Boris Konstantinovich Vaĭnshteĭn (on his seventieth birthday)

A. S. Borovik-Romanov, Yu. A. Osip'yan, A. M. Prokhorov, V. I. Smirnov, L. A. Feĭgin, A. A. Chernov, and L. A. Shuvalov

Usp. Fiz. Nauk 161, 205-207 (July 1991)

On 10 July 1991 the prominent physicist-crystallographer Academician Boris Konstantinovich Vaĭnshteĭn reaches his seventieth birthday.

The canvas of B. K. Vaïnshteïn's biography is very simple. He was born in Moscow in 1921, graduated from secondary school and subsequently from the Physics Faculty of the Moscow State University, and later received also an engineering diploma from the Institute of Steel (all this with distinction). In 1945 he began graduate work at the Institute of Crystallography of the Academy of Sciences of the USSR. In 1950 he defended his Candidate's dissertation, in 1955 his dissertation for the degree of Doctor of Physico-mathematical sciences, and since 1959 he has been in charge of the laboratory on protein structure organized by him. Since 1962 he has been the Director of the Institute; in 1962 he was elected a Corresponding Member of the Academy of Sciences of the USSR, and in 1976 was made a full Member. Thus his work of more than 45 years at the Institute of Crystallography includes almost 30 years as its Director.

Behind this seemingly cloudless biography stands intensive creative work of many years based on a rare talent; difficult organizational-administrative activity; loss of energy and health in defending the interests of the Institute in complex collisions of interrelationships with the administration, colleagues and collaborators.

But let us return to the beginning of Boris Konstantinovich's creative activity. At the end of the 1940's and the beginning of the 1950's, he obtained a number of fundamental results in electron diffraction on kinematic and dynamic theory of the intensities of scattering of electrons by atoms; he discovered the method of synthesis of the Fourier potential, and studied the atomic structure of many inorganic and organic crystals. As a result, he developed electron diffraction as a method of structural analysis in its present form. This stage in B. K. Vaïnshteĭn's creative activity is summarized by the monograph "Structural Electron Diffraction" published by him in 1956 and currently widely used by specialists in electron diffraction in many countries.

In the 1950's-1960's, B. K. Vaĭnshteĭn published a series of papers on the general theory of structural analysis; in particular he proposed an original interpretation of the Patterson function, and developed some direct methods. He examined in general terms the structure and symmetry of chain molecules, the principles of their mutual combination into aggregates, and the theory of scattering by polymers. These results were summarized by him in the monograph "Diffraction of x-rays by chain molecules" (1962) which has been acknowledged as a classical exposition of the problem.

He then also solved problems on the structure of liquid



BORIS KONSTANTINOVICH VAĭNSHTEĭN

crystals utilizing methods developed by him. Under his leadership originated our country's school for the study of symmetry and structure of liquid crystals.

B. K. Vaĭnshteĭn developed the theory for analyzing electron microscope images. He found an algebraic method of reconstructing the three-dimensional structure of an object based on its projections, and then proposed (in 1970) also another method, the determination of the shape of a body by summing the projecting functions. With the aid of this theory supermolecular structure of many viruses and large proteins was determined.

During more than thirty years, B. K. Vaĭnshteĭn and the members of the laboratory organized by him for the study of atomic structure of biological molecules and crystals carried out a tremendous amount of work on the creation in our country of a biochemical and crystallographic foundation for protein crystallography and determined with high resolution the three-dimensional structure of many protein molecules. On the basis of the results obtained the mechanism of biological activity of some of them was explained.

635 Sov. Phys. Usp. **34** (7), July 1991

0038-5670/91/070635-02\$01.00

As the Director of the Institute of Crystallography, B. K. Vainshtein is developing the traditions of the first director-A. V. Shubnikov-to utilize as broadly as possible the physics approach to problems of crystallography. He participated actively in the solution of pressing problems in the synthesis of crystals for new technology and in investigating their physical properties. Under his guidance the first laser ruby and other crystals for quantum electronics were obtained in our country. In the seventies under the guidance of B. K. Vaïnshteïn the problem was solved of automating the structural analysis of crystals with the transfer to computers of many functions of this process. The results of these and other investigations on crystals, on the apparatus for synthesizing them and on investigating their properties have been introduced into production in industry. On the initiative and under guidance by B. K. Vaïnshteĭn he and a group of members of the Institute have written a four-volume encyclopedia "Modern Crystallography" (1979-1981) that has been published, just as the two monographs of B. K. Vainshteïn mentioned above, abroad in English.

The school of B. K. Vaĭnshteĭn developed many investigators in practically all fields of crystallography. Some of them have in their turn become prominent scientists in different fields of this science.

B. K. Vaĭnshteĭn is one of the leading organizers of physical science in our country. As a deputy to the Academic Secretary of the Division of General Physics and Astronomy of the Academy of Sciences of the USSR and the Chairman of the Scientific Council of the Academy of Sciences of the USSR on the physics of crystals he coordinates the research in this field of science carried out in our country. B. K. Vaïnshteĭn is the Editor-in-Chief of the journal "Kristallografiya" (published by the AIP in English translation as Soviet Physics-Crystallography), and is a member of the editorial boards of a member of Soviet and international journals.

The many-sided scientific activity of B. K. Vaĭnshteĭn has been widely acknowledged internationally. For many years he was a member of the Executive Council of the International Union of Crystallographers and its vice-president. In 1990 Boris Konstantinovich was the recipient of the highest international crystallographic award—the Ewald Prize and Medal.

B. K. Vaïnshteĭn is a member of a number of foreign scientific societies: the German "Leopoldina" Academy, the Polish Academy of Sciences, the Barcelona Academy; he has an honorary doctorate from Stockholm University, and is an honorary member of the Hungarian Physical Society.

The breadth of scientific interests, the combination in one person of the abilities of a physicist-mathematician, experimenter and engineer, the ability of deeply feeling, clearly formulating and solving scientific problems in many branches of solid-state physics, structural chemistry, molecular biology, the understanding of applied problems of crystallography, the organizing abilities—all this taken together characterizes the unique individuality of Boris Konstantinovich as a scientist.

In congratulating Boris Konstantinovich Vaĭnshteĭn on this jubilee, we wish him many years of health and the same active fruitful activity in the service of the science of crystallography beloved by him.

Translated by G. M. Volkoff