

The Work of James Lewis Howe

BIBLIOGRAPHER OF THE PLATINUM GROUP METALS

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This year marks the seventy-fifth anniversary of the publication of James Lewis Howe's classic "Bibliography of the Metals of the Platinum Group 1748-1896", an appropriate occasion for a brief examination of his life and work, with special emphasis on his bibliography.

James Lewis Howe was born in Newburyport, Massachusetts, U.S.A., on August 4th, 1859, the son of Dr. Francis Augustine Howe, a physician, and his wife, Mary Frances Howe (née Lewis). The Howe family was noted for its progressive and liberal outlook and for its longevity. Howe lived to be ninety-six and at the time of his death was one of the American Chemical Society's oldest members. He was thus a transitional figure in chemistry; he was born one year after Kekulé proposed the self-linking of carbon atoms, yet he lived to witness the hydrogen bomb. Howe originally intended to become a physician like his father, but during high school in New-

buryport he became interested in chemistry. He received his B.A. degree in 1880 from Amherst College.

As was customary in those days, Howe went to Germany after graduation to complete his studies. From 1880 to 1882 he studied at the Universität Göttingen under Hans Hübner, J. Post, and the legendary Friedrich Wöhler. In 1882 he was awarded his doctorate with the dissertation "Ueber die Äthylderivate des Anhydrobenzdiimidobenzols und über ein Nitril desselben", based on research carried out under Hübner's direction. These results were published as two short separate papers (1) and constitute both his first publications and his only works in organic chemistry. After returning to the

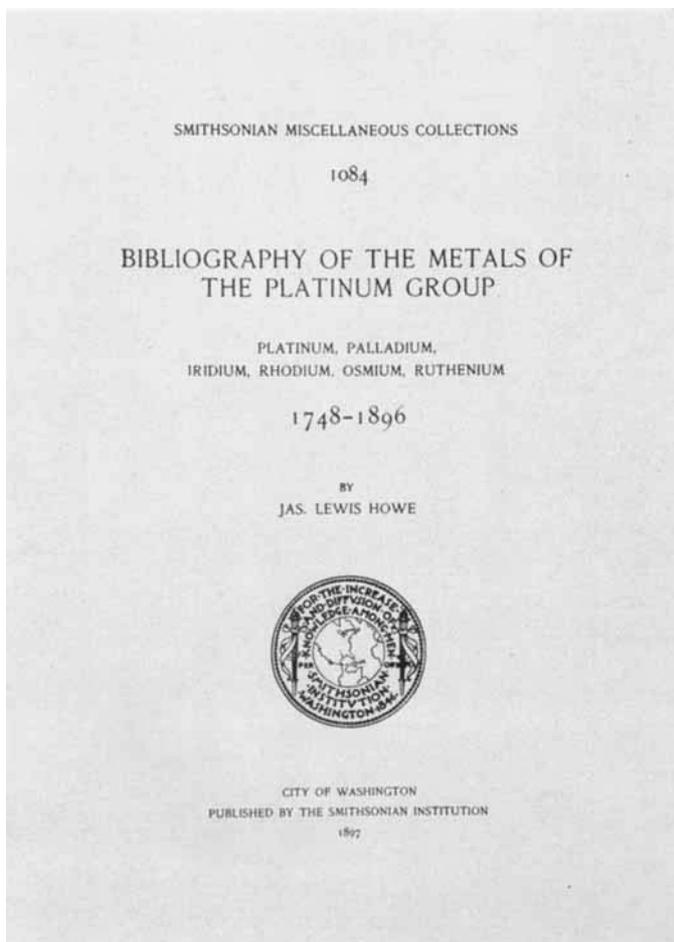


James Lewis Howe
1859-1955

America's foremost authority on ruthenium and author of the classic bibliography on the platinum group metals.

(Photograph by courtesy of James L. Howe, Jr., and Guendolen Howe.)

