

SOVIET EDUCATION: from DETSKY SAD to ASPIRANT

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IMAGINE AN AMALGAMATION of M.I.T., National Bureau of Standards and Bell Telephone Laboratories in a single organization called the U. S. Academy of Sciences. This hypothetical research conglomerate would be comparable to the Soviet Academy of Sciences. Our visit, for five months of research at the Institute of Physical Chemistry of the Soviet Academy of Sciences in Moscow, gave us an opportunity to observe from the inside the working order of the Russian scientific establishment.

Our plane landed at the Moscow International Airport on a dreary Monday evening last year. We had heard dismal stories about the experiences of others and our excitement was dampened as much by uncertainty as by the rain.

Prepared for a long wait and complicated customs procedures, we were pleased to claim our unopened baggage immediately. Exchange scholars on the US-USSR Academies of Sciences Program are practically free of political interference. The reason is that the Russians have the same selfish motives that we have for keeping open the lines of scientific communication. Within an hour we checked into our new home for the autumn and winter: the 14-story hotel of the Academy of Sciences on Leninsky Prospect near Gorky Park. The apartment, small but well-furnished, had two rooms and a bathroom but no kitchen. Luckily we had packed an electric skillet which became the nucleus of a makeshift kitchen. Borrowing an idea from the Russian housewife, we used the interior of the double window for a refrigerator. Nature did its best to keep the temperature below freezing but occasionally we found in our icebox an unexpected supply of defrosted food. The bathtub turned out to be an all-purpose fixture, serving as laundry tub, bathtub and kitchen sink.

Our Russian colleagues at the Institute of Physical Chemistry loaned us kitchenware and

small appliances and gave us useful shopping tips. Still, for an American woman speaking little Russian, shopping in Moscow was a full-time job. Sign language and a sense of humor helped. More often than not, curious shoppers joined in to guess what the needed item might be. Usually these guessing games ended in laughter and a successful purchase. The Russian people are like Americans, friendly and willing to help. Strangers gave us their seats on buses for our children and often showed concern about our children's clothing. Russian housewives were astonished to see our daughters dressed in a single coat for the cold winter days. In Moscow, woolen or nylon clothing articles are rare and the children wear three or four layers of clothing to keep warm.

The streets of Moscow are literally lined with buses, streetcars and minibuses. The fare is 3 to 5 kopecks (100 kopecks = 1 rouble) and the passengers pay on the honor system by dropping their fare into a machine and dialing their own receipt. The fine for not paying is low, only 40 kopecks, so there is often someone trying to get a free ride.

Stores in Moscow are specialized: bread stores, dairy-product markets and vegetable stores but only a few supermarkets. The stores are well-stocked with staple items such as flour and sugar but few luxury items or out-of-season fruits are available. We quickly grew accustomed to standing in line. A single purchase is a complicated transaction consisting of three steps: 1) find the article and obtain its price at the counter, 2) pay for the article and get a receipt at the nearby cashier's desk and 3) return to the counter and exchange the receipt for the article. This inefficiency is not amusing when you are in a hurry to buy a loaf of bread.

Books are the best shopping bargain in Moscow. The quality of the paper and the printing is substandard but prices are very low. For example, we purchased a hardbound copy of a popular course in physical chemistry (600 pages) for \$1.50. Comparable bargains are available in



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fiction. The problem is that it is hard to find copies of books by Bunin or Yevtyshenko, much less Solzhenitsyn. The complete works of the nineteenth century writers (Pushkin, Gogol, etc.) are available in handsome and inexpensive editions.

WE WERE OFTEN invited to Russian homes where we became acquainted with the traditional Russian hospitality. No one we knew owned a house; the apartments were small by our standards. Often the grandparents share a three-room flat with the young family. All of the scientists and engineers whom we met own television sets and refrigerators. **The Russians laugh at our obsession about slimness. Food is not a diversion in an evening of entertainment; it is the main feature. Dinner lasts for hours and hours and it is impossible to eat everything that is served.** The table totters under its load of *zakuski*: cold meats, fish, salads, cheeses, breads and sometimes caviar which, regretfully, is becoming scarce as pollution decimates the sturgeon population of the Caspian Sea. These hors d'oeuvres are delicious but, like a long-distance runner, it is important to maintain restraint at the beginning in order to finish. The next course is borsch (cabbage and beet soup served with sour cream) or another soup accompanied by cabbage-filled cakes. Finally, almost too late to enjoy it, the main course appears and is followed

leisurely by fresh fruit and assortments of cakes and candy. Often, tea is served with a special kind of jam which is eaten before each sip for sweetening. Beverages with the meal include Georgian wine, Armenian cognac and, of course, vodka.

We sampled the Moscow restaurants and found the quality of the food and the service to be occasionally very good but more often mediocre. Tipping is considered somewhat belittling and does not improve the service.

A typical wage in Moscow is 130 roubles (144 dollars at the official exchange rate) per month. Usually husband and wife both work so that the family earns 260 roubles per month. Russian women, with equal pay, drive steamrollers, shovel hot asphalt and are employed as doctors, scientists and directors of collective farms.

A few weeks after we arrived in Moscow, we enrolled our children in the State-run *detsky sad* or kindergarten. The long school day, from 8:30 to 5, allows the Russian mother to work. Younger children of working mothers attend the *detsky yashi* or nursery schools. Our children's class of twenty was cared for by four women. The daily schedule included three meals and a long play period or walk outside, even in the winter. A three-hour nap (yes, three hours) ensures that the children are full of energy when they return home in the late afternoon.

THERE ARE TEN years of school; Russian children enter elementary school one year later and finish high school one year earlier than American children. More time is devoted to physics, mathematics and chemistry in the Russian schools and, in Moscow, over half of the children study English. For Russian teenagers



Moscow State University has an enrollment of 30,000 and is Russia's finest university.

