CRIME WITHOUT Philosophy

PUNISHMENT and Genetics

Genetics 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 philosophy, Frolov attempted to explain the worthlessness 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, Bonifati Kedrov, and Vladimir Engelgardt.

Frolov recently published *Philosophy and the History of Genetics,* a revised and updated edition of the first book, which gives an unorthodox view of the problems of 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 Presidium 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 Selectionists.

Q: The appearance of the new monograph 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 philosophy, biology, and genetics. To understand its significance and to assess 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 new 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 universally recognized success. But following a gradual suppression in the 1930s, genetics was dealt a crushing blow by Trofim Lysenko and his associates at the August 1948 session of the All-Union Academy of Agricultural Sciences. Genetics-oriented research institutes that were making good progress were all closed and their personnel first sacked and then physically exterminated. Total obscurantism in science set in. The very existence of genes and chromosomes was denied; the heritability of acquired properties, sporadic procreation of one variety or species by another, and unsubstantiated methods of improving varieties of agricultural crops were championed.

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At such a tragic period it would have seemed natural for our philosophers to come to the aid of genetics and repulse the advance of medieval thinking. But the overwhelming majority of philosophers adapted themselves—some out of fear, others in order to advance their career—to the political situation. They were not just neutral; they went to work building a philosophical foundation for the absurd teachings of 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-Lysenkovite. 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 refuted Lysenko's teaching. Lysenkovites gave the book a very hostile reception. They called Frolov every name they could think of, accusing him of being anti-Marxist, antidialectical, and anti-Darwinist.

But life took its course, and the truth gradually asserted itself, though with some difficulty. In our times Lysenkoism—Lysenko himself died in 1976—has been debunked, but we still hear its echo and see attempts to restore it.

Frolov's book, in its first and second editions, is valuable because of its philosophical concepts and its analysis of the methodology of genetics against the background of the historical development of genetics. That is the only way to comprehend its problems, dialectics, and prognosis of development.

Frolov has won the respect of geneticists with his daring and his adherence to principle in very difficult, dangerous times. To this day he takes an active part in the development of Soviet genetics. He is a member of the Learned Council on Problems of Genetics and Selection at the Academy of Sciences of the USSR.

Q: I understand it is not easy to reduce Frolov's philosophical concepts to a level that is comprehensible to the layperson, but I would like to ask you which of these concepts you believe to be the most meaningful for geneticists.

A: All the chapters of the book are interesting. They are full of historical information about the development of genetics, which previously had been scattered about in specialized periodicals. The book deals with practically all the basic areas of modern genetics and analyzes them from the standpoint of dialetical materialism. You are correct in saying that it is impossible to speak of all these rather complex problems. I will dwell on just two problems in genetics that remain controversial to this day. The philoso- ▶

pher's stand on these issues is very important because he takes a broader view in analyzing genetic processes than do the experimenters working in this area.

The first is the assessment of the specific role of heredity and social factors in the formation of the human intellect. This is a most complicated problem. Since it is connected with human beings, its solution not only aroused furious debates but served as a pretext for political labeling. Discussions on the theme continue.

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.

Today, just as 20 years ago, Frolov gives the more correct answer—that the formation of the intellect depends on the interaction of biological and social factors. As for determining the precise correlation of these factors—heredity and environment—it is difficult to determine as yet even in laboratory animals.

Positive assessment of the role of heredity in transmitting intellectual capabilities acquires special significance in our age, the age of scientific progress. It justifies the selection and corresponding education in different fields of talented children. This important measure, somewhat discredited 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 dissimilar 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.

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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 part, then 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 Academy 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 curtailment 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 boom in farming. Lysenko grasped this situation and exploited it, proposing fantastic projects as if from a bottomless well. The projects appealed to Stalin, and he gave Lysenko his full support, first suspending and then annihilating the best scientists, including Academician Nikolai Vavilov. Analyzing Stalin's deviation from Lenin's principles of democracy, people often ask how it could have happened. The answer would simultaneously explain the triumph of Lysenkoism.

During the autocratic rule of the "genius of all humanity" [Stalin] and the sweeping repressions, resisting Lysenko's ideas was unthinkable, especially after Stalin himself approved and edited Lysenko's program report at the notorious August 1948 session of the Academy of Agricultural Sciences. From that moment on, criticism of Lysenko's propositions meant opposition to Stalin himself. The consequences of opposition were well known. The upshot was that the Lysenkovites gained unprecedented opportunities for smashing their opponents and implanting the most absurd ideas in science.

Lysenkoism is only one of the more hideous and deformed manifestations of Stalinism that is incomprehensible to common sense.

Q: Soviet genetics, which occupied an advanced position in the 1920s and 1930s, has not yet regained its potential since its "formal rehabilitation" in 1964. This was stated at the conference devoted to the prospects of the development of genetic research in the USSR that was held late last year in Moscow. What has already been restored, and what still remains to be done?
A: Measures were taken to restore genetics in our country after the 1964 October Plenary Meeting of the CPSU Central Committee, which condemned the dogmatism and totalitarianism of Lysenkoism. That proved 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.

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In order to put Soviet genetics in the front ranks of modern world science, we have a great deal to do to train the necessary personnel—we have to provide 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 heritability 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 heredity should be based on common sense and not on dogma, which is doomed to failure. Genetics is an excellent field for philosophers. ■