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CURRENT SOVIET OUTLOOK ON THE INHERITANCE  
OF ACQUIRED ADAPTATIONS\*

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Lack of communication between biological scientists in the United States and in the Soviet Union has given rise to the notion here that the influence of Trofim D. Lysenko has declined, and that as a corollary the views of Lysenkoism in the Soviet Union have changed materially. Twenty years ago, T. D. Lysenko offered an explanation resembling Lamarck's to account for inheritance, and his report was approved by the Central Committee of the Communist Party, with the result that geneticists who deplored the acceptance of the report were relieved of their duties. Nikolai I. Vavilov was removed from the presidency of the Soviet Academy of Agricultural Sciences following his controversy with Lysenko (Vavilov, 1939). Vavilov disappeared from the public scene soon after 1939. However, early in 1956 the Soviet Academy of Science ordered a republication of Vavilov's works, apparently as a sign of the reversal of governmental attitude

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following the death of Premier Stalin (Times, 1956). This was interpreted in the United States as a lessening of Lysenko's influence.

My visit to the Soviet Union for five weeks during 1958, together with an examination of textbooks and correspondence with several American scientists interested in the status of genetics there, reveals that although some modifications of the views intensely hostile to "Western genetics" have transpired, and contradictions seem to exist between professed beliefs and actual practice, the acceptance of the gene concept has not occurred in the slightest degree. T. D. Lysenko appears to be more solidly entrenched than ever, and he is an important Communist Party official, having recently received again the Order of Lenin. Lysenko is head of the Institute of Heredity in Moscow, and is engaged in directing investigations designed to increase the production of milk by dairy cattle.

How extensively Lysenko's name and ideas have entered the fabric of the Soviet Union's outlook may be gauged in a number of ways. For example, there are 17 references to his work in a general biology textbook (Maxovko and Makarov, 1956). A new textbook for the tenth grade, used throughout the nation, entitled "Fundamental Darwinism," contains a lengthy discussion of Lysenko's contributions to Soviet science, with his picture (Veselov, 1958). Academician Lysenko is one of eight editors of a five-volume encyclopedia of agriculture; a revision of his 600-page "Agrobiologia," dated 1952, supersedes the 1948-9 edition (Lysenko, 1952). The methods advocated by Lysenko for improving plants by means of treating seeds, planting under unusual conditions and grafting to obtain new kinds of seeds, are an important part of a large methodology book for botany teachers (Verzilin, 1955), and his name even appears in a book for teachers of invertebrate zoology, published by the Academy of Pedagogical Science (Lozina-Lozinskovo, 1955). Furthermore, four of twelve essays dealing with "philosophical questions of natural science" (Kaganov et al., 1957) mention Lysenko, and a book of essays on dialectical materialism and natural science contains three essays citing his conclusions (Knazeba, 1957).

Some Americans have talked with Academician Lysenko in Moscow recently, but I was unsuccessful in my efforts to do so. The interpreter through whom arrangements were attempted was dubious from the start, saying, "You see, Lysenko is a very high Party member." It was disappointing not to visit his laboratories after V. M. Kaganov (1957) told me, "Academician Lysenko maintains his experiments with plants at his laboratories even today, and if you could see them, you would be convinced."

At one university, I posed questions about actual scientific support for Lysenkoism. One of four Soviet scientists present said that in this connection a group of investigators under the leadership of N. P. Dubinin was undertaking a "critical review" of the Lysenko position. It should be mentioned that abstracts and translations of journals of genetics are available to some investigators. The Russians quickly and vigorously respond to American articles which question Lysenko's techniques. In conversations, however, criticisms of these articles are comparatively mild; V. M. Kaganov said, "We were surprised at the suggestion that Lysenko's findings contained an element of political bias."

It was noticed that the former term, "Mendel-Morgan genetics," used with intense disapprobation a decade ago, has apparently been supplanted by "Goldschmidt-Morgan." Mendelism is, in its broadest meaning, acceptable. One of four color plates in a general biology textbook (Maxovko and Makarov, 1956) shows  $F_2$  flowers as white, pink, and red, in the familiar 1:2:1 ratio; however, the text states, ". . . but Soviet scientists have improved upon this." The gene concept is unacceptable, since inheritance is believed to be a function of the entire cell contents, in what appears to be a Darwinian "pangene" concept. However, the existence of DNA was cited as evidence to *support* the Lysenkoists' stand.

Several questions grow out of the realization that T. D. Lysenko is still held in

high esteem and that his views are passed on to students and pupils in textbooks.

Does the rejection of "Western genetics" imply a rejection of plant breeding methods which have been eminently successful in the United States for corn and wheat? The fact that agronomists visiting the United States were exceedingly eager to obtain precise descriptions of crosses of the latest kinds introduces a puzzling inconsistency. However, the only evidence that theory and practice do not coincide is a fairly reliable report that in 1944 in Tashkent, Uzbekistan, colchicine was used to obtain new kinds of plants in crosses between Asian and American cotton.

