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I FIRST RAN ACROSS the name V. M. Goldschmidt in 1937, when I was a fourth-year student at Canterbury University College in Christchurch, New Zealand. Browsing through the latest journals, I saw his Hugo Müller Lecture (March 17, 1937) to the Chemical Society of London, entitled "The Principles of Distribution of the Chemical Elements in Minerals and Rocks." At the time I was doing some research on the electrochemistry of dilute solutions, and this lecture opened up an entrancing new field of surpassing interest, one that had never been mentioned in my courses in chemistry and geology. I checked *Chemical Abstracts* for his other publications, only to find that they were mostly in German journals unavailable in New Zealand. The only one I located was entitled "Rare Elements in Coal Ashes," published in *Industrial and Engineering Chemistry*, 1935, and this was also fascinating.

In March 1939 I was working in the New Zealand outback as an exploration geologist for a subsidiary of the Shell Oil Company when I received the offer of a Graduate Fellowship from the University of New Zealand—£200¹ a year for two years of overseas study. Traditionally these scholarships were taken up at universities in England, but I broke tradition by asking to take it up in Norway. I wrote to Goldschmidt explaining my circumstances and asked if I might come to his institute and do research in geochemistry. I received a delightful reply (unfortunately lost during the war), saying that he had never had a student from the Antipodes, that he would be glad to have me, and he assured me that in Oslo I could "live like a king on £200 a year." There was no request for transcripts or any other evidence of my academic qualifications—university life was simpler in those days! It took some months to terminate my contract with the oil company and I finally left New Zealand for Norway in November 1939; World War II had begun in September but was now in its "phony phase."

¹ See *Notes*, starting on page 117, for this and all subsequent footnotes.

I sailed to San Francisco and spent the month of December leisurely crossing the U.S. by Greyhound bus. During this time I met Adolf Pabst,² who had worked with Goldschmidt in 1928–29 and gave me much good advice. I also met Tom. Barth³ (Professor of Petrology at the University of Oslo, who was at that time at the Geophysical Laboratory in Washington), from whom I learned of the serious rift between him and Goldschmidt, a touchy subject.

I arrived in Oslo one evening early in January 1940 and next morning went to the Geological Museum,⁴ for which Goldschmidt was director and where he had his research facilities, mainly emission and X-ray spectrographs. The secretary greeted me warmly, said the professor was expecting me, and ushered me into the inner sanctum. Goldschmidt was an impressive figure, heavily built, and with a thick black moustache. At that time he was 52 years old. After a brief chit-chat, the great man announced "Today you must have dinner with me. At home I have a steak as big as a taxicab!" He took me for a tour of the research facilities, introduced me to his assistants and fellow research students, allotted me a room, and cautioned me against smoking on the same floor as the spectrographs. He had already selected my research theme, the geochemistry of tellurium.

Shortly after noon he called for a taxi and we drove to his house in Holmenkollen, a suburb of Oslo with a magnificent view of the city and fjord. The famous international ski jump was just behind his house. Goldschmidt was a bachelor, and had a cook-housekeeper, Miss Marie Brendingen.⁵ We went into the kitchen, and there lay the steak—if not as big as a taxicab, it at least covered most of the table. "Mr Mason, you cannot tell me from what beast this steak has been cut." "Yes, Professor, it is a whale steak." I could wish that all my quizzes had been as easy! As a child I lived in Port Chalmers, a small town in southern New Zealand, where my father was superintendent of the dock. This town was the first and last call of the Norwegian whaling fleet then operating in the Ross Sea, and whale steak became part of our diet when the whalers returned at the end of the summer season. So I was fortunate in starting on a good footing with my professor. We had an excellent dinner, starting with lobster (he urged me to eat lots of lobster so as to support the Norwegian fishermen, whose markets had been disrupted by the war) and followed by whale steak and onions, washed down with a good red wine, finishing with dessert, coffee, and brandy. He tried to get me to smoke one of his big fat cigars, but I prudently declined. I was in a distinctly elevated mood when he called for a taxi to take me to the university hostel where he had arranged my accommodation. As I was about to leave, he said "Of course you read German." What a dilemma—should I confess my inability, thereby exposing myself as unqualified for my research responsibilities, or should I bluff it out? Actually I said nothing, whereupon he pressed a large bundle of his reprints on me, saying "Just browse through these before you come to the museum

tomorrow." When I got to my room I started on one, got completely lost in the first paragraph, a single sentence of several hundred words, and gave up in despair, seeing myself exposed as an unworthy ignoramus the next morning (actually, he never brought up the subject, and over the next few weeks, with the aid of a dictionary and the help of my fellow students, I gradually acquired a reasonable facility in scientific German).