The title page of the first volume of Howe's Bibliography. It contained 2,438 entries by more than 1,300 authors. It has been referred to as an ideal bibliography. An edition revised to 1917 appeared in 1919, a volume covering 1918 to 1930 appeared in 1947, and decennial indexes for 1931-1940 and 1941-1950 were published in 1949 and 1956, respectively



United States, Howe became Instructor of Science at Brooks Military Academy, Cleveland, Ohio (1882-1883), Professor of Chemistry (later of Physics and Geology as well) at Central College, Richmond, Kentucky (1883-1894), and finally in 1894 Professor of Chemistry and Head of the Chemistry Department at Washington and Lee University, Lexington, Virginia, one of the South's leading liberal arts colleges for men, where he remained for almost half a century. On December 27th, 1883, Howe married Henrietta Leavenworth Marvin of Scranton, Pennsylvania. The couple had one son, James Lewis, Jr., himself a chemist who spent a number of years in China involved in missionary work, and two daughters,

Guendolen and Frances. In 1886 Howe received an honorary M.D. from the Hospital College of Medicine, Louisville, Kentucky, where he was Professor of Medical Chemistry and Toxicology.

For the first fifteen years of his tenure at Washington and Lee University, Howe was a one-man chemistry department. The entire chemistry laboratory was merely a single room located over the power plant with Howe's office and a balance room partitioned off at one end and a small research laboratory at the other. It was in these cramped and noisy quarters that Howe carried out the research on the element with which his name is so closely identified—ruthenium. His lecture style was informal,

and although he was sparing in his use of demonstrations, he made liberal use of anecdotes and reminiscences, many about the immortals of chemistry that he had known in Europe.

As a well-known bibliographer, Howe was naturally a wide and avid reader of the literature, and he kept his lectures thoroughly up to date with the latest chemical advances. He insisted on personally supervising his students' laboratory work, and he was rigorous in his standards and firm in his discipline. His bibliography and his unchallenged position as the leading American authority on the chemistry of the platinum metals led directly to his appointment in 1917 as Chairman of a special sub-committee on platinum of the National Research Council, and he subsequently received three presidential appointments to commissions for assaying the coinage of the United States.

A member of, and participant in, many professional and honorary organisations, Howe also engaged in numerous civic and fraternal activities. He was particularly active in the Presbyterian Church and ranked religion equal to science in his life. Although he retired from teaching in 1938, Howe remained active and continued to work on his bibliography. During World War II he was recalled from retirement to teach chemistry and German. He retired for a second time in 1946. He died on December 20th, 1955.

Howe's Chemical Research

Howe's early work, aside from the two papers based on his organic dissertation research (1), was primarily inorganic (2a) and analytical (2b). In his first work on the chemistry of ruthenium (3), dated March, 1894, Howe sought a simple, reproducible method for preparing the exceptionally stable so-called "ruthenium tetrachloride" described by Claus (4). Howe confirmed Joly's conclusion (5) that the compound was RuCl_3NO rather than RuCl_4 and emphasised the necessity for *complete* analytical data. Howe also investigated the reactions of

nitrosochloride solutions ($[\text{Ru}(\text{NO})\text{Cl}_5]^{2-}$) with various reagents and devised means for distinguishing them from hexachloride ($[\text{RuCl}_6]^{3-}$) solutions. He made a study of the cyanide complexes (6), investigating ten methods for the preparation of $\text{K}_4[\text{Ru}(\text{CN})_6] \cdot 3\text{H}_2\text{O}$. He also described the preparation of new salts of this series (7).

The major portion of Howe's research on ruthenium concerned the chlorides and their complexes. In a series of papers (8), he investigated three important classes of complexes: (i) hexachlororuthenates(IV), $\text{M}_2[\text{RuCl}_6]$; (ii) tetrachlorooxoruthenates(VI), $\text{M}_2[\text{RuO}_2\text{Cl}_4]$; and (iii) pentachloroquo-ruthenates(III), $\text{M}_2[\text{Ru}(\text{H}_2\text{O})\text{Cl}_5]$. He also attempted to unravel the extremely complex relationships between the salts of the three series $\text{M}_2[\text{Ru}^{\text{IV}}\text{Cl}_6]$, $\text{M}_2[\text{Ru}^{\text{IV}}(\text{OH})\text{Cl}_5]$, and $\text{M}_2[\text{Ru}^{\text{III}}(\text{H}_2\text{O})\text{Cl}_5]$. Howe also investigated analytical methods for the quantitative determination of ruthenium (9) and made studies of ruthenium(II) chloride (10). For a more detailed and critical discussion of Howe's life and work, the reader is referred to another paper by the present author (11).

