The social responsibility of scientists

The scientific community, which enjoys freedoms and benefits from its activities, has a duty to inform the public fully about the impact of scientific developments.

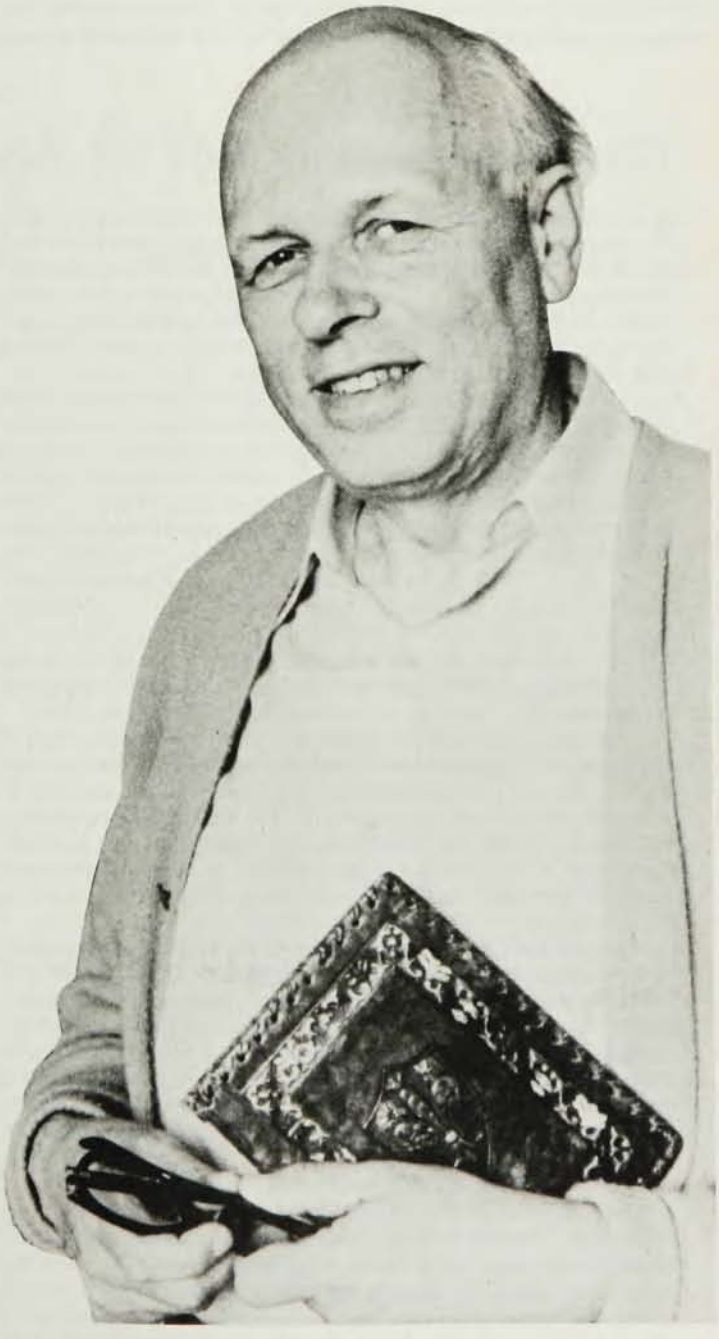
Andrei Sakharov

Because of the international nature of our profession, scientists form the one real worldwide community which exists today. There is no doubt about this with respect to the substance of science: Schrödinger's equation and the formula $E = mc^2$ are equally valid on all continents. But the integration of the scientific community has inevitably progressed beyond narrow professional interests and now embraces a broad range of universal issues, including ethical questions. And I believe this trend should and will continue.

Scientists, engineers and other specialists derive from their professional knowledge and the advantages of their occupations a broad and deep understanding of the potential benefits—but also the risks—entailed in the application of science and technology. They also develop an awareness of the positive and negative tendencies of progress generally, and its possible consequences.

