



## The Founders of Economic Geology

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### Part 4

These three brief biographies bring to a close the vignettes of the 12 men who played key roles in the founding of *Economic Geology* a century ago. These final three, Spurr, Lindgren, and Ransome, like their founding colleagues, were very interesting people—interesting because they were major forces in the development of economic geology as a field, and also because they led varied and interesting lives.

### Josiah Edward Spurr, 1870–1950

In a brief biography for F.L. Ransome, published in volume 30 of *Economic Geology*, Waldemar Lindgren wrote that Spurr was the man who first suggested the need for a journal devoted to mineral deposits. The suggestion was made in November or December 1904. The first issue of *Economic Geology* appeared in October 1905. When it was decided that the new journal would be most appropriately published by an incorporated company rather than a newly founded scientific society, Spurr was elected first President of the Economic Geology Publishing Company.



Born in Maine, educated at Harvard—where he was strongly influenced by

Professor N.S. Shaler—Spurr went to work for the Minnesota Geological Survey and made the first geological map of the Mesabi Range. In 1894 he was hired by the U.S. Geological Survey and worked with S.F. Emmons at Leadville, Colorado, then at Mercur in Utah, and Aspen, Colorado. His Aspen work is published in USGS Monograph 31. Assigned to mapping in Alaska during the years of the Yukon gold rush, Spurr is honored by the naming of Mt. Spurr, an active volcano, after him. There is a story in the Spurr family that when Mt. Spurr, which is not far from Anchorage, erupted about a year after his death, a reporter asked his wife if she thought her husband was trying to contact her? To which she replied “Well, I knew that Edward had passed on to another world, but until today I had not realized which one.”

Spurr left the U.S. Geological Survey in 1906 to work for the American Smelting and Refining Company, and then in 1908 he moved full time to consulting, in which role he was much acclaimed. He was less acclaimed for his theorizing on the nature of the ore-forming medium. He dispensed with hydrothermal solutions and argued instead for ore-magmas, which he envisioned as highly concentrated and dense magmatic residues. His two-volume work detailing his ideas, *Ore Magmas; a Series of Essays on Ore Deposition*, was published in 1923 by the McGraw-Hill Company. Despite skepticism for

his ideas about ore magmas, Spurr was admired as an outstanding field observer. In his examination of the Velardeña district, Durango, Mexico, he observed minerals formed by contact metamorphism that he could not identify, and thought might be new. Examination of the minerals by F.E. Wright of the Geophysical Laboratory showed that two were new; one,  $\text{Ca}_5(\text{SiO}_4)_2(\text{CO}_3)$ , was named spurrite.

Ever active and ever enquiring, in 1937 Spurr became interested in the geology of the moon. Eventually, in the years 1944 to 1949, he published four books on

to page 4 . . .



Photo Source: USGS Photo Library

Josiah, better known as J. Edward Spurr, stands in the middle, flanked by Frank C. Schrader (left) and Harold B. Goodrich. The October 1896 image shows the three dressed in field gear.

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the subject. In a memorial, published in the Proceedings of the GSA for 1968, Jack Green writes of Spurr's original ideas about the moon. "...behind every sketch was 50 years of field training. Behind every analogue were decades of mapping and observation." Spurr's work has been recognized by the naming of a lunar feature after him. At Lunar latitude 27.9 N and longitude 1.2 W, adjacent to the landing site of Apollo 15, is Spurr crater, 13 km in diameter and partially covered by lava.

Spurr is credited with the suggestions that led to the founding of the Society of Economic Geologists in 1920, and was Society President in 1923. His Presidential Address on "The Origin of Metallic Concentrations by Magmation" is published on pages 617 to 638 of Volume 18 of *Economic Geology*.

### Frederick Leslie Ransome, 1868–1935

The first Secretary to the Board of the Economic Geology Publishing Company, and for 30 years, to the day of his death, an Associate Editor, Ransome was a devoted and hard-working member of the small group of people who founded and nurtured *Economic Geology* to the stature it has attained.



