

Sea. Nor is it to be wondered at that he was the able and trusted spokesman for the industry at the then Board of Agriculture and Fisheries—sometimes, it may be said, to the discomfiture of scientific colleagues with whom he did not always see eye to eye.

The quality of independence which he possessed abundantly must surely have accounted for his translation to the chair at Leeds in 1907, for it was then that the Government took over the fishery investigations. Great as were his contributions to marine zoology, both academic and economic, zoology was the gainer by this change. For his virile mind was thereby released to pursue the philosophical and speculative tasks for which he was so patently fitted. It permitted, too, that his personality should be felt and enjoyed by the many generations of his students. He inspired them with a love for the subject, and, more, he made them think and seek for themselves. His class lectures were unique in that they often ignored the channels prescribed by syllabus and became instead a forum in which he argued with himself on his own philosophical speculations. Here were first sown the seeds of his classical re-statement of the biogenetic law. It was in his degree-course lectures, too, that his ideas on larval forms and vertebrate ancestry first appeared. Here it was that he began to build up his logical case for the influence of larval modifications on adult evolution by the process of pedomorphosis, a word of his own coining. During this time he developed a reputation as a world authority on tunicates, and used his knowledge on their morphology to develop his theme on chordate phylogeny.

Garstang never isolated himself from the outside world. Over many years and through his active presidency of the Yorkshire Naturalists' Union, the Leeds Naturalists' and the Leeds Philosophical and Literary Society he stimulated the interest of the amateur biologists of Yorkshire. He was president of Section D of the British Association at the Glasgow meeting in 1929. After retirement, he continued his investigations, and a steady stream of papers appeared right to the end. Before the War he renewed his study of marine animals and particularly of larval forms by visits to Bermuda. His critical grasp of detail emerges in his criticism of modern molluscan nomenclature and, to greater effect still, in the remarkable treatise on the morphology and relations of the Siphonophora, which was published as he was approaching his eightieth year.

Few who go from us will leave behind so much affection and such a sense of gratitude. It is inevitable that his students will remember Garstang for his perpetual youth and his genial kindness. They will think of their visits with him to the marine station which he established at Robin Hood's Bay; of teas in the laboratory at which he and Mrs. Garstang were generous hosts and at which the week's problems were discussed; and of their open house at Meanwood where all students were welcome. He will also be remembered for his interpretation of bird-song—something of a poetic interlude in his scientific work—the enthusiasm for which he easily imparted to those who joined him in this delightful pursuit. It is good to know that he lived always a happy and full life in the midst of a devoted family who shared his interests. His wife, whom he married as Miss Lucy Ackroyd of Newnham College in 1895, died in 1942. They are survived by a son and five daughters.

L. EASTHAM

Prof. Bailey Willis

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'EARTHQUAKE WILLIS', one of the most colourful and widely known figures in American geology, has passed away. The record says he died at the age of ninety-one; but those who, a short while ago, saw him striding jauntily across the Stanford campus, riding his bicycle to the gymnasium, or arguing vehemently with embryo geologists, will tell you that he was still a student eagerly learning his trade. First among the impressions he leaves is one of perennially vigorous, inquiring youth.

A few days before he died, he completed another part of his autobiography, "Friendly China", sequel to "Yankee in Patagonia". Yet his first geological paper appeared sixty-five years before. He graduated in the late seventies as an engineer from Columbia, and for the rest of his days his prime concern was with the mechanics of mountain-building. The colours of his spirited landscape-paintings re-appear in all his writings, as when, discussing mountain arcs, he asked: "Are the wrinkles on our face there because the muscles have pushed or because the flesh has shrunk or the skin expanded?" It was the physiognomy of the earth's face that specially intrigued him, and not so much the details as the fundamental causes. Let some of his chief papers be recalled. His "Mechanics of Appalachian Structure", dated 1893, remains a classic for development of the concept of competent and incompetent beds and the role of initial dips in folding. His writings on "The East African Plateaus" and on "The Dead Sea" advocate the compressional origin of the great rift valleys; his articles on the coast ranges of California emphasize shearing along faults as a cause of deformation, and compression along deep shears as a cause of vertical uplift.

For him, the theory of continental drift was "a fairy tale, ein Märchen"; no need to invoke it to answer the demands of palaeontology when temporary isthmian links might do the same with less affront to his concepts of earth-mechanics. For him, the propulsive force in earth-movements was volume-change at depth, brought on by the rise of 'asthenoliths', blisters of molten rock, developed by decay of radioactive substances scattered irregularly beneath the crust. The earth is growing hotter; the rising blisters expand upward, and their covering rocks, becoming foliated by recrystallization, spread sideways. Discoidal surfaces of shear form in the lithosphere; the disks rise and fall. Metamorphism is no less the cause than the result of orogeny.

These were among the views Bailey Willis championed with vigorous pen and fluent speech, and his travels took him over most of the globe in search of evidence. The same search inspired his large works on the geologic map, the palaeogeographic maps, and the index to the stratigraphy of North America.

His training as an engineer led him naturally to seismology. For six years he presided over the Seismological Society of America; his influence had much to do with the important part now played in seismology by Californian institutions. He was greatly concerned with earthquake insurance, and did much to improve the building codes in California. Indeed his reputation grew until he found it hard to allay rumours that he had powers of prediction.

