

Paper Number: 4098

Viktor Moritz Goldschmidt (1888–1947) and Vladimir Ivanovich Vernadsky (1863–1945): The father and grandfather of geochemistry?

Müller, A.^{1,2}

¹Natural History Museum, University of Oslo, N-0318 Oslo, Norway ion, email: a.b.mueller@nhm.uio.no

²Natural History Museum, London SW7 5 BD, United Kingdom

Geochemistry is a relatively young discipline within the geosciences, having developed at the turn of the 20th century and first defined in its contemporary understanding by Vladimir Ivanovich Vernadsky (1863–1945) in 1910 [1]. Vernadsky was obviously not the first scientist, who addressed geochemical questions. Three schools contributed decisively and almost simultaneously to the establishment of geochemistry as a scientific discipline. First, there was the US-American school under the leadership of Frank W. Clarke (1847–1931), second, the Russian-Soviet school under Vernadsky and Alexander Fersman (1883–1945), and, third, the Norwegian–German school under Viktor Moritz Goldschmidt (1888–1947) [2, 3]. However, Vernadsky and Goldschmidt are indisputably the two most important founders of and theoreticians within geochemistry.

In 1910 Vernadsky provided the first definition of geochemistry, and therewith the basis of the scientific discipline concerned with the processes governing the distribution of the elements in the Earth System. In 1911, Goldschmidt, then 25 years younger, and commonly considered as the ‘Father of modern geochemistry’ in the western world, defended his Ph.D. thesis ‘Die Kontaktmetamorphose im Kristianiagebiet’ (The contact metamorphism in the Kristiania area). His thesis and his ‘Geologisch–petrographische Studien im Hochgebirge des südlichen Norwegen’ (Geological and petrographic studies in the mountains of southern Norway) published in the following years were primarily dedicated to answering questions about the mineralogy and petrology of the area. With the foundation of the Raw Material Laboratory of Norway in 1917, of which he was the first director, Goldschmidt carried out a systematic program of chemical analysis of rocks, soils and minerals and, therewith, began to address fundamental questions about geochemical processes. Goldschmidt's lecture ‘Der Stoffwechsel der Erde’ (The metabolism of the Earth) published in 1922 subsequently opened the era of investigation of the distribution of the elements in the Earth's crust, meteorites and solar system and of the laws controlling this distribution. With this new approach, Goldschmidt followed the definition of process-controlled geochemistry which had been formulated by Vernadsky 12 years earlier.

In this study the influence of Vernadsky on Goldschmidt's oeuvre has been analyzed by referring to private correspondence, biographical publications and other documents. The exchange of letters, hitherto largely unknown, proves that exchange of scientific ideas between the two men took place over a long period. Goldschmidt invited Vernadsky for several visits to Oslo in 1927 and to Göttingen in 1932. The exchange is documented in 38 surviving letters written between 1913 and 1939, justifying the conclusion that Goldschmidt's work was substantially inspired and influenced by Vernadsky, at least after 1922. However, Vernadsky's influence on Goldschmidt was mostly restricted to the theoretical background of geochemistry and the processes responsible for distribution of elements in the Earth's crust rather than analytical developments and documentation of element distributions.

References:

- [1] Vernadsky VI (1910) Dnevník XII s'esda Russkich Estestwoispytatelej i Wratschej, 1 otdel, Moscow, pp. 73–91. (in Russian)
- [2] Krüger P (1983) Z Angew Geol 29: 347–355. (in German)
- [3] Müller A (2014) J Geochem Explor 147: 37-45.

