

Vavilov and the World Collection of Plant Varieties. Discussion on a Review in Literaturnaia Gazeta

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This article corrects certain misconceptions in a recent review in *Literaturnaia Gazeta* of a film about the biologist Nikolai Vavilov. This article briefly discusses the character of Vavilov's research, some problems of the work of the pseudobiologist Trofim Lysenko, and the value of the world collection of plant varieties that Vavilov founded in Leningrad.

Keywords: Vavilov, Lysenko, Luk'ianenko, world collection, Soviet agriculture, wheat.

This article in *Literaturnaia Gazeta*: "Narkormivshie lozh'iu" by Dr. Mikhail Anokhin reviews very critically the film "Narkormivshii chelovechestvo" about the life and work of the great Soviet biologist Nikolai Ivanovich Vavilov. This review contains several inaccurate and misleading assertions about Vavilov and his work and about the pseudo-scientist Trofim Denisovich Lysenko.

1. According to Anokhin, Vavilov's main contributions were his theory of homologous series in genetic variation, and his formation of the world collection of plant varieties in Leningrad.

On the first point, Anokhin minimizes Vavilov's study by noting that that the homologous pattern of variation was "known to biologists from Darwin's time." On this point Anokhin cites a brochure by Professor V. I. Pyzhenkov, «Николай Иванович Вавилов — ботаник, академик, гражданин мира» (2009). Anokhin in this criticism implies that Vavilov ignored previous literature and claimed as a discovery something long known before. Anokhin omits the fact that Vavilov knew and cited the work of Darwin and many other biologists in his essay on homologous series. Vavilov did not claim to have discovered homologous series, but he presented a new explanation of it based on modern genetics and his own studies of plants.

On the second point, Anokhin cites the same source and also I. A. Benediktov, the long-time minister of agriculture, with no source given, that the plant collection has brought no benefit to Soviet or Russian agriculture and is just a waste of time, money, and land. He also writes that the varieties that Vavilov obtained came from backward countries, implying that they were useless. He also contrasts the collections of David Fairchild from the United States Department of Agriculture, alleging that 200,000 varieties that he collected were put to use in American farming.

In fact, the collection of plant varieties, which was the work of many scientists in addition to Vavilov, included varieties from all over the world, including from advanced countries in Europe, North America and Japan. It is wrong to assume that because Ethiopia is a poor third-world country, its plant varieties are useless! Fairchild also gathered most of his collection from "backward countries." It is a substantial overstatement that all 200,000 of Fairchild's varieties "were introduced into American agriculture." (This description of Fairchild's work is the same as the description in Wikipedia, not the most reliable source.) Many of the varieties he obtained were curiosities, gathered as examples of different agricultural systems, which was the same reason why Soviet scientists gathered many of the varieties in the World Collection. But both obtained varieties from many regions in the hope of finding genetic characters not found in the heavily inbred European varieties.

Most important, Vavilov's world collection has served as an extremely valuable resource for Soviet plant breeders of all types. By the 1980s, Soviet plant breeders had used the world collection to produce crops sown on 80 percent of all cropland in the USSR (Dubinin, 1989, p. 177). Perhaps the most successful one was Pavel Panteleimonovich Luk'ianenko. Luk'ianenko used a range of wheat varieties from Vavilov's collection, including several bred by the Italian breeder Nazareno Strampelli, which had genes from Japanese dwarf wheat, and varieties from Argentina (also with dwarfing genes) and the United States. The result in the 1950s was Bezostaia-1, a semi-dwarf very high yielding variety of winter wheat that produced the highest and most stable yields of any Soviet wheat variety up to that time. By 1972, Bezostaia-1 was planted on more than 18 million hectares in the USSR, Eastern Europe, and Turkey, where it was the highest-yielding variety in international wheat variety competitions in 1969–1971. Luk'ianenko's work began a Soviet Green Revolution, a few years before Norman Borlaug produced similar varieties in Mexico. Borlaug and his associates in an international conference in 1972 recognized Bezostaia-1 as equivalent to the varieties that they had bred in Mexico, using some of the same parent plants (Borlaug, 1972). By then Luk'ianenko and his team had bred several even better varieties, and many breeders around the USSR were emulating his techniques (Жуковский, 1973). All of these specialists relied at least partly on Vavilov's collection.