In 1940 essentially nothing was known of the abundance and distribution of tellurium (Te) in rocks and minerals, nor of methods for concentrating this element, so I had an open field ahead of me. We started work around 8 a.m., and around 11 a.m. the geochemical group would gather together to eat sandwiches and drink coffee. During this break Goldschmidt usually appeared and discussed our individual work, asking questions and making suggestions. He proposed measuring tellurium concentrations on two lines in the far ultraviolet of the emission spectrum, which proved to be sensitive down to about 1 ppm (parts per million). I made standards by coprecipitating known amounts of Te with PbS (lead sulfide). Goldschmidt then had me measure Te in olivine ($(Mg,Fe)_2SiO_4$), nickel-iron, and troilite (FeS), all separated from meteorites, which showed (as expected from the position of Te in the Periodic Table) that this element is concentrated in the troilite and to a lesser extent in the metal, and rejected by the olivine. I had started analysing for Te in terrestrial minerals when the German invasion of April 9, 1940, abruptly terminated this research. It received a brief mention in Goldschmidt's book *Geochemistry*, which was published in 1954.

I left Oslo on the morning of the invasion with the university lecturer in English, who had taken his car out of winter storage the previous day; we were a couple of hours ahead of the German army. I had no opportunity to speak to Goldschmidt, but my Norwegian friends told me he spent the day burying his valuables in his garden. After some interesting adventures I reached Stockholm, where I was destined to remain until August 1943 (although I did not anticipate it at the time). I enrolled at the University of Stockholm, but was unable to continue my tellurium research. Instead, I began crystal structure research in the Chemistry Department with Professor Westgren and mineralogical research in the Mineralogical Institute with Professor Quensel. From time to time I had word of developments in Oslo. Conditions there deteriorated severely in 1942 when the Germans established a so-called "national government" and installed Vidkun Quisling as "ministerpresident," a figurehead Führer (and Gulbrand Lunde,⁶ a former Goldschmidt research associate, as Minister of Propaganda). Anti-Jewish regulations were promulgated (the Jews in Norway were a tiny minority, fewer than 2000 in the whole country). In October 1942 most Jews, including Goldschmidt, were arrested and put in the Berg concentration camp, on the outskirts of

Tønsberg. Eventually they were deported to camps in Poland, where most of them died.

One evening in December 1942 I was working in the Chemistry Department on interminable calculations having to do with the crystal structure of the mineral braunite, Mn_7SiO_{12} (an experience that weaned me from crystal structure analysis for ever). The phone rang and it was Professor Westgren, who invited me to his house, which was quite nearby, to meet an unspecified visitor. Imaging my surprise to walk into the living room and find that the visitor was none other than Goldschmidt, much thinner than I remembered him, but in excellent spirits. He had been rescued by the Norwegian underground and transported to Sweden by way of a remote border crossing. He was particularly proud of the fine pair of boots the underground had provided; they were stolen from German army stores.

He remained in Stockholm until March 1943, when the British authorities arranged to fly him to England. I recall one day he came into the Mineralogical Institute in high glee, waving a postcard and saying "Her har jeg ett brevkort fra Guds bestefar im Zürich" (Here I have a postcard from God's grandfather in Zürich). "God's grandfather" was his reference to Professor Paul Niggli, an eminent mineralogist with a markedly pontifical manner.

I got to England in the fall of 1943, by which time he had settled at the Macaulay Institute for Soil Research in Aberdeen, Scotland. In December I visited him; we spent a pleasant evening in his apartment in front of a good coal fire. He drew my attention to the ash, which was a bright yellow color; he had procured the coal from the Hartley seam in the Durham coalfield, in whose ash he had shown, some years earlier, the presence of 1–2% germanium (GeO_2 has a bright yellow color).

