

Memorial to Alan Mara Bateman 1889—1971

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Alan Mara Bateman, Silliman Professor Emeritus of Geology at Yale University and, for half a century, editor of *Economic Geology*, died at his home in New Haven on May 11, 1971, at the age of 82. Thus ended 60 years of highly competent and devoted service to economic geology, the mining industry, and his country.

Alan was born on January 6, 1889, in Kingston, Ontario, one of the four children of George Arthur Bateman and Elizabeth Janet Mara Bateman. Before they were ten years old his father started whetting his children's interest in the world around them, encouraging them to use both hands and head by teaching them carpentry and such homely and useful skills

as plumbing and wiring. Each of his sons became prominent in a field of applied knowledge—one (George Cecil Bateman) in mining engineering, one in economic geology, and the third in the construction industry. Alan also got an early start at their summer home in the Thousand Islands in some of the outdoor activities that were to give him so much pleasure throughout his life.

Alan entered Queens University in 1906. One of his classmates remembers him as "a very active red-haired and burly hellraiser, and an excellent student." Being by nature strong and athletic, he was very active in sports, particularly football and soccer. He was also a star performer in the Mandolin and Guitar Club, which his organizing ability helped to inaugurate and sustain. His practice of economic geology began while he was still an undergraduate. In the summers of 1907 to 1910, he was employed on prospecting parties, mostly in Ontario, under A. E. Barlow, and in 1909 he was assistant to Barlow in a special survey of the Chibougamau district for the government of Quebec. During these years, he gained a reputation for his speed and endurance in the bush.

In 1910, Bateman entered graduate school at Yale. Although his main interest lay in the field of economic geology, presided over by the widely esteemed John Duer Irving, much of the groundwork and stimulation for his later career must also have come from others of its illustrious faculty, notably professors Barrell, Pirsson, Dana, Ford, and Gregory. During the summers of 1911-1912, Bateman served as an assistant geologist of the Geological Survey of Canada, primarily in a gold district on the Fraser River in British Columbia. His work there was the basis for the dissertation entitled "Geology and ore deposits of the Bridge River district, British Columbia," that earned him a Ph.D. in 1913.

He was promptly invited to become one of the three field geologists of the Secondary Enrichment Investigation, a rich plum for a fledgling Ph.D. This investigation, inspired and guided by L. C. Graton and financially supported by a group of mining companies, was a two-pronged attack—field and experimental—on the problems of secondary enrichment. In order to lay a firm scientific foundation for exploring for and developing secondary enrichment deposits, it was planned that the field geologists would examine as many prominent copper mines as possible, and, at the same time, chemists and petrologists of the Geophysical Laboratory would investigate the relevant chemical systems in the laboratory. Bateman, Augustus Locke, and E. H. Perry (killed in action, 1918), together with a group of younger field assistants that included D. H. McLaughlin, carried out the fieldwork in the years 1913–1916. The first world war precluded a summary report on the whole investigation, but the work did result directly in a large number of individual papers, and for some years it had a notable influence on the scientific study of secondary enrichment, experimental studies of sulfide geochemistry, and mining exploration.

Among the many deposits that Bateman visited was that of Kennecott, Alaska, with its extraordinarily rich chalcocite ores. Donald McLaughlin has recalled the excitement of seeing these unique and amazingly rich deposits at an early stage of their development, and of experiences shared in the midst of glaciers and lofty peaks, some dizzy rides on aerial tramways, and many hours in cold mine workings. When Graton visited them there, arguments were lively and heated, for it was only with extreme reluctance that Graton gave up his efforts to convince his juniors that the chalcocite there, as well as much of it associated with bornite in deep mines elsewhere, was of supergene origin—a mystical replacement of bornite. In this case, at least, history has found for the geologic evidence of the students rather than for the generalization of the master. The further conclusion of Bateman and McLaughlin (1920) that the copper was deposited by heated meteoric waters that had extracted the metal from the Nikolai Greenstone has a familiar ring today and may well survive the test of stable-isotope determinations.

