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THE MARILYN AND STURGES W. BAILEY DISTINGUISHED MEMBER AWARD

The Marilyn and Sturges W. Bailey Distinguished Member Award of the Clay Minerals Society was presented to Dr. Boris Zvyagin at the 37th annual meeting of the Clay Minerals Society in Chicago, Illinois on June 26, 2000. The following introduction was made on behalf of the recipient.

INTRODUCTION OF BORIS ZVYAGIN

VICTOR A. DRITS

It gives me great pleasure to present to you a brilliant scientist and my close friend, Prof. Boris Zvyagin for the honor of the Marilyn and Sturges Bailey Award. I think that it is very remarkable that he is the first recipient of this most prestigious Award of the Clay Minerals Society because Zvyagin has pursued clay structural mineralogy along a path parallel to the one pursued by Prof. Bailey. Each of them blazed new trails in clay mineralogy, and I can say that a modern level of our knowledge of crystal structures and crystal chemistry of layer silicates and clay minerals in significant degree is a result of their fundamental research.

The scientific career of Boris Zvyagin is rather simple. He graduated Moscow State University as a physicist in 1944 and then prepared his Ph.D. at the Moscow Soil Institute. After his successful defense in 1949, Zvyagin worked at the All-Union Geological Institute in Leningrad as a senior scientist. In 1963, he became a Doctor of Science defending his dissertation at the Institute of Crystallography of the USSR Academy of Science. In the same year, he moved to Moscow to work at the Institute of Ore Mineralogy of the Russian Academy of Science as the head of the laboratory and now as a principal scientist. Since 1977, Zvyagin has been a Professor of Crystallography and Mineralogy.

Zvyagin is a pioneer in many theoretical and experimental aspects of structural mineralogy. He developed an original methodological approach to deduce systematically regular polytypes of kaolinite, chlorite, serpentine, mica, palygorskite, and other layer silicates. In particular, Zvyagin was the first who discovered the peculiar features of talc-pyrophyllite polytypes and showed that talc has a one-layer triclinic structure and pyrophyllite occurs either as $2M$ or $1Tc$ polytypes. He successfully applied his methodological approach to analyze polytype diversity not only of layer silicates, but also of various other layer and peudolayer minerals such as astrophyllite, chain-ribbon silicates and silicates with complex tetrahedral layers, graphite, sulfides, high-temperature superconductors, oxyborates, *etc*.

A symbolic notation Zvyagin proposed for description of polytypes is very reasonable and effective. Comparing their approaches, Bailey noted that Zvyagin's system is "a more complex but more precise analytical scheme of symbols to describe the resulting structure"

Zvyagin is a pioneer in the comprehensive structural study of clay minerals by electron diffraction. In fact,

he was the first who worked out and successfully used oblique texture electron diffraction (OTED) as an independent and powerful tool for structural analysis of clay minerals. This was complex work. OTED patterns differ dramatically from those obtained by X-ray diffraction. One of the main problems was to interpret OTED patterns observed for various clay minerals. Zvyagin showed that texture patterns are especially suitable for identification of polytypes and developed simple diffraction criteria for their unambiguous identification. Due to a deep understanding of relationships between structural and diffraction features of different polytypes, Zvyagin discovered structural peculiarities of many clay minerals poorly studied at that time. Among them halloysite, ferripyrophyllite-2*M* nacrite, lizardite-$2H_1$, *cis*-vacant 1*M* illite, $2M_2$ mica, triclinic cookeite, crysotile, *etc*., as well as layer silicates with complex or unusual structures, for example 4*M* Ti-biotite, six-layer Unst-type serpentine, and chapmanite—an iron kaolinite. By OTED technique, Zvyagin for the first time in 1957 refined the crystal structure of the clay mineral, celedonite. This was a remarkable result. At that time most crystallographers believed that electron diffraction could not be used for structural analysis because of dynamic effects, and the only way to refine a crystal structure was by single crystal X-ray analysis. Since 1957, Zvyagin and his colleagues refined numerous layer silicate structures (kaolinite, nacrite, different polytypes of muscovite, phengite, and paragonite, biotite, *etc*.). During the last several years, Zvyagin concentrated his attention on developing a modular analysis of crystal structures. He proposed analytical means for the consideration, description, and derivation of modular structures, which included as a component, the polytypism of layer silicates. In fact, this is a new scientific domain in modern structural mineralogy and he is a leader. Zvyagin is an active and creative scientist. He is an author and co-author of more than 300 publications, mainly devoted to the structure and crystal chemistry of layer silicates, clay minerals, and other minerals with layer and pseudo-layer structures.

For outstanding contributions in crystallography and structural mineralogy of layer silicates, Zvyagin was awarded the highest honor presented by the Russian Academy of Sciences for Crystallographers, the Fedorov Gold Medal Award. He was awarded also the Vainshtein award on Electron Crystallography. I hope that my short review of Zvyagin's scientific achievements clearly demonstrates that he is an outstanding and unique scientist and does deserve to be awarded the Bailey Award.

Unfortunately, I have no time to tell you about some of his remarkable personal features: he has great passion for music and loyalty to friends and friendship, two features that adorn his life and lives of his friends.