

SCIENTIFIC RESEARCH AND THE WAR EFFORT OF U.S.S.R.

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IN an exchange of letters between Professor Lena Stern, the only woman member of the Academy of Sciences of the U.S.S.R., and Sir Henry Dale, president of the Royal Society of London, which was published in *Nature* of July 17, 1943, Professor Stern declares:

The work which is being carried on so intensively at our factories and mills, in our research institutes, in our university departments and in our war hospitals is wholly directed towards helping the front, to perfecting the arms of war, to protecting the health of our fighters.

This statement is certainly a source of encouragement, especially when the nature of some researches which Professor Stern apparently has in mind is considered. The programs of research had been conceived and begun before the actual outbreak of the present war; however, despite the fact that the Academy of Sciences of the U.S.S.R. was moved to Sverdlovsk in the Ural Mountains, and many of its institutes, laboratories and publications scattered, these programs are said to be carried out for the most part as originally scheduled. Reports indicate lively research activity going on in these institutes, as well as in the provincial divisions of the Academy of Sciences, such as the Ural Division and the Georgian Division.

S. I. Vol'fkovich, corresponding member of the Academy of Sciences of the U.S.S.R., recently published a partial roster of scientists and engineers who were awarded Stalin prizes, ranging from 25,000 to 100,000 rubles, for outstanding achievements resulting from their researches carried out in 1940 and 1941. The ruble is not quoted on exchanges outside the U.S.S.R.; the official Soviet rate of exchange is five rubles to the dollar. Although the issue of the *Bulletin of the Academy of Sciences of the U.S.S.R.* in which the article by Professor Vol'fkovich appears was published in Kazan a little less than a year ago, it did not reach this country for quite some time because of shipping difficulties.

Stalin prizes have been awarded by a special committee of the Government since 1939 for important accomplishments in the sciences, the arts, technology and the humanities. Some of the chemists mentioned in the last two lists of awards have published the results of much research in the fields of study for which they were honored, and the nature of their work is well known. Others have been engaged in research of purely military significance, and little has

been published of their work. The diversity of subjects covered by the present-day chemical research in the U.S.S.R. is illustrated by the reports of the sessions of the department of chemistry of the Academy of Sciences. The February, 1942, session of this department was devoted exclusively to the research of the Radium Institute, in commemoration of the twentieth anniversary of this institute; the March, 1942, session dealt with infrared spectrum analysis and the mechanism of detonation of explosives; the May, 1942, session was partly devoted to a paper reviewing the scientific works of Professor Gilbert Newton Lewis, of the University of California, who was elected at that session an honorary member of the Academy of Sciences of the U.S.S.R.; and the July session was concerned with anodic oxidation of aluminum and its alloys. In addition, results of research on acetylene derivatives, on platinum metals and on other subjects were reported.

Ample assistance is provided by the state for every worthwhile research project. Although the number of college-trained chemists in the U.S.S.R. was estimated at the beginning of 1941 to have reached 50,000, indications were available that there were vacant positions for chemists, since the third Five-Year Plan (1938-1942) called for a greater development of the chemical industries than in any other period and was, in fact, referred to as the Chemical Five-Year Plan. The Soviet chemical industry was in a large measure created in the period between the two World Wars, and Soviet estimates show that in 1941 only 4 per cent. of the production of the chemical industry came from plants in existence before the industrialization of the country was begun.

The editors of the *Journal of Applied Chemistry of the U.S.S.R.* stated in a recent issue that on the eve of the present war (1941) there were over forty research institutes serving exclusively the chemical industry of the U.S.S.R. and seventy special colleges or college departments for training chemical engineers. These colleges had an enrolment of 35,000-40,000 students and graduated on the average 5,000 chemists and chemical engineers a year.

Many of the scientists whose work gained them distinction are well known to their colleagues abroad. Their achievements deserve, however, more general notice on the part of American scientists, and this account purports to call attention to some of these researches, particularly in the fields of chemistry and

chemical technology. The following abbreviated list shows some of the accomplishments which won Stalin prizes for the scientists responsible for them:

A. N. Bakh, president of the Mendeleev Chemical Society and director of the Biochemical Institute: Research on biochemistry; specifically, application of the results gained in the research on the action of ferments and on the chemistry of breathing to industrial biochemical processes. The results of this work were helpful in raising crops more resistant to cold and drought, improving the production of tea, baking bread, making wine, storing fruit and vegetables and drying cereals harvested before maturity. The last named is stated to be of importance for harvesting in rainy years. Perhaps it also had military significance when grain was to be harvested before time in order to prevent it from falling into the hands of the enemy.

