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HARRY FIELDING REID

1859—1944

A Biographical Memoir by

ANDREW C. LAWSON AND PERRY BYERLY

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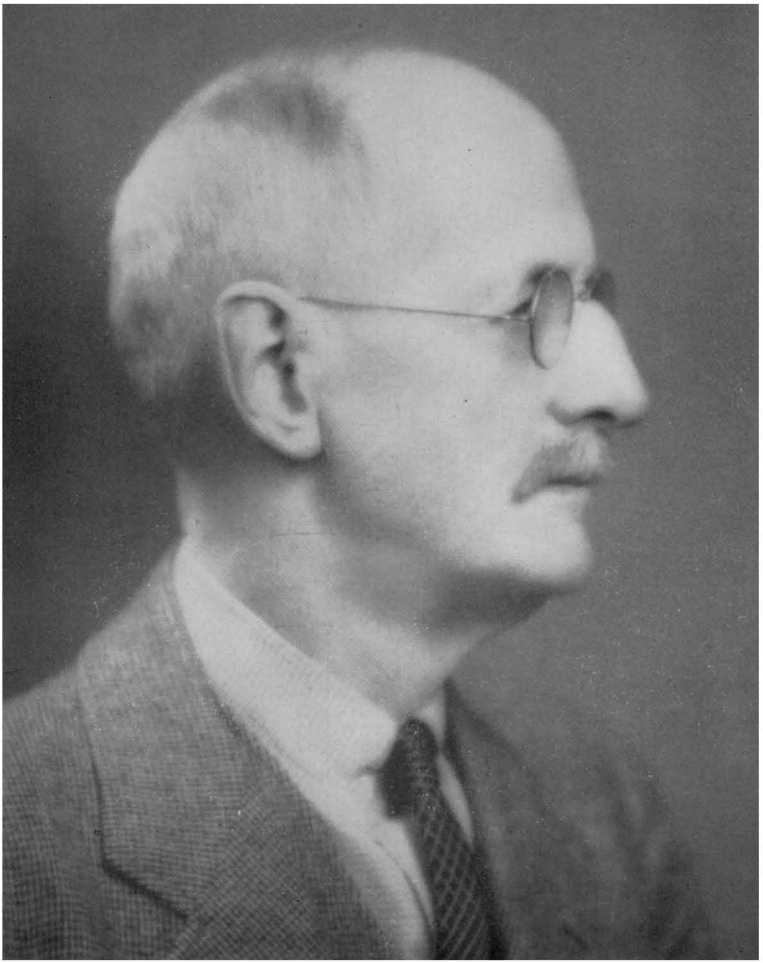

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Harry Fielding Reid was born May 18, 1859 in the city of Baltimore and died June 18, 1944. As a boy he went to school in Lausanne, Switzerland, where the family lived for some years. Returning to Baltimore about the time of the opening of Johns Hopkins University, he became a student in that university, receiving from it his bachelor's degree in 1880, and his doctorate in 1885. In 1886 he was appointed Professor of Mathematics at the Case School of Applied Science, Cleveland, and in 1889 became Professor of Physics in that institution. He occupied this chair for five years, after which he became attached to the geological staff of the University of Chicago as Associate Professor of Physical Geology and then returned to Johns Hopkins University, where in 1901 he became Professor of Geological Physics. The title of this department became that of Dynamic Geology and Geography in 1911 and he continued as its head until 1930, when he retired.