One consequence of Bateman's work at Kennecott was that he gained the confidence of the group that was dominant in the merger of the Alaskan mines with the far greater Utah Copper Company. Bateman served them as a consultant for many years, particularly in the interval from 1915 until his government service began in 1942. In the days before Kennecott had a formal exploration division, he directed a number of explorations, especially in Alaska, in the Precambrian of eastern Canada, and in Mexico, and he also made periodic reviews of the reserve estimates of properties in the Southwest. One observer has commented on the forthrightness of his reports, even where the conclusions were discouraging. In 1927, he assisted the company in industry-government discussions of cost depletion versus percentage depletion.

Bateman was also, on occasion, retained by other companies, among them Selection Trust, for which he visited the newly burgeoning Rhodesian (now Zambian) Copperbelt in 1929. His microscopic study of the ores led him to the economically useful

conclusion that the dominant chalcocite of the deposits was hypogene and could, therefore, be expected to persist downward. The series of articles he wrote in 1930 served the very useful purpose of providing the most detailed review of the deposits to appear in the mining and scientific press up to that time.

In the fall of 1915, Bateman returned to Yale as an instructor in economic geology under Irving, and soon thereafter began his service to the journal, *Economic Geology*, that was to continue for over 50 years. In 1916, Professor Irving, who was editor of *Economic Geology*, took leave to enter officer's training camp in the summer and fall, delegating his editorial duties to Bateman, by then assistant professor. In the spring of 1917, Irving was appointed a Captain in the Army Engineers and left on duty from which he did not return, for he died in service in France in July 1918. Bateman, who had been made assistant editor in the spring of 1917, was appointed editor in March 1919. During the same period, he first substituted for and then succeeded Irving as the professor of economic geology; he was made associate professor in 1922, professor in 1925, and Silliman Professor in 1941. Following his return from government service in Washington after World War II, he assumed the duties of department chairman, which he retained until 1957, when he was approaching retirement.

It was in June 1916, after his return to Yale, that he married Grace Hotchkiss Street of New Haven, who survives him. Their lifelong partnership was characterized by deep affection on both sides, and an exceptional degree of companionship. Mrs. Bateman accompanied Alan to Alaska in the first summer of their marriage, and in subsequent years was a partner on a number of trips to Europe, Mexico, and Africa. Their "family" included many close relatives, and most of Alan's numerous lasting friendships with contemporaries in New Haven and the mining world were shared by both wives and husbands.

As a teacher, Bateman was expectably most highly regarded by those who later went on to careers in mining. He excited the imaginations of those who were inclined in this direction with his accounts, commonly based on his own experience, of a variety of mineral deposits all over the world. The practical wisdom that he imparted provided them with a valuable foundation for their future work. As one old friend (a former teacher himself) has observed, most students like to have the truth revealed with authority, and this was Alan's forte. Whether they were simply impressed or whether they were stimulated by the challenge to resist such indoctrination, the lesson must have been valuable to many of those who have become members of a profession that rates positive thinking only one notch below a successful exploration program.

For many students, Alan's role as a mentor went far beyond the classroom. A former associate recalls that he always found time to lean back in his large leather office chair, pipe in hand or mouth, and listen to any student with questions or problems, offering his views or kindness, as appropriate. Even after his retirement, the hospitality of the Bateman home cheered the stay of many in New Haven. Large numbers of students obtained their first jobs in mining through his efforts, and because of his wide acquaintance in the mineral industries and the interest with which he followed his students'

careers, he was often able to give a boost or two later on as well. His own donations to departmental fellowships and his ability to obtain similar funds from alumni materially helped a number of students to complete their education, and his bequests include a substantial sum to be given ultimately to Yale as a fund for geology.

The warmth of feeling that he engendered in his students is clearly revealed by the dedication of the portrait given to him when he retired: "Presented by his students in gratitude for his forty-two years of devoted service to Yale geology, and for his many personal kindnesses to them."

