fact, a "more or less predictable . . . result of the evolution of human consciousness (again: Science being part of history and not the other way around)" (p. 120). He cites William Whewell as a "biologist . . . forerunner" of Darwin (p. 91).

Lukacs writes as though historians of science are still engaged in hero worship, and he thinks it arrogant of scientists themselves even to seek laws of universal validity or to search for extraterrestrial life and intelligence. Yet he does not hesitate to assert that God-created human beings are the most complex creatures in the entire universe or to engage in hero worship of his own—for example, of Goethe and Cardinal Newman. His favorite humanists are obviously far more original than any scientist.

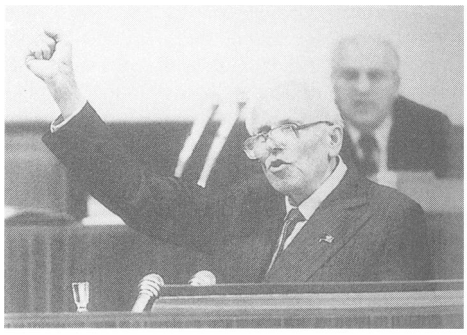
Curmudgeonly defenses of the humanities are surely welcome to this usually generous reviewer, but Lukacs's book does not succeed. We may be living in a postmodern age, but many general intellectual readers (and not only academics) will still prefer novel insight and evidence and argument, however critical, to repetition of one-sided assertions.

THOMAS NICKLES

Gennady Gorelik. *Andrei Sakharov: Nauka i Svoboda.* 512 pp., illus., bibl. Izhevsk: R&C Dynamics, 2000.

Richard Lourie. *Sakharov: A Biography.* xiv + 465 pp., illus., bibl., index. Hanover, N.H.: Brandeis University Press, 2002. $30 (cloth).

The cultural tradition of the intelligentsia—"the largest single Russian contribution to social change in the world," in Isaiah Berlin's words—may have ended with Andrei Dmitrievich Sakharov. For about 150 years Russian society bred a caste of intellectuals whose *raison d'être* was to revolt in idealistic pursuit of highly moral goals against the social order that ensured their own privileged status and existence. With their contribution, that order was broken twice during the last century. The first revolution undermined their position, yet the intelligentsia phenomenon managed to revive in later Soviet society. The second revolution, at the century's end, seems—at least for now—to have leveled their social condition more thoroughly into a "normal," "civilized," or "democratic" state of affairs, in which intellectuals en masse entertain higher principles insofar as this does not contradict the basic foundations of their own well-being.



Andrei Sakharov, Soviet physicist and activist, speaking at the First Congress of People's Deputies, with Mikhail Gorbachev in the background (from Gennady Gorelik, Andrei Sakharov, *p. 65).*

Born in 1921 and graduated from Moscow University's physics department in 1943, Sakharov belongs to the intelligentsia's Soviet generation. His studies in theoretical physics were interrupted in 1948 with the recruitment of his graduate advisor, Igor Tamm, to help the H-bomb effort. As members of the Tamm group, Sakharov and Vitaly Ginzburg made two crucial suggestions that helped the Soviet team to beat their American rivals in testing the first thermonuclear bomb in August 1953. That year Sakharov became the youngest scientist ever to be elected to full membership in the Soviet Academy of Sciences. Until 1968 he worked in a remote secret laboratory on the design and improvement of nuclear weapons. The recipient of a string of the highest government honors, he regretted the diversion from fundamental physics but found higher satisfaction in the feeling that the weapons work was morally important, contributing to the preservation of world peace, deterrence against the superior U.S. nuclear threat, and the prevention of further Hiroshimas and Nagasakis.