Besides his academic work he assumed from time to time various other scientific duties connected with public service. He was chief of the highway division of the Maryland Geological Survey from 1898 to 1905; expert in charge of earthquake records, U. S. Geological Survey, 1902-14; member of the Commission Internationale des Glaciers; representative of the United States in the International Seismological Association from 1906 on; honorary member Société Helvétique des Sciences Naturelles; corresponding member Philadelphia Academy of Natural Sciences. He was elected to the National Academy of Sciences in 1912. He was also a Fellow of the Geological Society of America; a member of the American Physical Society; the Washington Academy of Sciences; American Philosophical Society; the Seismological Society of America, of which he was President in 1913; and the American Geophysical Union (chairman, 1924-26). In 1906 he was appointed by Governor Pardee a member of the California State Earthquake Investigation

Commission. In 1911 he was Hitchcock Lecturer at the University of California. In these Hitchcock Lectures he gave an admirable exposition of the new Elastic Rebound Theory of Earthquakes. He wrote parts VI, VII and VIII of the Highways of Maryland, 1899, and was joint author with A. N. Johnson of the Second Report on the Highways of Maryland, 1902. He is also the author of Volume II of the report of the California State Earthquake Investigation Commission, 1910. In 1915, at the request of the President of the United States, he reported on the possibility of controlling the landslides at Panama. Besides these varied activities he continued throughout his life to publish papers and monographs on particular problems in the geological periodicals.

The scientific problems which concerned Reid throughout his life fall chiefly into two general categories. From 1892, when he first began to publish the results of his scientific studies, until 1907 his printed writings had to do almost wholly with the description and discussion of glaciers. He contributed much to our knowledge of the more obscure features of the glaciers of Switzerland, Alaska, Washington, and Oregon, and became the recognized leader in such investigations.

The great California earthquake in 1906 diverted him from glaciers to the study of stresses and movements in the earth's crust. From that date onward his published papers indicate clearly his devotion to seismological studies. In the list there are a few discussions of glacial questions, which appear to be hold-overs from the previous cycle.

The principal outcome of Reid's seismological work was the formulation and discussion of the theory which he named "The Elastic Rebound Theory of Earthquakes," now generally recognized as an important advance in the science of geology.

Personally, Reid was blessed with a charming character. It was always a joy to meet him; and his interests not only in science but in the ordinary affairs of life covered a wide range. To his friends he was open-hearted and cordial, although he may have appeared somewhat austere to strangers. In his earlier career he was devoted to mountain climbing, a habit acquired in his studies of glaciers. He was recognized among geologists

as an exceptionally clear thinker and his scientific papers were always worthwhile contributions to the problems which he discussed in them. He was a firm believer in isostasy as a fundamental geological principle; and his brief but significant papers of 1911 and 1922 have contributed much to the general acceptance of the doctrine. Reid's most important contribution to the theory of isostasy is his paper on the Influence of Isostasy on Geological Thought, published in Bulletin 78, pp. 116-122, of the National Research Council, 1931. In this important paper he sketches the history of the development of the theory of the subject and discusses various geological questions which flow from it. The paper amplifies and further clarifies the topics presented in the earlier paper in the Bulletin of the Geological Society of America in 1922. It leaves little room for doubt as to the validity and fundamental importance of the doctrine or of its acceptance by geologists.

It was as a member of the State Earthquake Investigation Commission, which studied the California earthquake of April 18, 1906, that Reid entered deeply into seismological problems. Two great contributions to seismology came out of his studies (1) the recognition of elastic rebound as the source of earthquake waves and (2) his theory of the seismograph.

The elastic rebound theory was first stated in Volume I, Part I, of the report of the Commission (1908) and was further developed by Reid in Volume II (1910), in his discussion of the mechanics of the earthquake. In his Hitchcock Lectures at the University of California in 1911, Reid presented the theory in a clear and general form. The older idea of translation of blocks of the earth's crust as a source of earthquake waves was excluded for the 1906 shock and hence probably for all shocks. The important role played by elastic forces was emphasized and a reasonable immediate source for the great energy released in an earthquake was at last taken to be that of elastic strain. The accumulation of this strain slowly is in agreement with the slowness of most geologic regional processes. Reid's masterly exposition and the theory's own reasonableness brought it immediate acceptance. The creep of geodetic triangulation stations in California since 1906 seems to be giving additional foundation to the

theory, although insufficient observations have been made to date to establish it without doubt.