Colossal opportunities exist for the application of recent advances in physics, chemistry and biochemistry; technology and engineering; computer science; medicine and genetics; physiology and hygiene; microbiology (including industrial microbiology); industrial and agricultural management techniques; psychology; and other exact and social sciences. And we can anticipate more achievements to come. We all share the responsibility to work for the full realization of the results of scientific research in a world where most people's lives have become more difficult, where so many are threatened by hunger, premature illness and untimely death.

But scientists and scholars cannot fail to think about the dangers stemming from uncontrolled progress, form unregulated industrial development and especially from military applications of scientific achievements. There has been public discussion of topics related to scientific progress: nuclear power; the population explosion; genetic engineering; regulation of industry to protect the environment; protection of air quality, of flora and fauna, and of rivers, lakes, seas and oceans; the impact of mass media. Unfortunately, despite the urgent and serious nature of the issues at stake, such discussions are often uninformed, prejudiced or politicized, and sometimes simply dishonest. Experts, therefore, are under an obligation to subject these problems to unbiased and searching examination, making all socially significant information available to the public in direct, first-hand form, and not just in filtered versions. The discussion of nuclear power, a subject of prime importance,



Andrei Sakharov is a member of the Academy of Sciences of the USSR; he received the Nobel Peace Prize in 1975.

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is an instructive example. I have expressed elsewhere my opinion that the dangers of nuclear power have been exaggerated in the West, and that such distortion is harmful.

With some important exceptions (primarily affecting totalitarian countries), scientists are not only better informed than the average person, but also strive for and enjoy more independence and freedom. Freedom, however, always entails responsibility. Scientists and other experts already influence or have the capacity to influence public opinion and their governments. (That influence should not be exaggerated, but it is substantial.) My view of the situation of scientists in the contemporary world has convinced me that they have special professional and social responsibilities. It is often difficult to separate one from the other—the communication of information, the popularization of scientific knowledge, and the publication of endorsements or warnings are examples of activities with both professional and social aspects.

Similar complications arise when scientists become involved in questions of disarmament: in developing strategy for or participating in international negotiations; in advancing proposals or issuing appeals to governments or to the public; and in alerting them to dangers. Disarmament is a separate, critically important issue which requires a profound, thorough and scientifically daring approach. I realize that a more detailed treatment is needed, but now I will simply outline a few ideas. I consider disarmament necessary and possible only on the basis of strategic parity. Additional agreements covering all kinds of weapons of mass destruction are needed. After strategic parity in conventional arms has been achieved, a parity which takes account of all the political, psychological and geographical factors involved, and if totalitarian expansion is brought to an end, then agreements should be reached prohibiting the first use of nuclear weapons, and later, banning such weapons.

Another subject closely connected to questions of peace, trust and understanding among countries is the international defense of human rights. Freedom of opinion, freedom to exchange information and freedom of movement are necessary for true accountability of the authorities which in turn prevents abuses of power in domestic and international matters. I believe that such accountability would make impossible tragic mistakes such as the Soviet invasion of Afghanistan and would inhibit manifestations of an expansionist foreign policy and acts of internal repression.

The unrestricted sale of newspapers, magazines and books published abroad would be a major step toward

Comments in honor of Andrei Sakharov

I am pleased to add my congratulations to Academician Andrei Sakharov on the occasion of his 60th birthday. Sakharov is one of the true spiritual heroes of our time. An outstanding scientist whose position ensured him all the security and comfort he might desire, he was willing to risk all to speak out on behalf of human rights and freedom. He persisted in this mission even after being subjected to increasingly harsh penalties.

Mr. Sakharov is a Russian patriot in the best sense of the word because he perceived his people's greatness to lie not in militarism and conquests abroad but in building a free and lawful society at home. His principled declarations on behalf of freedom and peace reinforce our belief in these ideals. We hope and pray that his exile will be ended and that he will enjoy a long and creative life on behalf of science and humanity.

Ronald Reagan
President

The banishment of Andrei Sakharov from Moscow to Gorky reminds one of the isolation of Robert Oppenheimer by denial of his security clearance in the nineteen fifties.

