

## Comments and Communications

### Extension of Political Domination beyond Soviet Genetics

The widely discussed antigenetics campaign, linked with the name of Trofim Lyenko, has raised in the mind of many a Western scientist questions as to the possible implications of Lyenko's crusade for other branches of science. It is the aim of this paper to provide some information on the reverberations of the genetics controversy in physiology and biochemistry.

It has been obvious from the start that more than genetics was at stake. Lyenko presented the controversy as just one facet of the struggle between the "materialist" and the "idealist" outlook in science, sure to affect the foundations of nearly all branches of biology (Lyenko, T. *The science of biology today*. New York: International Publishers, 1948. P. 16.). In the session of the council of the Academy of Sciences of the USSR held August 24-26, 1948, action was taken against the physiologist Orbeli, president of the biology section of the Academy of Sciences, as well as against Shmalhausen, director of the Institute of Evolutionary Morphology, and the cytologist Dubinin. The section of biological sciences was directed to review the matter of scientific personnel and publication facilities, and to look after the Michurinist genetics. The section of history and philosophy was to devote attention to the generalization and theoretical interpretation of the achievements of Michurin and his disciples (Levy, J. *Science and Soc.*, 1948-49, 13, 61).

But the steam-roller of the Lyenko "revolution" did not stop there. At the session of the Academy of Medical Sciences it was stressed that medicine should make use of the conquests of biology produced by the Michurin doctrine (Levy, J. *Op. cit.* P. 62). Scientific journals in basic medical sciences hastened to note Lyenko's "discoveries" and greeted the event as opening a new epoch in Soviet biology. The editors beat their breasts loudly in ostentatious repentance, combined with a paradoxical air of "We have been saying the same thing all along." The editorial in the November-December, 1948, issue of the *Sechenov Journal of Physiology*, established by I. P. Pavlov in 1917 and published by the Academy of Sciences of the USSR, may serve as a good example (Editorial. *Sechenov J. Physiol. U.S.S.R.*, 34, 661-664). The fact that the journal has been maintaining high scientific standards provides an even sharper contrast to the level of the editorial.

The editors acknowledged with a flagellant's satisfaction that the discussions at the meeting of the Agricultural Academy (*The situation in biological science: Proceedings of the Lenin Academy of Agricultural Sciences of the U.S.S.R., July 31-August 6, 1948. Complete stenographic report*. New York: International Publishers, 1949.) have revealed a series of errors committed by the Soviet biologists. These errors delayed the development of biological sciences (and, by inference, constitute

sabotage of a speedy realization of the socialist commonwealth). These principles of "creative Darwinism," as the Lyenko dogma is called, must be incorporated without delay into all biological disciplines.

Until recently an erroneous idea was held widely—continued the editorial—the idea that defeat of Weismann-Morgan genetics does not affect those biological disciplines which are not directly concerned with the problem of inheritance, such as experimental physiology, which investigates the concrete mechanisms underlying the function of the animal and human organism. In Soviet physiological textbooks and physiological journals one does not encounter the term *gene* or *chromosome*. However, say the editors, it would be a sign of narrowness if physiology were to remain aloof and fail to be fertilized by the ideas of the Michurin-Lyenko school of thought. Such a tendency would indicate a lack of correct "orientation."

The editors concede that physiologists have been concerned with developmental aspects of organic functions. But, they ask, did the physiologists even phrase the question about the *leading* principle of developmental physiology? No! They did not recognize the full significance of the work of Michurin and his follower, Lyenko. They failed, say the editors, to relate the experience of the great transmutator of plants, Michurin, to their investigations on the evolution of functions of animal organisms.

The editorial attempts to minimize the number of Soviet biologists who professed adherence to "Western" genetics. And yet in the next sentence the editors go on, penitently, to admit that until the August, 1948, session of the Agricultural Academy, "All of us failed to appreciate fully the reactionary essence of idealistic tendencies in the theory of inheritance, widely disseminated abroad and having penetrated, unfortunately, into our country." "We have failed to appreciate these facts and that was the reason we took no part in the fight" (Editorial. *Sechenov J. Physiol. U.S.S.R.*, 34, 362).

