Memorial to Alexander Kennedy Baird
1932–1985

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Alex Baird, teacher and researcher, well known for his research and application of X-ray spectrography, especially to the chemistry of granites and Martian surface materials, died at age 52 at Lake Arrowhead, California, July 6, 1985.

Alex was born November 22, 1932, in Pasadena, California, the son of Kennedy and Phyllis Baird. From secondary school in Pasadena he entered Pasadena City College, intending to pursue a career in engineering. However, an introductory geology course from Stanton Hill incited a new interest, as it had for many before Alex, and Hill arranged a meeting for his promising student with A. O. Woodford at Pomona College, Hill’s alma mater. A close bond quickly developed between Woodford and Baird, a bond that continued to grow to the time of Alex’s death. Alex was elected to Phi Beta Kappa at Pomona, and graduated cum laude in 1954, a year of important changes in that distinguished geology department.

A. O. Woodford retired in 1954, and Alex was retained as an instructor. Woody recognized Alex’s exceptional promise in teaching and research, and the potential to continue building on the strengths developed at Pomona by Woody, himself, over 32 years. The departmental chairmanship was assumed in 1954 by Donald McIntyre, newly arrived in the U.S. and enthusiastic about concepts of metamorphic tectonite analysis he had recently acquired from Eugene Wegmann in Switzerland and had employed with considerable success in Scotland. Alex’s initial research applied these concepts to metamorphic structure in the nearby San Gabriel Mountains, leading to an M.A. degree which he received in 1957. Thus began a dual career of active research and teaching that continued uninterrupted to the time of Alex’s death. The quality and commitment of his teaching was of the caliber expected at the best of small liberal arts colleges, and his research sustained a quality and pace consistent with a large, research-oriented university of the highest reputation.

This early interest in analysis of complex structures led Alex briefly from Pomona to the University of California-Berkeley, where he completed a Ph.D. dissertation that is still a primary resource on superposed deformation in the Sierra Nevada foothills. Upon completion of his residency at Berkeley in 1958, Alex returned to Pomona and teaching. At that time, thanks to Pomona alumnus Frank Seaver, the department was engaged in planning a new building (Sever South), and acquiring new equipment, normally found only in large research institutions. Availability of this equipment allowed Alex to develop a natural gift for electronic devices into a keenly honed skill which approached wizardry. X-ray fluorescence spectrography became a particular interest because he thought it could be developed as an analytical technique of high precision for the routine chemical analysis of rocks. Serendipitously, the physics department at Pomona included Burton Henke, who
was developing x-ray tubes capable of highly efficient excitation of soft x-rays. Together, Alex and Burt developed tubes for quantitative analysis of the lighter major elements in granitic rocks. The geology department soon had an assortment of both standard and homemade demountable "Henke" tubes capable of routinely analyzing elements as light as sodium and magnesium. During this time, Alex was the first to directly analyze for oxygen in rocks by x-ray methods.

The goal of the development work on x-ray spectrometry was to achieve rapid, precise, and accurate analysis of large numbers of granitic rocks. Alex and Donald McIntyre had become especially interested in the nature of chemical variability, at various scales, across the southern California batholith. At this time, a few others had just begun to explore such topics within single plutons, and the inconsistency of results among laboratories using classical chemical methods in analyzing igneous rocks was becoming widely recognized. A systematic plan was conceived to sample granitic rocks exposed over a 45,000 km² area in the Peninsular and Transverse Ranges in southern California. Considering the enormity of the proposed undertaking, a remarkably small team was assembled: Alex, Donald, and two graduate students, Edward Welday and Alex's wife-to-be, Kathleen White. Research undertaken included fundamental development, such as design of a pressing die for sample preparation. They also worked on determining the precision and sources of error in quantitative x-ray fluorescence analyses, requisite sample size of rock for analysis, and chemical variability of the batholithic rocks by scale; ultimately, they designed elaborate sampling schemes which would lead to both an accurate and reproducible assessment of the chemical variation across the batholith. Included were three pioneering studies of the variability within single plutons in association with R. S. MacColl, D. M. Morton, and J. F. Richmond. Nearly 550 composite samples were analyzed in the regional study, and an even greater number in preliminary studies, to determine chemical variability at various scales of observation. Throughout these investigations there was an insistence on completeness of empirical proof that was one hallmark of Alex Baird's research. The culmination of this work was the first accurate assessment of the systematic chemical variation across a composite batholith.

