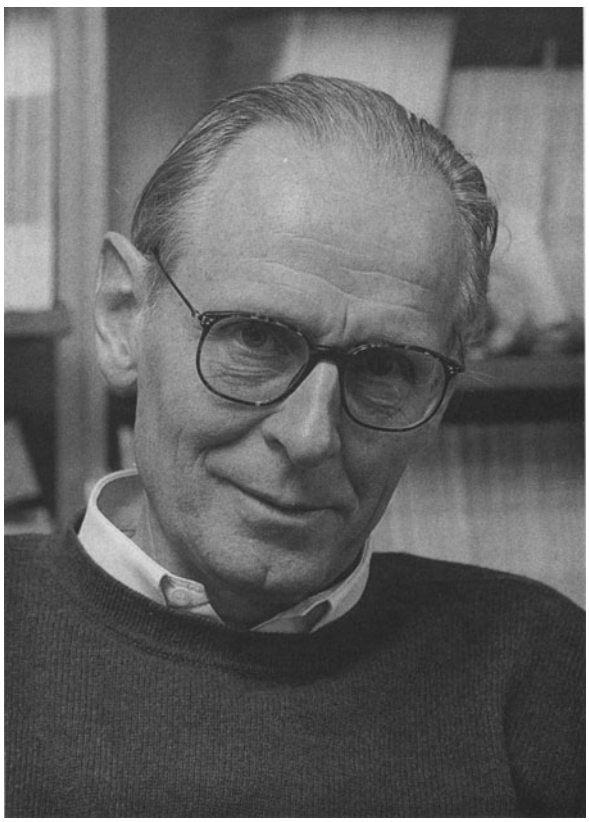
Clays and Clay Minerals, Vol. 46, No. 2, 219–221, 1998.

DISTINGUISHED MEMBER AWARD

The Distinguished Member Award of The Clay Minerals Society was presented to Professor Emeritus Dr. Udo Schwertmann at the 34th Annual Meeting of the Clay Minerals Society in Ottawa, Canada, on June 21, 1997. The following introduction was made by Jerry M. Bigham on behalf of the recipient.



INTRODUCTION OF UDO SCHWERTMANN

Ladies and gentlemen, it is my pleasure at this closing ceremony of the 11th International Clay Conference and the 34th Annual Meeting of the Clay Minerals Society to introduce Professor Emeritus Dr. Udo Schwertmann, recipient of the 1997 CMS Distinguished Member Award. Prof. Schwertmann was born in 1927 near the northern German city of Hamburg. After completing gymnasium and serving in the army during World War II, he studied horticulture at the Technical University of Hannover where he received a diploma in 1952. He continued his postgraduate education in Hannover by studying chemistry, mineralogy and geology. During that time, he was strongly influenced by the teachings of Prof. Paul Schachtschabel and became enthusiastic about the discipline of soil science. He was also introduced to what proved to be his professional passion: the iron oxides. He received a Ph.D. degree in 1959, and 2 years later a "Habilitation" concerning the silicate clay mineralogy of soils and sediments was completed. In 1964, Prof. Schwertmann was appointed Professor and Head of the Institute of Soil Science at the Technical University of Berlin. Five years later, he accepted a similar position at the Technical University of Munich in Freising-Weihenstephan—a position that he held until his retirement from active service in October 1995. During his tenure at Weihenstephan he not only conducted an active research program and handled administrative matters for the soil science institute but also taught basic soil science to approximately 200 students each year. His broad understanding of the subject is reflected in repeated contributions to the classic German soil science text, *Lehrbuch der Bodenkunde* (Schachtschabel et al. 1992) that is now in its 13th printing.

Prof. Schwertmann has actively supported the idea that scientists should be careful to return something to society because society has provided the resources and freedom for scientists to pursue even their most basic academic interests. It is this belief that undoubtedly prompted him to devote a major portion of his career to the study of soil erosion, a fact that may not be widely appreciated within the clay science community. In Bavaria, he found that copper, which is commonly used as a fungicide in hops and which is strongly adsorbed to soil organic matter, could be used as a tracer for soil erosion. More importantly, he and his colleagues demonstrated that soil losses from the Bavarian hop gardens far exceeded tolerable limits for sustained production. Soil losses quantified from the copper balance were also found to correlate closely but not perfectly with the famous Universal Soil Loss Equation (USLE). Various factors in the USLE were subsequently tested and modified in order to adapt the model to southern Germany. The result was a handbook for soil loss prediction that was quickly adopted by government agricultural advisors in Bavaria to design and implement improved conservation practices. Prof. Schwertmann was also instrumental in establishing a long-term research center for quantifying soil erosion and its ecological side effects in southern Germany. This center began operation in 1990 and will carry out both basic and applied agroecological research until the year 2005. As a counterpart to his erosion work in Germany, Prof. Schwertmann also initiated a long-term aid program in West Africa. Once again, the focus was on adapting the USLE to local conditions and to developing erosion-control methods

that could be implemented without major investments of capital. This research eventually led to an erosion handbook for the humid tropics.