The primary function of Russian universities is teaching . . . the basic research and development is performed by the institutes of the Soviet Academy of Sciences.

the heavy homework assignments provide little spare time for dating and amusements. Even though Russians love, almost idolize, their children, they believe in strict discipline and the nonsense approach that *parents-know-best-what's-good-for-their-children*. The family life is close and the generation gap is not taken very seriously.

The strength of the Soviet curricula in the basic sciences has been well-known since the launching of the first sputnik. Less well-known is the Soviet emphasis upon foreign languages, particularly English. The training begins early, especially for the children of scientists. For example, in 1958, when scientists and engineers began to arrive in Novosibirsk to start the now-famous scientific center in Siberia, one of their first acts was the formation of an English reading circle for their children. Programs like these have achieved impressive results: a large percentage of Russian scientists and engineers speak English and nearly all of them can read technical English.

Higher education in the USSR is divided into two basic types: 1) universities and 2) special educational institutions. The special educational institutions have programs in agriculture, medicine, pedagogy, etc. and include the technical institutes which train the Russian engineers. **The duration of the engineering program is five years. The engineering curricula at the technical institutes contain almost no courses in the humanities and social sciences and there are no elective courses.** As a result, the Russian engineer receives a good but specialized technical education. The Russians complain that their engineers do not receive enough practical experience in the laboratory, a complaint familiar to U. S. educators.

After obtaining a degree at a technical institute or at a university, the student, called an aspirant, may work for the degree of Candidate of Science. There is no formal course work for the Candidate degree, which is based upon research and requires the defense of a thesis. The highest degree is Doctor of Science. It is tempting to equate the Russian degrees of Candidate and Doctor with the U. S. degrees of MS and PhD in the sciences. Actually the Russian degree of



Smolensky Cathedral in Moscow's Novodevichy Convent. In the convent cemetery are the graves of the composer Scriabin and the writers Gogol and Chekhov.

Doctor of Science requires much more work than our PhD degree. For the Soviet doctorate, a typical thesis is based upon a five- or ten-year research program and dozens of publications.

The primary function of Russian universities is teaching. Most of the basic research and development is performed by the institutes of the Soviet Academy of Sciences. This division of teaching and research in the Soviet system contrasts sharply with the U. S. system, where most basic research is done at the universities.

The research activities of the Soviet Academy of Sciences are organized according to disciplines: Institute of Organic Chemistry, Institute of Mathematics, Institute of Geophysics, Institute of Physical Chemistry, etc. Within each institute authority is delegated to senior scientists called academicians, who run research teams consisting of several dozen scientists and technicians. The rank of academician in the Soviet Union is a cherished position which brings with it such privileges as a chauffeur-driven car and virtually unrestricted freedom to travel abroad.

The institutes in Moscow are quite crowded; three scientists may share a small room. Only academicians have private offices. Therefore it was obviously no small sacrifice that I was given a well-equipped private office. Dozens of Russian scientists and engineers at the Institute of Physical chemistry work in the field of surface chemis-



St. Basil's Cathedral in Moscow, built during the reign of Tsar Ivan the Terrible, has domes that resemble peppermint-striped onion bulbs.

try and the desire to learn about their research was the reason for our trip to Moscow. Technical discussions, sometimes in Russian and sometimes in English, began a few days after our arrival. Soon, the routine of daily discussions led to some exchanges of ideas which were eventually published in joint articles.

Besides the lack of space, Russian scientists and engineers are faced with a scarcity of instrumentation and computing facilities. A Russian scientist needing, say, a chromatograph for a routine analysis may have to build it himself. The computers (for example, the BESM 8) are comparable in speed and storage capacity to the latest American models but scientists complain that the demand for computer time greatly exceeds the supply.

The most conspicuous weakness of the Soviet scientific establishment is its technology. I heard a lecture about the U.S. given by a Soviet scientist, who said that the U. S. and Russia are equal in strength of basic research but American technology is superior. He meant that the interlock-

ing and overlapping system of research and development at U. S. universities and industrial research laboratories has no counterpart in Russia. In Russia, the universities teach, the Institutes of the Academy of Sciences do basic research and the industrial organizations do applied research. This clear-cut division of responsibility has obstructed the free exchange of ideas between basic research and applied technology. The Russians are aware of this weakness and are experimenting now with plans for a more equitable distribution of basic research among the institutes, universities and industrial research laboratories.

Our trip to Russia was a rich and rewarding experience. The exchange program sponsored by the U. S. National Academy of Sciences has accomplished the nearly impossible feat of opening the lines of communication between the U. S. and USSR. Unfortunately the number of scientists and engineers exchanged each year is small and it is hoped that agreements negotiated in the future lead to a generous enlargement of the program.



The Kremlin Palace surrounded by the walls and towers of the ancient Kremlin.

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ASEE LITERATURE

The Relations with Industry Division of ASEE held the 22nd Annual College-Industry Conference at the University of Florida, Gainesville, Florida on February 5-6, 1970. The presentations at that conference are published as Industry-Engineering Education Series I-3, *The Current Campus Scene*. Copies of this 77-page paperback are \$2.00. The booklet contains 13 papers on the problems of the campus, the college-industry relationship, the student adjustment in industry and in gov-

ernment, the response of industry, and challenges to higher education.

The Engineering School Libraries Division of ASEE has published a *Guide to Literature on Chemical Engineering* by V. E. Yagello, Head of Chemistry and Physics Libraries, The Ohio State University. Single copies of the 24 page guide are \$1.00 but 25¢ if 10 or more are ordered).

This literature should be ordered from: Publication Sales, ASEE, Suite 400, One Dupont Circle, Washington, D. C. 20036.