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Citation for final published version:

Harper, Peter 2017. Lysenko and Russian genetics: Reply to Wang & Liu. *European Journal of Human Genetics* 25 (10) , 1098. 10.1038/ejhg.2017.118

Publishers page: <http://dx.doi.org/10.1038/ejhg.2017.118>

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Lysenko and Russian Genetics

(Response to Liu and Wang's letter to European Journal of Human Genetics.)

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 views (2) 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 R 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 Present, 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: Babkov (6) *The Dawn of Human Genetics*; Roll-Hansen (7) *The Lysenko Effect*; Lysenko TD (8) *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.

References:

- 1 Haldane JBS. In defence of genetics. *Modern Quarterly NS*. 4: 194-202
- 2 Paul DB. A war on two fronts: JBS Haldane and the response to Lysenkoism in Britain. *J Hist Biol*. 1983 16:1-37
- 3 Hagemann R. How did East German geneticists avoid Lysenkoism? *Trends in Genetics* 2002 18 320-324
- 4 Medvedev Z. *The Rise and Fall of TD Lysenko*. New York, Columbia University Press. 1969.
- 5 Lenin Academy of Agriculture Sciences of the USSR. *The Situation in Biological Science*. Moscow, Foreign Language Publishing House. 1949.
- 6 Babkov VV. *The Dawn of Human Genetics*. New York, Cold Spring Harbor Laboratory Press. 2013
- 7 Roll-Hansen N. *The Lysenko Effect*. New York, Humanity Books. 2005.
- 8 Lysenko TD. *Heredity and its Variability*. New York, King's Crown Press. 1946