

from the Roker Cliffs at Sunderland. Most of this surface is above the tide-mark. Many of the calcareous balls exposed in any part of this bed exhibit similar narrow concentric zones, which also are a rearrangement of the carbonate of lime in an orderly fashion after the formation of the spheres. A few years ago in Fulwell Hill Quarry I saw, on about the same horizon as the top of Carley Hill, already mentioned, a bed of such balls 2 in. to 3 in. in diameter, from which a few feet of Boulder Clay had been removed six years earlier. These also had the same concentric lines, but as yet I have had no opportunity of fixing a time-scale for the formation of zones shown in Fig. 1. I ought to state that a few microscopical examinations of unweathered specimens revealed no such lines across the rod structure. The two forms of weathering are probably due to the same physical change. The second one, when I saw it in 1901, I supposed was due to segregation, and therefore I have since then called it segregation banding, but a better title is possible. Similar zonings of carbonate of lime have been produced by osmotic action by Prof. S. Leduc, of Nantes, and are shown on p. 84 of his "La Biologie Synthétique" (A. Poinet, Paris). Much the same thing is now known as Liesegang's rings, but who can claim priority I do not know. Except for a considerable difference in width of the interspaces they closely resemble the zones in weathered mortar due to rearrangement of carbonate of lime.

GEORGE ABBOTT.

2 Rusthall Park, Tunbridge Wells,  
December 30, 1916.

### Tertiary Igneous Rocks of the Pyrenees.

THE review of the treatise of Beyschlag, Vogt, and Krusch in NATURE of August 3, 1916, gives prominence to their mention of supposed absence of Tertiary igneous rocks. Yet even their pages figure grey-copper veins of Loş Arcos cutting Tertiary beside ophite and granite intrusions. The latest official map of a Pyrenean district (Orthez) figures the ophite veins cutting uppermost Cretaceous, which I have insisted on during thirty years. In that time I have succeeded in securing by fossil evidence the recognition of the Cambrian of the map of 1890 as Hippurite Cretaceous, the "Silurian" slates of Lourdes as Middle Cretaceous, and the Scolithia beds of San Sebastian as Nummulitic Eocene. The erroneous classification led to the conception of the entire Pyrenees as rolled from the Sierra Nevada in such confusion and reversal as forbid attention to local and detailed observation, in the progressive correction of the map of Dufrenoy.

Yet even in Cornwall the excellent version of French methods supplied by an eminently practical miner has promoted accurate observation, and even Suess has returned, in his latest pages, to the principle of direction. As a hopeful science, apart from literary speculation, geology must aim at verifiable measurements and fossil confirmation. As example, I may quote my latest revision of the cluster of interior basins between Pamplona and Bayonne, which present floors of the plain Cretaceous border, now cited as exposures of that plain beneath a shovelled Palaeozoic mass. With accurate mining plans, I trace their Cretaceous filling, in places, to the highest surrounding summits, and its successive beds as distinctly synclinal in disposition. Exceptional points of dislocation and reversal prove to accompany those local faults attested in mining work, abounding specially on the depressions followed by the high roads of the tourist's automobile. The Tertiary age of much of the ophite and granite of the Pyrenees has been my

main contention since my first map of 1881, confirmed in both France and Spain, and affording a fresh clue from the most neglected portion of the chain. The latest observations in both Alps and Andes led Suess himself to rehabilitate the importance of igneous intrusion, and its recognition in connection with mining and orogenics has seemed to me of supreme utility in practical geology.

P. W. STUART-MENTEATH.

Ciboure, January 20.

### THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE sixty-ninth regular annual meeting of the American Association for the Advancement of Science was held in New York City on December 26-30, 1916, under the presidency of Dr. C. R. Van Hise, of the University of Wisconsin.