Starting with a 1958 article on the environmental dangers of radioactive fallout, Sakharov increasingly devoted his attention to social topics. His expertise helped bring about the 1963 Moscow treaty that banned all but underground nuclear tests. As the politicians did not always follow his other advice, Sakharov became more critical of the Soviet regime's failure to satisfy its own—and his—ideal image. Relying on the high social and moral standing of science in Soviet society, he applied his authority to issues beyond his direct professional expertise, petitioning the government to continue de-Stalinization and pleading on behalf of victims of political persecution. His move from reformist insider to open critic occurred around 1968, the time of

international rebellion against the Cold War order. While the death of Martin Luther King did not stop the movement toward civil rights in the United States, the Soviet regime managed with only limited repression to frustrate demands for further democratic reforms. As one of the leaders of the dissident movement, Sakharov continued to act and argue courageously in defense of legality and human rights. The struggle cost him many of his former privileges but was recognized internationally in 1975 by the Nobel Peace Prize. Hardest to bear, however, was the feeling of hopelessness: arrests and exiles of fellow dissidents were increasingly reducing the movement to defending the rights of the defenders themselves.

In early 1980 Sakharov's protest against Soviet intervention in Afghanistan's civil war prompted the government's decision to exile him to the city of Gorky, where he lived with his wife, inaccessible to foreign correspondents and other visitors except for occasional colleagues from the Physical Institute of the Academy of Sciences. Practically all expression of open opposition was silenced in the country, yet the feelings driven underground continued to spread. The accumulated energy broke loose after Mikhail Gorbachev came to power and resumed democratic reforms in the late 1980s. The changes from above came fifteen years too late, since in the meantime the intelligentsia had become irreparably alienated from the regime and its values. After returning from exile in late 1986, Sakharov became the moral leader of the growing democratic opposition to Communist Party rule. Facing a hundred-thousand-strong demonstration outside the Kremlin walls, Gorbachev finally agreed to satisfy Sakharov's call to remove from the constitution the article proclaiming the Communist Party "the guiding force of Soviet society." This crucial concession came two months after Sakharov's sudden death from heart failure in December 1989, at the time when he had started drafting a new constitution of the Union of Soviet Republics of Eurasia. The revolution driven by the intelligentsia proceeded much further on its own momentum, destroying the Soviet Union itself along with the society and culture that had allowed scientists and intellectuals to speak from a position of moral and political authority.

The two books under review are not exactly academic biographies: they aim at a much broader range of readers, though in rather different ways. Each succeeds admirably on its own terms; their strengths complement each other, and they provide extremely informative reading for professional historians as well. Richard Lourie, writing as an American journalist in the genre of political biography, gravitates toward explaining Sakharov's character in terms of his family upbringing, with roots leading back to the old Russian intelligentsia. His account is particularly impressive on the psychological side, empathizing with Sakharov's struggles and thoughts and paying close attention to his life in politics and as a family man. The author's attitudes and outlook are close to Sakharov's own at the end of his life, as expressed in his *Memoirs* (Knopf, 1990), which Lourie translated into English. Gennady Gorelik writes as a historian of science within the established Russian/Soviet tradition of science popularization. He sets Sakharov's biography in the historical context of Soviet physics and provides enlightening but nontechnical discussions of his contributions to both nuclear weapons design and fundamental theoretical physics. Placing less emphasis on the family tradition, he explains the formation of Sakharov's character largely through reference to the uninterrupted tradition of the Russian scientific intelligentsia. This too is traced to its prerevolutionary roots: through Tamm, Sakharov's teacher in life and science, to Leonid Mandelstam, Tamm's academic mentor and role model.

The books' weaknesses are related to their strengths. Lourie feels somewhat uncomfortable about his hero's long-held socialist mentality and ideals, which he mentions briefly but is afraid or unprepared to discuss seriously as an important cause of Sakharov's idealist rebellion against the Soviet political establishment. Gorelik takes for granted the view that science and scientists are natural sources of moral authority and allies of freedom, which, as a basic cornerstone of the intelligentsia's peculiar worldview, should belong to the explanandum rather than the explanans. Investigating these two additional aspects of Sakharov's beliefs and life story will bring us closer to understanding the specific phenomenon of the *Soviet* intelligentsia. However, this may require (or lead to) a new understanding of still-too-recent Soviet history and experience in general, the time for which may not yet have come.

ALEXEI KOJEVNIKOV

Tian Yu Cao (Editor). *Conceptual Foundations of Quantum Field Theory.* (Based on papers presented at the Center for Philosophy and History of Science, Boston University, 1–3 March 1996.) xx + 399 pp., illus., figs., indexes. Cambridge/New York: Cambridge University Press, 1999. $100.