At a meeting of x-ray spectroscopists in Denver in 1969, where Alex delivered an invited review paper on the results of the Pomona team's spectrometry, Benton Clark, a research physicist now with Martin-Marietta Aerospace, was greatly impressed with the quality of research Alex had conducted. This chance meeting led to an exciting period of shared research, from which Alex gained his highest degree of recognition. Ben had been seeking a collaborator to develop a spectrometer for possible use on the Mars Viking project. Together they developed a rugged miniature spectrometer which used 55Fe and 109Cd, rather than the standard x-ray tube, to excite secondary x-rays. Competition was fierce for a place as one of only two inorganic experiments on the Viking landers. Through a series of competitions which tested the precision and accuracy of various prototype instruments, the Baird-Clark spectrograph was acknowledged as the best for the purpose. NASA's selection of this instrument was more than vindicated by the large amount of high-quality chemical data returned to Earth over several years. From 1976 to 1982, Alex worked on Viking mission operations, where he supervised all sample selection for the inorganic chemical analysis experiments, and was a principal investigator for NASA's Mars Data Analysis Program. The Martian research gave rise to many stimulating papers. An important conclusion was that the fines in Martian regolith consisted of pulverized or altered, pyroxene-rich, volcanic material probably similar to Precambrian iron-rich komatiite and perhaps subsequently altered to nontronite. This suggested that Mars developed shield volcanoes erupting highly fluid, iron-rich komatiite, but unlike Earth, did not erupt any highly evolved magmas.

As the Mars research slackened, Alex turned his attention Earth-bound once again and back to granitic rocks. He spent 1983 as a National Research Council Senior Resident Research Associate at the Jet Propulsion Laboratory in Pasadena. In transition from Mars to Earth he applied knowledge gained in NASA-related work to remote sensing of the chemical composition of granitic rocks by near-infrared reflectance. He was able to determine the iron content of granitic rocks in Mexico and
Egypt from data gathered from the shuttle Columbia. Also during this time, with Dave Mohrig and Ed Welday, he pursued the role of vapor deposition in the formation of basaltic stalactites at Kilauea, Hawaii.

A vexing problem for Alex and his coworkers over 25 years had been the lack of a method to determine the modal composition of granitic rocks with accuracy and speed on a par with x-ray fluorescence chemical analysis. In 1984, with Bill Wadsworth of Whittier College, Alex completed a method of rapid quantitative mineral analysis of granitic rocks by x-ray diffraction. At the time of his premature death, they were working on systematic variation in modal composition across the southern California batholith.

During his extensive research activities, Alex was always the consummate teacher; he carried a full teaching load except for a two-year leave of absence during the height of the Viking work. He never lost his interest in field work, and taught the field geology course at Pomona. Sooner or later, each of his students recognized the exceptional lucidity of his explanations and the depth of his concern for their welfare. Alex was a very forthright person who set high standards for himself, his associates, and his students. He appreciated quality at all professional levels and was held in high esteem by the nonteaching staff at Pomona College. If his bluntly outspoken nature could at times offend, his integrity and compassion could not be hidden from his students. The remarks of two graduates of Pomona College capture the essence of Alex Baird as teacher and colleague.

He inspired me to reach for what was best in me. He taught me some hard lessons with the firmness of the grouch he pretended to be and the kindness of the man he was.

Alex was honest, sarcastic, hard-headed, straightforward, proud, disciplined, stubborn, and dogged . . . Alex cared more for the thousand or so of his privileged students than he wanted us to know.

We all knew and loved him for it.

Alex was so productive that it might be assumed he sacrificed time with his family and his other interests to professional pursuits. That is not the case. His efficiency, both of thought and in the performance of his duties, left considerable time to share with Kathy their love of quiet, remote places in the southwest. Knowing very well how fortunate he was to combine in Kathy his wife, best friend, and valued professional colleague, he nurtured that relationship.

Alex had a fondness, which dated from his childhood, for “old time” theater organs. He belonged to the Los Angeles Theater Organ Society and derived considerable pleasure from recitals in the movie theaters. Although not an adept musician, Alex had purchased a small theater organ and was becoming proficient enough not to offend his own experienced ears.

Alex was a Fellow of the Geological Society of America, and a member of the American Geophysical Union, Planetary Society, and the Society of the Sigma Xi.

SELECTED BIBLIOGRAPHY OF A. K. BAIRD


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