

Moscow street scene at quitting time. During working hours, streets are almost deserted.

An American Geneticist in the USSR

by Norman H. Horowitz

LAST AUGUST I had the opportunity, along with eight other Americans, to visit the Soviet Union as a guest of the Academy of Sciences of the USSR. The occasion of this visit was a symposium on the origin of life, organized by the Russian Academy. The meeting was sponsored by the International Union of Biochemistry, of which the American Society of Biological Chemists is a member organization.

Perhaps related to the fact that our State Department is currently interested in furthering cultural exchanges with the Russians, the National Science Foundation granted a sum of money for the travel of American participants to the conference. After we arrived in Moscow we were guests of the Academy, with all of our expenses paid. The Russians were most generous hosts, and the friendliness of the Russian people was evident wherever we went. I spent 10 days there—7 days in Moscow and 3 in Leningrad—and even the souvenirs I

bought and the long distance call I made to my wife from Leningrad were paid for by the Academy.

One reason I was interested in going to the Soviet Union was to find out what I could about the status of genetics there. Genetics is my special field of interest, and genetics has been under fire in Russia for some time. Starting in the middle thirties, there began a series of more or less officially sponsored attacks on the science of genetics. In particular, the chromosomal theory of heredity, the backbone of genetics, was attacked. This theory is associated with the names of such men as Mendel, who made the first basic discoveries in genetics, and T. H. Morgan, who founded the biology department at Caltech. Morgan's students are still teaching at the Institute—Prof. Alfred H. Sturtevant, for example—so we have more than a casual interest in the fate of the chromosome theory.

Genetics was criticized in public meetings in Russia

in the thirties as being a foreign "bourgeois" science, and it was also criticized for being "objective." Its critics invented a sort of native kind of biology that had Marxian roots and was "subjective."

The man who emerged as the leader of this movement was one T. D. Lysenko, an agriculturist who had made a reputation in practical farming. He knew little or nothing about the science of genetics. This was revealed quite clearly in his speeches and in his writings. In place of what he termed "Western genetics," he recommended the adoption of "Michurinism." Michurin was a well-known Russian plant breeder, like our Burbank, who apparently held unscientific views about heredity.

Michurinism, as outlined by Lysenko, is a form of Lamarckism. Lamarck was a French biologist of the 18th century who proposed as the underlying mechanism of evolution the theory that characteristics which the organism acquires in its lifetime are transmitted directly to its offspring. Now, this is a plausible view; if one wants to explain how evolution takes place, then this idea is almost the first one that springs to mind. It is an appealing notion, it is simple, and at one time it was very respectable. Darwin, for example, was a Lamarckian. The only thing wrong with Lamarckism is that no convincing evidence has ever been found in its favor. Modern genetics provides no mechanism by means of which the heredity of a plant or animal can be changed in an adaptive or a directed way by use or disuse, or by crude changes in the environment.

As an example of the sort of evidence that Lysenko put forward for this idea, I can cite his claim to have changed a species of wheat with 28 chromosomes into one with 42 chromosomes by the simple expedient of planting it in the autumn instead of the spring. This result is so unlikely as to immediately raise doubts as to the genetic purity of Lysenko's starting material.

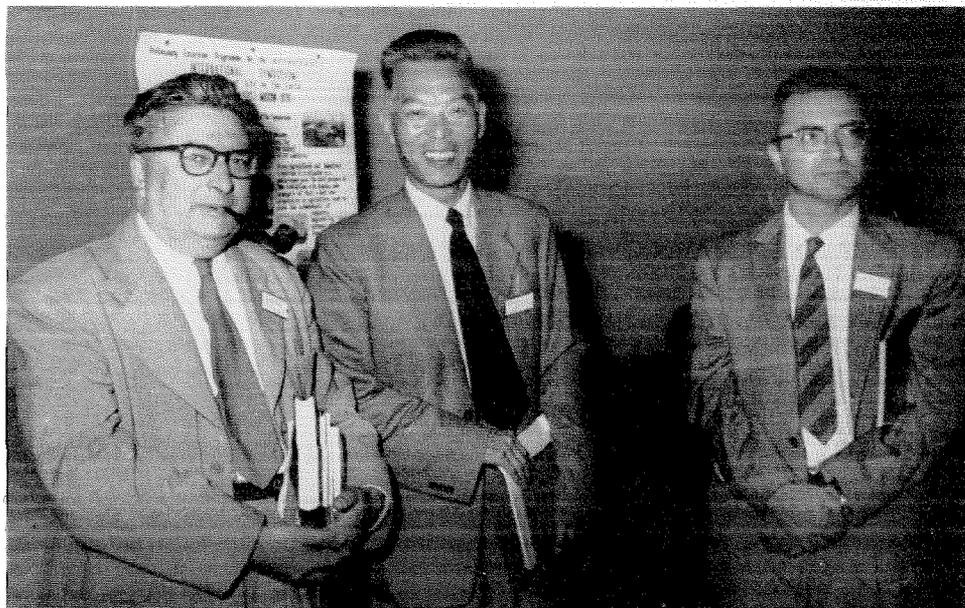
It is not generally realized that a number of careful attempts to confirm Lysenko's results have been made

in laboratories in Western Europe and in America. Little or nothing has come of these.

The climax of the Lysenkoist movement in the Soviet Union came in 1948 at a meeting of the Lenin Academy of Agricultural Sciences, where Lysenko made a full-scale attack on genetics. The Mendelian position was defended by various Soviet geneticists (and there were some very good ones in the Soviet Union) but Lysenko then revealed that his views had the approval of the Central Committee of the Communist Party—and this ended the meeting.

