SAKHAROV ELECTED TO PRESIDIUM OF SOVIET ACADEMY OF SCIENCES

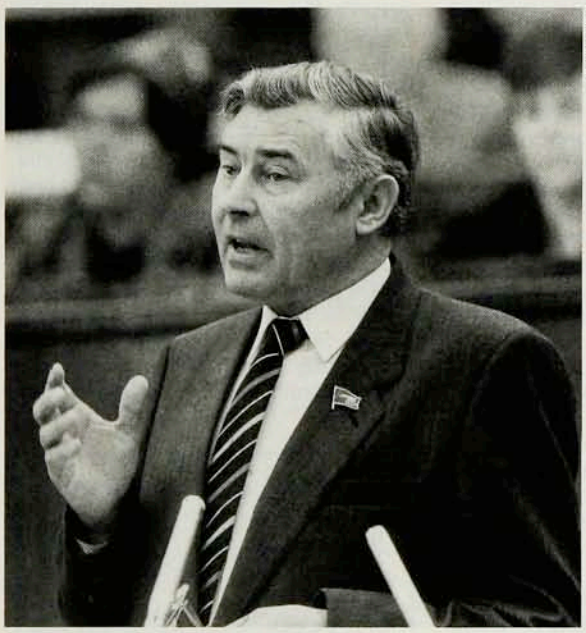
In an election held at the end of October, the Soviet Academy of Sciences elected Andrei D. Sakharov to its 47-member presidium and made Yuri A. Ossipyan one of its five new vice presidents. Sakharov's election represents a stunning reversal of fortune for a man who, little more than two years ago, was still living in exile in Gorki, and it means that he will continue to play a prominent role in Soviet politics—and not just Soviet science politics. Ossipyan, the director of the Institute for Solid State Physics in Chernogolovka and president-designate of the International Union of Pure and Applied Physics, seems destined to be an increasingly influential scientist–statesman as well. Ossipyan will become IUPAP president in 1991 (see PHYSICS TODAY, October, page 73, and December 1987, page 76).

Also at the October meeting, the academy's general assembly approved a plan to cut the academy's staff by roughly a third, and Ossipyan is serving on a special academy committee to cut red tape in science administration.

Separately from the meeting, it was announced that science funding will be increased in 1989 by 12% and funding for basic research by 32%.

Sakharov and Sagdeev

Sakharov's election to the presidium is especially significant because it came at a time when he was beginning to speak out as a loyal critic of General Secretary Mikhail Gorbachev's *perestroika*. In an interview with *The New York Times* reported on 1 November, shortly before his departure for the United States, Sakharov warned that planned changes in the Soviet political system would give Gorbachev a dangerous monopoly of power. "Today it will be Gorbachev," he said, but "tomorrow it may be somebody else, and there are no guarantees—we must be frank about this—no guarantees."



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Guri Marchuk, president of the USSR Academy of Sciences, addresses a joint meeting of the Soviet of the Union and the Soviet of Nationalities in October 1988 at the Grand Kremlin Palace. The meeting opened the 11th session of the USSR Supreme Soviet of the Eleventh Convocation.

Sakharov's election to the presidium took place during a dramatic meeting at which Roald Sagdeev withdrew his candidacy for the physics vacancy on the presidium in favor of Sakharov, whom he nominated for the position. Sagdeev said, "It is very important that in the presidium there be people with a broad perspective ... a high moral sense and with a sense of social responsibility before the people and before the world." Sagdeev recently resigned as director of the Space Research Institute (IKI) on the grounds that 15 years was long enough to serve in an administrative position and that he wished to resume doing research himself. (For a description of IKI, see PHYSICS TODAY, February 1988, page 69.)

Sagdeev urged the academy's general assembly to limit directors of institutes and other research leaders to terms of no more than ten years, but the assembly rejected the suggestion. Apparently one speaker made the point that this kind of rule would have put Pyotr Kapitza out of business prematurely.