The results of these actions should be instructive to the men in the Kremlin. Oppenheimer became an even greater celebrity than before, and as a consequence the US government became in international opinion a country where outspoken criticism, even by eminent scientists, was suppressed, intimidated and discouraged. He became a martyr to the cause of peace and free expression of critical opinion, and the US lost a great deal of its lustre as the land of the free and the home of the brave.

The men in Kremlin likewise failed to understand what a great national asset they had in Sakharov, a great scientist, patriot and humanitarian. From his small apartment and with very limited means, these issued a constant stream of constructive criticism of actions of the rulers of the country he loved so dearly. To the outside world he showed that the Soviet Union, oppressive as it appeared, still allowed a small flame of freedom of thought and expression to light the pervading darkness. Now that tiny island of freedom in that small apartment in Moscow is suppressed and the intellectual map of the Soviet Union is uniformly black.

What have the policy makers in the Kremlin gained from this brutal act? The answer is the universal condemnation of the world outside and the loss of a constructive critic within. They lost the service of a great man who brought respect for the moral quality of the Soviet people and Soviet science. It also raises a question in my mind: Is the Kremlin so weak and so insecure that they dare not tolerate one small voice from one small apartment in Moscow? Perhaps that voice is a mirror for them to see themselves in all their meanness and moral bankruptcy.

The World has given Sakharov the Nobel Peace Prize and the President of the United States has given Oppenheimer the Fermi prize. How long will it take the Politburo to make amends to one of the Soviet Union's great and courageous scientists and humanitarians?

I. I. Rabi
Columbia University

Since being exiled to Gorky a year ago, on 22 January 1980, Andrei Sakharov has been totally isolated from his friends and colleagues. It is more than the injustice of his confinement and the indignities of his present living circumstances, under constant watch, that are so outrageous. Andrei is a scientist, and perhaps a fellow scientist can best appreciate how serious and distressing it is to lose the stimulation of personal discussions and seminars and the access to scientific writings of colleagues. These are the life blood of theoretical physics; denied them, Sakharov's scientific career is in serious jeopardy. We should not, and will not, forget the very unhappy conditions of Sakharov's life at present. His letters from Gorky record a pattern that is both psychologically stressful and physically precarious.

Sakharov is a brilliant physicist, best known in the West as the father of the Soviet hydrogen bomb. In 1951 he published, with Academician Igor Tamm, the pioneering paper in the Soviet controlled-fusion effort. He has also made important contributions to the studies of gravitational and elementary-particle phenomena. In 1953 he was elected, at the age of 32, the youngest full member of the USSR Academy of Sciences.

In the years from 1953 to 1968 his social and political views underwent a major evolution. His 1968 essay "Progress, Coexistence and Intellectual Freedom" argued that the division of the World into opposing camps threatens it with destruction and that intellectual freedom is essential to human society. This essay publicly marked Sakharov's transition from a scientist in search of Nature's principles for the structure of matter to a moral leader in search of ethical principles for a humanity in quest of peace, progress, and basic freedoms. He has forcefully reiterated and developed these same basic arguments on a number of occasions in the intervening thirteen years.

Sakharov was a cofounder of the Committee on Human Rights in Moscow in 1970 with Valery Chalidze, who is now in the US, and Andrei Tverdokhlebov, who was later sentenced to a Siberian exile. In 1973 he took the courageous step of making worldwide public appeals for support for dissidents forcibly committed to

effective freedom of information in totalitarian countries. Perhaps even more significant would be the abolition of censorship, which should concern first of all the scientists and intelligentsia of totalitarian countries. It is important to demand a halt to the jamming of foreign broadcasts that deprives millions of access to the uncensored information needed to form an independent judgment of events. (Jamming was resumed in the USSR in August 1980 after a seven year interval.)

I am convinced that support of Amnesty International's call for a general, worldwide amnesty for prisoners of conscience is of special importance. The political amnesties proclaimed by a number of countries in recent years have helped to improve the atmosphere. An amnesty for prisoners of conscience in the USSR, in Eastern Europe, and in all other countries where political prisoners or prisoners of conscience are detained would not only be of major humanitarian significance but could also enhance international confidence and security.