Having torn their robes in sadness that they were not, after all, such good Marxists as they had thought, and having sprinkled ashes thick on their weary crania, the editors tried to blow up a few straws to clutch. They noted that I. P. Pavlov in his investigations on conditioned reflexes had demonstrated the interdependence between the organism and its environment, and had examined physiological mechanisms by which functional bonds are acquired in the ontogenesis of the organism. And they cited the studies by Pavlov's pupil, K. M. Bykov, on the relations between the cerebral cortex and inner organs, and the work of other laboratories, devoted to the study of the influence of the environment on the animal organism, particularly on its higher nervous activity.

Furthermore, the editors credit Pavlov with having considered the problems of inheritance in reference to

the nervous system and having started experimental work in that direction. He died before he was able to complete them. We are informed that in Pavlov's institute for the experimental genetics of higher nervous activity, studies had been initiated before the war and are actively pursued now, directed toward producing inheritable changes resulting from the action of factors of the external environment.

In a way, this is old stuff, argue the editors. Orbeli, editor-in-chief of the journal, is said to have put forth the concept of the inheritance of acquired characteristics as a principle of the evolution of the nervous system a long time ago. A passage is cited from a 1923 paper on "Mechanisms of the Origin of Spino-cerebral Coordinations":

Investigations on conditioned reflexes reveal the way of the functional evolution of the nervous system. The ready-made coordinating mechanism with which we are born was created in the course of thousands of years according to the same basic laws by which new coordinating bonds are created in the course of weeks, sometimes days and hours, in the course of an individual life.

The editors themselves feel that their arguments are weak and the penitent mood dominates the next move. It is true, they go on, that Soviet physiologists have not promulgated anti-Michurinist doctrines, but they have not declared specifically that Morganist principles are basically foreign to them. The Soviet physiology, based on the work of Sechenov, Pavlov, and Vedenskij, cannot but be materialistic. The physiologists must scrupulously scrutinize their ideological direction and must orient the development of physiology in such a way as to exclude any possibility of contamination with ideological tendencies foreign to a materialistic philosophy. Attempts at a revision of the materialistic bases of Soviet physiology, encountered in the work of some of the Soviet physiologists, must be eradicated. But that is not enough. Soviet physiology must be constructed on the principles of the great progressive biological theory of Michurinism!

The biochemists, in their turn (Editorial. *Biokhimiya*, 1948, 13, 393-396.), rushed in to praise the Lysenko revolution as "a very important landmark in the development of all science concerning the living world." Mr. Lysenko is congratulated on having

... revealed in a profound manner the ideological struggle in biology and showed the complete fruitlessness of the reactionary idealistic teachings of Weissmann-Mendel-Morgan. ... At the same time he gave clear testimony to the vitality and power of progressive Michurinist science. The firm foundation of the dialectic-materialistic world outlook and the unbreakable bond with the urgent needs of the national economy characterize the Michurinist direction in science. Its significance thus far transcends the limits of biology and extends to the natural sciences as a whole.

This applies, say the editors, in full measure to biochemistry, which "cannot find the correct lines of development except as they are pointed out by the progressive Michurinist science." In the past, the representatives of biochemistry have not repulsed, as they should have done, the attempts by Morganist-Mendelists

... to appropriate the achievements of biochemistry for the purpose of hiding their idealistic outlook by pseudoma-

terialistic formulations. More than that, we meet with direct acknowledgement of these pseudoscientific postulates, with thoughtless and uncritical use of concepts and ideas which are the bases of the chromosomal theory of inheritance.

Still in 1948 there were men, like S. I. Alikhanyan, who expressed publicly the belief that significant progress in genetics will result from the biochemical study of the action of the genes. Y. O. Parnas, V. L. Ryzhkov, and V. I. Tovarnitskij formulated theories not distinguishable from the bourgeois genetics of Beadle. Something had to be done about this state of affairs.

