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ACADEMICIAN NIKOLAĬ NIKOLAEVICH BOGOLYUBOV

(On the occasion of his fiftieth birthday)

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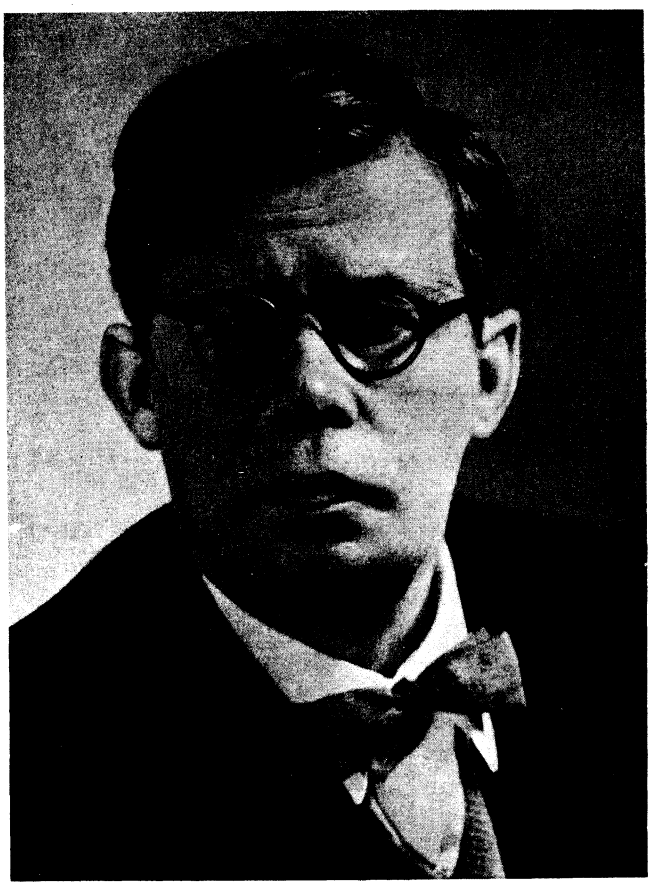
ON August 21, 1959 Nikolai Nikolaevich Bogolyubov, one of our most prominent mathematicians and theoretical physicists, attains the age of fifty.

N. N. Bogolyubov was born in the city of Gor'kiĭ. His exceptional gift for mathematics was noted very early. Already in 1923 he took part in the seminar of Academician N. M. Krylov. In 1924 he wrote his first scientific paper, and next year, at the age of sixteen he became a graduate student in the faculty of mathematical physics of the Academy of Sciences of the Ukrainian S.S.R. In 1928 he defended his candidate's dissertation, and in 1930 he was awarded the degree of Doctor of Mathematics honoris causa.

At first Bogolyubov's scientific and pedagogic activities took place in Kiev. There he worked in the Academy of Sciences of the Ukrainian S.S.R. and taught at Kiev University, where from 1936 he held a chair, while between 1946 and 1949 he was the dean of the Mechanical and Mathematical Faculty. After his transfer to Moscow Bogolyubov became the head of the division of theoretical physics of the V. A. Steklov Mathematics Institute of the U.S.S.R. Academy of Sciences and became (beginning in 1956) the head of the Theoretical Physics Laboratory of the Joint Institute for Nuclear Research. His pedagogic activity is continued at Moscow University where he holds the chair of Statistical Physics and Mechanics.



Bogolyubov is the author of approximately 200 scientific publications on various problems of mathematics and theoretical physics. His important contributions to science are recognized not only in the Soviet Union but also abroad. His books have been translated into many languages; his appearances at international conferences are invariably greeted with interest.

In 1947 Bogolyubov was elected corresponding

member of the U.S.S.R. Academy of Sciences, in 1948 he was elected an active member of the Academy of Sciences of the Ukrainian S.S.R., and in 1953 he became an academician of the U.S.S.R. Academy of Sciences. He has also been awarded a doctor's degree honoris causa by the Hyderabad University (India).

Bogolyubov's scientific and social activities have received high recognition by the Party and the Government. He was awarded a Stalin prize, and in 1958 he was honored with a Lenin prize. He was also awarded six decorations, among them two orders of Lenin.

The first papers which gained Bogolyubov wide recognition were of a purely mathematical nature. Thus, a series of his early investigations had for its aim the study of the direct methods of the calculus of variations. One of the papers of this series[1] received the distinction of being awarded a prize by the Bologna Academy of Sciences (The Merlani prize). We should also note his important contributions to the theory of nearly-periodic functions,[2] to the theory of boundary-value equations,[3] and to the theory of dynamic systems[4] (together with N. M. Krylov).