The worldwide character of the scientific community assumes particular importance when dealing with such problems. By its international defense of persecuted scientists and of all persons whose rights have been violated, the scientific community confirms its international mandate, which is so essential for successful scientific work and for service to society.

Western scientists are familiar with the names of many Soviet colleagues who have been subjected to unlawful repressions. (I shall confine my discussion to the Soviet Union since I am better informed about it, but serious human rights violations occur in other countries including Eastern European countries.) The individuals I mention have neither advocated nor used violence since they consider publicity the only acceptable, effective and non-pernicious way of defending human rights. Thus, they are all prisoners of conscience as defined by Amnesty International. Their stories have much else in common. Their trials were conducted in flagrant violation of statutory procedures and in defiance of elementary common sense. My friend Sergei Kovalev was convicted in 1975 in the absence of the defendant and counsel, that is, with no possibility whatsoever for a defense. He was sentenced to seven years labor camp and three years internal exile for anti-Soviet agitation and propaganda allegedly contained in the *samizdat* news magazine *A Chronicle of Current Events*, but there was no examination of the substance of the charge.

Comparable breaches of law marked the trials of Yury Orlov, the founder of the Moscow Helsinki Group, and of other members of the Helsinki Groups and associated committees: Victor Nekipelov, Leonard Ternovsky, My-

psychiatric hospitals. This led to his first public warning by Soviet officials and to his public chastisement by some of his own academic colleagues for activities "hostile to the Soviet Union." The petty harassment which was initiated at this point by Soviet authorities began taking its toll physically on Sakharov, who suffers from serious heart problems, and on his wife, Yelena, also afflicted with serious health problems.

It was shortly after this that I first met Sakharov, when I attended a small working physics seminar organized by the Soviet Academy of Sciences in the summer of 1974 in Moscow. We shared scientific interests as well as our mutual concerns about the impact of science on the human condition, particularly in the field of nuclear weapons and their control. I found him a gentle colleague with whom I formed a warm bond of friendship. Sakharov invited me to his small, crowded, but humanly warm Moscow apartment for supper with several family members. As it turned out, this was to be his last supper for some time because it marked the start of a hunger strike which coincided with his delivery of a letter of protest to the heads of both the US and Soviet governments, just then starting summit talks in Moscow. His letter protested the restrictions on emigration for many of the ethnic minorities in the Soviet Union, and this hunger strike was his personal way of focusing the world's conscience and attention on this issue.

Sakharov achieved a pinnacle of reverence, respect, and recognition in the fall of 1975 when he was awarded the Nobel Peace Prize. As the Nobel citation so fittingly concluded:

> Sakharov's love of truth and strong belief in the inviolability of the human being, his fight against violence and brutality, his courageous defense of the freedom of the spirit, his unselfishness and strong humanitarian convictions have turned him into the spokesman for the conscience of mankind, which the world so sorely needs today.

Characteristically, Andrei responded in his prize lecture by rededicating himself and calling attention to his countrymen who were prisoners of conscience with whom he wished to share the honor of the Nobel award, and, indeed, to prisoners of conscience everywhere:

> Granting the award to a person who defends political and civil rights against illegal and arbitrary actions means an affirmation of principles which play such an important role in determining the future of mankind. For hundreds of people, known or unknown to me, many of whom pay a high price for the defense of these same principles—the price being loss of freedom, unemployment, poverty, persecution, exile from one's country—your decision was a great personal joy and gift.

These words were read by his wife, as Sakharov was unable to attend the ceremonies at which the award was presented for the same reason that he was unable to participate in the celebration of his sixtieth birthday.

In fact, while the Nobel ceremonies were in progress, Sakharov himself was in Vilna, Lithuania, in a vigil at the trial of a close friend and fellow leader of the human rights movements, the brave and then painfully ill biologist, Sergei Kovalev. And on that occasion, even as he was calling attention to a serious violation of human rights, he emphasized his concerns about survival in our nuclear armed world. I quote from Sakharov's Vilna statement:

> It is absolutely unacceptable—even for a goal as important as respect for human rights—to make conduct in that area a precondition for disarmament negotiations. Disarmament must have first priority.