Bateman's unique and perhaps greatest contribution was his editorship of the journal *Economic Geology*. For practical purposes, he was editor from the time when Irving left Yale, in the spring of 1917, until July 1969, a term of 52 years, plus an additional seven months in 1970 when he filled in during the sabbatical leave of his successor. This is surely a record of some sort, not only in geology but for scientific journals generally. Although for most of his 52 years the journal was largely a one-man show, it blossomed under his stewardship. In 1916, the 11-year-old journal published 46 articles and discussions, had a circulation of 862, and was financially shaky. In 1969, it published 111 articles and discussions, circulation was 5,090, and a healthy endowment, mostly built up by prudent management in which Bateman figured large, enabled it to price subscriptions below cost. Perhaps his memory of early hard times, as well as his love for the journal, led him to remember it generously in his will. From first to last, he maintained the journal's international pre-eminence as a forum for those interested in mineral deposits.

Bateman's own writings, whether books, articles, or reviews, were scholarly and well written. Both as editor and author, he was an enemy of jargon, never using a long word where a short one would do. Much of his professional life was spent in educating others, whether in classroom, a mine, or a conference room in Washington, which may explain his concern for simplicity in both the style and the content of his own writing, and his praise of this quality in books that he reviewed.

His *Economic Mineral Deposits* has been popular with teachers of economic geology; the second revised edition has sold about 40,000 copies and has appeared in Spanish-, Japanese-, and Korean-language editions. *The Formation of Mineral Deposits* has served well its purpose of giving individuals with relatively little or no training in geology an idea of how ore deposits form and some feeling for the requirements and problems of exploring for and developing them.

The scholarly approach and thorough mastery of the literature that characterize his textbooks are also noteworthy in his contributions to the scientific literature. In addition to the papers mentioned above, note should be taken of his Presidential Address to the Society of Economic Geologists (1942) and a successor paper (1951) that reflect his special interest in the iron-oxide deposits of magmatic affiliation. The articles are a nice blend of firsthand field examination, microscopic study, and reinterpretation of published field and laboratory data. His concept of late magmatic gravitative liquid accumulation should, at least with modification, be longest lived of his contributions to geologic thought. What he saw in the field and under the microscope

obliged him to support a hypothesis that apparently denied the refractory character of the iron and titanium oxides. After making what was, for him, a most unusual acknowledgment in the introduction to his Presidential Address (“I wish to approach [these ideas] from the viewpoint of the field economic geologist, and not that of the petrologist and geochemist, for whose work my respect is greater than my knowledge.”), he must have chuckled later when the flow at Laco, Chile, described by Park proved so irrefutably that iron-oxide magmas exist, regardless of how they may actually have formed.

The bald chronicle of Bateman’s government services that can be found in standard biographical references gives little inkling of the nature and value of his work. Most notable was his service from January 1942 until 1945 as Director of the Metals and Minerals Branch of the Board of Economic Warfare, later the Foreign Economic Administration. When war broke out, the country became ruefully aware that, in terms of domestic production, shortages existed for nearly 60 minerals or metals rather than for the dozen or so that had been generally recognized as inadequate. Supplying war-time demands required an unprecedented dependence on foreign minerals, and in almost all cases a very large increase in production in the countries involved. Although Bateman was not a businessman by training, his extraordinarily broad knowledge of the minerals industry and its people enabled him to recruit a top-grade staff of dedicated men, collectively knowledgeable in geology, mining, ore concentration, and smelting, and in the purchasing of ores, concentrates, and metals. He has described some of the operations of this group and their remarkable degree of success in an article (1946) in which, characteristically, he looks ahead as well as behind at the need to preserve the gains that had been made in international cooperation. Most of the papers that he was to write thereafter stress the need for national recognition of the degree to which the United States is likely to remain dependent on foreign sources for many minerals, and the corollary need for it to find ways of sharing amicably with others the fruits of a prosperity that depends, ultimately, on mineral resources.

A simple list of his other government services is long, even excluding memberships on various boards and commissions that were automatically part of his work for BEW. To all these offices he brought a broad knowledge of the economics of mineral production, skill as a negotiator, and dedication.

