enetics and Dialectics, a book by a relatively unknown scientist, Ivan Frolov, was severely attacked by the supporters of Academician Trofim Lysenko when it was published in the Soviet Union 20 years ago. With the help of applied science and philosophers, Frolov attempted to explain the unworthiness of the "Lysenko myth," which had firmly entrenched itself in the science of that period. Such an attack was a most daring and unexpected step for a young scholar, and it triggered a storm in the scientific community. At the same time the book attracted the attention and elicited the support of such eminent scientists as Pyotr Kapitsa, Nikolai Semyonov, Boris Astaurov, Dmitri Belyayev, Bordafy Kedrov, and Vladimir Engelgardt.

Frolov recently published Philo-

sophy and the History of Genetics, a revised and updated edition of the first book, which gives an unorthodox view of the problems in science in general. The topical nature of the questions raised in the monograph prompts renewed scrutiny of the development of genetics.

Today Academician Frolov is a scientist of international renown. He is president of the Philosophical Society of the USSR, chairman of the Scientific Council of the Academy of Sciences of the USSR on the Philosophical and Social Problems of Science and Technology, and chairman of the Interdepartmental Center of the Science of Man. Frolov is also a People's Deputy of the USSR. Recently he became editor in chief of the newspaper Pravda.

Svetlana Soldatenkova interviews Academician Vladimir Strunnikov, president of the All-Union Society of Geneticists and Seleotists.

Q: The appearance of the new mono-

graph by Academician Ivan Frolov has aroused keen interest among both general readers and specialists at home and abroad. You were one of the many scientists who witnessed the long reign of the Lysenko cult in our country and the bitter struggle in which our best scientists were destroyed. What did you think about Frolov's clearly anti-Lysenko book 20 years ago, and what do you think of the new edition?

A: Many books on science are being published nowadays, and the reissue of one or another does not warrant, as a rule, any special coverage in the press. But Frolov's monograph is a different matter. It occupies a special place among publications on philosophic biology, and genetics. To understand its significance and to judge its true scientific worth, we should not only study the role of philosophy in the development of genetics but look back into the past, because what happened in those times is not only incomprehensible but often completely unknown to the next generation.

So let me digress into history. In the first quarter of this century our country was in the forefront of the study of genetics and achieved outstanding success. Following a gradual suppression in the 1930s, genetics was dealt a crushing blow by Trofim Lysenko and his associates. Geneticists and progressive biologists became politically suspect, a situation that ended in tragedy for those concerned. Philosophers lost a great deal of ground in the eyes of progressive intellectuals, who remained true to their ideals. It must be said that the desire of these philosophers to save their own skin and their lack of principle remain a blot on the collective conscience of science in this country.

Year after year dragged on in this gloomy atmosphere. Then suddenly there appeared the name of the young philosopher Ivan Frolov, who flung himself into an unequal struggle against Lysenko. It was quite unbelievable—a philosopher who was an anti-Lysenkoite. Frolov's principles got him into a lot of trouble: Grigori Platonov, one of the most zealous and active substantiators of Lysenko's teachings, refused to supervise Frolov's scientific work.

Frolov wrote a book that was definitely anti-Lysenko. The manuscript was approved by outstanding but officially blacklisted scientists of the time—Astaurov, Kedrov, Kapitsa, Nikolai Dubinin, and Axel Berg. Understandably such a book could not be printed immediately, and it came out only in 1968 after the Plenary Meeting of the CPSU Central Committee, which rejected Lysenko's teachings, and the All-Union Academy of Agricultural Sciences. Genetics-oriented researc...
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The extreme view boils down to the assertion that all people are born with practically the same intellectual potential, and only social conditions determine their intellectual level.

Positive assessment of the role of heredity in transmitting acquired capabilities acquires special significance in our age, the age of scientific revolution. It justifies the selection and corresponding education in different fields of talented children. This important measure, somewhat disregarded due to bad organization, should be developed further.