The task of our scientific press, of all media of scientific propaganda, and of the actual activities of our research institutions is to combat relentlessly and with determination every kind of penetration into biochemistry of foreign, idealistic views and at the same time to draw the attention of the broad masses of biochemical research workers to the truly urgent and realistic objectives of biochemical research. ... to pass quickly from a contemplative attitude [of the purely analytical, descriptive research] to an active intervention in the chemistry of living things.

"Know how to change the metabolism of the living body and you shall change its heredity," such is the objective set by T. D. Lysenko for Soviet biology, and directly addressed to biochemical research.

Other disciplines, in their turn, are drawn into the maelstrom: neuropsychiatry (Grashchenkov, N. I. *Neuropatol. Psikiatr.*, 1948, No. 5, 3-16), psychology (Bauer, R. A. *Amer. Psychologist*, 1949, 4, 418), even education and law.

One may ask: Why was a technical point, important but limited in scope, made a battlefield? Because it became not a theoretical but an "ideological" problem. It was accepted as a foregone conclusion that "Weissmann-Morgan genetics" leads necessarily and logically to racism, and the conclusion was drawn that Western genetics represents vicious "idealistic" ideology. The fact that Western scientists sharply criticized the Nazi prostitution of genetics is nowhere mentioned. To arms, the cry resounds, here you see clearly the demonstration of one of the basic tenets of Marxism—namely, that all science, including biology, constitutes an area of struggle between materialistic and idealistic philosophy which reflects the struggle between progressive and reactionary forces of humanity. The case of genetics—go on the Soviet dialecticians—demonstrates the deep truth of Leninist-Stalinist teaching that science must retain a "party-character" (*partijnost nauki*); departure from this principle leads to the support of the enemy camp.

These are profoundly disturbing developments. The antithesis in political systems and the tensions resulting from the struggle between the Eastern and the Western power blocs for supremacy are beyond the hope of real reconciliation. In the past, science—at least the natural sciences—provided a common meeting ground. Soviet scientists were, on the whole, well acquainted with the work done abroad. Their bibliographical references in scientific journals, such as the physiological journal which printed the infamous editorial, demonstrates that the Soviet scientists were actually less provincial in their reading than some of their American colleagues.

The victory of Lysenko's irrationalism and chauvinism, reliance on the backing of the Party in a scientific con-

trovery, the xenophobic attitude toward "foreign" scientific theories—all of these increase the gulf between East and West. At a time when the equilibrium of peace is more than precarious, the added heat, from which no light can be expected to come, dangerously increases the chances of an explosion.

To estimate the real significance of these events for the development of Soviet biology and medicine is not an easy task. So far, the actual content of the journals has not changed. Will the storm affect only the political teapot, and does it represent a phenomenon which must be explained primarily in terms of internal power politics? It may be noted that Lysenko directed his campaign, started as far back as 1935, against Nikolai I. Vavilov, whom he finally (in 1939) replaced as president of the Lenin All-Union Academy of Agriculture. This may be a part of the story but is certainly not all of it.

The climate of opinion, the "Zeitgeist" characterized by nationalism, curiously intertwined with communist ideology, provided both stimulus and receptive ground for the flowering of Lysenkoism. Lysenko's slipshod methods were repeatedly criticized. C. D. Darlington. (*J. Hered.*, 1947, 38, 145) pointed out that in "proving" the inheritance of environmental effects Lysenko began the experiments with a mixed stock, omitting to use proper controls and repudiating statistical tests. This laxity in scientific standards, which seems to heap gold and honor on Lysenko, is likely to be contagious in the Soviet Union.