Bateman was a long time Fellow of The Geological Society of America and of the Mineralogical Society of America. He was a member of the Society of Economic Geologists (President, 1940); American Association of Petroleum Geologists; Mining and Metallurgical Society of America (President, 1956); American Institute of Mining, Metallurgical, and Petroleum Engineers; American Geophysical Union; Washington Academy of Sciences; and American Academy of Arts and Sciences. At Yale, he served for many years on the executive committee of the Sheffield Scientific School. His standing in his profession and his contributions to it have been recognized in many ways. In addition to the two society presidencies noted above, he was an Honorary Member of the Society of Economic Geologists and the Société Géologique de Belgique, and in 1962 was Penrose Medalist of the Society of Economic Geologists. In 1970,

Queens University awarded him an honorary D.Sc. A special issue of *Economic Geology* with papers by his students, associates, and colleagues was dedicated to him in January 1971.

Outside of his numerous professional activities, Alan was, to the end, an enthusiastic sportsman. He enjoyed fishing for trout and salmon in Canada and for bluefish off the coast of New London, Connecticut. In 1934, he was one of a crew of five on a friend's 68-foot schooner, *Mandoo*, which participated in the Bermuda race, and then went on across the Atlantic. He was an ardent golfer, ultimately the oldest active member of the New Haven Country Club. For indoor recreation, he greatly enjoyed bridge, and in winter, few Saturdays went by without a meeting of the Philosophical and Athletic Society—a gathering of close friends in the basement of his home for a session of Kelly pool. He was one of the Yale football team's most enthusiastic fans.

For 52 years, the Batemans spent as much time as possible each summer at an attractive old farmhouse in Pleasant Valley, Connecticut, where they kept up extensive flower beds and took great pride in the size and quality of the vegetables their garden produced. Both were pillars of New Haven's Center Church on the Green, which was served long and well by the acumen Alan displayed as chairman of the finance committee.

Outwardly, Alan's self-assurance and sense of decorum, combined with an impressive physique, graced both his appearance and actions with an Olympian air. He gave the impression of gliding majestically through almost every imaginable situation, ignoring or brushing aside obstacles that might have stopped another. His extraordinary self-assurance was genuine, and stemmed from unwavering confidence in his ability to cope with the world around him, and from the strength and fearlessness to face, with equanimity, any reverse that might be thrust upon him. It was extraordinarily difficult to persuade him that, after 50 years of editorship and a serious disabling operation on his jaw, it was imprudent to base plans for the journal on the assumption that he was still good for another 10 or 15 years. It would not be hard at all to believe that the tremendous courage with which he endured his last, painful illness was fortified at least in part by confidence that death was something that might happen to others but not quite yet to him.

Those who looked beyond his massive self-assurance found one who was by nature a very warm and kindly man. He liked people and enjoyed their company. Although he was always forthright, rarely if ever would he downgrade a colleague or make unnecessarily critical remarks, and he would lean over backwards to avoid making a student uncomfortable. He was unshakably loyal to those he liked or admired, and a roster of those, particularly in the mining industry, with whom he shared a friendship would be very long indeed. Some of the most penetrating accounts of Alan as a friend and companion have come from a group of his contemporaries in New Haven whose contact, for many decades, was during periods when he shed most of the earnestness he was apt to wear among professional associates. To these friends, as to some of his other very close friends, he was a man of cheerful good nature, generous to a fault,

enthusiastic in all that he did, and possessed of a refreshing sense of humor. They found him a delightful companion in all kinds of settings, and their anecdotes reveal a light hearted side of Alan that most of his younger professional associates had little opportunity to observe.

No one now living could know more than a few facets of this many-sided man, and and it should be self-evident that this memorialist, like almost anyone else who might have prepared this memorial, would have to rely heavily on many associates of recent and former years. The sense of affection for Alan that pervaded so many of the letters received has been heartwarming. This indispensable help is acknowledged with deep gratitude.

With the passing of Alan Bateman, economic geology has lost an outstanding teacher and editor to whom it will always be in debt; the mining industry and its affiliates in government have lost a highly respected, competent, and industrious servant. Yale has lost one of its most devoted sons, and the many throughout the world who will continue to cherish their remembrance of him have lost a kind and generous friend.