Honours came to him from many lands. He was president of the Geological Society of America and recipient of its highest award, the Penrose Medal.

The Geological Society of London elected him a foreign member, and the Royal Geographical Society an honorary member. Germany, France and Belgium paid him tribute.

The Stanford campus is no longer graced by his striking figure and courteous manner, but his example

remains of how old age may best be spent, in exercise, study and cultivation of the affection of one's fellows. He closed his full life, as he closed his speech accepting the Penrose Medal, "with a cheer to Youth that carries on in the search of Truth".

HOWEL WILLIAMS

## NEWS and VIEWS

Wool Industries Research Association: Mr. B. H. Wilsdon

THE resignation of Mr. B. H. Wilsdon offers the opportunity to place on record some of the work accomplished during his fourteen years directorship of the Wool Industries Research Association. His experience before going to Torrington included research at Oxford, varied activities as professor of chemistry at Lahore, and five years as superintendent of laboratories at the Building Research Station of the Department of Scientific and Industrial Research. He found the vitality at Torrington at a low ebb; but under his stewardship the output of research increased steadily in volume and quality, and the chief successes of the teams he gathered together and encouraged are impressive. Torrington became the birthplace of partition chromatography. Described by Sir Robert Robinson as the greatest advance in protein chemistry since the work of Fischer, it spread rapidly to many important laboratories faced with complex mixtures of organic and inorganic substances. By its aid and by other methods, significant contributions were made to our knowledge of the chemical constitution of wool. In the more technical field, the dry chlorination process for producing non-felting wool was ready at the outbreak of war in 1939, together with the 'Warnorm' certification mark, to help ensure the unshrinkability of the socks and underwear supplied to the Forces. Another war-time activity, carried forward with great energy, was the impregnation of fabrics with active charcoal, originally as an anti-gas measure, but later used extensively to absorb bad odour from anaerobically dressed wounds. Noteworthy advances were also made in the application of physics: a clearer insight into the physical factors underlying the comfort of wool clothing was gained, and studies on machinery and operational research pointed the way to post-war economies in woollen carding and worsted drawing. In addition, statistics was brought to bear on testing methods and on wool metrology. All this work was widely appreciated in Australia and in the United States, but less so in Great Britain. This is a common occurrence in the life of a growing institution; even the active workers do not appreciate the full value of their collective efforts. Later recorders will, it can be safely assumed, point to Mr. Wilsdon's directorship as a very bright period in the scientific history of Torrington.

### Social Implications of Scientific Progress

AN important event of the year for the world of science is the three-day Convocation at the Massachusetts Institute of Technology, Cambridge, Mass., which opened on March 31. The general theme of the Convocation is "The Social Implications of Scientific Progress at the Mid-Century Point", and two opening speeches were delivered by Mr. Winston Churchill and Mr. Harry S. Truman. Addresses given by eminent men from many walks of life and from

various parts of the world fall under the following six main divisions: "The Problem of World Production"; "The Problem of the Underdeveloped Area"; "Science, Materialism and the Human Spirit"; "The Role of the Individual in a World of Institutions"; "Specialization in Twentieth Century Education"; "The State, Industry and the University". Among the British speakers are Sir Henry Tizard, chairman of the Defence Research Policy Committee of the Ministry of Defence; Lord Hailey; and Sir Richard Livingstone, president of Corpus Christi College, Oxford. Speakers from other countries include Sir Ramaswami Mudaliar, president of the United Nations Economic and Social Council, and Prime Minister of Mysore State; M. Pierre Ryckmans, Belgian representative on the Trusteeship Council of the United Nations; Mr. Carlos Contreras, president of the National Planning Association of Mexico; and Mr. Oswaldo Aranha, formerly Brazilian Ambassador to the United States. At the end of the Convocation, the ceremony of inauguration of Dr. James Rhyne Killian, jun., as president of the Massachusetts Institute of Technology, takes place, and one of the addresses of welcome to Dr. Killian is by Mr. David A. Shepard, honorary secretary in London of the Institute, and chairman of the Anglo-American Oil Co.

### Manchester Joint Research Council: Report for 1948

THE Manchester Joint Research Council, established in 1945, has for the first time issued a printed annual report. This report, covering the year 1948, pays tribute to the work of Mr. A. H. S. Hinchcliffe, as chairman, and Sir John Stopford, as treasurer, during the first, formative years, and they have now been succeeded by Sir E. Raymond Streat and Sir Charles G. Renold, respectively. One of the most successful ventures of the year was the meeting in February, addressed by Dr. A. King, which was a result of the efforts by the Council to supply information to the Department of Scientific and Industrial Research on the need for sponsored research activities in the north-west of England. The resulting discussion further indicated that for many years to come the Council is likely to be closely concerned with improving the technology of the small firm and with encouraging accelerated development and inventiveness in industry generally. In an effort to ascertain how the Council might apply itself to discovering the hindrances which prevent firms from using knowledge already available, Sir Henry Tizard was invited to the October meeting of the Council. Sir Henry's remarks reinforced the opinion that an objective and scientific investigation of the needs of industry in this area would be a substantial contribution; and at the annual meeting on February 28, the joint honorary secretary, Mr. J. Ainsley, indicated the broad pattern of the inquiry which the Council proposed to pursue. The intention was for a team of experienced men to