Competent geneticists are in agreement that Lysenko's views would never be discussed, had they not become of political importance in the Soviet Union: "Lysenko displays an astonishing ignorance of the real nature of the views he is attacking. Several of his own purported results are at variance with the general experience—work carried on over many years, with many kinds of organisms, in many parts of the world" (Sturtevant, A. H. Personal communication, 1949). This will not prevent satellite minds, not necessarily residing in satellite countries, from swallowing eagerly, the "new line," hook and sinker. What would Descartes say to his compatriot Marcel Prenant. (*Science and Soc.*, 1948-49, 13, 50-54), who defends the Soviet Michurinists by arguing that "In a socialist country menaced by aggression, as is the U.S.S.R. today, biologists who are aware of their responsibilities have more urgent things to do than to touch up the details of theory"? (Italics mine.)

The implications of the genetics controversy reach not only beyond the field of genetics (Huxley, J. *Heredity east and west: Lysenko and world science*. New York: Henry Schuman, 1949) but also beyond the geographical frontier of the USSR. Like Stahl's theory of phlogiston, the heat substance lost in the process of burning, the exhumed theory of the inheritance of acquired characteristics, reinforced by the spirit of scientific dogmatism, may prove to be a real handicap to the progress of scientific biology in a large part of the world.

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## Atomic Energy and the New Dictionaries

It is pertinent to the current evaluation of *The American College Dictionary* and *Webster's New Collegiate Dictionary* to report that an examination of them for words used in nuclear physics and chemistry, especially those concerned with the development of atomic energy, shows *WNCD* superior both in number of entries and informativeness of definition. One hundred twenty-four expressions were looked up in both dictionaries. The entry was counted only if the expression was defined in the nuclear sense. And the entry was still counted if it gave no definition at all but referred to another entry defined in the nuclear sense. Of the 124 expressions, 83 were not found in either dictionary, 23 were found in both, 15 were found in *WNCD* alone, and 3 in *The ACD* alone. Of the 83 not found in either dictionary, most are too recent, technical, or transitory for inclusion, but a few omissions seem odd even when time is considered. *Reactor*, for example, does not appear in either dictionary; nor do *atom smasher*, *electrostatic generator*, *Mev*, *particle* and *particle accelerator*, *radioactive isotope*, and *triton*. More surprising than the omission of *reactor* is the omission of *uptake*, which has long been in use generally among biologists to mean to absorb and retain, and is now appearing in nuclear writings: "The uptake of radioactivity by the land and water organisms. . . ." (U. S. Atomic Energy Commission. *Atomic Energy Development 1947-1948*, Washington, D. C., p. 93).

The 15 expressions contained in *WNCD* but not in *The ACD* are *fission* (*The ACD* does not have the nuclear application), *meson* (*The ACD* has *mesotron* but not *meson*), *metastable state*, *microcurie* (under *micro*), *moderator*, *nuclear energy*, *nucleon*, *nucleonics*, *penetrometer*, *photodisintegration*, *photoelectron*, *radioelement*, *reaction* (nuclear), *servo* (*system*), and *tracer* (*radioactive*). The three in *The ACD* but not in *WNCD* are *classify* (in the sense of to put into a secret class), *radioactive series*, and *cloud chamber*—this last is a curious oversight by *WNCD*. The fact that *The ACD* (copyright 1947) is some two years older than *WNCD* (copyright 1949) may account in part for the larger number of nuclear entries in the latter; on the other hand, according to advertisements *The ACD* totally has more entries than *WNCD*, 132,000 to 125,000. But what accounts for the superiority of *WNCD* in the definitions of words common to both dictionaries seems to be simply greater care plus larger space.

The definitions of the 23 expressions that both dictionaries contain were compared for informativeness—a combination of accuracy, quantity, precision, and clarity. Neither was better than the other in nine words, *WNCD* was better in 12, and *The ACD* was better in two. The 12 terms in the definitions of which I found *WNCD* superior are *betatron*, *chain reaction*, *curie*, *Geiger counter*, *half-life*, *isotope*, *meson-mesotron*, *pair production*, *photoelectric*, *pile*, *positron*, and *radioactive-radioactivity*. *The ACD* two are *atomic bomb* and *dosimeter*. Three examples will show what I mean by a better definition—in the first one *The ACD* is better; in the second and third, *WNCD*.