A. E. Favorskii, member of the Academy of Sciences and professor at the Leningrad University: Development of an improved method of synthesis of isoprene rubber, a result of Favorskii's numerous researches on unsaturated hydrocarbons, which were published during the last fifty years. The award for this work shows the great interest the Soviet Government has in the research on rubbers other than butadiene rubber, which is the basis of the Soviet synthetic rubber industry.

N. D. Zelinskii, member of the Academy of Sciences and director of the Institute of Organic Chemistry: Conversion of petroleum constituents into aromatic hydrocarbons, including toluene, and also into alcohols, aldehydes, etc.; research on catalytic cracking. Zelinskii has received awards for numerous other achievements in recent years.

B. M. Rybak and co-workers, employed by the petroleum industry of U.S.S.R.: Development of improvements greatly increasing the manufacture of aviation gasoline.

B. Z. Rudoï, of the Institute of Mineral Fuels: Apparatus for the determination of the octane rating of motor fuels which is simpler and cheaper than the Waukesha engine.

N. N. Semenov and co-workers. Semenov is a member of the Academy of Sciences and director of the Institute of Chemical Physics: Theory of chain reactions and theory of combustion. These theories are stated to have led to methods of determining intermediate products in combustion processes and to the discovery of a number of important phenomena. The velocity of propagation of flame and inflammability limits can be predicted on the basis of the theory of combustion, and detonation can be calculated. The theory of combustion is also helpful in explaining the phenomena occurring in the combustion of fuel in internal combustion engines.

A. N. Kuznetsov, M. M. Faïnberg and co-workers, of the Leningrad Mining Institute and the Karpov Institute of Physical Chemistry: Invention of new explosives from abundantly available raw materials, the value of which was recognized in industry and on the battle front.

I. V. Grebenshchikov, member of the Academy of Sciences and director of chemical research at the Optical Institute: Theory of the structure of glass, which de-

scribes the glass as a mesh formed by anions, with the cations being capable of more or less free motion. Application of this theory is stated to have led to the development of important borosilicate glasses of great value in optical work. It is used in almost all Soviet plants making optical war equipment.

P. P. Budnikov and co-workers. Budnikov is a member of the Academy of Sciences and professor at the Institute of Chemical Technology in Khar'kov: Development of anhydrite cement, which is being manufactured on a large scale and is said to be an important building material.

N. P. Bogoroditskii: Invention of an improved "ultra-porcelain" insulating material, which is already being produced on a large scale by the radio industry.

S. I. Vol'fkovich and co-workers, of the Institute of Fertilizers and Insectofungicides: Research on processing native apatites and phosphorites providing for complete utilization of their phosphorus, calcium and fluorine. This research led to methods of production of highly valuable fertilizers, control of agricultural pests and methods of production of rare earths of the cerium group.

A. N. Frumkin, director of research at the Colloid-Electrochemical Institute and member of the Academy of Sciences: Theory of electrode processes based on research on the structure of double electrical layers; research on atom layers adsorbed on electrodes, electrokinetic behavior of metals, overvoltage and similar phenomena. This work is of importance in the understanding of corrosion, chemical sources of electrical current and industrial electrolysis.

L. I. Mandel'shtam, member of the Academy of Sciences: Further developments in the application of Raman spectroscopy. The phenomenon of combination scattering of light was discovered by Mandel'shtam and G. S. Landsberg simultaneously with Raman.

S. Z. Roginskii, Institute of Chemical Physics. Roginskii is a corresponding member of the Academy of Sciences: Theory of catalysis. Roginskii established the high significance of minute quantities of impurities on the surfaces of catalysts for their specific effects.

N. S. Kurnakov and co-workers. N. S. Kurnakov was the head of the Institute of General and Inorganic Chemistry and a member of the Academy of Sciences: Physicochemical method of analysis, characterized by application of geometrical methods to the study of the relationship between composition and properties of equilibrium systems. This method, developed by the late Professor Kurnakov, led to the prognosis of rich deposits of potassium, magnesium and other salts in the Soviet Union; it also found wide application in research on and the manufacture of alloys.

G. I. Nosov and co-workers, of the Magnitogorsk Metallurgical Combine and the Research Institute 48: Development of a new type of armor steel and of a method for its production.

V. V. Mikhailov and co-workers of the Ural Division of the Academy of Sciences and the Ural Metallurgical Industry: Metallurgy of carbon ferrochromium in blast furnaces.