Born in England but brought to the United States in infancy, Ransome grew up in California, where his father was a concrete pioneer, building the first concrete building and first concrete bridge in America. When Ransome entered the University of California, Berkeley, there seemed little chance he would become a geologist. But in 1890, Andrew C. Lawson, fresh from his PhD at Johns Hopkins, arrived and fired Ransome's ambitions. Ransome graduated in 1893 and stayed on to complete a PhD in 1896. During that time he and Charles Palache worked on a mineral they discovered in the glaucophane schists of Marin County—it turned out to be new and they named it lawsonite.

Ransome joined the U.S. Geological Survey in 1898 and was assigned to California, where he worked on the Mother Lode—the results appeared in

1900 in USGS Atlas folio number 63. From there he moved to Arizona, where he studied Globe and Bisbee, published in Professional Papers 12 and 21, respectively. In 1904 he began a collaborative study with Lindgren of the Cripple Creek district, the result of which is one of the classics of American geology, Professional Paper 54. When Ransome joined the Survey he worked under the supervision of S.F. Emmons; following Emmons' death in 1911, Lindgren succeeded as chief of the metals division. Then, when Lindgren became Chief Geologist in 1912, Ransome became head of metals, a position he held until he left the Survey in 1923 and moved to the University of Arizona in Tucson as professor of economic geology. Four years later he moved again when he was appointed to a similar position at California Institute of Technology in Pasadena, California.

Ransome was President of the Society of Economic Geologists in 1927. His Presidential address on "Directions of Progress in Economic Geology" can be read in volume 23 of the journal, pages 119 to 131.

### Waldemar Lindgren, 1860–1939

Lindgren is probably the most familiar name among the founders of *Economic Geology*. It is familiar because of the breadth and depth of his writings and because of his impact on the development of economic geology as a field of study and scientific investigation.

Born in the southeast corner of Sweden, near Kalmar, Lindgren was raised in a well-to-do and aristocratic family. Much attention was paid to his education and he developed a fluency in several modern languages—training that served him well in later life, even though his interests were more with science than languages. A brief working experience at the zinc mines at Ämmeberg at the end of high school convinced him that geology was his calling, and he entered the Bergakademie at Freiberg, Saxony, in 1878. A brief discussion of his training at this famous



Photo Source: Library of Congress, Washington, DC

old school was published in *SEG Newsletter* number 43, October 2000, pages 30 to 32.

After graduation as a mining engineer and surveyor and a further year spent studying chemistry and petrography, Lindgren sailed to United States and landed a job working under the direction of Raphael Pumpelly on the Northern Transcontinental Survey. On completion of the survey at the end of 1883, he worked as an assayer in Montana, then on smelter design at Anaconda. At the end of 1884, on the recommendation of Pumpelly, he joined the U.S. Geological Survey as a member of the staff of George F. Becker. He remained with the Survey for 31 years, rising to Chief Geologist in 1911. During his Survey years, Lindgren was author or co-author of a number of classic papers and monographs. Among the classics is the first detailed study of a disseminated, or porphyry copper at Clifton-Morenci in Arizona, published in USGS Professional Paper 43 in 1905, and in 1906, with F.L. Ransome, the Cripple Creek, Colorado Professional Paper 54.

Lindgren was appointed professor of economic geology at the Massachusetts Institute of Technology in 1912, in which position he remained until his retirement in 1933. The work for which Lindgren is best known was published soon after he arrived at MIT, his classic text *Mineral Deposits*. The text ran through four editions, the last in 1933, and was the standard against which all other texts in economic geology were measured for the first half of the 20<sup>th</sup> century. Lindgren's thoughts and ideas continue to pervade the literature of economic geology today.

Lindgren was a founding member of both the Economic Geology Publishing Company and the Society of Economic Geologists. He was second President of the Society, in 1922. His Presidential address on "Concentration and Circulation of the Elements from the Standpoint of Economic Geology" can be read in volume 18 of *Economic Geology*, pages 419 to 442. The paper is an attempt to trace the geochemical cycling of a number of chemical elements, and is a fascinating insight into the thoughts of a seminal scientist. 