Anokhin also does not mention that Vavilov's collection was a precedent for the huge global seed bank in Norway's Spitsbergen Island. The main international agricultural research organization CGIAR and many scientists have devoted considerable money and efforts to collect and safely preserve all the possible varieties in the world lest they become extinct before their potential value is understood. A recent article by the scientist and wheat breeder A.F. Merezhko documents the importance of the world collection of Vavilov for work to improve and protect one of our most important food sources, from Bezostaia-1 to the present (Merezhko, 1998). To question this type of project is very short-sighted.

2. Vavilov's valuable work included more than the plant collection and the study of homologous series. His main area of research, from his first major publications through his career and up to his last works, was plant pathology and plant immunity to disease. One of the reasons he worked on his collection was to find unknown varieties in remote locations that might have better resistance to disease and infestations than well-known varieties. Vavilov was guided by his growing understanding of the origins of cultivated plants, and he published a small book identifying the main centers of origin of many plants. While research has challenged some of his ideas, the book is still cited today. Many people know Vavilov from the term "Vavilov centers," used for the eight centers he identified in that book. It was rational and foresighted to look for new varieties in such places. One reason for the success of this research was Vavilov's remarkable capability to identify new varieties just by sight, which he helped other researchers at VIR to develop.

3. Anokhin's article also appears not to understand the problems associated with Lysenko. He writes that Lysenko "supported" "traditional plant breeding." This is not quite correct. Lysenko rejected genetics and considered himself "Lamarckian" in his belief in the inheritance of acquired characteristics. This belief led him to many incorrect and even absurd ideas.¹ So Lysenko thought that one could plant spring wheat in fall and if the plant survived, then it had somehow changed, which was of course not true. The interaction of plants and winter weather, called vernalization, is actually regulated by several genes, but since Lysenko rejected genetics, he could never have understood it. It would therefore have been very difficult for him to breed

¹There are many studies of Lysenko; on his Lamarckist views, see Gershenson, 1990, p. 449.

successful varieties, even by “traditional” methods. Anokhin cites the memoir of the geneticist N. P. Dubinin (1989), that agrotechnical decisions of Lysenko saved Soviet agriculture. But in this book, Dubinin repeatedly criticizes Lysenko and documents the harm he caused genetics and agriculture (see for example p. 331–346, 380).

The article refers to the idea that Lysenko “anticipated” epigenetics and genetic modification. Lysenko and his followers tried to make many types of impossible crosses of plants and animals. But certainly Lysenko was not the first biologist who imagined the potentially usefulness of transferring characteristics between unrelated organisms. The people who actually introduced these techniques in biology in the 1980s and afterward were not followers of Lysenko, but were scientists working at the forefront of genetics. Not only would Lysenko and his cronies inevitably fail in their attempts to conduct such remote crosses, but they would also not be able to understand why their projects failed.

Lysenko’s personality and style of relating to people were also both extremely damaging to science. He fawned on Stalin, while treated legitimate scientists in a condescending and humiliating way. He connived against scientists he opposed, deriding them behind their backs, even with Stalin. Lysenko’s derogatory comments to Stalin about Vavilov were one of the reasons why Vavilov was arrested. Lysenko plagiarized other scholars’ work, falsified evidence, ignored most of the literature on genetics that did not agree with his “views,” and in other ways violated basic canons of scholarly ethics.

Vavilov, by contrast, was a remarkably humane person. He was respectful and encouraging toward peers, students (including Lysenko), and politicians. He was patient and gave people the benefit of the doubt. He endured setbacks and bounced back and kept going. Considering his administrative obligations as president of VIR and VASKhNiL, he published a relatively large quantity of valuable scientific works. He had a remarkable knowledge of the scientific literature in his areas of research and several related areas, in many languages and from many countries around the world. The respect that scientists around the world had for him was based on his intelligence, his character, his research, writing, and mastery of genetics and other fields of biology, and his capacity to guide and manage large-scale scientific projects like VASKhNiL and the world collection. In all of these areas, Lysenko could never compare with Vavilov.

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Вавилов и мировая коллекция сортов культурных растений. Обсуждение рецензии в «Литературной газете»

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Эта статья исправляет некоторые заблуждения в недавнем обзоре фильма про биолога Николая Вавилова, напечатанного в «Литературной газете». В данной статье кратко рассматриваются характер исследований Н.И. Вавилова, значение мировой коллекции сортов растений, основанной Вавиловым в Ленинграде, и некоторые проблемы, связанные с псевдобиологом Трофимом Лысенко.

Ключевые слова: Н.И. Вавилов, Т.Д. Лысенко, П.П. Лукьяненко, мировая коллекция культурных растений ВИР, советское сельское хозяйство, пшеница.