In a remarkable speech delivered on 18 October, the first day of the academy's general meeting, Sagdeev called for Soviet science to make itself heard at the highest political levels and to select leaders of the highest merit (see excerpts, page 63). Sagdeev said that the space program once involved outstanding people like Mstislav V. Keldysh and Sergei P. Korolev, but that "we no longer have people of that caliber."

Election dynamics

The academy election was notable both because Sakharov was elected to the presidium in a competitive vote and because the leadership of the academy acted as though it felt threatened and could not take its position for granted.

Before the academy election, it had been rumored in the USSR and abroad that Academy President Guri I. Marchuk might be in trouble. Mar-

chuk often is described as a member of the "old guard," and he is thought to have been associated with Yegor K. Ligachev—Gorbachev's leading rival—at a time when Ligachev and Marchuk both had responsibilities in Siberia. In September, it was reported that Gorbachev had publicly denounced Marchuk's past performance as head of the Siberian branch of the academy. During a visit to the Krasnoyarsk, Gorbachev said that Marchuk had "failed to speak out and take a firm stance" when confronted with economic development plans that were going badly.

At the academy meeting on 19 October, the day after Sagdeev's first speech, Kiril Kondratiev—an eminent atmospheric scientist and former rector of the University of Leningrad—made a highly critical speech about the Soviet space program and IKI. Responding to Sagdeev's charge that Soviet science had stagnated, Kondratiev said, "I'm not stagnating." Kondratiev and allies also described Sagdeev's resignation as pretentious and accused Sagdeev of paying more attention to the West than to the USSR itself.

After Kondratiev's speech and again the following day, when Sagdeev rose a second time to nominate Sakharov for the physics slot on the presidium, Marchuk seemed to defend Sagdeev somewhat ambivalently. When Sagdeev responded to Kondratiev's charge that the results of the Vega project had been reported in Paris and New York but not Moscow—Sagdeev said that Marchuk and Kondratiev had in fact reported the results personally at a Soviet seminar—Marchuk first appeared to object but then seemed to concede that Sagdeev was right. When members of the academy tried to silence Sagdeev and prevent him from nominating Sakharov, Marchuk reacted by saying: "Academician Vladimir Alekseevich Kirillin has made the request that candidates not speak. I am passing on the request, but personally feel that a man will do as he pleases."

After Sagdeev withdrew his candidacy in favor of Sakharov, the contest for the physics position was between Sakharov and Andrei Gapanov-Grekhov, a radiophysicist from Gorky. Sakharov won by 152 to 82 in a secret vote. Others elected to the presidium include Georgy Arbatov, the influential US specialist; Georgy Golitsyn, a well-known climatologist; and Leonid Abalkin, an economist who favors wide introduction of market mechanisms.

The general assembly also posthumously reinstated Nikolai Bukharin, an ally of Lenin who was executed by Stalin and now is considered an intellectual precursor of Gorbachev. Marchuk said that Bukharin's expulsion from the academy in the 1930s was a "deplorable event in the history of our association, a deed which we had to correct."

Competitive research

In the matter of introducing more competition into Soviet science, Sagdeev and Marchuk acted as allies at the academy meeting. Marchuk announced that an additional 500 million rubles would be allocated to priority research programs, and that funds would be distributed competitively. One such program is in high-temperature superconductivity and will be managed by a committee that is headed by Marchuk and includes Ossipyan. Ossipyan announced at the meeting that restrictions had been lifted on publication of research in high-temperature superconductivity.

Marchuk disclosed that a new system of science funding will be inaugurated in 1989. He said that funds would now go to specific projects, selected by peer review, rather than to the scientific institutes *per se*.

New US–Soviet Journal

This spring the first issue of a new journal, *Science and Global Security*, will appear. The journal will be published in English by Gordon and Breach Science Publishers and in Russian by Mir, the major Soviet science publisher. The Soviet physicist Roald Sagdeev and Frank von Hippel, a physicist and professor of public and international policy at Princeton University who works primarily on public policy issues, are cochairmen of the editorial board. Harold A. Feiveson of Princeton University is editor. Feiveson has undergraduate and graduate degrees in physics, and a PhD in politics.

