies; John Evans, F.R.S.; L. Fletcher, F.R.S.; C. Le Neve Foster; A. Geikie, F.R.S.; A. Harker; J. C. Hawkshaw; H. Hicks, F.R.S.; G. J. Hinde; W. H. Hudleston, F.R.S.; Prof. T. McKenny Hughes, F.R.S.; J. W. Hulke, F.R.S.; J. E. Marr; H. W. Monckton; F. W. Rudler; J. J. H. Teall, F.R.S.; W. Topley, F.R.S.; Prof. T. Wiltshire; H. Woodward, F.R.S. Officers:—President: A. Geikie, F.R.S. Vice-Presidents: W. T. Blanford, F.R.S.; Prof. T. G. Bonney, F.R.S.; L. Fletcher, F.R.S.; W. H. Hudleston, F.R.S. Secretaries: H. Hicks, F.R.S.; J. E. Marr. Foreign Secretary: J. W. Hulke, F.R.S. Treasurer: Prof. T. Wiltshire. The thanks of the Fellows were unanimously voted to the retiring Members of Council: Prof. A. H. Green, Rev. Edwin Hill, Major-General C. A. MacMahon, E. T. Newton, and Rev. G. F. Whidborne.

February 25.—Dr. A. Geikie, F.R.S., President, in the chair.—The following communications were read:—A contribution to the geology of the Southern Transvaal, by W. H. Penning. The following table shows the author's classification of the sedimentary rocks of this region, as compared with those of Messrs. Dunn and Stow and Prof. Rupert Jones:—

DUNN. (Map, 1887.)		STOW.	T. R. JONES.		PENNING.	
Coal-measures: *Upper Karoo* (formerly Stormberg Beds, above Upper Karoo).	CARBONIFEROUS TO TRIASSIC.	*Upper Karoo.*	*Lower Karoo.*	TRIASSIC FORMATION.	*High Veldt Beds.*	OOLITIC.
Kimberley Shales: *Lower Karoo* (formerly Upper Karoo).		....			*Kimberley Beds.*	
					Klip River Series.	*Megaliesberg Formation.* DEVONIAN.
Lydenburg Beds.	SILURIAN.				*Witwatersrand Series.*	
Namaqualand Schists.					*De Kaap Valley Beds.*	SILURIAN.

The De Kaap Valley beds consist of schists, shales, cherts, and quartzites, with some conglomerates, chloritic and steatitic beds of great thickness, faulted, according to the author, against the granite. They contain a few obscure corals, and are provisionally referred to the Silurian. The Witwatersrand series consists chiefly of sandstones, shales, cherts, and quartzites, having an estimated thickness of 18,000 feet, possibly formed in a hollow of the granite, and perhaps of marine formation. The Klip River series is formed of shales, flagstones, cherts, and quartzites, with numerous interstratified traps, and is at least 18,000 feet thick. Near its base is the "Black Reef," and a chalcedonite like that described by the author in connection with the Lydenburg district, which confirms his opinion that this area is formed of part of the Megaliesberg formation. The base of the series is generally conformable to the underlying rocks. The whole of the lower half of the Megaliesberg formation is let down against the north side of the granite south of Pretoria. The author divides the formation, which he described in 1884 under the heading of "High-level Coal-fields of South Africa," into the Kimberley beds and the High Veldt beds. The former thin out eastward, and are overlapped by the latter, the estimated thickness of which is 2300 feet. A volcanic rock overlies the coal-formation. Near the base of the formation is a bed of loose, calcareous, sandy clay, inclosing many water-worn pebbles, some of large size, derived from the quartzites and "bankets" of the underlying formation. The author is convinced that the region was under glacial influences at some time during the long period which intervened between the deposition

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of the Megaliesberg formation and of the coal-bearing rocks of the High Veldt, which latter, he maintains, are certainly Oolitic; the latter contain *Glossopteris* (?) and fishes which he considers to be nearly allied to *Lepidotus valdensis*, the latter being from the Free State. The High Veldt rocks are of fluviatile origin, and there appears to have been continuity of fluviatile denudation on the close of the Oolitic period until now. The reading of this paper was followed by a discussi n, in which Mr. Gibson, Mr. Alford, Prof. Rupert Jones, Mr. Smith Woodward, and Dr. Blanford took part.—On the lower limit of the Cambrian series in North-West Caernarvonshire, by Miss Catherine A. Raisin. Communicated by Prof. T. G. Bonney. A discussion followed, in which Prof. Blake, Dr. Hicks, Prof. Hughes, Prof. Bonney, the President, and Mr. Peach took part. —On a Labyrinthodont skull from the Kilkenny Coal-measures, by R. Lydekker.

Paris.