The second no less important and topical issue is the mutability of organisms. A quarter of a century ago, Lysenko and his supporters were still fiercely defending the Lamarckist concept of the heritability of acquired properties—that is, properties that come into existence under the influence of dissimilar conditions of habitat. However, geneticists believe that since these dissimilars conditions do not affect the structure of genetic information registered in the chemical makeup of the chromosomes, DNA, the changes that have taken place will not be consolidated in later generations. The newly originated properties are passed on to future generations only when the program of their development is duly registered in the hereditary apparatus. Newly acquired and inherited properties, called mutations, occur very seldom, and, as geneticists believe, independent of the changing environment. In other words, mutations that promote better adaptability of the species to a new habitat do not occur frequently in changing conditions. Extensive experimental data confirm this outlook.

Frolov subjected to sharp and well-documented criticism the Lysenko concept of the heritability of acquired properties. He did not, however, reject the possibility of an engineered occurrence of mutation.

We must give Frolov due credit for his firm stand on this issue, which has been justified. For instance, American scientists at the Harvard University School of Medicine published an article in a 1988 issue of Nature magazine in which they showed the possibility of obtaining purposeful and, most important of all, mass mutation in one variety of bacteria. This variety, the colon bacillus, has no gene that controls the assimilation of lactose, the sugar present in milk. But if the bacillus is cultivated in a medium in which sugar is a component, it acquires precisely those genes that control the assimilation of lactose in large quantities. We still have to discover the genetic "mechanism" of this remarkable phenomenon. The new data may open the road to a broader solution of this vital problem that will extend the horizons of the applied sciences.

Q: Why was Lysenkoism compatible with Stalinism? This question arises from a reading of Frolov's book.

A: Because personal totalitarianism is at the foundation of both. The Academy of Sciences of the USSR, the Academy of Medical Sciences, and the Academic of Agricultural Sciences have set up a special commission to analyze the history of the development of genetics in the USSR and the study of Lysenkoism, among other things. I am the head of this commission. Archives at numerous institutes have yielded hitherto unknown material that gives a clearer insight into the inception, development, and collapse of Lysenkoism. I will simply say now that the deformation of the country's agriculture, which began in the 1930s as a result of the distortion of Lenin's principles of socialism and the cooperative sector, and the curtailing of the New Economic Policy forced Stalin to search feverishly for a solution to the wretched situation. 

Like a drowning man clutching at a lifeline, he lunged at projects that promised an instantaneous recovery, and many outstanding scientists of world renown attached primary significance to it. Frolov subjected to sharp and well-documented criticism the Lysenko concept of the heritability of acquired properties. He did not, however, reject the possibility of an engineered occurrence of mutation. 

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insufficient, however, because the crackdown on science had taken too heavy a toll. The liquidation of Lysenkoism coincided with the discovery of the code of genetic information registered in the complex chemical combination of the chromosomes—DNA. It was a sensational discovery, and many outstanding scientists of world renown attached primary significance to it. The generous financing of molecular genetics in the USSR was, therefore, absolutely justified. But classical genetics was undeservedly pushed into the background, its significance underestimated. After all, molecular genetics is only the successful offspring of general genetics. Genetics continues to be the basis of fundamental research in biology—modern medicine and selection are built on its achievements. We should not forget that the world owes the double increase of its agricultural yield in the past 30 years partly to selection, which has unlimited potential. And this potential will increase with new discoveries.

In order to put Soviet genetics in the front ranks of modern world science, its proponents had to train the necessary personnel—we have to have the normal material and financial support for research institutions and to create suitable conditions for creative and truly talented scientists. It is especially important to receive timely scientific information and to cooperate with colleagues abroad. It is impossible to say beforehand which specific types of research will have priority; that will depend on the many and diverse conditions in which the research is conducted.

Q: What are the prospects for research in the philosophy of genetics?

A: Genetics is developing intensively. Important discoveries that shed new light on heredity and mutability are coming thick and fast. The already accumulated and continually increasing knowledge persistently calls for philosophical assimilation. Historical experience has shown that analysis of historical facts could be based on common sense and not on dogma, which is doomed to failure. Genetics is an excellent field for philosophers.