Science and Global Security will appear four times a year in both Russian and English. The initial issues are expected to include articles about a cooperative US–Soviet research program on nuclear test ban verification, the possibility of banning nuclear reactors from near-Earth orbit, and verifiable means of dismantling nuclear warheads.

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In his remarks to the academy, Sagdeev strongly supported the grants system, saying that the only critics of the system he found in the United States were Soviet emigrés who couldn't handle the greater competition in such a system (see excerpts).

In the estimation of Loren Graham of Harvard and MIT, a science historian and authority on Soviet science, the mistrust some Soviet scientists feel toward Marchuk may go back to disappointment that Evgenii P. Velikhov was not selected to be the academy's new president three years ago (PHYSICS TODAY, January 1986, page 72). Graham thinks Marchuk was wise to associate himself with Sagdeev's criticisms of Soviet science during the academy meeting, and Graham thinks it is *not* true, as some claim, that Marchuk is out of step with *perestroika*.

In a speech delivered at the US National Academy of Sciences on 9 December, Marchuk said he believed "that the basic course of *perestroika* in science should be consistent, across-the-board structural reforms and the democratization of all aspects of the scientific community." Marchuk said that "scientific–technical policy decisions should be oriented toward resource conservation, progressive accomplishments in the production process, supporting scientific breakthroughs in priority matters, increasing the level of information in society and heightening the role of social sciences and the humanities. A systematic renovation of equipment and technology—the preconditions for which are basic research—has now become a necessary condition for an ongoing increase in labor productivity."

Marchuk said that the Soviet Academy "has been delegated important tasks in drastically upgrading the level of research in the most important scientific fields" and that with this aim in mind it had begun working on basic issues of practical importance. "Among these are the study of information and computer technology, solid-state physics, quantum electronics, synthetic chemistry, biotechnology, Earth sciences and ecology. More attention is now being devoted to longer-term basic research [in] high-energy physics, astrophysics and space research [and] physico-chemical biology."

Marchuk attributed a slowing of scientific progress in the USSR to a "lack of systematic practical demands upon science and, consequently, decreased funding for scientific research," and also to factors internal to

Excerpts from Sagdeev's Remarks to the Soviet Academy of Sciences

The following passages are from speeches that Roald Sagdeev delivered to the general assembly of the Soviet Academy of Sciences on 18 and 20 October 1988. Our version draws on two independent translations obtained by PHYSICS TODAY.

Comrades, we have had the good fortune to be witnesses to and, I hope, participants in the truly revolutionary process of renewing our society. The role that science is having occasion to play is quite unusual. We, as representatives of mankind, as those who have the scientific instruments of foreseeing and predicting, must help mankind, which, like an army scout, is moving through a more and more thickly mined field. . . . Science must not only lay a base for scientific and technological progress and create an intellectual reserve but also become an aid in decisions at the highest political levels. . . .

Star Wars and yellow rain

I would like to say in particular that participation in the working out of disarmament problems must not be limited to the social sciences. . . . As a concrete example of real achievement of this kind I want to cite the participation of a wide circle of our scientists in working out a Soviet response, a Soviet reaction, to the American "Star Wars" program, the SDI program.

In some circles of the military–industrial complex, following the usual stereotype, there was talk that we too should not lose time and should do something similar to the American system or do something better. But a sensible view prevailed—to scrap the stereotype—and the concept of an asymmetric response was worked out. I think that it played its role in those important advances in the negotiations. I would attribute the success in the first stage of the disarmament talks [the treaty eliminating medium-range missiles in Europe] not to the Strategic Defense Initiative of the United States, not to the position of American strength, but precisely to the sensible and sober position of the Soviet Union. . . .

I think that . . . we must reexamine completely the notion of the way Soviet science, our Academy of Sciences, participates in the life of the international community. This reexamination should not deal only with problems of financing and authorizing trips abroad. There are a number of other very important problems to consider—problems of an ethical nature in particular. . . .