The headquarters of the meeting was Columbia University, but, with the twelve sections of the association and the fifty-two national societies of restricted scope affiliated with the association at this meeting, the large lecture-rooms of Columbia University were insufficient, and meetings were also held in the American Museum of Natural History, in Barnard College, in the College of the City of New York, in the Cornell Medical College, in the College of Physicians and Surgeons, and in the Union Theological Seminary. The association, while holding annual meetings, is making especial effort to have every fourth meeting unite all the scientific societies of the United States, and this meeting at New York was the first of these four-year meetings. The second will probably be held at Chicago in 1920.

The attendance was larger than it has ever been in the history of the association. More than two thousand registered at the association headquarters, and it is estimated that above a thousand more were in attendance at the meetings held in other parts of the city.

The address of the retiring president, Dr. W. W. Campbell, of the Lick Observatory, University of California, on "The Nebulæ," was delivered on December 27 in the large lecture-hall of the American Museum of Natural History. The address was followed by a reception given by the trustees of the museum, and the guests were received by Mrs. H. F. Osborn and by Mr. J. H. Choate, former United States Ambassador to London.

During the week presidential addresses before the different sections were given as follows:—

Prof. W. A. Setchell, of the University of California, before Section G, on "The Geographic Distribution of Marine Algæ." This address was followed by a symposium on the relations of chemistry to botany.

Prof. E. Davenport, dean of the College of Agriculture of the University of Illinois, before Section M, on "The Outlook for Agricultural Science." The address was followed by a discussion on "The Adjustment of Science to Practice in Agriculture."

Dr. G. F. Kunz, before Section I, on "Scientific Efficiency and Industrial Museums: Our Safeguard in Peace and War."

Prof. W. McPherson, of the Ohio State University, before Section C, on "Asymmetric Syntheses and their Bearing upon the Doctrine of Vitalism."

Prof. E. P. Cubberly, of Stanford University, before Section L, on "Some Obstacles in Educational Programme."

Prof. Lillian J. Martin, of Stanford University, on "Personality as Revealed by the Content of Images."

Mr. B. J. Arnold, of Chicago, before Section E, on "The Inter-relationship of Engineering and Pure Science."

During the week two public lectures, complimentary to the citizens of New York, were held. The first was by Dr. Simon Flexner, director of the scientific laboratories of the Rockefeller Institute for Medical Research, on "Infantile Paralysis and the Public Health." The second was given by Prof. A. A. Noyes, of the Massachusetts Institute of Technology, on "Nitrogen and Preparedness."

A number of important symposia were held in addition to those mentioned in connection with two of the vice-presidential addresses. Section K (physiology and experimental medicine) and the American Society of Bacteriologists held a symposium on "Cancer and its Control." The papers presented at this symposium were as follows:—

Prof. G. N. Calkins, of Columbia University, on "The Stimulating Effects of Protoplasmic Substances on Cell Division."

Prof. Leo Loeb, of the Washington University Medical School, on "Tissue Growth and Tumour Growth."

Dr. J. C. Bloodgood, of Johns Hopkins University, on "Cancer in the Human Being."

Prof. James Ewing, of the Cornell Medical School, on "Radium and Cancer."

Mr. C. E. Lakeman, of the American Society for the Control of Cancer, on "Past and Present Efforts to Control Cancer through the Education of the Public."

A conference on the metric system was held under the auspices of Section I, at which delegates from the National Wholesale Grocers' Association, the American Institute of Mining Engineers, the American Pharmaceutical Association, the American Institute of Electrical Engineers, the American Chemical Society, the National Wholesale Druggists' Association, the National Association of Retail Druggists, the Philadelphia Bourse, the Philadelphia Commercial Museum, and the American Institute of Chemical Engineers were in attendance. The council of the American Association for the Advancement of Science, at its final session on December 29, passed a resolution urging the general adoption of the metric system in the United States. The association has always favoured this move, and has passed similar resolutions at previous meetings.

