

LIFE HISTORIES OF HONORARY IHSS MEMBERS

Dr. Morris Schnitzer, Senior Research Emeritus

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Morris Schnitzer was born into a Jewish family in Bochum, Germany, in February 1922. At that time, Bochum was one of the industrial centres of the Ruhr Valley, some 40 kilometres east of the Rhine river. After completing 4 years of public School, he entered the local Gymnasium in 1932. During his first year at that school, Hitler came to power in January 1933. As time went on, his fellow students began to wear the uniform of the Hitler Youth and put pressure on Morris to leave the Gymnasium where he was the only Jewish student in his class. In 1936, he left the Gymnasium but managed to be accepted by the only Jewish Gymnasium in Germany which enabled its students to enter University, but which was in Berlin far away from his home. In November 1938, he was arrested and forced to leave Germany. He left in December 1938 on a Kinder (Children's) transport for Holland. In 1940, when Germany invaded Holland, Morris had no choice but to roam Western Europe (Holland, Belgium, Switzerland, France, and Belgium once more) trying to elude the Nazis. During that time, he took on three different identities, (his own, that of a Dutchman and that of a Belgian) in order to save his life. He spent much of the time on the run and in jails. Last year he published a book on his odyssey that saved his life under the title "My Three Selves" (Lugus Publications, Toronto, 2002).

With the help of his brother, the only surviving member of his family, Morris came to Montreal, Canada in May 1947. He had been out of school for nine years. These nine years were years of war, starvation, severe physical and mental hardship and insecurity. Did he still possess the capacity to concentrate, study and write examinations? He decided to test himself and began preparations for writing the required entrance examination for McGill University. He had three months to study for these examinations. His brother supplied him with the required textbooks and offered him the use of his house in the country approximately sixty miles north of the city. He studied there 14 to 16 hours each day, all by himself. After three months hard work, he returned to the city, and to the astonishment of his relatives and himself passed all exams and was admitted to McGill. This was one of the most important tests of his life. He was now ready to satisfy his hunger for knowledge.

Morris obtained his B.Sc. with first class honors in 1951, M.Sc in 1952, and Ph.D. in 1955, all from McGill University in Soil Chemistry. From 1954 to 1956 he worked as a Research and Development Chemist for the Aluminum Company of Canada (ALCAN) in Arvida, Quebec. His task was to develop analytical methods for the analysis of metals in aluminum alloys. Morris says that his work in industry gave him a strong background in analytical chemistry, which underlies all of chemistry and prepared him for the research work that he assumed later. In 1956 he joined the Research Branch of Agriculture Canada. His first research dealt with the formation of complexes between metals and fulvic acid in Spodosols. The characterization of these complexes led to in-depth studies on the characteristics of fulvic acid and to research on its chemical structure.

From 1961 to 1962, Morris did post-doctorate studies in the Organic Chemistry Department of the Imperial College of Science and Technology in London, England, under the guidance of Sir Derek Barton, Nobel Laureate in Organic Chemistry. He did his research on a Spodosol fulvic acid which he had brought from Canada. The fulvic acid was first exhaustively methylated so that 50% of it became soluble in benzene. The benzene extract was then separated over Al_2O_3 with solvents of increasing polarity into several fractions which differed in molecular weights, oxygen-containing functional groups and spectroscopic properties. More important than the research were his many discussions with Sir Derek on how to apply Organic Chemistry, or more specifically natural products chemistry, to solving structural problems in fulvic acid.

After his return to Canada, Morris started a long-term investigation on the oxidative degradation of humic acids, fulvic acids and humins as well as whole soils, using a variety of oxidants. The oxidation products were extracted by organic solvents, separated by gas chromatography and identified by mass spectrometry. Among the oxidation products were aliphatic carboxylic, phenolic, and benzenecarboxylic acid. These studies showed that: (a) isolated aromatic rings are important structural units of all humic substances; (b) aliphatic chains are linking aromatic rings to form aromatic networks; and (c) structures contain voids of various dimensions that can trap organics and inorganics. Other studies were concerned with the symmetry and coordination of paramagnetic metals bound to humic and fulvic acid. In the early 1980's he began extensive research in finding the most favourable conditions for ^{13}C -NMR analysis of humic substances, soil organic matter, and whole soils. These experiments showed the importance of aliphatic C in these materials. Near the end of the 1980's, Morris initiated collaborative research with H.-R. Schulten which lasted for twelve years, and resulted in the publication of 70 scientific papers on the development and application of

pyrolysis-soft ionization mass spectrometric methods for the analysis of humic acids, fulvic acids, humins, and whole soils. In an other application, Curie point-pyrolysis-gas chromatography/mass spectrometry was used in structural studies on humic and fulvic acids. This research resulted in the development of two-dimensional structural models for humic acids. The latter were then converted by computational chemistry to three-dimensional humic acid model structures.

In other investigations, Morris and his co-workers examined a colloid-chemical properties of humic materials, mechanism of water retention, reaction with metals and minerals, and with pesticides and herbicides. With the aid of pyrolysis-gas chromatographic/mass spectrometric methods, more than 100 N-compounds were identified in soils and humic substances. These included pyrroles, pyrrolidines, imidazoles, pyridines, pyrazines, nitriles, indoles, quinolines, benzothiazoles and pyrimidines, all heterocyclic N-compounds.

A more comprehensive account of Morris' life-time research has been published in *Advances in Agronomy* 68: 1-58, 2000. Morris retired in January 1991. At the same time, he was named Emeritus Distinguished Research Scientist by Agriculture Canada. He has continued his research on a part-time basis. He carried on his collaborative research with H.-R. Schulten on the application of mass spectrometric methods to the analysis of humic materials until 1999. He also collaborates with Henri Dinel and his colleagues on the chemistry of composting, and with P.M. Huang and his students on the synthesis in soils of N-heterocyclics by the Maillard Reaction catalyzed by δ -MnO₂.



Nicola Senesi Morris Schnitzer Yona Chen Michael Spiteller

Over the years, Morris managed to attract 30 postdoctorate fellows and visiting scientists from 15 different countries to work with him in Ottawa for various lengths of time. These young scientists included Yona Chen, Nicola Senesi and Michael Spiteller. In addition, he collaborated closely with 12 well-established scientists. He enjoyed working with the young scientists, he says: "He learned as much from them as they learned from him". Morris published 3 books and 350 refereed scientific papers on the chemistry and reactions of humic substances.

Morris was awarded Fellowships by the Canadian Society of Soil Science (1971), Soil Science Society of America (1977), American Society of Agronomy

(1977), Honourary Member, International Humic Substances Society (1986), and Royal Society of Canada (1991). He received the Soil Science Award of the Soil Science Society of America in 1984, the Soil Science Distinguished Service Award of the Soil Science Society of America in 1995 and was co-winner of the Wolf Prize in Agriculture in 1995/96.

He has presented papers at many national and international meetings. He was chairman of Commission II (Soil Chemistry) of the International Society of Soil Science (1978 - 1982), Founding Member of the IHSS (1982) and has served on editorial boards of the *Canadian Journal of Soil Science*, *Soil Science*, *Geoderma*, *Agrochimica*, and *Plant and Soil*.