

Igor Kurchatov

Vospominaniia ob Igore Vasil'eviche Kurchatove. A. P. ALEKSANDROV, Ed. Nauka, Moscow, 1988. 496 pp., illus. 2 rubles, 10 kopeks. Uchenye SSSR.

Igor Kurchatov was scientific director of the Soviet nuclear program from its inception at the end of 1942 until his death in 1960. During that time his responsibilities were far broader than those of J. Robert Oppenheimer, for he was in charge not only of the development of nuclear weapons but of a whole atomic industry, from uranium mining to uranium enrichment and plutonium production. This collection of 61 essays by people who worked with Kurchatov throws new light on one of the leading pioneers of the nuclear age.

This is essentially a celebratory volume, and it has many of the faults one might expect from such an enterprise. Its tone is uncritical, and often sentimental; and some of the contributions are slight and anecdotal. Yet in spite of the deficiencies of the genre, this is a valuable book, with many informative essays. Some of the people who knew Kurchatov best have contributed to it: his brother, Boris, a radiochemist; Iu. B. Khariton, whom Kurchatov knew from his Leningrad days and put in charge of weapons development; G. N. Flerov, who wrote to Stalin in April 1942 about the need to build the bomb; Ia. B. Zel'dovich, who was chief theorist at the weapons institute; M. G. Pervukhin, Minister of the Chemical Industry, who worked closely with Kurchatov from early 1943 until the 1950s; B. G. Muzrukov, one of the first directors of Cheliabinsk-40, the plant near Kyshtym in the Urals where the first plutonium production reactors and reprocessing plant were built.

All the main stages of Kurchatov's life are covered here: the years from 1925 to 1941 at the Physico-Technical Institute in Leningrad; his work for the Navy in 1941 and 1942 to protect ships from magnetic mines; his role in the development of nuclear weapons; and the part he played as director of the Institute of Atomic Energy in promoting research in high-energy physics and the peaceful uses of atomic energy.

Some of the most interesting aspects of Kurchatov's life are, however, not even touched upon. It was Stalin who took the decision in 1942 to initiate a Soviet atomic bomb project, after learning of German, British, and American work; and it was Stalin who decided after Hiroshima to turn

what was still largely a laboratory project into a full-scale industrial effort. Yet there is nothing in the book about Kurchatov's relations with Stalin, to whom I noticed only one reference. There is, besides, no mention of the man in overall charge of the project, the notorious police chief Lavrenti Beria, with whom Kurchatov had frequent contact. It is only in the last year, after this book went to press, that any reference to Beria's role in the Soviet project has been published in the Soviet Union. There is apparently another volume of reminiscences about Kurchatov in preparation; perhaps that will throw more light on this important aspect of the nuclear program.

Kurchatov is presented by some of the authors as destined for greatness from the beginning. But on the eve of the war his future did not look so bright. He had not been successful in elections to the Academy of Sciences, and a plan he had submitted to the Academy in 1940 to build an experimental nuclear pile had been rejected. In 1942, when the Soviet project was started, Kurchatov was not the first choice as scientific director, and indeed doubted his own ability to direct the project.

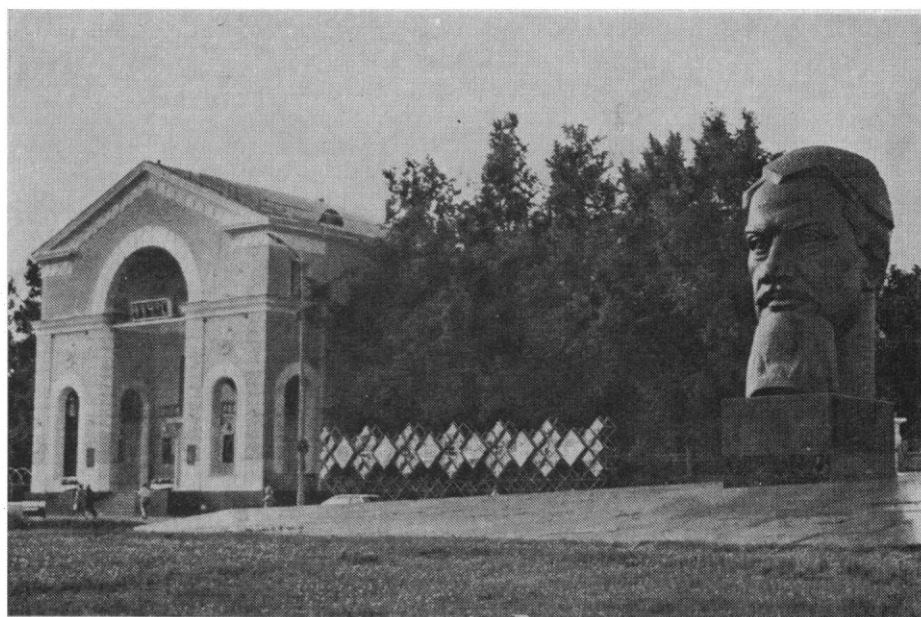
In spite of his misgivings, Kurchatov proved to be a superb organizer. He had a clear conception of the main problems to be solved and could explain them clearly to managers who did not understand nuclear physics. To save time he pursued different paths to the same goal; he organized, for



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example, research into four different methods of uranium isotope separation. In spite of his broad responsibilities, he took an active part in building the first Soviet pile, which went critical on 26 December 1946. He moved to Kyshtym to supervise the construction of the first plutonium production pile, which went critical in June 1948. His role in the design and development of the bomb is not elucidated here, but he was in charge of the first atomic bomb test on 29 August 1949.