The shocking thing about this to Western scientists was not so much the views that Lysenko espoused; we have plenty of ignorance in our own country, and it is not hard to find people who ought to know better supporting views which are scientifically unsupportable. I have heard of teachers of science in high school, for example, who don't accept evolution. The shocking thing was that Lysenko's view was adopted as the official point of view by the government. Eventually, appropriate action was taken—consisting, among other things, of the dismissal of geneticists from their posts and the abolition of the teaching of genetics in Russian schools.

During the past year there have been suggestions in the press that Lysenko has lost favor, and that genetics is coming back in the USSR. I was interested in finding out whether or not this is true. I can sum up my impressions by saying that the state of genetics in the Soviet Union is still not good, although it is not so bad as it was six or seven years ago. Lysenko is still director of the Institute of Genetics of the Academy of Sciences in Moscow. The chair of genetics in the University of Moscow is still vacant. On the other hand, the workers in Lysenko's institute (I did not meet Lysenko himself) now accept the basic facts of Mendelian genetics, and they use Mendelian terminology and concepts in their papers and discussions. But they deny the exceptional importance of these concepts; they believe that



Three participants in the international symposium in Moscow; Prof. M. Florkin of Liege, Belgium, president of the International Union of Biochemistry; H. C. Yin (who got his PhD at Caltech in 1937), director of the Institute of Plant Physiology of the Academia Sinica, Shanghai; and Norman Horowitz, Caltech professor of biology.

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there is much more to heredity in plants and animals than is compassed by classical genetic theory, and they are attempting to prove this.

In principle, one cannot object to this attitude; certainly there are large areas of uncertainty in our knowledge of heredity phenomena, and it would be rash indeed to think that there are no surprises left in this field.

Some workers in Lysenko's institute are beginning to identify their findings with a phenomenon that has been recognized in bacteria since 1928—namely, genetic transformation. It is possible to change the heredity of certain bacteria in a directed way by exposing them to the nucleic acid obtained from bacteria of a different strain. Nucleic acid is the material that constitutes the genes; it can be dissolved out of the bacterial cell by chemical extraction. When intact bacterial cells of the same species are exposed to this material they can take it up and incorporate it into their own genetic makeup. In this way, they come to resemble the donor strain in various hereditary characteristics.

It is conceivable that even in higher organisms it may be possible to effect transformations. Several people, including some at Caltech, have attempted to bring about transformations of higher animals by methods analogous to that described above. So far, this has not been successful; the only successes have been in bacteria. But, in principle, we have no reason at the present time to think that this cannot be done if the right conditions are found. The Russians think they may have accomplished transformations in birds, but these claims are being made by the same group of people who just a few years ago were making nonsensical statements about genetics. For this reason, they will have to be confirmed in other laboratories before they are accepted.

From genetics to atoms

With regard to the geneticists who lost their jobs when Lysenko came to power, I learned that some of them are back at work in laboratories of radio-biology, presumably studying the genetic effects of high-energy radiations. I got the impression that these geneticists are welcome to work in nuclear research laboratories. They do not work in the Institute of Genetics. Unfortunately, none of those I would have liked to see were in Moscow at the time of the conference.

It thus appears possible that genetics may be able to gain a foothold in the Soviet Union again. This will require the resumption of teaching of modern genetics in the universities, even more than it requires the resumption of research. Soviet biology is already so far behind in this respect that it will be difficult for it to catch up.

An amusing incident that occurred at the meeting was the arrival of a cablegram from India, which said, "This is to inform you that living matter has just been synthesized in our laboratory. Best wishes for the success of the symposium."

Everybody in the audience realized that this was a joke except the newspaper reporters. One of the news service men sent the story out, and it was published in the United States. The next day, all of the other American reporters in Moscow were being chewed out by their editors for not having sent the story.

On later occasions I had a chance to talk to these reporters, and I was astonished to discover that none of those I met spoke Russian. One of the important impressions I gained on this trip is that the Russians have a tremendous advantage over us; they know our language, but we don't know theirs. Most of the Russian scientists at the meeting spoke English fluently, and read English scientific papers with ease. Even the children on the street in Moscow and Leningrad often speak English fluently. They learn it in school, starting in the fifth grade, and by the time they are 13 or 14 years old many of them speak English very well. Not only do we not teach Russian very much in this country, but even the reporters we send to Russia apparently get the news through translators.

Our friends in Russia

The night before I left Leningrad I went outside the hotel, and there were a few boys waiting around on the sidewalk. One of them stepped up and asked, "Do you speak English?" "Yes," I said, "I certainly do." It turned out that he was 13 years old, was studying English in school, and had heard there were foreigners in town. He wanted to know what I was doing in the Soviet Union and where I came from.

I happened to have a folder of pictures of Pasadena in my pocket that I had bought at the Los Angeles airport just before leaving. I took it out and showed him what Pasadena looked like. By this time a number of boys had gathered around, and he circulated through the crowd and showed them the pictures of Pasadena.

When he came back and handed me the folder I told him he could keep it. He put it inside his shirt and said, "I want to give you a coin." I thought he was trying to give me money, because I had discovered that you can't out-gift a Russian; if you give him something, he immediately gives you something back. I started to refuse, but one of the interpreters came up and said, "You ought to take that; it is an interesting coin." So I did; it was a 50-kopeck piece that hasn't been minted for some time.

The next day I was leaving for the airport to go to Helsinki. The cab was late, and I was dashing out of the hotel when one of the boys from the night before stepped up to me and handed me a postcard. I didn't get a chance to look at it until I got into the taxi. It was a flowery-looking Russian greeting card. I turned it over to see what was on the other side, and he had written a message on it, in English. It said, MAY OUR FRIENDSHIP PROSPER!