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Science in Eastern Europe: I

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Lady Raman and myself left for Europe by the s.s. "ASIA" which sailed from Bombay on the 9th of May this year and docked at Genoa in Italy on the morning of the 23rd of the same month. We were in Europe for nine weeks and took the same steamer back to India, leaving Genoa on the 30th of July and reaching Bombay early morning on the 13th of August. We travelled by rail, stopping off at various places for a shorter or longer period as we thought fit. The tour gave us a wonderful opportunity of seeing the countries through which we passed and of obtaining some knowledge of their condition and activities at the present time. This article records some of my personal impressions and it is hoped that it may be of interest to readers of *Current Science.*

The countries we had arranged to visit were in Eastern Europe, but our journey to them took us through Italy and Austria. Proceeding from Genoa to Milan, a brief stop was made at the latter city where we visited the Science Museum recently set up by the civic authorities, in which a remarkable exposition of the pioneer investigations of Leonardo Da Vinci is a noteworthy feature. Travelling from Milan through Verona and the Brenner pass, we reached Innsbruck in Austria where we made an overnight stop. We found Innsbruck to be a town of great charm set in Alpine surroundings of impressive grandeur, and we were thereby confirmed in our resolution to return to it for a longer stop during our return journey. The railway took us across Austria from Innsbruck to Linz via Salzburg, through a region of mountains, lakes and valleys of entrancing beauty. At Linz we made an overnight stop, and left next morning for Prague which we reached on the afternoon of the 27th of May.

2. Prague

A feature that impressed us during the journey through Czechoslovakia was the meticulous attention given to agriculture, not an acre of land, so far as we could see, escaping the attention of the cultivator. It was also obvious that we were passing through a highly industrialised country. It did not therefore surprise us to discover when we arrived at Prague that Czechoslovakia pays much attention to advanced studies in science and technology and that research is assiduously pursued.

Figure 1. Prof. Heyrovsky in the garden of the Polarographic Institute.

The Czechoslovakian Academy of Sciences played host to us at Prague. The Academy had placed a young spectroscopist—Dr Josef Pliva—on special duty to take me around and he carried out the assignment with energy and enthusiasm. Indeed, the five days of our stay at Prague were crowded with activity. Formal receptions, social engagements, visits to the Research Institutes of the Academy and to the Laboratories of the Technical University and excursions to places of interest around Prague filled up most of the time. I also delivered two lectures at the Physical Institute of the Charles University, the first on "The specific heats of crystals", and the second on "The physics of the diamond".

It is not possible here to summarise all that I saw of the scientific life of Czechoslovakia or even to mention the many distinguished men of science with whom I conversed and discussed scientific problems during my stay at Prague. The barest reference to a few items must suffice. I was highly impressed by my visit to the unpretentious laboratory of Professor Jaroslav Heyrovsky, famous as the founder of the polarographic method in physical chemistry. He received me most cordially and expounded for my benefit the basic principles of the subject.

At the Institute of Technical Physics of the Academy, I saw much of interest, a notable item being the preparation of a rod of pure silicon which was in progress. During my visit to the Technical University, I was much struck by the excellence of the mineralogical museum which I saw on one of its floors. The museum was a wonderful collection of beautiful specimens from all parts of the world arranged

and exhibited in a remarkably perfect fashion. Finally, I should mention my visit to the Institute for Research in Minerals situated in Tournov about seventy kilometres from Prague. The journey was made by motor through a beautiful landscape known locally as the Czech Paradise. I found that an important section of the Institute was devoted to the synthetic production on a large scale of crystals required for the electrical and other industries. There was also a section devoted to the cutting of quartz and the fabrication of optical instruments made from quartz. A demonstration was given to me of the performance of the so-called birefringent filter made of quartz plates which finds application in astronomy.

