put some technical questions to him, about the development of the Soviet reactor perhaps, but not about the reactor itself, assembly of which did not begin until August 1946. Bohr gave Terletsky some very general answers and provided him with a copy of the Smyth Report on the bomb, which had been published by the U.S. government in August.

In his unpublished account of the visit to Bohr, Terletsky makes the point that Bohr told him nothing that Soviet physicists did not know already. Bohr spoke in very general terms, according to Aage Bohr, Niels Bohr's son and himself a Nobel laureate in physics, who was present at the conversations between Bohr and Terletsky. What Sudoplatov does not recount—and may not know—is that Bohr told Danish intelligence about the visit, which took place at his Institute, and also informed the British and American authorities. Sudoplatov, whose knowledge of nuclear matters is minimal on the evidence of this book, may indeed believe that Bohr was supplying useful information. But such a belief does not in itself constitute evidence of espionage. This book's charge that Bohr was a spy does not stand.

The evidence in support of the charge against Oppenheimer is even flimsier. Sudoplatov reports that Oppenheimer had lunch in December 1941 with Grigori Kheifetz, the NKVD man at the Soviet consulate in San Francisco. During this lunch Oppenheimer allegedly told Kheifetz about the letter that Einstein had written to Roosevelt in August 1939 pointing to the possibility of an atomic bomb. It is certainly possible that such a lunch took place; it is also possible, though perhaps unlikely, that Oppenheimer knew of Einstein's letter to Roosevelt, and that he told Kheifetz about it. That might have been indiscreet, perhaps, but the letter did not contain any secrets.

The book claims that Oppenheimer made a special effort to bring Klaus Fuchs to Los Alamos. This is wrong. Fuchs went to Los Alamos in August 1944 (not in 1943 as the book says) after working in New York on gaseous-diffusion isotope separation as part of the British delegation to the Manhattan Project. There is no evidence that Oppenheimer made any special effort to recruit him. The list of names for the British delegation was submitted by the British and ultimately accepted by General Leslie M. Groves (as Groves recounts in *Now It Can Be Told* [Harper, 1962], pp. 142–143). Fuchs went to Los Alamos because Rudolf Peierls, whom Hans Bethe invited to join the theoretical group there, wanted to bring Fuchs, his assistant, with him (see Robert Chadwell Williams, *Klaus Fuchs: Atom Spy* [Harvard University Press, 1987], pp. 73–74).

The evidence provided by Sudoplatov and his coauthors to support their charges is largely untrue. Sudoplatov's American coauthors, the Schecters, have argued in response to criticism that Sudoplatov was in a position to know who spied for the Soviet Union and that his word should be taken even if he has misremembered the details. They have also argued that the role played by Oppenheimer *et al.* was such that there is no documentary evidence to show that they caused information to be passed to the Soviet Union. It might be added, moreover, that intelligence information from the United States played a very important role in the Soviet project; the first Soviet bomb, exploded in 1949, was a copy of the first American plutonium bomb.

Several responses may be made to these points. The first is that the authors are wrong not only about details but also about the essential elements of their charges against Oppenheimer, Fermi, Szilard, and Bohr. Almost nothing in these charges stands up to scrutiny. Moreover, these errors are embedded in an account that is mistaken about other aspects of the American and Soviet atomic projects that do not bear directly on the specific charges. There is in this whole account a pattern of carelessness (to put it kindly) that does not inspire trust.

Second, there is no need to invoke the names of the four physicists in order to explain how the Soviet Union received information about the American bomb. Klaus Fuchs, in particular, provided a detailed description of the American plutonium bomb. The fact that the Soviet Union received extensive information from the United States is not in itself evidence in support of the charges that the authors make.

Third, Sudoplatov is a self-confessed assassin and organizer of disinformation operations. To believe the charges of espionage on the basis of his testimony alone would be reckless. If all we are ever going to have is his word, then the evidence in support of charges against such men as Oppenheimer, Fermi, Szilard, and Bohr is weak in the extreme.

Sudoplatov could have various motives for making his accusations: to make money or to cause mischief, for example. It is also possible that he wants to magnify the role of the KGB, and thereby belittle the role of Soviet physicists, in the Soviet nuclear program; this is a campaign that some former KGB people have conducted over the last four years in order to discredit Andrei Sakharov and other Soviet physicists. It is even possible that Sudoplatov believes the charges, though that, as I have indicated, does not constitute evidence, since many of the things he believes or remembers can be shown to be wrong.

Sudoplatov's motives may be understandable, but his American coauthors are very much to blame for not making the effort to check out his serious, but unsubstantiated, charges.