BIBLIOGRAPHY OF ALAN MARA BATEMAN

- 1912 Geology of Fraser Canyon and vicinity, British Columbia, Siwash Creek area: Canada Geol. Survey Summ. Rept. 1911, p. 125-129.
 — (with Ferguson, H. G.) Geologic features of tin deposits: Econ. Geology, v. 7, p. 209-262.
- 1914 Exploration between Lillooet and Chilko Lake, British Columbia: Canada Geol. Survey Summ. Rept. 1912, p. 177-187.
 — Lillooet map area, British Columbia: Canada Geol. Survey Summ. Rept. 1912, p. 188-210.
- 1917 Magmatic ore deposits, Sudbury, Ontario: Econ. Geology, v. 12, p. 391-426.
 — The geologist in war times—The training of artillery officers: Econ. Geology, v. 12, p. 628-631.
- 1918 A tungsten deposit near Fairbanks, Alaska: Econ. Geology, v. 13, p. 112-115.
 — Discussion of "genesis of the Sudbury nickel copper ores," by Roberts, H. M., and Longyear, R. D.: Am. Inst. Mining Engineers Bull., v. 136, p. 854-855.
 — Discussion of "Replacement in the Bendigo quartz veins," by Stillwell, F. L.: Econ. Geology, v. 13, p. 222-223.
- 1919 Military and geologic mapping—A plane table: Geol. Soc. America Bull., v. 30, p. 405-414.
 — Why ore is where it is: Econ. Geology, v. 14, p. 640-642.
- 1920 (with McLaughlin, D. H.) Geology of the ore deposits of Kennecott, Alaska: Econ. Geology, v. 15, p. 1-80.
 — Geology of the ore deposits of Kennecott, Alaska [abs.]: Geol. Soc. America Bull., v. 31, p. 157-158.
- 1921 Notes on the Kennecott Glacier, Alaska [abs.]: Geol. Soc. America Bull., v. 32, p. 52-53.
- 1922 Economic geologists and literature: Econ. Geology, v. 17, p. 214-215.
 — Industrial companies and publication: Econ. Geology, v. 17, p. 295-296.
 — Kennecott Glacier of Alaska: Geol. Soc. America Bull., v. 33, p. 527-539.
 — Croppings of ore deposits: Econ. Geology, v. 17, p. 703-708.
- 1923 Primary chalcocite; Bristol copper mine, Connecticut: Econ. Geology, v. 18, p. 122-166.
 — An Arizona asbestos deposit: Econ. Geology, v. 18, p. 663-683.
- 1924 The Eötvös torsion balance: Econ. Geology, v. 19, p. 84-86.
 — On introductions: Econ. Geology, v. 19, p. 86-88.