A symposium on "The Structure of Matter" was held at a joint meeting of Sections B and C,

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the American Physical Society, and the American Chemical Society, in which Prof. R. A. Millikan, of the University of Chicago, Prof. G. N. Lewis, of the University of Chicago, Prof. R. W. Wood, of Johns Hopkins University, and Prof. W. B. Harkins, of the University of Chicago, were the principal speakers.

A symposium on "Biology and the National Existence" was held by Section F and the American Society of Naturalists, the principal speakers being Dr. S. Paton, of Princeton University, Mr. W. J. Spillman, of the U.S. Department of Agriculture, Prof. J. Loeb, of Columbia University, and Prof. E. G. Conklin, of Princeton University.

The American Genetic Association held meetings throughout the week, joining the American Association for the Advancement of Science for the first time; as also did the newly organised Ecological Society of America.

Another important series of meetings was held by the newly founded Federation of American Societies for Experimental Biology, formed by the Physiological Society, the Society of Biological Chemists, the Society for Pharmacology and Experimental Therapeutics, and the Society for Experimental Pathology.

The principal social events of the week, apart from the opening reception at the American Museum of Natural History, included a smoker at the Aquarium, given by the New York Zoological Society, and a reception by the United Engineering Societies in their beautiful clubhouse. There were many dinners, including an especially interesting one given in honour of Prof. E. B. Wilson, of Columbia University, by his former students.

The Committee of One Hundred on Scientific Research held an important meeting on the first afternoon, at which reports from a large number of sub-committees having charge of special aspects of scientific research questions were presented.

The most important action taken by the council of the association was to authorise a thorough revision of the constitution of the association, in the hope of increasing the efficiency of the association and to permit possibly more intimate relationships with the national scientific societies of specific scope.

The general committee, at its meeting on the final evening, accepted an invitation to meet at Pittsburgh in the winter of 1917-18, and elected the following officers:—

*President:* Prof. T. W. Richards, of Harvard University. *Presidents of Sections:* B, Dr. W. J. Humphreys, U.S. Weather Bureau; C, Prof. W. A. Noyes, University of Illinois; E, Prof. G. H. Perkins, University of Vermont; F, Prof. Herbert Osborn, Ohio State University; G, Dr. B. E. Livingston, Johns Hopkins University; H, Prof. E. B. Titchener, Cornell University; I, Mr. G. W. Perkins, New York City; K, Dr. C. E. A. Winslow, Yale University; L, Prof. E. F. Buchner, Baltimore; M, Prof. H. J. Waters, University of Kansas. *Secretary of Council:* Prof. W. V. Bingham, University of Pittsburgh. *General Secretary:* Prof. J. McK. Cattell, Colum-

bia University. *Secretaries of Sections*: B, Prof. George W. Stewart, State University of Iowa; C, Prof. J. Kendall, Columbia University; E, Prof. R. T. Chamberlin, Chicago; K, Dr. A. J. Goldfarb, New York.

#### RESEARCH IN TIMBER.

IN an address<sup>1</sup> to the Timber Trade Federation, delivered in October last, Prof. Percy Groom showed that the lack of co-operation in the past between technical science and the timber trade of this country had resulted in the timber resources of the Colonies and India not being efficiently utilised. The British Empire includes within its bounds a larger number and wider range of timbers than any other State; but many of these are imperfectly known, and on that account not in commercial use. Prof. Groom instanced many examples of the need for scientific research in timber. Wood-pulp, the import of which into the United Kingdom was valued at 5,500,000*l.* in 1913, is obtained at present mainly from spruce growing in foreign countries. In all probability it could be manufactured as cheaply from the soft woods, valueless as timber, which grow abundantly in the forests of our tropical possessions; and an investigation into this problem is most desirable. The hard woods of the tropics, owing to the loose nomenclature and wrong naming of many species, are less sought for than they deserve by architects, railway companies, and other large consumers of strong durable wood. The African mahoganies, for example, comprise a large series of different woods, varying widely in colour, hardness, and other qualities; and the identification and standardisation of these and other tropical woods should be the subject of prolonged scientific investigation. Some woods of great merit show defects in ordinary use which might be remedied by experiments in the laboratory, an interesting example being the Indo-Malayan Yang wood<sup>2</sup> (*Dipterocarpus* sp.), which had been introduced into England as a substitute for teak, but was found to warp badly and exude a resin, injuring its utility and appearance. Experiments carried out at the Imperial Institute resulted in the discovery of a simple cure for these defects, and the wood has been reinstated into favour.