M. N. Sobolev and co-workers: Metallurgy of ferro-vanadium.

E. I. Antonovskii and co-workers, of the Balkhash Copper Combine and the Leningrad Mining Institute: Development of a successful method of producing molybdenum.

F. F. Vol'f and co-workers, of the Ural Aluminum Industry. Vol'f is professor at the Ural Industrial Institute: Development of a method of large-scale manufacture of aluminum from Ural bauxites.

P. A. Rebinder, corresponding member of the Academy of Sciences: Research on surface phenomena and the effect of small additions of active substances on the properties of solids. This work led to the development of new cutting fluids which facilitate the machining of metal. Substances were also developed as a result of these studies which reduce the hardness of geologic formations in drilling.

A. P. Belopol'skii and co-workers, of the Institute of Fertilizers and Insectofungicides: Development of a new method of manufacture of soda and ammonium sulfate from mirabilite, resources of which are very extensive in the U.S.S.R.

G. K. Boreskov and A. G. Amelin, of the Institute of Fertilizers and Insectofungicides: Improvements in the contact method of sulfuric acid manufacture through perfection of the method of preparation of the vanadium catalyst and the refining of the gases handled.

I. N. Usyukin: Suggestion of a method of intensification of the nitric acid industry, which is stated to have high defense value.

Z. A. Rogovin and co-workers, of the Mendeleev Institute of Chemical Technology and the Institute of the Cotton Industry: Invention, now being used by industry, of a simple method of making cloth fire resistant and water repellent.

B. A. Dolgoplosk and B. A. Dogadkin: Development of a method of preparation of latex from synthetic rubber.

I. N. Nazarov, Institute of Organic Chemistry: Synthesis of vinylacetylene derivatives used by optical, machine-building, and other industries as adhesives.

A. I. Kiprianov, corresponding member of the Academy of Sciences: Invention of cyanine dyestuffs and photosensitizers.

O. Yu. Magidson, of the Chemico-Pharmaceutical Institute: Inventions in the field of pharmaceuticals, including sulfamide preparations.

A. V. Vyshnevskii: Development of the widely used method of novocaine anesthesia and a new type of bandage.

In addition to the impetus given to chemical research by the Stalin prizes granted by the Soviet Government, the Chemical Society of the U.S.S.R. also actively encourages research. A Russian chemical journal just received contains a news account of a contest conducted by the Mendeleev Chemical Society for the best research in chemistry. The researches offered were to be judged on the basis of the following criteria: (a) importance to the war effort; (b) significance for the national economy; (c) novelty of methods used and objects of the investigation selected; (d) quality of the work carried out; (e) theoretical value of the data obtained. The day on which the researches were to be submitted was postponed from January 1 to May 1, 1943. Ten prizes, ranging from 1,000 to 5,000 rubles, and ten certificates of merit were to be awarded.

SCIENTIFIC EVENTS

PRESIDENTIAL ADDRESS AT THE ANNUAL MEETING OF THE ROYAL SOCIETY

SIR HENRY DALE, in his presidential address to the annual meeting of the Royal Society, urged that plans for the reconstruction of London should include provision for a spacious central home for the scientific societies.

There was a large gathering, and at an informal luncheon preceding the meeting the president welcomed the presence of General Smuts, a fellow of the society since 1930, and many guests, including Mr. Attlee, Sir John Anderson, Lord Woolton, R. S. Hudson, L. S. Amery, W. S. Morrison, the High Commissioner for India and the High Commissioner for New Zealand.

Reviewing the history of the society and the different quarters it had occupied, Sir Henry Dale recalled that the society remained for 50 years from its foundation a tenant of rooms in Gresham College, till in

1710, when Isaac Newton was president, it acquired the house in Crane Court, off Fleet Street, which was its home for another 68 years. In 1778 it was granted quarters in Somerset House, where the accommodation was regarded from the first as inadequate and where the society remained for nearly 80 years.

He described proposals then made for bringing the major scientific societies under one roof—the Royal, Linnean, Geological, Astronomical and Chemical Societies—centralizing and coordinating their libraries without any attempt at fusion. He said the acquisition by the Government of Burlington House, Piccadilly, provided what seemed to be the ideal opportunity of giving effect to such a plan, and the Prince Consort, with a vision of the future meaning of science far in advance of his time, privately urged the five societies to press their claim to the site.

There was much rival lobbying in those days, and a magnificent opportunity to give London a scientific