

Preface

THIS BIOGRAPHY SHOULD have been written in 1950, when most of Goldschmidt's friends and colleagues were still alive. In 1971 Professor Denis Shaw of McMaster University (Hamilton, Ontario, Canada) began collecting material for such a biography by writing to surviving friends and colleagues for reminiscences, but no publication ensued. The initial stimulus for the preparation of the present biography was provided by Professor Charles Sclar of Lehigh University (Bethlehem, Pennsylvania). Early in 1986, being aware of the impending centenary of Goldschmidt's birth in 1988, he proposed to The Geochemical Society that this event should be suitably celebrated. At its annual meeting in May, 1986, the council of the society "nominated C. Sclar (Lehigh University) to form a committee with representatives of other interested societies . . . to bring a proposal to council at its 1986 Fall Meeting for the commemoration of V. M. Goldschmidt's birth in 1888." Sclar formed a committee with himself as chairman and the following members: M. L. Crawford (Mineralogical Association of Canada representative), M. Fleischer, D. M. Henderson, M. J. Holdaway (Mineralogical Society of America representative), G. Kullerud (Meteoritical Society representative), and B. Mason (Geochemical Society representative). The committee met at Lehigh University in December, 1986, and made a number of recommendations, the principal ones being the holding of a Goldschmidt Centennial Symposium in May, 1988, and the preparation of a Goldschmidt biography. Professor G. Kullerud, a Norwegian geologist then on the faculty of Purdue University (Lafayette, Indiana), informed the committee that Aslak Kvalheim, Goldschmidt's long-time associate and his successor as Director of the Norwegian Raw Materials Laboratory, had planned such a biography but had suffered a stroke and was unable to continue. He had offered Kullerud access to his material if he would write the biography. The committee recommended that Kullerud accept this offer. Financial support was forthcoming from

Norwegian sources, and Professor Kullerud spent some time during the summers of 1987, 1988, and 1989 organizing the Goldschmidt Archives in the Geological Survey of Norway in Trondheim. He had begun to write an introductory chapter before his untimely death in October, 1989.

In March, 1990, Dr. Knut Heier, Director of the Geological Survey of Norway, approached me to accept this responsibility. I spent two weeks in July, 1990, and two months in April–June, 1991, perusing these archives, comprising 144 file boxes. Goldschmidt corresponded widely, and copies of his letters, memoranda, and some unpublished manuscripts had been carefully preserved. Unfortunately, Goldschmidt was an only child, never married, and left no close relatives, so many details of his personal life are unavailable.

Why the title "Father of Modern Geochemistry"? The concept of an autonomous discipline dealing with the chemistry of the Earth is an old one, the term "geochemistry" having been introduced in 1838 by the Swiss chemist Schönbein (discoverer of ozone). Throughout the nineteenth century, geochemical data were mainly the byproduct of general geological and mineralogical investigations and comprised more and better analyses of the various units—minerals, rocks, natural waters, and gases—making up the accessible parts of the Earth. The results of these investigations were admirably summarized by F. W. Clarke in 1908, in his monograph *The Data of Geochemistry* (U.S. Geological Survey Bulletin 330). Clarke was Chief Chemist of the U.S. Geological Survey from 1883 to 1925, and was responsible for a vast and ever-growing output of analyses of rocks, minerals, and ores collected by the field staff or submitted for examination. His monograph passed through five editions in less than twenty years, the last in 1924. In many respects this marked the end of an era in geochemistry. During the preceding hundred years geochemical research was largely synonymous with the analysis of those parts of the Earth accessible to visual inspection and chemical assay. From the nature of things it could be little more; interpretative geochemistry, the creation of a philosophy out of the mass of factual information, had to wait upon the development of the fundamental sciences, physics and chemistry. Fundamental advancements in these sciences were made in the early years of this century, such as the discovery and exploration of radioactivity, the Rutherford-Bohr atomic structure, the discovery of X-ray diffraction and its application to chemical analysis and crystal structure. It is the mark of Goldschmidt's genius that he seized upon these discoveries. His insight and intuition, his ability to plan and expedite extensive research programs, and not least his recruitment and inspiration of devoted research associates, revolutionized geochemistry. Thanks largely to his work and stimulus, geochemistry has developed from a somewhat incoherent collection of factual data to a philosophical science based on the geochemical cycle,

in which the individual elements play their part according to established principles.

When I began this biography I was inspired by the following statement by M. F. Perutz, in his preface to *Is Science Necessary* (E. P. Dutton, New York, 1989):

“There is little benefit in following scientists’ daily grind but much in tracing the unique combinations of theoretical knowledge and manual skills, the web of personal encounters and accidental observations, the experience, temperament, moods and clashes that go into the making of discoveries, even though the crucial leap of the mind is often impenetrable. There is also something to be said for finding out why others, seemingly just as able, were too blind to grasp what Nature tried to tell them.”

Goldschmidt epitomized the characteristics described by Perutz. In writing this book I have tried to interpret this for the possible readership, which as I see it may comprise three groups: geologists, chemists, and geochemists; historians of science; and the layman interested in science but not necessarily conversant with chemistry and geology. The task is a difficult one; what may be obvious to the scientist is far from obvious to the layman, so I have attempted to provide enough scientific background to inform the latter, hopefully without boring other prospective readers.

Most of the documents in the Goldschmidt Archives are written in German and Norwegian. In translating these into English, I have tried to translate as literally as possible, but into idiomatic English. Unless otherwise indicated, quoted letters and documents are preserved in the Goldschmidt Archives in Trondheim.

Careful readers may note some inconsistencies in the ionic radii used in the text. This results from Goldschmidt using 1.33Å for the radius of O^{2-} , whereas the current value is 1.40Å.

One of the intriguing features of Goldschmidt’s scientific career is his change from field to laboratory research around 1917. This may not have been solely due to the setting up of the Raw Materials Laboratory at that time. Goldschmidt’s health after 1917 did not permit strenuous field work, although he delighted in taking colleagues, students, and visitors into the field and demonstrating the source of many of his ideas.

There is no denying a dark side to Goldschmidt’s personality. As the correspondence quoted in this book will show, he inspired lifelong devotion in most of his students and research associates. With his colleagues in the University of Oslo, however, the story was different. He was unduly sensitive to questions of priority and credit, and he had a suspicious nature—in his office at the museum all the cabinets

had individual padlocks, because of probable imaginary fears that his research materials might be stolen. His feud with his old student, Professor Barth, seriously affected faculty relationships at the University of Oslo, and saddened many who, as did I, liked and admired both men.

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Washington, D.C.
November, 1991*