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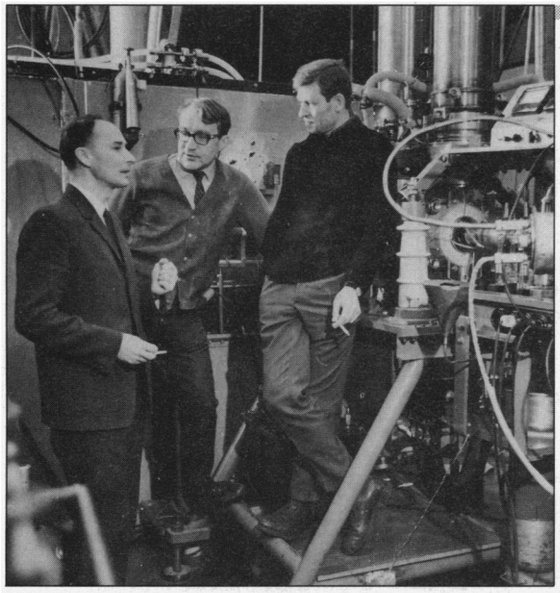
A Blossoming under Totalitarianism

The Making of a Soviet Scientist. My Adventures in Nuclear Fusion and Space from Stalin to Star Wars. ROALD Z. SAGDEEV. Susan Eisenhower, Ed. Wiley, New York, 1994. xii, 339 pp. $24.95 or £14.95.

As a one-time Soviet scientist Roald Sagdeev begins this book of memoirs by introducing himself as belonging to an "extinct species." It is worth considering how this species evolved and flourished in a very specific society that has disappeared before our eyes.

The role of physics in this extinct civilization was particularly striking. Not only did nuclear and space achievements serve as a showcase for the Soviet state, it was physics that enabled the Soviet Union to become a superpower. Isn't it a puzzle that in a country where spiritual freedom was so totally suppressed such scientific prowess could be achieved?

Though the development of the Soviet atomic bomb has been attributed by some to the exploitation of espionage, there is general agreement about the independence of the Soviet achievements in the cases of thermonuclear fusion and space exploration. In fact, Russian capabilities in physics reached the height of their fame in the 1930s, and the later achievements were in a sense by-products of that era. This blossoming under totalitarianism had clear material reasons. To create state power the government was generous toward the physicists at a level incommensurate with the ordinary standard of living in the Soviet Union and even with that prevalent in the West, then suffering a



Roald Sagdeev (center) with R. Soloukhin and A. Ponomarenko at the Novosibirsk plasma physics installation, 1969. [TASS from SOVFOTO]

deep economic crisis. At a time when the humanities were being systematically devastated, Soviet physics was like newly plowed, abundantly watered virgin soil. The first harvest of this soil, as usual in such cases, was particularly good. The number of Soviet physicists grew tenfold in the '30s, and four of the five Soviet Nobel prizes in physics were awarded for accomplishments of that decade.

The emergence of the intensive high-sci arms race brought to physics a further influx of support. Physics was the most privileged science in the Soviet state, and the physicists in turn tended to favor the power that took such good care of their science, their life's cause. This delayed for about two decades the effects of malignant factors in the Soviet regime on the enterprise of physics. The social prestige of physicists reached its zenith in the beginning of the 1960s; it was acknowledged even by Soviet popular poets. In this same era physicists used their extraordinary power also for peaceful purposes, defending geneticists against Lysenkoists, being the most receptive audience for nonconformist literature and art, and playing an unusually active role in social life.

Sagdeev was lucky enough to reach his creative maturity during just those years. He describes his generation as the "kids of socialism" and "children of the 20th Party Congress." This generation was to elaborate the accomplishments of the founding fathers of nuclear and space science, from unique devices at the frontiers of technical capability to the regular utilities of a superpower state. Of the same generation was the politician who was to try to save but eventually accelerated the collapse of the Soviet system. The future General Secretary studied law at Moscow University at the same time Sagdeev studied physics there. Four decades later the young lawyer was to head the first (and last) Soviet parliament, and the young physicist was, together with Andrei Sakharov and six other physicists, to be elected to it from the Academy of Sciences. The extent of the representation of physicists in the parliament tells a lot about their social role.