Does the Lysenkoist view affect the "scientific attitude" of young people and the outlook upon phases of study beyond agricultural research?

It must be remembered that the basic assumptions inculcated by the educational system are unequivocal and oft-repeated. There is no inconsistency in textbooks, all of which emanate from publishing houses whose officials are, or are responsible to, Communist Party leaders. The teaching profession and scientific workers are members of a trade union of whose 4 million members forty percent are Party members. The Lysenkoist position is stated categorically.

While it is true that pupils are permitted to raise questions and criticize studies undertaken in the classroom, laboratory, and field station, the teachers themselves are not permitted to question the foundations of subjects presented in textbooks. If doubts were to arise in the case of heredity, it would be likely they would lead nowhere, simply because the basic assumptions which are given are unassailable by any evidence provided in textbooks or in the teachers' experience.

It is not a question of teachers suppressing knowledge, but one of having no other information which can be regarded seriously. How questions are handled in advanced courses is not known by the writer, but it is possible to "deny the existence" of genes by merely requiring a kind of evidence for their existence which cannot be presented. The very essence of dialectics is the creation of unassailable assumptions which form the basis, in the case of dialectical materialism, for action and extended reasoning sometimes contrary to circumstantial evidence, until the creation of new assumptions seems unavoidable. The preponderance of evidence favoring genes is, of necessity, circumstantial. "Western geneticists" find the concept exceedingly fruitful for practical applications and for extending ideas to higher levels with predictive results, whereas Lysenkoism, in its most favorable interpretation, satisfies itself with only that portion of the evidence tending to show that cells and organisms are more highly integrated and complex in their activities than hypothetical genes can wholly explain.

Does the rigid position taken about the gene concept overflow into ancillary scientific areas? Without question, the rejection of the idea of inheritable particles alters certain academic as well as scientific procedures. For example, there are no aptitude tests in the educational system. All school promotions and college entrance qualifications are based upon manifest performance in oral and written examinations. Guidance is based upon the expressed preferences of the pupil coupled with insight and the records kept by teachers. Lack of mental ability, in addition, is considered as a reflection of laziness rather than of imperfect inheritance. Defects of hearing as well as other malformations are viewed as postnatal in origin, or possibly as intra-uterine. Severe mental disturbances are believed to have no parental connection, although in one laboratory of defectology, an investigator said, ". . . but we are beginning to think there must be a strong connection."

From all appearances, there is actually an exceedingly high sense of accuracy, faithfulness to fact, and an eagerness to discover true relationships in nature, among people of all levels, and a very deep respect for science apart from the exceptions noted. To assume that the scientific fabric of the Soviet Union is verging on collapse because of bias in one area of it is to set the stage for a rude

awakening. There is even a slight gain accruing from explaining inheritance on the basis of the reactions of the whole organism to its environment: great effort is expended to test the potential adaptability of the germ plasm to its limits in environmental situations not normally encountered by a given plant or animal. Plants are tested incessantly; "sports" are sought after by thousands of school children on the experimental farms; animals, such as the sturgeon, are transplanted to assorted habitats without inhibition. Variations thus discovered are available for exploitation. How the variations occur does not hamper this work, of course. It is possible that the high yields of millet, said to have brought Lysenko his early fame, and by some reported to have made a very important contribution during the war, were obtained by these methods adopted from Luther Burbank's work in the United States; the same methods still give notable results, as in the development of a watermelon which ripens during the short growing season around Moscow, although the spherical melon may indeed be the result of a cross.

Lastly, it is probable that the best students in advanced biological science are not totally insulated from worldwide applications of the gene concept. It is likely that discussions of heredity are bound to touch upon the idea of the particulate nature of inheritable bodies and that, despite the basic assumptions which have grown up (every person under the age of forty-two has lived all his life under the aegis of these assumptions), there are opportunities for referring to genes, if only as improbable explanations.

The greater likelihood is, however, that the concern for scientific freedom about genetics expressed in America is not shared as intensely by scientists in the Soviet Union. Those who would perpetuate the concept of the gene are undoubtedly few, now, and it can be concluded that the issue itself is considered relatively unimportant upon the backdrop of the tremendous progress being achieved in areas of science not affected by the current outlook regarding the inheritance of acquired adaptations.

In the long run, production in agriculture might be jeopardized by the rejection of the gene concept. If that time arrives, there is no question in my mind, and I understand to some extent the basic assumptions of communism, as to the change that will thereupon occur. It is a maxim of communist philosophy that "Truth is absolute, but not final." This means, "What is believed today is very firmly believed, for it facilitates progress. But what is believed today need not resist all change, since a new absolute truth can arise tomorrow."

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