The Great Bibliography

Despite his fundamental research on the chemistry of ruthenium, Howe's magnum opus and best known contribution to chemistry was his "Bibliography of the Metals of the Platinum Group" (12), which eventually covered the literature from 1748, when platinum was first described, to the end of 1950, a span of more than two centuries. This monumental bibliography was cited as the major basis on which Howe was awarded in 1937 the American Chemical Society Georgia Section's "Charles H. Herty Medal" for the advancement of science in the southern United States. Professor M. Guy Mellon of Purdue University, long a recognised authority on the literature of chemistry, always referred to Howe's work as an ideal bibliography.

In a letter of January 18th, 1897, to Mr Samuel Pierpoint Langley (1834-1906), the

American astronomer, physicist, and pioneer in aeronautics who was then Secretary of the Smithsonian Institution, Dr. Henry Carrington Bolton (1845–1903), himself an eminent bibliographer of chemistry, wrote, "The Committee of the American Association for the Advancement of Science having charge of Indexing Chemical Literature has voted to recommend to the Smithsonian Institution for publication the following: 'A Bibliography of the Metals of the Platinum Group, 1748–1896' by Professor Jas. Lewis Howe, M.D., Ph.D.". In December of that same year, the first volume of Howe's great bibliography appeared as No. 1084 in Volume 38 of Smithsonian Miscellaneous Collections (12), less than three years after the completion of his first research paper on ruthenium (3). The work was a truly remarkable achievement in view of the obvious painstaking and meticulous care expended in its compilation.

Howe's bibliography contains 2,438 separate entries by more than 1,300 authors. Many of these entries contain more than one reference citation, some as many as two dozen! Dissertations as well as journal articles are included, and many entries contain citations of reviews and abstracts of articles. Each entry is unequivocally designated by two numbers—one for the year and a second for the number within that year. The first entry is, appropriately enough, the first reference to platinum, by its discoverer Don Antonio de Ulloa in 1748 (13). The first references for the other platinum metals are as follows: palladium (1803) (14), iridium (1804) (15), rhodium (1804) (16), osmium (1804) (17), and ruthenium (1826) (18) and (1844) (19). From the single entry for the year 1748, the number of entries reaches a peak of sixty-eight in 1892, reflecting the increasing attention paid to the platinum metals. The articles are primarily chemical, but for earlier references, other divisions of the subject are included, for example, the use of platinum in electrical apparatus, in photography, and in connection

with X-rays. Howe's 36-page subject index contains 66 separate headings and is remarkably complete. In addition to the expected chemical headings, it includes headings such as decomposition of ores, assay, physiological action, optical properties, exhibits at expositions, and various physical properties such as those connected with light, heat, thermochemistry, magnetism, electricity, thermoelectricity, polarisation, and electrolytic action. A 15-page author index listing the more than 1,300 authors concludes the volume.

In preparing his bibliography, Howe carefully searched one hundred journals, literally from A to Z (*Allgemeines Journal der Chemie* to *Zeitschrift für physiologische Chemie*). He was also aided in this immense task by referring to a rare monograph "Fragment einer Monographie des Platin's und der Platinmetalle" (20) by Carl Ernst Claus (Karl Karlovich Klaus) (1796–1864), the discoverer of ruthenium, which contained a fairly complete critical bibliography of the platinum metals to 1861, but which contained many errors that Howe had to correct.

Succeeding Volumes

Howe's first volume met with great success, and in 1919 a second volume (21), co-authored with Dr. Hendrick Coenraad Holtz and covering the period 1748–1917, was published. Like its predecessor, it quickly established itself as the standard bibliography on the subject. Twenty-eight years elapsed before the third volume, entitled "Bibliography of the Platinum Metals" and covering the years 1918–1930 (22a), was published in 1947 by Baker and Co., Inc. (now Engelhard Industries, Inc.). Since then, two further Howe-Baker decennial bibliographies (1931–1940, 1941–1950) have appeared (22b, c) in the same attractive format with the lettering on the cover stamped in palladium leaf.

Howe was scrupulous in keeping up with the literature. Except when deterred by illness and the infirmities of old age, he could

be found late at night in his upstairs room at the typewriter under a bare light bulb preparing index cards for the next decennial volume of the bibliography, which was to cover the period 1951-1960. He continued this activity until as late as the autumn of 1955, and upon his death in December of that year his daughter Guendolen presented the cards to Baker and Co. I was disappointed to learn recently that these cards had been "destroyed with permission" (23). This is indeed unfortunate, for the continuation of the decennial bibliographies would have constituted a fitting and perpetual tribute to the patience and foresight of the man who initiated the series—James Lewis Howe—a true pioneer in the chemistry and literature of the platinum metals.

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