Academy of Sciences, March 2.—M. Duchartre in the chair.—Observations of asteroids, made with the great meridian instrument of Paris Observatory during the second quarter of 1890, by Admiral Mouchez. The asteroids which have been observed are Pallas, Ceres, Juno, and Melete.—On metallic reflection, by M. H. Poincaré. Further objections are adduced against MM. Cornu and Potier's interpretation of Herr Wiener's experiment on the direction of vibration in a polarized beam of light (*Comptes rendus*, January 6 and February 9).—On an attempt at oyster-culture in the experimental fish-pond of the Roscoff Laboratory, by M. de Lacaze-Duthiers. Oysters measuring from 1·5 to 2 cm. in April 1890 had attained a greatest length of 5 cm. in June, and in September 1890 and March 1891 reached a length of 7 and 8 cm. Of the 8500 young oysters placed in the fish-pond, only 50 died during the severe weather experienced this winter. This is an extremely low rate of mortality when compared with the loss at ordinary oyster-beds. The reason of this success is probably due to the fact that the boxes containing the oysters could be protected from the cold air during low tides by running them down into the sea by means of chains.—On the composition of drainage waters, by M. P. Dehérain.—On a variable nebula, by M. G. Bigourdan. (See Our Astronomical Column.)—History of apparatus for the measurement of baselines, by M. A. Laussedat.—On the transformation of a geometrical demonstration, by M. A. Mannheim.—On the minima surfaces limited by the four corners of an irregular quadrilateral, by M. Schoenflies.—Results of actinometric observations made at Kief, in Russia, in 1890, by M. Savélief. Observations made from the beginning of June to the end of November give the following results:—(1) In summer and in autumn, the real value of the absolute heat intensity of solar radiation, for an apparently clear sky, reaches a maximum about 10 o'clock; a secondary maximum occurs between 1 p.m. and 2 p.m.; between these two maxima a well-defined minimum may be observed at midday. In autumn, the calorific intensity of solar radiation is greatest between 9 a.m. and 2 p.m., and reaches a higher value than in summer. (2) In summer, the hourly mean of absolute intensities—that is, one-sixtieth of the quantity of heat received normally in one hour by a surface having an area of 1 sq. cm.—reaches a maximum about 10 a.m., and a secondary maximum about 5 p.m. In autumn, the curves are more regular than in summer, and present only a single maximum about 11 p.m.—Remarks on M. Savélief's communication, by M. A. Crova. Variations similar to those described by M. Savélief have been registered on M. Crova's actinometer at Montpellier.—On duplex-beating metallic reeds, by M. A. Imbert.—On some alkaline derivatives from erythrite, by M. de Forcrand. The author has obtained crystallized alkaline erythrates by the action of erythrite on aqueous solutions of potash and soda.—On the dyeing of cotton, by M. Léo Vignon. —On a vegetable hæmatin, aspergillin—a pigment of the spores of *Aspergillus niger*, by M. Georges Linossier. The author shows that the fruits of *Aspergillus niger* contain a pigment having the same characteristics as the hæmatin of the blood of animals.—Idiosyncrasy of certain species of animals for carbolic acid, by M. Zwaardemaker. Small doses of carbolic acid have no effect on dogs or rabbits, but intoxicate and subsequently kill cats and rats, the deaths being always preceded by convulsions lasting several hours.—On the hepatic epithelium of the testacle, by M. J. Chatin.—On the conglomerate of Gourbesville containing fossilized bones, by M. A. de Lapparent.—On the age of the strata cut by the Panama Canal, by M. H. Douvillé. Some fossils that have been collected in Panama Canal cuttings belong to the Miocene and Eocene periods.—On the relation of earth tremors to the seasons, by M. de Montessus. It has been asserted that earth tremors occur more frequently in winter than in summer, and are therefore connected with meteorological phenomena. M. Montessus has investigated 63,555 tremors with respect to their time of occurrence, and finds that the astronomical seasons bear no relation to them.—On the action of running water on some minerals, by M. J. Thoulet.

Brussels.

Academy of Sciences, January 10.—M. Stas in the chair. —M. Folie was elected President for 1891.—Researches on the velocity of evaporation of liquids at the temperature of ebullition, by M. P. de Heen. The author has used specially devised apparatus for the determination of the influence exercised on the velocity of evaporation: (1) by the velocity of a dry current acting on its surface; (2) by temperature; (3) by the nature of the liquid; (4) by the nature of the gaseous current; (5) by the pressure of the gas in motion. He finds that the velocity of evaporation is proportional to the square root of the velocity of the gaseous current, and that for a given velocity of the current the quantity of liquid vaporized is proportional to the vapour tension. Experiments on water, benzine, chloroform, acetic acid, alcohol, ethyl bromide, carbon bisulphide, and ether indicate that, *cæteris paribus*, the amount of liquid vaporized varies as the product of the vapour tension into the molecular weight. The interior friction of hydrogen, carbon dioxide, and air are respectively represented by 95, 163, and 194. Experiments with these gases as currents show that the vaporizing influence is greater when the interior friction of the gas is greater. The amount of liquid vaporized appears to depend on the velocity of the current of gas, but is independent of the pressure.—Preliminary notes on the organization and development of different forms of Anthozoa, by M. Paul Cerfontaine. —Crystallographical notice on the monazite of Vil-Saint-Vincent, by Dr. A. Franck.

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