

LETTERS

Lysenko and Russian genetics: an alternative view

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We read with great interest the recent article ‘Some pioneers of European human genetics’ by Peter Harper.¹ This comprehensive review is very informative and highly appreciated. But a somewhat misleading statement needs to be reconsidered. Harper regarded Lysenko as a fraudulent agronomist. We disagree with him on this fundamental point. We are thinking that he was greatly misled by Medvedev’s book, *The Rise and Fall of TD Lysenko*,² which he cited in his article. It should be noted that there are many misleading statements in this book. For example, in chapter 8, Medvedev argued against the validity of Lysenko’s work on plant graft hybridization, and pointed out that ‘serious and precise experiments by many scientists have failed to prove the possibility of transfer of hereditary stable properties from stock to scion’,² thus regarding graft hybridization as Lysenko’s fraud. To our knowledge, it is Darwin who put forward the concept of graft hybridization. He described many cases of graft hybrids, and considered it to be special importance for understanding the mechanism of inheritance and variation. Later, Michurin invented the so-called ‘mentor-grafting’ method, which greatly enhanced the induction of graft hybrids. Lysenko not only recognized the existence of graft hybrids, but also applied the method of graft hybridization to the practice of plant breeding. Over the past several decades, extensive experiments on graft hybridization have been carried out and numbers of new crops and varieties were developed by grafting, indicating that graft-induced variant characteristics were stable and inheritable.³ Now it has been proposed that graft hybridization may serve as a mechanism of horizontal (or lateral) gene transfer. Thus, it is not proper to continue to regard Lysenko as a fraudulent agronomist.

Harper considered the inheritance of acquired characteristics as the defining feature of Lysenkoism, and referred to it as false science.¹ Actually, the inheritance of acquired characters has been the subject of passionate debate and heated controversy since the days of Lamarck. Even Darwin accepted the Lamarckian inheritance of acquired characteristics as an established fact, and had assumed that it was of importance in evolution.⁴ He considered natural selection, the inheritance of acquired characteristics and mutation as three factors influencing evolution. It is true that Lysenko was a keen supporter of the inheritance of acquired characteristics. He claimed that the environmentally induced changes were transmitted to the progeny by demonstration of the conversion of spring wheat into winter wheat and vice versa. In recent years, there has been a substantial body of reliable experimental evidence for the inheritance of acquired characteristics.^{4–5} Lysenko’s work on the conversion of spring wheat into winter wheat can be explained by transgenerational epigenetic

inheritance.⁶ Now it seems that Lysenko was not wrong in believing the inheritance of acquired characteristics.

Harper also mentioned Lysenko’s errors and crimes, as well as the death of numerous researchers in genetics.¹ The impression which one gets from reading this paragraph is that Lysenko was responsible for the death of these geneticists. We fear that this view is too one-sided and not supported by historical evidence. It is true that Lysenko disputed with Vavilov and many other geneticists on some genetic viewpoints. But we must know that Lysenko was a leading Soviet scientist in agriculture and genetics. He was not the NKVD chief, thus he had no power to arrest geneticists. Lysenko himself repeatedly maintained that he was not personally responsible for Vavilov’s arrest and death. He recalled that the investigator of Vavilov had come to see him and asked: ‘What can you say in general about the wrecking (spying, counterrevolutionary) activities of Vavilov?’ Lysenko replied: ‘There were and are some differences of opinion on scientific matters between myself and Vavilov, but I have no knowledge of any wrecking activities of Vavilov.’⁷ In addition, Haldane, one of the towering figures of twentieth century biology, also denied that Lysenko had been responsible for Vavilov’s arrest and death.⁸

It is not our intention to minimize Lysenko’s mistakes and to exalt his contributions, but we must try to see things in their right proportion. Actually, some of Lysenko’s work had a certain scientific merit, which was recognized internationally. For example, it was Lysenko who coined the term vernalization, which is now still an extant scientific term and frequently appears in *Nature*, *Science*, *Cell* and many prestigious journals. In addition, some of Lysenko’s work was highly praised by world-famous scientists. For example, in early 1930s, Vavilov repeatedly place a high value on Lysenko’s contributions to science and agricultural production. As he said, ‘Lysenko is a careful and highly talented researcher. His experiments are irrefragable.’⁹ In 1964, Haldane made an objective comment: ‘In my opinion, Lysenko is a very fine biologist and some of his ideas are right’.¹⁰ Of course, we also recognize that some of Lysenko’s ideas were wrong and badly wrong. His biggest mistake was mixing science and politics. He regarded Mendelian genetics as ‘bourgeois science’ and forced Soviet geneticists to accept Michurinism, for which he got a bad reputation.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Lysenko and Russian genetics: Reply to Wang & Liu

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I thank Drs Liu and Wang for their appreciation of my article 'Some Pioneers of European Human Genetics' (*Eur J Hum Genet*, doi:10.1038/ejhg.2017.47) and am glad of the opportunity to enlarge on my brief comment regarding Trofim Lysenko in relation to Russian human genetics. This is a complex area, to which a few words cannot do justice.

First, our modern understanding of transgenerational epigenetic effects certainly means that one can no longer dismiss the inheritance of acquired characteristics out of hand, though any example requires detailed evidence and cannot be reliably invoked for a situation close to a century ago. Likewise, these developments have in no way invalidated the Mendelian nature of the many human genetic disorders studied by Vavilov's colleagues, such as Solomon Levit, and reinforced by abundant work internationally up to the present.

The problem with most of Lysenko's work is that its results are almost impossible to assess; his lack of scientific education and of principles of experimental design, and his opposition to any form of statistical analysis, all hinder any detailed evaluation, whether at the time or now. Vavilov's initial encouragement of Lysenko, including an offer for him to work in Vavilov's own institute, (which was strongly opposed by his colleagues), was probably intended to help to remedy these deficiencies. At no stage though was Lysenko recognised as a 'leading Soviet scientist' in genetics by most of his scientific colleagues, except in the political sense. Internationally the initial support of JBS Haldane, later abandoned,¹ is made less credible by Haldane's strong political views² and was in any case related to Lysenko's early work in plant physiology, not that on genetics.

As to whether Lysenko's work was fraudulent, the same experimental deficiencies hamper any distinction between error and true fraud; that his work could not be repeated was shown by the later post-war failure of the eminent geneticist Hans Stubbe and his

colleagues in communist East Germany to replicate any of Lysenko's results, as is well described by his pupil Hagemann.³ Lysenko's opposition to mendelism in human genetics was entirely theoretical, since he did no work in this field.

As to Lysenko's complicity in Vavilov's imprisonment and subsequent death, it is disingenuous to absolve him of this because he was not directly responsible. To read the verbatim accounts of the 'debates' of 1937 and later,^{4,5} and the unscientific, aggressive, and threatening comments of Lysenko and his colleague Izaak Prezent, show clearly how he was working consistently for the downfall of Vavilov, of his human genetics colleagues such as Solomon Levit and classical genetics as a whole.

I have indeed drawn heavily on the book of Medvedev,⁴ who was a trained geneticist, working in Russia at the time of the events, but there are other sources that support his account. For non-Russian readers (who include myself), I suggest the following, to illustrate both sides of the argument: Babkov⁶ *The Dawn of Human Genetics*; Roll-Hansen⁷ *The Lysenko Effect*; Lysenko⁸ *Heredity and its Variability*; and *The Situation in Biological Science*;⁵ careful reading of these and other sources should avoid the situation of Lysenko being credited for the subsequent discovery of valid epigenetic effects, as well as showing the destructive nature of his campaign against Vavilov and Mendelism.

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