3. Moscow and Leningrad

We were at Moscow from the 4th to the 7th of June, and again from the 11th to the 14th of the month, the interval of three days from the 8th to the 10th being taken up by a brief visit to Leningrad. The time thus devoted to these two great centres of scientific activity was, of course, much too short to enable them to be adequately explored. Even what I saw was sufficient, however, to impress upon me the vast scale on which scientific advance is encouraged and supported by the USSR.

The Institute for Physical Problems directed by Academician Peter Kapitza was the very first to be visited by me. That Institute specializes in the production of low temperatures and the study of the physical properties of matter at such temperatures. I utilized the facilities available in it for making some preliminary studies on the luminescence spectrum of diamond held at liquid helium temperature. A highly interesting forenoon was spent at the Institute of Crystallography where I was welcomed with special enthusiasm by Academician Belov and his collaborators. A striking exhibit had been there arranged for my benefit of moving films exhibiting the growth of crystals as well as the order-disorder phenomena observed in them. During my return visit to Moscow, I delivered a lecture at the Institute of Prof. Kapitza on "The thermal energy of crystals". On the 12th of June, I was officially received by President Nesmeyanov and his staff at the administrative offices of the USSR Academy of Sciences. The next evening, at his invitation, I delivered in the conference room of the Academy a lecture on "The dextro and laevo forms of the carbon atom", standing beside a gigantic portrait in oils of the great Russian chemist, Mendeljeff. The Lebedev Institute of Physics directed by Professor Skobeltcyn and the grandiose building of the University of Moscow and its Institute of Physics were also visited.

One day of my brief visit to Leningrad was utilized for a call at the Institute of Semiconductors directed by the celebrated Russian physicist, Academician Joffe. I was there shown the thermoelectric batteries and the thermoelectric refrigerators which had been developed in the Institute as practical applications of thermoelectricity. On another day the well known observatory at Pulkovo near

Leningard directed by Academician Mikhailov was visited. The observatory which had almost been completely destroyed during the war had been reconstructed and is functioning once again. During my tour of the observatory buildings, I was shown a new type of coronograph which had been developed at the observatory. It was evident from what I saw at Pulkovo and elsewhere that great advances in optical technology had been made in the USSR and that in the production of optical instruments such as spectrographs, gratings, large mirrors and lenses, the USSR is now completely self-sufficient.

4. Kiev

We were at Kiev from the 15th to the 18th of June. This city, the capital of the Ukraine, is beautifully situated on an elevation overlooking the river Dneiper. It has been almost completely reconstructed after the war and but little evidence remains of the destruction caused by the latter. Civic pride is manifest in the tidiness of the roads and the beautifully kept boulevards and gardens.

Though our visit to Kiev was very brief, it was full of interest. The Ukraine has its own Academy of Sciences. At some little distance from the city a new Institute of Physics has been built and equipped which is devoted for the most part to nuclear studies. I was very warmly received by its Director, Academician Pasechnik and his colleagues and went round the laboratories. In the auditorium of the Institute which was filled to capacity, I gave a lecture on the theory of the atomic vibrations in crystals. On the afternoon of the same day, I delivered a semi-popular address in the hall of the University of Kiev describing the results of the Bangalore investigations on iridescent minerals. The various departments of the University were visited later the same evening. The next morning, I went round the Institute of Metals conducted by the Academy and was greatly impressed by the wide range of the problems being investigated by its staff. Here, again, I gave a lecture on "The diffraction of X-rays by diamond". In the afternoon, I visited the Institute of Physical Chemistry of the Ukrainian Academy of Sciences and had a long conference with Academician Brodsky and his colleagues in which problems of common interest to us were discussed.

5. Budapest

Many years ago, before the war, I had been at Budapest for a fortnight. Seeing it again, it was evident that the scars left by war had not all been effaced. Nevertheless, Budapest was beautiful as ever, standing as it does astride the Danube and with the hills overlooking it. We were very happy to be able to devote ten days for our visit to Hungary. The Magyars—as they call

themselves—are a gifted people fully capable of rising to great heights of achievement in all the realms of knowledge.

