

# SCIENCE

VOL. 82

FRIDAY, NOVEMBER 8, 1935

No. 2132

*The American Association for the Advancement of Science:*

*The Living Globe:* PROFESSOR BAILEY WILLIS ..... 427

*Scientific Events:*

*The Western Division of the Connaught Laboratories; The Lawrence Hopkins Memorial Experimental Forest; The Reorganization of the Department of Vital Statistics of the U. S. Bureau of the Census; The United Engineering Trustees; Meetings of Geologists in New York City. Recent Deaths* ..... 433

*Scientific Notes and News* ..... 435

*Discussion:*

*The Born Theory of the Electron:* DR. ARTHUR BRAMLEY. *The Question of Wildlife Destruction by the Automobile:* DR. W. A. DREYER. *Is a Pace-maker Involved in Synchronous Flashing of Fireflies?:* PROFESSOR GORDON ALEXANDER. *The First School of Chemistry:* DR. PHILIP E. BROWNING ..... 438

*Scientific Books:*

*The Alligator:* DR. ALBERT M. REESE. *Aeronization in Medicine:* J. W. PINCUS ..... 441

*Special Articles:*

*Bacterial Content of the Air at High Altitudes:* DR. GEORGE WALKER. *On the Nature of Filterable Viruses:* DR. ROBERT G. GREEN ..... 442

*Scientific Apparatus and Laboratory Methods:*

*A Simple Method of Determining Areas in Microphotographs:* RONALD L. IVES. *A Method of Preparing Skeletons of Small Vertebrates:* DR. ROLF L. BOLIN ..... 445

*Science News* ..... 8

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

## THE SCIENCE PRESS

New York City: Grand Central Terminal

Lancaster, Pa.

Garrison, N. Y.

Annual Subscription, \$6.00

Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

## THE LIVING GLOBE\*

By Professor BAILEY WILLIS

STANFORD UNIVERSITY, CALIFORNIA

Dynamics is the soul of the problem.

—T. C. Chamberlin.

DURING the nineteenth century, geology, dependent on physics, knew but one ultimate terrestrial force—gravity. Gravity, the conservator of established relations, was the cause of all disturbances in any effort to restore any dis-established relations. He held continents and ocean basins in balance, in spite of erosion and sediment; he raised mountain chains by contracting the earth and wrinkling the crust; he pulled the globe constantly toward the center and transformed the energy of in-fall into heat; and since the heat escaped he thus cooled the earth, pointing to a dark and chilly future. Similarly, he was the source of all heat in the sun, and the life-giving energy of that luminary was definitely limited. There was enough

\* Address of the retiring president of the Pacific Division of the American Association for the Advancement of Science, Los Angeles, California, June 25, 1935.

truth in these ideas to command credence, and yet they so narrowed the possibilities of pre-historic geology and cosmogony, not to mention the denial of future opportunity, that they were found wholly inadequate. When Chamberlin challenged Lord Kelvin's estimate of twenty to forty million years as the probable past of the earth he argued for the strength of geologic evidence as opposed to the weakness of imperfect, incomplete knowledge of natural forces.<sup>1</sup>

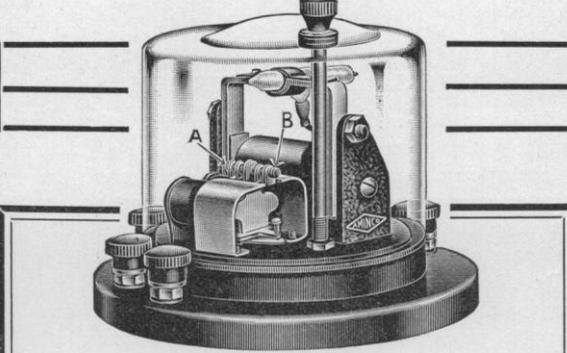
The discovery of radioactivity and of the general occurrence of radioactive minerals throughout the accessible rocks, though in very minute quantities, opened new possibilities to geologic theory. Here was a source of atomic energy, quite independent of gravity and abundantly able to supply heat for indefinite periods of time. Geologists were slow, however, to avail themselves of this potent energy. Chamberlin in 1911 welcomed the opportunity thus afforded for

<sup>1</sup> T. C. Chamberlin, SCIENCE, n. s., Vols. 9 and 10, 1899.



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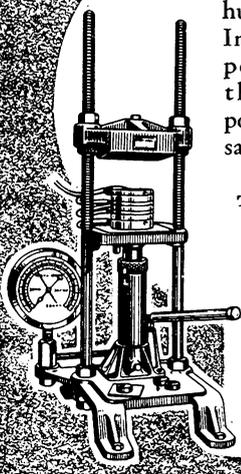
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