

## Memorial to Armand John Eardley 1901-1972

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Armand J. Eardley was born October 25, 1901, in Salt Lake City, Utah. He died in the city of his birth November 7, 1972, at the age of 71. The cause of death was heart failure, but the event was not entirely unexpected as he had suffered previous attacks.

Eardley was of Mormon stock. His father and mother were English, and his four grandparents migrated to Utah under pioneer conditions. He attended the public schools in Salt Lake City and took his college training at Stanford University, University of Utah, and Princeton University. In 1930 he married Norma Ashton. Their son Michael was born in 1940. Armand's teaching career began in 1932 at the University of Michigan where over the ensuing years he rose in the ranks to the position of full professor. From 1942 to 1949 he was Director of the University of Michigan Rocky Mountain Field Station at Camp Davies, about twenty miles from Jackson, Wyoming.

Armand returned to the University of Utah in 1949. He served as acting head of the Department of Geology from 1951 to 1954 and as dean of the College of Mines and Mineral Industries from 1954 to 1965. He had been Professor Emeritus for approximately one year at the time of his death.

Armand Eardley was an educator, writer, and administrator as well as a scientist—the type of individual whose career adds luster and credit to the profession of geology and the institutions which he served.

Armand is probably best known through his books. In these his genius as an expositor and educator shines forth. He sought and reported his own truths but went beyond to integrate and publicize the contributions of others. His first book *Aerial Photographs: Their Use and Interpretation*, published in 1942, was a pioneer treatment of what was to become in an age of aerial and space photography a discipline of major importance. He told me with his usual modesty that he knew nothing of aerial photography to begin with; he taught himself and passed his knowledge on to others to help provide base maps for geological work in areas where no maps existed.

In 1951 Harper and Brothers published his monumental 750-page *Structural Geology of North America*. The title is somewhat misleading as the book is not merely structural geology—it is a reference work on the stratigraphy and historical geology of a continent as well. Today I am sure the word “tectonics” would be in the title. Although there were many joking comments about its odd shape and format and the difficulty of getting it on a shelf with ordinary books (too outstanding), the decision of the publishers to print it in an 8¼ x 11-inch edition was a wise one. How else could

they do justice to the magnificent flowing lines of Eardley's cross sections and diagrams that are so important and instructive? Without the author's permission, this book was translated into Russian and widely distributed in the U.S.S.R. He never went to Russia to collect the 50,000 rubles due him. A second edition of the book came out in 1962 with seven new chapters and extensive revisions.

In 1965 Harper and Row published his *General College Geology*, a 499-page textbook for the nonprofessional student. This also reflects Armand's great desire to make geology interesting and understandable to the average student. Its profuse illustrations include many line drawings and photographs that are Armand's own work. It took much time, not to mention self-discipline, for Armand to write this book in the press of many other important projects and duties. Few geologists not specifically trained in paleontology could become well enough informed to produce a textbook leaning heavily on fossils.

His final book, *Science of the Earth*, was issued by Harper and Row in 1972. Again it reflects the breadth of his interests and capabilities as well as a desire to instruct. It is described as being intended for general education courses in geology and earth science. It is more than conventional geology. There are several chapters that must be classed as oceanography and several that are meteorological and climatological. Finally there is a section on environmental science which, in step with the times, stresses the management and conservation of the Earth's water, land, and air. Armand had a tough time trying to please everyone with this book—an experience anyone has who tries to tread the delicate path between environmentalists and industrial interests.

Not only did Armand write much that must be classed as educational in aim and content, he also sought to foster and encourage such pursuits in others. He served as president of the National Association of Geology Teachers from 1962 to 1963. He was a member of the steering committee of the Earth Science Curriculum Project which produced the textbook *Investigating the Earth*, which together with its student manuals and teachers' guides was destined to make a permanent impression in earth science education in the United States.

Armand served the profession of geology in other important positions. He was president of the Rocky Mountain Section of Petroleum Geologists from 1950 to 1951, a member of the executive committee and editor of the *Bulletin* of the American Association of Petroleum Geologists from 1952 to 1954, and president of the American Geological Institute from 1964 to 1965. His memberships, offices, and services in connection with local academic and professional organizations are too numerous to mention.

Armand received many honors and awards. He was Distinguished Lecturer, American Association of Petroleum Geologists, 1952–1954, and National Lecturer, Sigma Xi, 1956. Among his awards are the Distinguished Service Award, Utah Academy of Sciences, 1958; James E. Talmage Scientific Achievement Award, Brigham Young University, 1963; Award for Distinguished Service in the Earth Sciences, American Federation of Mineralogical Societies, 1968; Distinguished Research Professor, University of Utah, 1969–1970; and Distinguished Sigma Xi Lecturer, University of Utah, 1970. He received an honorary Doctor of Science degree at the University of Utah in 1970. He was a member of the Utah Geological Society, the Rocky Mountain Sec-

tion of the American Association of Petroleum Geologists, the American Geological Institute, the National Association of Geology Teachers, and the Geological Society of America of which he became a Fellow in 1939.