The Hungarian Academy of Sciences played the host to us and we had a wonderfully interesting time. A young spectroscopist, Dr Laszlo Szalay, Lecturer in Physics in the University of Szeged, was on special duty to look after us and make all the necessary arrangements. Dr Szalay had prepared for my perusal a highly informative account giving us a complete picture of the state of physics in Hungary and a brief outline of the activities currently in progress under the auspices of the Academy and at the different universities in Hungary. An outstanding recent development has been the establishment of a Central Physical Research Institute—with ten departments—under the auspices of the Academy with Prof. L Janossy as Director. Prof. Janossy was away in China on a lecturing tour when I arrived at Budapest. Fortunately, however, he returned in time to be able to take an active part in a meeting of the Hungarian Physical Society held on the 27th June. One of the items on the programme of this meeting was a lecture by me on "Physical research in India". I spoke in English and Prof. Janossy gave a fluent running translation of my speech into Hungarian. Besides this lecture, I gave a systematic course of three lectures on "The physics of crystals" under the auspices of the Hungarian Physical Society. These lectures were attended by a large and distinguished audience and every lecture was followed by a vigorous discussion. The rest of my time was fruitfully spent in visits to the Central Physical

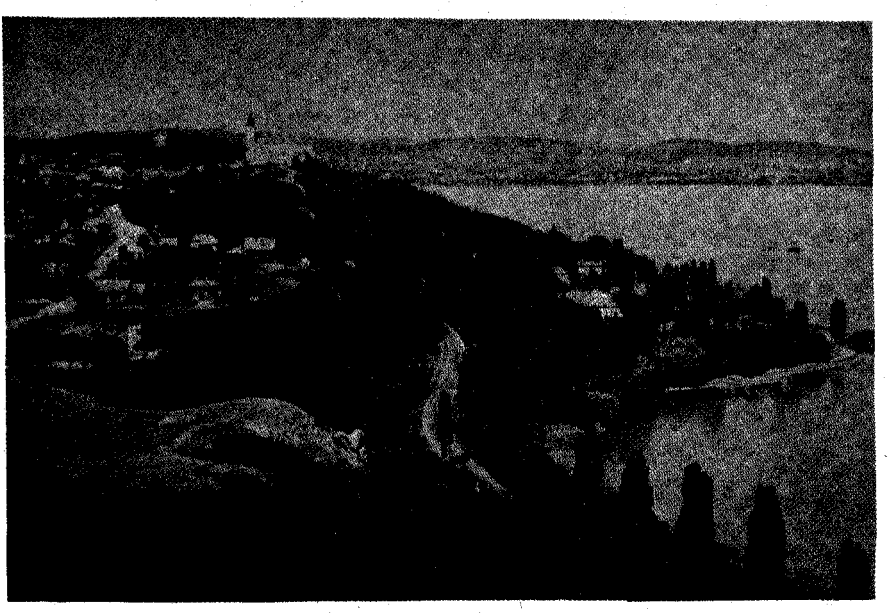

Figure 2. Tihany and Lake Balaton.

Research Institute referred to above and to the various other laboratories in Budapest including especially that directed by Prof. Z Gyulai—the doyen of Hungarian physicists—which concerned itself with crystal physics and the Research Laboratory of the Tungsten Lamp Industry directed by Dr G Szigeti. I witnessed fascinating demonstrations of the work in progress in both of these Institutes.

Limitations of space prevent my giving a fuller account of the scientific activities in Hungary which I witnessed and referring to the other distinguished men of science whom I was privileged to meet and discuss scientific problems with. This account of my sojourn in Hungary would however be incomplete if I do not at least mention the Lake of Balaton and Tihany where we stayed on Sunday, the 21st of June—a lovely beauty spot as can be seen from the picture reproduced. The day before we left for Rumania, Dr Szalay took us on a motor ride across Hungary to visit his own University of Szeged. The physicists of the University were mostly away attending the meetings at Budapest. But we had the pleasure of visiting Dr Szalay's own home and of a short conference with the theoretical physicist, Dr János Horváth on subjects of common interest to us.