Gregory P. Baxter

1876–1953

BIOGRAPHICAL *Memoirs*

A Biographical Memoir by
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NATIONAL ACADEMY OF SCIENCES

GREGORY PAUL **BAXTER**

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By R. Stephen Berry

Gregory Paul Baxter was born in Somerville, MA, attended Harvard College, and after graduating in 1896 became an instructor there. Thus began a distinguished academic career in analytical chemistry, particularly regarding his vast studies of atomic weights. In 1925, Baxter was appointed the Theodore William Richards Professor, a position he held until his retirement in 1944.

With coauthor M. A. Hines, Baxter published his first paper in 1905, a revision of the atomic weight of cadmium. This work was soon followed by similarly precise measurements of the atomic weights of iodine, manganese, cobalt, and bromine, and a second paper on cadmium. These published reports, and several other papers on other topics, such as solubilities, came out in 1905 and 1906.

Much of Baxter's work in the 1930s concerned the relations between atomic weights and the geological history of samples. Despite working with samples from very different sources, his measurements of the atomic weights of elements were remarkably precise. In all, he determined the atomic weights of 29 elements: the five cited above plus sodium, potassium, cesium, boron, carbon, silicon, tin, lead, nitrogen, phosphorus, arsenic, indium, thallium, nickel, copper, titanium, zinc, iron, chromium, lanthanum, europium, neodymium, praseodymium, and silver.

Baxter published over 160 scientific papers over the course of his career, the last one being in 1947. Most of his publications from 1940 on were reports of the International Union of Chemistry's Committee on Atomic Weights, which he chaired from 1930 to 1949. (One of the coauthors of those reports was Marie Curie!) The paper he published in 1947, with the young future-Harvard-professor Leonard K. Nash, was on the determination of gases in meteoritic and terrestrial irons and steels.

Baxter chaired Harvard's Department of Chemistry from 1911 to 1932. During World War II, he worked with the U.S. Office of Scientific Research and Development. He was a member of the American Academy of Arts and Sciences and was elected to the National Academy of Sciences in 1916.

Baxter was an outstanding mentor, in part because he treated his younger associates as professionals and immersed himself in their work. This was confirmed by Alfred Nier, the physicist and mass spectrometrist,[1] who came to Harvard in 1936 to work in the group of physicist K. T. Bainbridge but who also had many interactions with Baxter. Nier was studying the age of uranium samples by measuring the ration of the proportions present of two uranium isotopes, but no *volatile* uranium materials were available. Baxter came forward with two volatile uranium salts, UCl_4 and UBr_4, for Nier, which enabled him to make the crucial measurement. Baxter also converted Nier's lead samples, of geologic interest, to the volatile PbI_2. This allowed Nier to show that the various isotopic compositions of primordial lead samples had different geological histories.

In Nier's 1981 memoir, he discussed Baxter's initial skepticism of Nier's results; Baxter even went so far as to give Nier some random samples ("unknowns") to measure, as a test of the validity of Nier's work. When the measurements passed that validation test, Baxter was completely won over and accepted Nier's results. Nier later spoke of how he, as a postdoctoral fellow, "acquired a Harvard full professor as a research assistant!"

In the 1930s, Radcliffe was a women's college separate from but associated with Harvard. Baxter, like many of the Harvard faculty members, gave classes at Radcliffe, which meant walking the mile or so a few times a week from the Harvard Yard to the Radcliffe campus. He would frequently stop at the Harvard Research Laboratory of Physics along the way to see Nier; he would sometimes make that visit both when going to and returning from Radcliffe so as to check on any progress in the interim.

In 1939, Nier and coworkers showed that the uranium isotope that exhibits slow neutron fission is ^{235}U. He was able to do this because Baxter had given him some UBr_4 when they were working on the geological ages of samples.

Among Baxter's last students was C. D. Harrington, who followed Baxter's path of using mass spectrometry and isotopic ratios to study geological histories, especially of deserts.

1 Nier, A. O. *Ann. Rev. Earth Planet. Sci*. 9:1–17 (1981).

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