Sabbatical leaves and professional exchanges played a very important role in Prof. Schwertmann's growth as a clay scientist. In 1952, he received a Fulbright Scholarship to work in the laboratory of M. L. Jackson at the University of Wisconsin in Madison. In 1970 he performed research at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Division of Soils in Adelaide, Australia; in 1976 he was a visiting research scientist at the University of Natal in Pietermaritzburg, South Africa; and in 1981 he was honored as a Distinguished Visiting Scholar at the University of South Australia. These experiences not only gave him international exposure but also started vigorous cycles of collaboration with more than 30 scientists from abroad, many of whom eventually came to Freising for extended periods of time. These scientists benefited greatly from a stimulating intellectual environment, a relaxed, collegial atmosphere and the warm hospitality of Prof. Schwertmann and his wonderful wife, Dorothee. In 1985, this network of scientists played an important role in the convening of a North Atlantic Treaty Organization (NATO) Advanced Study Institute and the publication of a major text on *Iron in Soils and Clay Minerals* (Stucki et al. 1988).

Prof. Schwertmann's resumé includes a list of more than 240 peer-reviewed papers, and at least half of these relate to the genesis, chemistry and mineralogy of iron oxides. His work with these minerals spans a wide range of basic and applied topics; however, his favorite approach has always been to couple field observations and laboratory experiments to define pathways of mineral formation or to better understand mineral chemistry. For example, his early observation that soil hematites are regionally distributed on a global scale was tested through a large number of field and laboratory experiments designed to evaluate the impact of various environmental factors, such as temperature, rainfall, dissolved organics and pH on the balance of hematite and goethite in soil and sediment systems. The importance of Al substitution in natural iron oxides was quickly appreciated and resulted in a series of 18 papers wherein the conditions leading to Al for Fe substitution were carefully examined in model systems. Numerous papers concerned with the detection, surface properties and paragenetic relationships between ferrihydrite and more stable Fe oxides were also published. These include the famous oxalate procedure for selective dissolution of poorly crystalline Fe oxides that is now a citation classic (Schwertmann 1964). In fact, Prof. Schwertmann never hesitated to embrace new technology, and much information was generated from improved methods of analysis in his laboratory. These included differential X-ray diffraction for the identification of poorly crystalline phases in soils, computer-assisted analysis of X-ray diffraction data and the very significant application of Mössbauer spectroscopy to soil and sediment iron oxides.

Prof. Schwertmann has also had an enduring interest in acid sulfate soils and is credited with the first report of pedogenic jarosite. In recent years, this interest was extended to anthropogenic systems such as acid mine drainage and eventually led to the characterization of a previously unrecognized mineral that is common to these extreme environments—a mineral that has since been named in his honor by the International Mineralogical Association.

In 1991, Prof. Schwertmann contributed his substantial knowledge of mineral synthesis to the development of a laboratory recipe book for the iron oxides entitled *Iron Oxides in the Laboratory—Preparation and Characterization* (Schwertmann and Cornell 1991). This collaborative effort was subsequently expanded to produce a comprehensive text entitled *The Iron Oxides—Structure, Properties, Reactions, Occurrence and Uses* (Cornell and Schwertmann 1996) that is clearly destined to become a classic.

Prof. Schwertmann's technical achievements have brought honors and much respect from the scientific community. During his career, numerous professional societies and advisory boards entrusted him with leadership activities. He was Vice-President of the German Soil Science Society and General Secretary and Vice-President of Association Internationale pour l'Etude des Argiles (AIPEA). He served on the editorial boards of numerous journals including *Clays and Clay Minerals* and *Clay Minerals*. His advice as a referee was frequently sought by the Deutsche Forschungsgemeinschaft, the German Ministry for Research and Technology, the German Society for Radiation and Environmental Research and the Alexander von Humboldt Foundation. Prof. Schwertmann is a recipient of the Paul Wagner Award, a member of the Deutsche Akademie der Naturforscher Leopoldina and a Fellow of the American Society of Agronomy and the Soil Science Society of America. In 1992, he was named a Pioneer Lecturer in Clay Science.

Prof. Schwertmann's career accomplishments in teaching, research and service have had a major influence on clay science. His critical thinking, balanced evaluation of research findings and infectious enthusiasm for natural science have made him a much sought-after counselor by both students and colleagues. These attributes, coupled with a warm personality and humble character, have made him widely appreciated as both a gentleman and scholar. I am honored to present to you Udo Schwertmann, the 1997 Distinguished Member of the Clay Minerals Society.

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