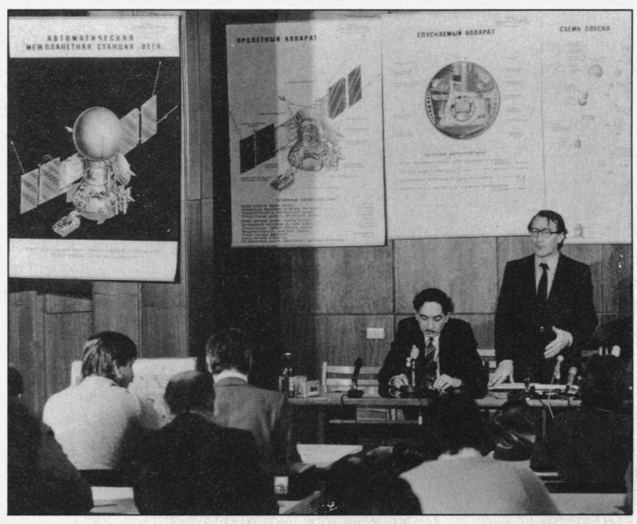
The pace of Russian history in this century has been so rapid that the most suitable unit of measure for it is the half-generation. The author had the opportunity to be closely acquainted with such remarkable and distinctive personalities of different half-generations as Piotr Kapitsa, Lev Landau, and Andrei Sakharov, and his narrative is full of personal glimpses that help illuminate the human side of Soviet physics.

Physicists put matter under extreme conditions to reveal its most fundamental features. History perhaps has put the community of Russian physicists under extreme conditions to reveal some fundamental features of the science itself.

In the foreground of the book, in any event, and its frame of reference, is the generation of the author. Having escaped from the Soviet Livermore (Chelyabinsk-70, in the Urals), Sagdeev started his career as a participant in the ambitious enterprise of converting the processes of thermonuclear weaponry into a peaceful source of energy. His contribution to fusion research was impressive enough to lead to his being dubbed—in a reference to a presumed ethnic kinship with a one-time emperor of Samarkand whose political and military concerns were displaced by an interest in astronomy—"the most famous Tatar after Ulugbek." And he didn't avoid a sad Ulugbekian experience in trying to combine the duties of an administrator with a passion for doing science when he came to head the main Soviet space research institution in the Academy and to deal with both clever and stupid Soviet *apparatchiks*.

In the short era of *perestroika*, however, the same experience provided Sagdeev an opportunity to participate, as an arms control expert during the Geneva summit of 1985, in the "new political thinking." In his assessment of Gorbachev the author uses as a benchmark the spell of Landau and other bright colleagues in physics, remarking, however, that "in his own weight category—politics—Gorbachev . . . was overwhelming."

In describing the activities at Geneva Sagdeev quotes one of his fellow members of the "gang of four" academician advisers as characterizing the group as "political call girls of the Soviet delegation." Sagdeev himself, however, was free and courageous enough when he refused election to the presidium of the Academy of Science in favor of Sakharov, although he does not write about this interesting episode here. And commenting on the difference between Sakharov's stance toward the totalitarian regime and that of himself and his fellow "moderates," he is honest and courageous enough to admit, "Maybe subconsciously we simply were not ready to sacrifice the privileges given to us by the system—the chance to do science and enjoy certain well-controlled dosages of foreign trips."



A December 1984 press conference at the USSR Ministry of Foreign Affairs following the launching of interplanetary automatic stations Veha 1 and Veha 2, which were "continu[ing] their flight to Venus and Halley's comet." Standing at right is Roald Sagdeev. [TASS from SOVFOTO]

In the 1960s and '70s the most popular work in the Soviet physical literature was a collection of anecdotes from physics entitled *Physicists Are Joking*. The pointed joke was one of the best antidotes to totalitarian ideology, and Sagdeev does not hesitate to supply his own book with humorous stories of a sort that, whether they concerned toilet paper or Beria, had no chance to appear

in a book in the years of "scientific socialism."

Many statements in the book that could be corrected by a historian are nevertheless of value for the dimensions of historical reality they reveal. For example, the author seems to believe that his first scientific hero, Landau, was groundlessly committed to a Stalinist jail, was released after being declared not guilty in 1939, and in his scientific work was occupied entirely with pure physical theory. Information that has recently been made available from the KGB archives represents the matter in another way: Landau was arrested after taking part in the preparation of an anti-Stalin leaflet, was declared not guilty only in 1990, more than 20 years after his death, and nevertheless strongly participated in the Soviet nuclear weapon program, being awarded two Stalin prizes and the title Hero of Socialist Labor. Both these versions of events reflect aspects of the historical reality of Soviet physics. Sagdeev helps us to comprehend this fascinating reality.

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Excavations in Iraq

Early Stages in the Evolution of Mesopotamian Civilization. Soviet Excavations in Northern Iraq. NORMAN YOFFEE and JEFFREY J. CLARK, Eds. University of Arizona Press, Tucson, 1993. xviii, 285 pp., illus. $50.