- 1924 Geology of the Beatson copper mine, Alaska: *Econ. Geology*, v. 19, p. 338-368.
 ——— Angular inclusions and replacement deposits: *Econ. Geology*, v. 19, p. 504-520.
- 1925 Notes on silver-lead deposits of Slocan district, British Columbia, Canada: *Econ. Geology*, v. 20, p. 554-572.
- 1927 Ore deposits of the Rio Tinto (Huelva) district, Spain: *Econ. Geology*, v. 22, p. 569-614.
- 1929 Some covellite-chalcocite relationships: *Econ. Geology*, v. 24, p. 424-439.
 ——— The Fifteenth International Geological Congress: *Econ. Geology*, v. 24, p. 753-757.
- 1930 Memorial to Percy A. Wagner: *Econ. Geology*, v. 25, p. 88-90.
 ——— The Rhodesian copper deposits: *Canadian Mining and Metall. Bull.*, no. 216, p. 477-513.
 ——— The ores of the Northern Rhodesia copper belt: *Econ. Geology*, v. 25, p. 365-418.
 ——— (Results from geophysical surveys), Kennecott mines, Alaska: *Am. Inst. Mining and Metall. Engineers Tech. Pub.* 369, p. 7-11.
 ——— Copper ores of Northern Rhodesia: *Eng. and Mining Jour.*, v. 130, p. 567.
- 1931 The Rhodesian copper deposits: *Canadian Inst. Mining and Metall. Trans.*, v. 33, p. 173-213.
 ——— The unexpected in the discovery of ore bodies: *Mining and Metallurgy*, v. 12, p. 327-328.
- 1932 (with Lasky, S. G.) Covellite-chalcocite solution and exsolution: *Econ. Geology*, v. 27, p. 52-86.
 ——— Notes on a Kennecott type of copper deposit, Glacier Creek, Alaska: *Econ. Geology*, v. 27, p. 297-306.
- 1935 The copper deposits of Ely, Nevada, *in* Copper resources of the world: Washington, 16th Internat. Geol. Cong., p. 307-321.
 ——— The Northern Rhodesia copper belt, *in* Copper resources of the world: Washington, 16th Internat. Geol. Cong., p. 713-740.
- 1942 The Beatson mine, Alaska, *in* Newhouse, W. H., ed., Ore deposits as related to structural features: Princeton, Princeton Univ. Press, p. 147.
 ——— The ore deposits of Kennecott, Alaska, *in* Newhouse, W. H., ed., Ore deposits as related to structural features: Princeton, Princeton Univ. Press, p. 188-193.
 ——— Economic mineral deposits: New York, John Wiley & Sons, 898 p.
 ——— Magmas and ores: *Econ. Geology*, v. 37, p. 1-15.
- 1943 Foreign minerals for the war program: *Eng. and Mining Jour.*, v. 114, p. 59.
- 1945 New international mineral problems: *Econ. Geology*, v. 40, p. 564-566.
 ——— Postwar position of world minerals: *Mining and Metallurgy*, v. 26, p. 199-203.
- 1946 Wartime dependence on foreign minerals: *Econ. Geology*, v. 41, p. 308-327.
- 1949 America's stake in world mineral resources: *Mining Eng.*, v. 1, p. 23-27.
 ——— Copper mine program: Japan Mining Ind. Assoc. Bull. (in Japanese).
- 1950 Economic mineral deposits (2d ed.): New York, John Wiley & Sons, 916 p.
 ——— The formation of mineral deposits: New York, John Wiley & Sons, 371 p.
- 1951 The formation of late magmatic oxide ores: *Econ. Geology*, v. 46, p. 404-426.
 ——— Geographical factors in the utilization of mineral deposits: U.N. Scientific Conf. on Conserv. and Utilization of Resources Proc., v. 2 (mineral resources), p. 13-16.
- 1952 (with Searls, Fred, Jr., and Cameron, Francis) The mineral potentialities of north Africa: *Mining and Metall. Soc. America Bull.*, v. 45, p. 25-40.
 ——— Our future dependence on foreign minerals: *Am. Acad. Polit. Social Sci. Annals*, p. 25-32.
- 1954 International implications of mineral resources: *Indian Minerals*, v. 8, p. 1-17.
 ——— Newer developments in the search for hidden mineral deposits: *Indian Mines and Minerals*, v. 2, p. 10-17 (also in *Nagpur Univ. Geol. Soc. Jour.*, v. 1, p. 20-26).
 ——— Recent American knowledge of the geology of iron formations: *Bhu-Vidya*, v. 16.

- 1955 (ed.), *Economic geology, 50th anniversary volume, 1905-1955*: Urbana, Illinois, Econ. Geology Pub. Co., 1130 p.
- *Economic geology (journal)*, in Bateman, A. M., ed., *Economic geology, 50th anniversary volume, 1905-1955*: Urbana, Illinois, Econ. Geology Pub. Co., p. 1-37.
- *The growth of geologic knowledge in the discovery of metallic and nonmetallic mineral resources*: *Jour. World History*, v. 2.
- 1956 (with Jensen, M. L.) *Notes on the origin of the Rhodesian copper deposits: Isotope composition of the sulfides*: *Econ. Geology*, v. 51, p. 555-564.
- 1960 *Waldemar Lindgren and "Economic geology"*: *Econ. Geology*, v. 55, p. i-ii.
- 1961 *Minerals; supply and demand*: *Bull. Atomic Scientists*, v. 17, p. 331-335.
- 1967 *Henry Gardiner Ferguson, 1882-1966*: *Econ. Geology*, v. 62, p. 168.