That was the last time we met. I returned to New Zealand in 1944, and took up a position as lecturer in the Geology Department of Canterbury University College. We corresponded from time to time. Shortly after the end of the war in Europe I received a long letter from him in England, to which I replied (September 19, 1945):

"My dear Professor, Thank you very much for your letter of July 3, which arrived here this morning. It was indeed a pleasure to hear from you again. I was extremely sorry to hear of your long illness during the last winter, and I do hope that you have completely recovered and are feeling fit and well once more. I am looking forward to seeing a long series of scientific papers from your pen for many years to come. It was gratifying to learn that your instruments, library, laboratory notes, and manuscripts had been rescued from your flat in Oslo, and had remained in safe keeping throughout the occupation. I will be interested to hear how you find things in Oslo on your return. It is indeed unfortunate that you have had so much opposition from a section of your university

colleagues. I hope you will get a satisfactory settlement of the whole matter. Please give my very best wishes and regards to my old friends and associates at the Museum, especially Mr. Kvalheim. A short time ago I received two parcels from Norway via Stockholm, one containing my university diplomas, and the other containing my thesis for the Master of Science degree of the University of New Zealand. To those who so carefully looked after these papers throughout the war years and then forwarded them to me my best thanks are due.

My heartiest congratulations to you on your election to an honorary fellowship of the Chemical Society of London. I am very glad to see that British scientific institutions have recognised the epoch-making advances you have achieved in geochemistry and honoured you accordingly. I am hoping that the publication of your book on geochemistry will not be long delayed. It will fill a very serious gap in the literature of science, and will make known the content and implications of geochemistry to a wide circle of scientific men who at present have very little understanding of the subject. So much of your work is inaccessible to British workers, as it is published in periodicals which are not normally available in our libraries. I endeavour to teach a certain amount of the fundamentals of geochemistry to my students, but find myself handicapped by lack of a suitable work of reference, especially as practically all my scientific papers are still in Stockholm."

In his last letter, dated December 1, 1945, he wrote:

"My return to Oslo is somewhat delayed because the dockers strike has caused more than 2 months delay in my large scale silicosis experiments.⁷ Anyhow both in Norway and here my work is in excellent progress. I hope to be able to send you some reprints concerning this matter in a near future.

My Oslo laboratories are getting on excellently, and I am getting a lot of new spectrographic data for my book from there.

Meanwhile there has been a "show down" at the University, resulting in complete victory. The rector and the senate sent me a letter much welcoming my return and so did, of course, the Ministry of Commerce. I think the matter has been rather awkward for certain persons, who have good reason to regret their foolishness. I am very glad that you got your certificates [my university diplomas]—which for 5 years were hidden behind my reprints, in the anteroom to the spectrography department. When we put them at that place we very much wondered, in 1940, what the world might be like, when we could dispatch them to you.

My health has been improving, so that I could give a lecture on X-rays and geochemistry before the Royal Institution, two weeks ago, to which I was invited in connection with the 50-years anniversary of the discovery of X-rays. At the Tøyen Museum now

all assistants and students have returned, some after many adventures, but fortunately all very much alive.

I am very sorry that you could not continue your tellurium work, as that element is the most unknown in all geochemistry, and we are very much in need of reliable data. Couldn't you follow up your discovery, that tellurium is so common in galenite [lead sulfide] ores, and make some quantitative chemical determinations in galenites and also in lead-antimony sulphosalts which probably are still richer in tellurium? Such an investigation would be most attractive and also has practical importance, especially in gold-mining continents.

My book has been somewhat delayed because of the immense material available. Some ideas concerning the trends of development will be seen from the article in *Soil Science*.

I can very well understand that you are very much attracted by the petrology of metamorphic rocks. I was bound by the same spell for very many years also. And most of my results is still unpublished because I fell for the charms of geochemistry.

And now a lot of my time has been devoted to the problem of preventing silicosis in foundries, and thus keeping disablement and death from that trade, by means of applied geochemistry. Anyhow, there is lots and lots to do for much more mineralogists than exist, or are likely to exist in any reasonable future.

I shall be glad whenever you recommend to one of your research students to make use of the facilities of our laboratories, which are as good as they have ever been. And we expect a number of British scientists there, in the years to come. And I think with much gratitude and satisfaction on the generous hospitality I have had in Britain for nearly three years now.

I always shall be very glad to hear from you and I hope you and your wife are enjoying life on the antipodic point about of the Northern countries.

When I come to Oslo, I shall try to send you copies of some of my old work on the metamorphic rocks of Norway, which I think may be more easily available than my geochemical publications" (original English).

From this letter it can be seen that he was looking forward with optimism and enthusiasm to returning to Norway and continuing his work there. Sad to say, when he returned to Oslo in June 1946 he was a very sick man, and he died shortly thereafter, on March 20, 1947.