Prof. Groom referred to a promising line of investigation, the economic utilisation of waste products which, in the form of slabs, shavings, and sawdust, are produced in great quantity in all conversion of wood. Every particle of wood is either a source of power, as when used for fuel, or can be transformed into a variety of valuable substances, as in the manufacture of explosives like cordite and acetone; of antiseptics, as creosote and carbolic acid; of alcohol, acetic acid, celluloid, collodion, artificial silk, etc. The chemical utilisation of wood lends itself especially to co-operative efforts in large towns; and some

improved method of distillation may solve the problems of dealing profitably with coppice-woods in England, and with forests in the tropics which consist mainly of trees producing unmarketable timbers.

Another important problem, not yet attacked in this country, is the economical application of preservatives and antiseptics to mining timber, the life of which in the pits might in many cases be prolonged from three to thirteen years, if recent experiments in the United States are to be trusted. In any case, there is a possibility of a large saving in the cost of raising coal by improved sanitation and appropriate treatment of wood in mines.<sup>3</sup>

As a practical scheme for linking up technical science with the timber trade and its dependent industries in this country, Prof. Groom advocates the establishment of an Imperial Timber Bureau in London, which would be in close touch with the Colonies and Dominions. It would supply technical advice, conduct investigations, and diffuse information amongst the trades and professions that handle wood. To the bureau would be attached an institute with timber, chemical, physical, engineering, and fuel laboratories, as well as workshops. Though not mentioned by Prof. Groom, it is almost precisely on these lines that investigation in timber on a large scale has been successfully carried on for some time by the Products Branch of the United States Forest Service.<sup>4</sup> Some account of the working of this department will be of interest. It consists of two sections, the Office of Wood Utilisation at Chicago, and the Forest Products Laboratory at Madison.

The Chicago office serves mainly as a bureau for the collection of information and statistics of production, consumption, utilisation, etc.; but it also deals with problems not requiring the aid of a laboratory; for example, by inducing manufacturers to undertake experiments of various kinds. This office publishes reports on the wood-using industries in each State, which are compiled with the aid of owners of timber, merchants, manufacturers, railway companies, and other consumers of wood, including certain Government departments. Much has also been done to eliminate waste by this office suggesting possible uses for material that had formerly been burnt to get it out of the way. Mr. Burdon states that the economic value of co-operation between the wood-using industries in the United States and the Forest Service Utilisation Office cannot be over-estimated, as the confidence reposed in the latter by the timber trade is remarkable.

The Forest Products Laboratory at Madison is staffed and equipped by the Forest Service in co-operation with the University of Wisconsin, which provided the buildings at a cost of 55,000 dollars in 1910. It is planned for research work on a semi-commercial scale, and has a large

<sup>1</sup> Percy Groom, "Pit Timber and its Preservation," *Trans. Inst. Mining Engineers*, vol. li., part ii., pp. 190-203.

<sup>2</sup> See U.S. Dept. Agric. "Review of Forest Service Investigations," vol. i., pp. 17-28 (1913); and E. R. Burdon in *Journ. R. Soc. Arts*, vol. lxi., pp. 438-446 (1913).

<sup>3</sup> Percy Groom, "Shrinkage, Swelling, and Warping of Cross-grained Woods," *Ann. Applied Biology*, vol. iii., No. 1, June, 1916.