As R. M. Munchaev writes in the penultimate chapter of this book, "It has now been established that the study of many of the key problems pertaining to the archaeology, ancient history, and culture of Mesopotamia and the Near East is now impossible without taking into account the results of investigations by the Soviet expedition to Iraq." Until such time as the final reports on the work of Soviet prehistorians in northern Iraq are available in English, this book conveying some of those results will be essential to all scholars interested in the prehistory of the Near East.

Early Stages is a compendium of papers dealing with the excavation of several prehistoric sites on the Jebel Sinjar plain in northern Iraq by Soviet scholars between 1969 and 1980. Seven of the papers have appeared in English in the journals *Iraq* and *Sumer*, eight are newly translated from Russian, and one is a short summary of the conclusions of a book in Russian on the excavations. In addition, Yoffee has provided a preface and a concluding analytical essay. The papers deal with the several sites excavated in chronological order (I would, however, recommend reading Munchaev's chapter first, as it provides an excellent introduction to the entire project).

The work reported on in this book has revolutionized our understanding of the late prehistory of Iraq and the Near East as a whole, particularly when combined with the results of later excavations by the British at Qermez Dere and by the Poles at Nemrik. These two sites extend the archeological sequence for the region back in time from the earliest site excavated by the Soviets, Maghzaliyah (dating from the end of the 8th or the beginning of the 7th millennium). Maghzaliyah is a small Neolithic settlement with evidence of both plant cultivation and animal husbandry. Next in the Soviet project's sequence comes the Tell Sotto Culture, excavated at both Tell Sotto and Kultepe. This phase is described as pre-Hassuna, is closely compared with the sites of Umm Dabaghiyah and Telul eth-Thalathat, and is dated by the excavators to the second half of the 7th or the beginning of the 6th millennium.

Anthropomorphic vessel from Yarim Tepe II. [From *Early Stages in the Evolution of Mesopotamian Civilization*]

The principal excavations of the Soviets were at a cluster of three sites named Yarim Tepe I, II, and III. Yarim I and II and the upper levels of Tell Sotto yielded classical Hassuna materials that are dated by the excavators to the second half of the 6th millennium. We are now in a position to come to grips with the Hassuna culture thanks to both the quality and the quantity of the Soviet excavations. Large horizontal areas were exposed, providing, for the first time, enough Hassuna material to permit a detailed analysis of the nature of this important late Neolithic or early Chalcolithic culture.

Yarim II and III produced Halaf-period materials, dated by the excavators to the 5th millennium. Again horizontal exposure was extensive, providing the largest single sample of Halaf materials ever excavated. The traditional stratigraphic relationship between Hassuna and Halaf was confirmed, cultural traits of both the eastern and the western Hala were found for the first time in a single context, and the domestic function of the heretofore enigmatic tholos structures was clearly demonstrated—they are granaries.

Yarim III yielded Ubaid materials, dated by the excavators to the late 5th or early 4th millennium. Again exposure was extensive. Perhaps most notable is the contrast in architectural plans between the buildings from Yarim III and more eastern Ubaid sites (for example in the Hamrin such as Tell Madhhur and Tell Abadeh).

Noticeably missing in these papers is any discussion of archeological theory or method (the only explicit attempt at such I could find is on p. 64). One would like to know more about how these sites were dug, how the material was dealt with out of the ground, and what were some of the interpretative issues that our then-Soviet colleagues were concerned with. A hint on the last issue can be found in the three papers that are analytical rather than descriptive: N. O. Bader's summary of the Russian volume, a discussion by N. Ya. Merpert and Munchaev of Halaf burial practices, and the essay by Munchaev previously mentioned. What is implicit in these papers (especially the first and last of them) is an understanding of cultural change and evolution on the Sinjar plain in terms of successive population replacements. If I understand the arguments correctly (and this is hard to do precisely because the issues are not stated explicitly), except for the interpretation of the Tell Sotto Culture as something pre-Hassuna that evolved into Hassuna, the Halafians are seen as a new people in the region who replace the Hassunians, and the appearance of the Ubaid is interpreted in the same way.

Yoffee's welcome concluding chapter, "Mesopotamian interaction spheres," is an excellent and intellectually stimulating effort to make up for the lack of methodological interpretation in the other papers and something of a counter-argument to the implied population-replacement model of cultural change. Yoffee's efforts to develop structural paradigms for historic Mesopotamian civilization that might, with due caution, as he emphasizes, be applied to a broad interpretation of change and cultural interaction in Neolithic and Chalcolithic Mesopotamia are an important contribution to the analysis of Near Eastern prehistory.

This collection offers as thorough a set of preliminary excavation reports as one can find in the archeological literature on the Near East, and the volume is handsomely illustrated in a way that makes it possible