Several years ago the American Administration accused the Soviet Union of using methods of chemical–biological warfare in Southeast Asia. The accusation concerned the so-called yellow rain. American scientists at their own risk and using their own means for the good of society organized a series of expeditions to Southeast Asia and prepared a competent report that completely disproved the American Administration's contentions and upheld the honor of the Soviet Union and the honor of our science. How did we answer our American colleagues?

After questions arose over the fact that the Soviet press, or at least certain organs of mass information, was inflating and supporting rumors spread by certain foreign press agencies that the AIDS virus was created artificially in American laboratories, we were silent, even though we are proud that our great academy has outstanding immunologists, bioengineers and so forth. I believe that did great damage to mutual understanding. . . .

Competition and democracy

Regarding the development of our internal academic life, I would heartily support a competitive system, a system of grants. . . . This system will present us with a whole series of difficulties; it will require much more self-discipline and greater responsibility. . . . I have to say that among the large number of Americans with whom I have discussed this question, I encountered only one social group with a negative attitude toward the grant system, who said bluntly, "Don't do that under any circumstances—it's an awful system." They were emigrants from the Soviet Union who are working now in the United States and who have not been able to adjust to the stiffer competitive conditions there. . . .

I think that in our search for forms of greatest democracy in the institutes, and probably more generally in all institutions, factories and plants, we have not yet found the right tone, the right balance. The form in which intra-institute democracy currently is developing supposes that service personnel, say cleaning women, have equal rights in the election of the director, members of scientific panels and other scientific positions. Certainly these are people without whom the institutes cannot function. However, distinctions have to be made when it comes to the election of a scientific leader. If democracy continues to develop in this direction . . . . I think that soon, when we board an Aeroflot plane, we will begin with a referendum to choose the pilot. . . .

Sakharov nomination

Comrades! I would like to say that history may never forgive us that such eminent scientists as Landau and Kolmogorov too were not members of the presidium. We know why they were not presidium members. . . .

I think we must reexamine our approach.

Indeed today we have people of the same caliber among us.

I want to thank those of you who supported my statement in the newspaper *Moscow News* in which I called on the Supreme Soviet to return the awards illegally stripped from Academician Sakharov.

I can report to you with satisfaction that this appeal also was supported by the Politburo of the Central Committee, and I believe that the awards soon will be returned.

I would like to say something today about the scientific contributions of Academician Andrei Dmitriyevich Sakharov. . . . He has to his credit a whole series of achievements as both scientist and engineer. . . . To this day the world records for explosively obtained ultrapowerful magnetic fields belong to the method proposed by Sakharov. Together with Academician [Igor] Tamm, who by the way also was never a member of the presidium, he was the founder of magnetic confinement. And the tokamak is one concrete example of an approach being developed most successfully today.

Andrei Dmitreyevich made a substantial contribution to work that brought us closer to the physics of elementary particles and cosmology. His name certainly will be associated forever with postulating baryon charge nonconservation. He is actively pursuing work on cosmology even now.

I think that the moral authority of our Academy of Sciences will be elevated not only in the world but also among the Soviet people if we elect Academician Sakharov to the physicist vacancy [on the academy's presidium]. . . .

the organization of Soviet science—"monopolism," the "domination of the administrative–bureaucratic system" and the "absence of *glasnost* and democratism." Last and not least, the Soviet scientific community was isolated from "the world scientific process" because of "an incorrect analysis of the laws of scientific development [in the USSR] on the one hand and, on the other, the deliberate policies of certain countries toward us. As a result the world scientific community lost a significant portion of its members. Nor did Soviet science gain anything by this."

Marchuk was in the United States to discuss implementation of a five-year exchange agreement, which the Soviets would like to expand to cover the global environment. Marchuk had to cut short his visit because of the tragic earthquake in Armenia.

New science leadership

Velikhov continues to be one of the nine vice presidents of the Soviet Academy, where he is now joined by Ossipyan. The other newly elected vice presidents are Vladimir Kudryavtsev, head of the Institute of State and Law; Nikolai Laverov, an expert on uranium deposits; Oleg Nefedov, a chemist; and Rem Petrov, head of the Institute of Immunology.