Reid's presentation of the theory of the seismograph in the Commission's report was the first complete treatment in the English language. As was usual for him it was thorough. Several types of suspension were treated. There was no neglect from the start of small effects in order to obtain an equation easily handled. He considered all effects, displacements, tilts, friction; and neglected no term without detailed discussion as to its probable magnitude. He treated solid friction here and in a later paper with a care not hitherto applied to the problem. In the seismographs of that day friction was important. He also detailed experiments for determining the constants of a seismograph. His chapter on the seismograph provided a handbook for the seismologist.

In the Commission's report Reid presented copies of many seismograms of the earthquake and analyzed them. His results were presented in tabular form giving the travel times of the preliminary tremors and the surface waves. He also computed the velocities of the preliminaries as a function of depth.

It is regrettable that the Report of the State Earthquake Investigation Commission was not distributed more widely, particularly in Europe where most of the seismological work was being done at that time.

Shortly after the issuance of the report Reid wrote two papers on the geometry of faults. His paper on the starting point of earthquake vibrations was the first to point out that the instrumental epicenter as determined from P alone was the point above that at which the fault *started* to break, but that the first S recorded might well come from another portion of the fault. Two later papers discussed this matter. In 1918 he wrote a paper on the velocity of tidal waves (tsunami) pointing out the error of computing average depth of the ocean from the average velocity of the waves.

In many ways we may say Reid was the first American geophysicist. He was ahead of his time and only now are we beginning to organize university curricula in geophysics to train men who, we hope, will have his mastery of both geology and physics.

KEY TO ABBREVIATIONS USED IN BIBLIOGRAPHY

Amer. Geol. = American Geologist
Amer. Geogr. Soc. Bull. = American Geographical Society Bulletin
Amer. Geophy. Union Trans. = American Geophysical Union Transactions
Amer. Journ. Sci. = American Journal of Science
Ann. Rept. Smithsonian Inst. = Annual Report of Smithsonian Institution
Arch. des Sci. Phys. et Nat. = Archives des Sciences Physiques et Naturelles
Beitr. zur Geophys. = Beiträge zur Geophysik
Carnegie Inst. Wash. Pub. = Carnegie Institution of Washington Publications
Carnegie Inst. Wash. Year Book = Carnegie Institution of Washington Year Book
Geogr. Rev. = Geographical Review
Geol. Soc. Amer. Bull. = Geological Society of America Bulletin
Geol. Soc. Amer. Proc. = Geological Society of America Proceedings
Internat. Geol. Congr. = International Geological Congress
Internat. Seis. Assn. = International Seismological Association
Johns Hopkins Univ. Cir. = Johns Hopkins University Circular
Journ. Geol. = Journal of Geology
Journ. Phys. = Journal of Physics
Md. Geol. Sur. = Maryland Geological Survey
Mem. Nat. Acad. Sci. = Memoirs, National Academy of Sciences
Nat. Acad. Sci. Proc. = National Academy of Sciences Proceedings
Nat. Geogr. Mag. = National Geographic Magazine
Nat. Res. Council Bull. = National Research Council Bulletin
Nat. Res. Council Reprint and Circular Ser. = National Research Council Reprint and Circular Series
Pan-Amer. Geol. = Pan-American Geologist
Pop. Sci. Mo. = Popular Science Monthly
Proc. Amer. Phil. Soc. = Proceedings, American Philosophical Society
Proc. Geol. Soc. Amer. = Proceedings, Geological Society of America
Seis. Soc. Amer. Bull. = Seismological Society of America Bulletin
Ter. Mag. Atmos. Elec. = Terrestrial Magnetism and Atmospheric Electricity
U. S. Coast Sur. Rept. = United States Coast Survey Report
U. S. Geol. Sur. Ann. Rept. = United States Geological Survey Annual Report
U. S. Geol. Sur. Bull. = United States Geological Survey Bulletin
Univ. Calif. Pub. Bull. Dept. Geol. = University of California Publications, Bulletin of the Department of Geological Sciences
Zeits. für Gletscherkunde = Zeitschrift für Gletscherkunde

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