

## The road into science<sup>1)</sup>

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... My laboratory in the Roentgen Institute; at present seven persons are working in it, seven projects are under way, and during this year five papers were completed and published in Germany—this is not the result so much of my own efforts as of the following: A. F. (Aleksandr Filippovich Val'ter), V. N. (Viktor Nikolaevich Kondrat'ev) and, finally, of the first recipient of a diploma Yu. B. (Yulii Borisovich Khariton). Being busy with the organization of the Roentgen Institute as a whole I was unable to devote to my own laboratory sufficient time, effort and initiative.

And, of course, the laboratory would not exist if I had not met such people as A. F., V. N. and Yu. B. On their part I always encountered infinite devotion, even a sense of self-sacrifice in the task of creating the laboratory literally from nothing. There never has been any formal attitude to the work at hand, no ideology of "it's none of my business", there was always a consciousness of the communality of the problems of the laboratory as a whole; if it became necessary in order to satisfy the needs of the laboratory to abandon temporarily one's own scientific work, they abandoned it, and devoted all their efforts to the common problems of organization. Never in my life have I experienced greater pleasure than in this collective work of our foursome; they were not my pupils, but were faithful tested comrades. In order to evaluate better the activity of A. F., V. N. and Yu. B., I will remind you of the conditions under which we had to build our laboratory in 1921. In the small room No. 47 of the Polytechnical Institute myself and three students of the second year began creating our laboratory, erected at the center a small wood stove, with the chimney taken out through the window; then installed a tank, and three students with three pails daily acted as the water supply.

The stove smoked terribly, the students in turn made good with their lungs the deficiencies of the chimney, but nevertheless we frequently had to work surrounded by smoke. In this room, or in this hell, surrounded by smoke and cold, three projects were completed. It was awfully crowded. Thus our laboratory was founded. And nevertheless all three projects immediately progressed. And this was achieved by three inexperienced students to whom I had time to give advice, but almost had no time to help with my own hands and by my own example, since for me this was no less a heroic time in organizing the Roentgen Institute. Do not forget that at the same time the students managed to attend all the lectures and exercises and to pass a maximum of examinations. Your will ask, how is it possible to do all this? Very simply and at the same time with great difficulty. Losing sleep at night, forgetting about all pleasures and rest.

But victory awaited them. Now we have a well-

equipped large laboratory, under the direction of V. N. and A. F. we already have four young students at work; they no longer have to exert such heroic efforts; they have arrived into already established surroundings created by sleepless nights, by the dreams and will of the first three.

But the principles of collective work and close comradeship, faithfulness to the laboratory are not extinguished in our laboratory, and in them, I believe, lies the foundation of its successful development.

Having such battle-tested comrades as A. F., V. N. and Yu. B., I have no doubt that we shall attain much and test the idea of introducing the principles of industrial organization into the process of scientific work itself. For I am convinced that the time of solitary scientists and individual scientific efforts is passing and scientific work requires a collective organization. Thus, the second achievement of A. F. and V. N. is the creation of our laboratory, and since in scientific work the problems of organization, the ability to overcome difficulties, the quickness and resourcefulness is one of the main preconditions of success, then this experience gained by them during the most difficult times makes them even more hardened and attuned to achievement and to struggle for scientific success.

Today is a festive day for us all; for the first time we are graduating students who have grown up and become established within our faculty. I bring sincere congratulations on this achievement to everyone, and particularly to Abram Fedorovich Ioffe to whom belongs both the idea of creating this faculty, and also the principal effort of carrying it out.

But I would like today to congratulate Abram Fedorovich with an even greater success. I would like to remind him that we all, his immediate pupils, with whom he surrounded himself in 1914–1915, we all know definitely that both the physical-mechanical faculty, and the Roentgen Institute, and our now independent laboratories are all different facets of the same work which he began to carry out ten years ago and which consisted of creating in Russia a new, lively, well-organized scientific school . . .

... In 1913 you, Abram Fedorovich, raised the banner, and I think there is now a basis for thinking that it will never be lowered, and that physics will be solidly based in Russia. Much effort, energy, time, wit and health have you invested in this work of a decade, but you have achieved success.

Today, Abram Fedorovich, it the first day when after many years, after five long years from the day when the last of us, your immediate pupils, P. L. Kapitsa received his diploma,—for the first time two young scientists are entering the ranks of the physicists of your school. And how are they entering these ranks: by graduating from the faculty created

by you and having carried out their work in the institute created by you. They are only the first leaders of that army of physicists who shall be set in motion following them. And if even a year or two ago one might have had some doubt as to the source of your work, there are now no more doubts; your work will survive. You will die, we will die, all your immediate pupils and assistants, but look and you can see strong and

robust people are coming to replace them, who have only one thought, one wish—to extend and continue your work.

<sup>1)</sup> The speech made by N. N. Semenov on the occasion of the graduation of the first class of students of the physical-mechanical faculty of the M. I. Kalinin Leningrad Polytechnic Institute in 1924. (Editor's note).

Translated by G. M. Volkoff