Kurchatov satisfied the harsh demands of Stalin and Beria for a Soviet bomb as soon as possible. At the same time he established



Entrance of the I. V. Kurchatov Institute of Atomic Energy, Moscow.

good working relations with industrial managers and engineers and retained the respect and loyalty of the scientists who worked for him. He emerges from this book as an energetic, cheerful, extrovert character who liked a joke and was fond of giving nicknames to the people he worked with. He had a powerful presence and considerable personal charm. He drove his subordinates hard, passing on the pressure that he was receiving from above. But he did not shirk the heavy responsibility that rested on his shoulders, and he did his best to help those who worked for him.

Kurchatov had no apparent qualms about his role in developing nuclear weapons. He believed that the Soviet Union needed to guarantee its own security by eliminating the American monopoly and achieving a nuclear balance. His close friend and colleague A. P. Aleksandrov writes, however, that Kurchatov was shaken by the results of the first Soviet thermonuclear test in August 1953. When Aleksandrov asked him what was wrong he replied, "That was such a monstrous sight! These weapons must not be allowed to be used." Kurchatov turned

his attention increasingly to the peaceful uses of atomic energy, and especially to research on controlled thermonuclear reactions.

Kurchatov wanted to encourage collaboration between Soviet and foreign scientists. In the mid-1950s he pressed for the declassification of Soviet nuclear research. It was he who decided that Soviet physicists should play a serious role in the first Conference on the Peaceful Uses of Atomic Energy in Geneva in 1955. And in April 1956, when he accompanied Khrushchev and Bulganin to Britain, he gave a lecture on controlled thermonuclear reactions at Harwell, speaking of work that had till then been secret and was still classified in Britain and the United States.

In spite of its deficiencies, this book makes an important contribution to our understanding of one of the most important figures in the nuclear age.

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Struggles and Accomplishments in India

Journey into Light. Life and Science of C. V. Raman. G. VENKATARAMAN. Indian Academy of Sciences, Bangalore, 1988 (U.S. distributor, Oxford University Press). xviii, 570 pp., illus., + plates. \$45.

Among the life stories of great men of science, this scientific biography stands out for providing insight into the evolution of a natural philosopher and scientist in a country which, though rich in traditions and cultural heritage, was a colony dominated by foreign rule. C. V. Raman was born and grew up in surroundings that had little to offer by way of tradition in or equipment for scientific research. Yet through love of science, thirst for knowledge, discipline and dedicated work, and personal sacrifices he overcame the obstacles he faced and made many outstanding discoveries. The most important of these, the change in the wavelength of light due to scattering by a transparent medium known as the Raman effect, won him the Nobel Prize in 1930.

In many ways the story of Raman is also the story of evolution of organized scientific research in India, of which he was the pioneer. Like all pioneers he was passionately attached to his cause, and in the cause of science he created many schools of physics, started and maintained research journals, organized national meetings of scientists, and provided inspiring leadership to schol-

ars from all over India. By lifelong devotion to such efforts he came to be regarded as the foremost among the men of science of that country and one of the greatest in the world.

Raman was born on 7 November 1888, in a village near Trichinopoly in South India, the second of eight children. Being a precocious child he finished his primary and secondary schooling and was ready for college at age 11. At 16, he earned his B.A. degree from the Presidency College in Madras, leading his class as usual and winning gold medals for English and physics. His professors, of whom many were Englishmen, advised him to go to England for higher studies, but the civil surgeon of Madras who examined him declared him unfit to withstand the rigors of the English climate. This event produced a lasting effect on Raman's mental and spiritual outlook and played a role in molding his personality. He joined the M.A. class at the Presidency College, where he undertook the study of a great variety of subjects, which included the scientific works of Lord Rayleigh and of Hermann von Helmholtz. His reading also included *The Light of Asia* by Edwin Arnold, and this left a lasting impression on him. He was moved by Siddhartha's renunciation and subsequent search for truth and enlightenment.

In 1906, while still a student at the Presi-

dency College, Raman initiated himself into research by executing a project in optics based on original observations and published the results in the *Philosophical Magazine*, London, all without assistance from anyone. This was soon followed by a second publication in the same journal.

When after earning his M.A. Raman found that research positions were nonexistent, he accepted a job in the finance department of the Indian government in Calcutta. This step could have dashed any hope he might still have had of pursuing physics had he not discovered the Indian Association for the Cultivation of Science within weeks after settling in Calcutta with his new wife, Lokasundari. He lost no time in resuming his researches at the Association, in an honorary capacity. For the next ten years he devoted long hours to research in acoustics and vibration (stringed musical instruments being a particular interest) in addition to fulfilling his duties as an officer of the government in an exemplary manner. Then, in 1917, as a consequence of the excellence of his work as evidenced by his steadily growing national and international reputation, he was appointed to the Palit professorship of the Calcutta University. Raman showed no hesitation in accepting this chair although it involved resigning from his lucrative government job and taking a large salary reduction.

Raman was committed to excellence, and to him the pursuit of science meant total involvement. When appointed to the directorship of the Indian Institute of Science in Bangalore in 1933, he made a dynamic drive to make that Institute a center of excellence by world standards. But his efforts were met with strong resistance, and in 1938 he had to step down from the directorship. Experiences such as these made him believe that politics and science should not mix and that the organization of pure research should not be influenced by governmental authority, which would tend to encourage mediocrity.



"Raman with his baby quartz spectrograph in Calcutta." [From *Journey into Light*; courtesy Raman Research Institute]