Evidently the Soviet science community will be strongly represented in the new constitutional order adopted by the Supreme Soviet on 1 December, following approval of the plan by the Central Committee a few days earlier. The plan calls for 2250 delegates to be elected next March to a Congress of People's Deputies; 1500 of them are to represent districts, and 750 the governing bodies of party, union, youth, arts and other organizations, including science. The Congress, in turn, will elect a new Supreme Soviet with 400–450 members, which is to be the country's legislature and will meet for two sessions of two to three months' duration each year. The presidium of the Supreme Soviet will be headed by a president, presumably Gorbachev initially.

Sagdeev and Arbatov told PHYSICS TODAY that the science community is expected to be allotted about 75 delegates to the Congress of People's Deputies and that the Soviet Academy will select about half of those delegates.

One other change could have an important impact on Soviet science policy: During the major reorganization of the Politburo on 30 September, Vadim A. Medvedev was promoted to party secretary and head of the commission on ideology, replacing Ligachev. The ideology post is considered to be more or less the number-two position in the Soviet leadership, and it was Medvedev who met with the press following the shake-up on 30 September to explain the changes.

Medvedev most recently had been the Central Committee secretary responsible for relations with Eastern European nations, but before that he was the secretary in charge of science and technology. A latecomer to party politics who spent most of his career as a professor in Leningrad, Medvedev is considered to be an expert on the management of scientific and educational institutions.

—WILLIAM SWEET,
WITH REPORTING BY IRWIN GOODWIN
AND GLORIA B. LUBKIN

US, EUROPEANS, CANADA AND JAPAN CONCLUDE SPACE STATION AGREEMENT

Meeting in Washington at the end of September, representatives of the United States, Canada, Japan and nine member states of the European Space Agency concluded an agreement to build a permanently manned space station in the 1990s. The agreement caps three years of negotiations, in which the 13 parties argued over complex scientific, commercial and national security issues; during that time, the estimated cost of the project escalated drastically and its proposed schedule slipped well beyond the 1992 launch date originally foreseen (see PHYSICS TODAY, April 1987, page 71). In the end, some of the most troublesome issues were finessed rather than truly resolved.

On the very sensitive question of whether the space station will be made available for work related to national security, such as testing of missile-defense system components, the agreement says the station will be used "for peaceful purposes," but it leaves the definition of "peaceful" to the countries controlling different elements of the station. ESA's four neutral member states—Austria, Ireland, Sweden and Switzerland—are not parties to the agreement, and an Austrian space official has said this is because use of the station for Star Wars testing is not excluded.

On the question of intellectual property rights, details are to be worked out later, but it is understood that any party developing a process or product through work on the space station will retain rights to it. The laboratory modules planned for the station are expected to be devoted mainly to microgravity research in the life sciences and materials science.

The cost of the space station is estimated now at $16 billion dollars, exclusive of launch and assembly costs, which will add another $10 billion or so—making the station about three times more expensive than initial estimates. Each party to the agreement will cover the launch costs for its own components: The United States will build the basic station itself and a laboratory module; ESA will contribute a second laboratory module, an unmanned but human-tended free-flying module and a polar platform; Canada will contribute a remote manipulator; and Japan will contribute a third laboratory module. It is anticipated that a variety of launchers will be used, including the Ariane 5 rocket and Hermès space plane that the Europeans are developing and the Japanese H2 rocket, as well as the US space shuttle.

Columbus program

While the space station agreement can be seen as a crowning achievement of President Reagan's personal diplomacy (see PHYSICS TODAY, May 1985, page 77), it also represents a triumph for the French, who persuaded the other Europeans—notably the Germans and Italians—to line up behind their major space development projects. In effect, France has persuaded the other Europeans to support development of a stronger aerospace industry, which eventually could help provide Europe with an integrated defense. An odd combination of conditions contributed to France's success, among them: the Reagan-Gorbachev treaty eliminating medium-range missiles in Europe, which has had the effect of convincing Europeans that they need to do more to assure their own defense; an increasingly strong pattern of military collaboration between France and West Germany, extending from military maneuvers to weapons development; and both the successes and failures of the US space program,