When Armand was called to be dean of the School of Mines and Mineral Industries at the University of Utah in 1954, it was a difficult new position involving integration of eight diverse departments including geology, ceramic engineering, fuels engineering, geophysics, metallurgy, meteorology, mineralogy, and mining and geological engineering. The space problem was acute, and competition among the departments for all resources was a constant problem. In addition to the on-campus tasks of administration, relations with a diversity of downtown mining and industrial interests required constant attention. Through it all Armand kept his mild-mannered good humor, and his administration was one of relative good will, stability, and growth. During his term as dean, Armand continued to teach classes on a regular basis. Perhaps the classroom was a welcome refuge from less pleasant duties elsewhere.

Armand had an abiding interest in the practical aspects of geology and was sought out as a consultant because of his wide and basic knowledge of the geology of the Western United States. From 1946 to 1949 he worked on a seasonal basis for Sinclair Oil and from 1949 to 1954 was retained by Cities Service Oil Company. He also contributed in various capacities to the development of other resources, including uranium, salt, and rock products.

As a scientist, Armand Eardley tended to "paint with a broad brush," and he was well qualified to do so because of his familiarity with basic patterns and wide regional relationships. His textbook on the structure of North America is certainly one of the notable productions of American geology and of a kind not likely to be duplicated (except poorly by a committee). He had a way of summarizing and synthesizing the works of others which preserved their essentials, gave due credit, and fitted their work into the big picture fairly and accurately.

Wherever he went, Armand could see geologic problems and opportunities. A short visit to Alaska resulted in papers on the Yukon Valley sediments and topography. A stay in southern France produced a fresh contribution on that well-worn topic of flysch and molasse and on the petroleum geology of the Aquitaine Basin.

He was a conservative in geological thinking. His works show that he did not "become a believer" in plate tectonics or continental drift. In his personal struggles with global matters, illustrated by papers on the relationships of North and South America (1954) and the Arctic Basin (1949), he managed without either plate tectonics or polar wandering.

Fundamentally, Armand was a believer in vertical uplift as a primary tectonic force. His unparalleled experience in the ranges of the Rocky Mountains convinced him that the thrust faults on the margins were due to gravity sliding. It was interesting to see him attempt to translate his thinking about the "thin-skinned" Rockies to the geosynclinal Great Basin. He looked for prethrust uplifts and gave the thrusters a good run for their money.

Although Armand's interests and publications were wide ranging, there were several subjects to which he remained devoted during his professional career. His doctoral thesis was on the southern Wasatch Mountains and was the basis for his first four

papers published in the interval from 1932 to 1934. Occasional papers on the Wasatch Range followed, the last in 1969. A longstanding interest in the Great Salt Lake is even more evident. His pioneer paper on sediments of the lake (1938) is widely quoted and basic to much subsequent work. Offshoots of his interest in the modern lake and sediments were publications on Lake Bonneville and consulting jobs and services as an expert witness in relation to exploration and utilization of the mineral resources of the briny "liquid ore body." At the time of his death, he was happily engaged in a significant joint study, financed by the National Science Foundation, of a deep core in the nearshore bottom sediments, which proves the existence of a succession of many lakes in the area. He lived to see the installation of great commercial enterprises on the lake and the utilization of much of his data in a practical way.

Armand did not escape involvement in less fruitful projects. His contribution on the tectonic relations of North and South America (1930) is a masterpiece of organization, but it was written just before the dawn of plate tectonics and is scarcely referred to. On the other hand, his much shorter and more speculative paper on the polar rise and fall of sea level (1964) pointed out a phenomenon that is engendering ever-widening attention.

His life's work proves that he kept everlastingly busy on long-range projects of many kinds. Yet he was not a man who seemed busy. He always had time to listen to the troubles of students and colleagues. He enjoyed his vacations at Camp Davies at the Eardley cabin, which he built himself. Outstanding was his willingness to go into the field with his graduate students time and time again, if necessary, to check their progress and keep them working effectively.

Eardley did not seek positions in the professional societies, yet few men held more varied or numerous offices. Not all of these were of the pleasant, honorary kind. He was willing to step in and work hard to save a faltering organization when no one else was interested.

Armand was a superb craftsman in many ways. His father was a carpenter, his grandfather a potter. He qualified as an excellent cabinetmaker, as many objects in his home and office testified. The relation of carpentry and drafting are unmistakable in his productions. With board or paper he always came up with something that fit, had utility, and was both understandable and economical. The same is true of his skill with words. His writing is simple and direct. The flow of thoughts and their organization was more important to him than a selection of flowery adjectives or technical jargon.

Armand was a member of the Church of Jesus Christ of Latter-Day Saints. He served as a missionary for the Church in Switzerland and Germany from 1921 to 1923. At the time of his death, he was a High Priest in the 11th Ward, Monument Park Stake, Salt Lake City. He was proud of his pioneer ancestry and in his own life exemplified the principles of hard work and unwavering personal integrity that are highly regarded Mormon virtues.

Armand Eardley is difficult to classify professionally. He is known chiefly as a structural geologist, but this probably arises from the frequent necessity of having to fill the blanks of some survey or citation with a specialty of one sort or another. In addition to structure and tectonics, his bibliography has important titles in sedi-

mentology, stratigraphy, geomorphology, Pleistocene geology, and the geology of oil and other mineral products. This sort of publication record is not the usual thing in a day of almost mandatory specialization.

Eardley may have resented the classification of men of his type as being of the classical school. He could be proud of being a geologist, which is more than being a mineralogist or a paleontologist or a seismologist. He was a student of the Earth.

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