During the period from 1932 to 1943 Bogolyubov, together with Academician N. M. Krylov, developed the theory of nonlinear oscillations ("nonlinear mechanics"). Nonlinear mechanics, which at the present time forms a division of mathematical physics, has been to a large extent created by the papers of Bogolyubov and Krylov,[4-9] among which we should especially note the basic monograph[9] which has received wide recognition in the leading countries of the world. These investigations have important technical applications. The methods of solving problems in the theory of nonlinear oscillations, developed by Bogolyubov and his pupils, have been described in a book[10] written by him together with Yu. A. Mitropol'skiĭ.

Bogolyubov's intensive scientific activity in the field of physics began in the postwar years. In his first papers on physics he applied the asymptotic methods developed by him earlier to problems in statistical mechanics. In particular, he investigated in these papers the establishment of statistical equilibrium in a system in contact with a heat bath.[3]

The name of Bogolyubov is associated with methods of constructing distribution functions and kinetic equations in statistical physics.[11] These methods are the most general ones of all those in existence. For these investigations and also for his monograph,[3] Bogolyubov was awarded the distinction of being named a laureate of the Stalin prize, first class. He later generalized his derivation of the kinetic distribution functions to include quantum statistics.[12]

Bogolyubov proposed a method of approximate second quantization.[12] In particular, this method (in an article together with S. V. Tyablikov[13]) made it possible to give a consistent formulation of the polar model of metals due to S. Shubin and S. V. Vonsovskiĭ.

Bogolyubov is responsible for an important method in the theory of superconductivity. Already in 1947, in an article on the microscopic theory of superfluidity,[14] he showed that an imperfect Bose gas may possess the properties of superfluidity. In the course of this research, he developed the method of canonical transformations, which played an essential role in the development of the theory of superconductivity. In 1957 after the appearance of the note by Bardeen, Cooper and Schrieffer (which communicated certain results of calculations carried out on the basis of the idea of the essential role played by paired interactions between electrons) Bogolyubov developed a consistent theory of superconductivity, using for this purpose the method of canonical transformations. He confirmed the point of view that superconductivity may be treated as superfluidity of the electron gas.[15]

This method was later developed in detail by Bogolyubov together with his pupils, and has been described in the monograph written together with V. V. Tolmachev and D. V. Shirkov.[16] The new method turned out to be useful also for the investigation of the properties of nuclear matter.[17] The development of this method has led to the formulation of a variational principle which is a generalization of the well known Fock method in atomic physics.[18]

Bogolyubov has also made a fundamental contribution to quantum field theory. In an extensive series of papers he investigated, together with his pupils, the mathematical structure and the principles of causality and unitarity in quantum field theory. He developed (together with O. S. Parasyuk) a general theory of the multiplication of causal functions as applied to the regularization of the scattering matrix.[19] Building upon these rules and upon a clearly formulated principle of causality, he gave a mathematically rigorous formulation of quantum field theory on the basis of perturbation theory. This work has been described in an original monograph written by him together with D. V. Shirkov.[20] One can also include

among the same series of papers the articles on the renormalization group (also together with D. V. Shirkov[21]).

A second extensive series of papers by Bogolyubov on quantum field theory is devoted to the theory of dispersion relations. In this field, which is considered to be the most promising one in contemporary quantum field theory, he is associated with the method of formulating dispersion relations and with the first rigorous proof of the dispersion relation for the scattering of π mesons by nucleons. In the course of these proofs Bogolyubov investigated a number of subtle questions relating to the theory of generalized functions and to the theory of functions of many complex variables. The method of dispersion relations is described in his monograph written together with B. V. Medvedev and M. K. Polivanov.[22] This monograph is the only book in the world literature devoted to dispersion relations. His work on the theory of generalized functions and on the theory of dispersion relations has led to the creation of a new direction of research in contemporary quantum field theory. It is specifically for his work on superconductivity and on quantum field theory that Bogolyubov was awarded a Lenin prize in 1958.

Bogolyubov devotes much effort to the education of young scientists. He responds in a lively fashion and with great enthusiasm to each new interesting paper, to each new physical idea. He has brought into being schools of nonlinear mechanics (in Kiev) and of theoretical physics (in Moscow).

The editorial board of this journal expresses their hearty greetings to Nikolaĭ Nikolaevich Bogolyubov and wishes him many years of health, happiness and significant creative attainments for the benefit of Soviet science.

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Translated by G. Volkoff
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