Sakharov is paying a high price today—and has paid for the last ten years—for having the courage to speak freely and courageously on fundamental issues that challenge the dogmas of the closed society in which he lives. In 1973 he told the Swedish journalist Olle Stenholm that

> There is a need to create ideals even when you can't see any route by which to achieve them, because if there are no ideals, then there can be no hope, and then one would be completely in the dark. . . .

And in his book *My Country and the World*, published in 1975, he wrote

> . . .The struggle for greater humanity in places of imprisonment and for human rights in general is not only the moral duty of honest persons throughout the world but constitutes a direct defense of human rights in their own countries.

Valentin Turchin, a former close associate in the human rights movement in Moscow and who, very happily, is now in the West, has noted the morality that compels Sakharov to speak out against injustice, near and far, great and small. Turchin has called him the "classical example of a prophet whose actions in defense of human rights arise out of his heart and soul." Turchin's words call to mind those of William Faulkner in *Intruder in the Dust*:

> Some things you must always be unable to bear. Some things you must never stop refusing to bear. Injustice and outrage and dishonor and shame. No matter how young you are or how old you have got. Not for kudos and not for cash: your picture in the paper nor money in the bank either. Just refuse to bear them.

Sidney Drell
Stanford Linear Accelerator Center

kola Rudenko, Alexander Podrabinek (and his brother Kirill), Gleb Yakunin, Vladimir Slepak, Malva Landa, Robert Nazarian, Eduard Arutyunian, Vyacheslav Bakhim, Oles Berdnik, Oksana Meshko, Mykola Matusevich and his wife, and Miroslav Marinovich. Tatiana Osipova, Irina Grivnina and Felix Serebrov have been imprisoned pending trial. (On 2 April, Osipova was sentenced to five years labor camp and five years internal exile) Yury Orlov's lawyer missed part of the trial proceedings when he was locked up forcibly in chambers adjoining the courtroom. Orlov's wife was frisked in a crude way and her clothing ripped during a search for written notes or a tape recorder, all from fear that the court's grotesque secrets might be revealed.

In the labor camps, prisoners of conscience suffer cruel treatment: arbitrary confinement in punishment cells, torture by cold and hunger, infrequent family visits subject to capricious cancellation, and similar restrictions on correspondence.

The political prisoners share all the rigors of the Soviet penal regimen for common criminals while suffering the added strain of pressure to "embark on the path of reform," that is, to renounce their beliefs. I would like to remind you that not once has any international organization, such as the Red Cross or a lawyer's association, been able to visit Soviet labor camps.

Political prisoners are often rearrested, and monstrous sentences imposed. Ornithologist Mart Niklus, poet Vasily Stus, physics teacher Oleksei Tikhy, lawyer Levko Lukyanenko, philologist Viktoras Petkus and Balys Gajauskas have all received sentences of ten years labor camp and five years internal exile as recidivists. A new trial is expected for Paruir Airikian, who is still in labor camp. Within the last few days I have been shocked by the fifth (!) arrest of my friend Anatoly Marchenko, a worker and author of two talented and important books: *My Testimony* and *From Tarusa to Siberia*. Imprisoned religious believers include Rostislav Galetsky, Bishop Nikolai Goretoi, Alexander Ogorodnikov, and Boris Perchatkin. Imprisoned workers include Yury Grimm and Mikhail Kukobaka. Alexei Murzhenko and Yury Fedorov are still imprisoned. I shall name only a few scientists deprived of their freedom; many others could be added to the list: Anatoly Shcharansky, the young computer scientist now famous around the world; mathematicians Tatiana Velikanova, Alexander Lavut, Alexander Bolonkin and Vazif Meilanov; computer scientist Victor Brailovsky; economist Ida Nudel; engineers Reshat Dzhemilev and Antanas Terleckas; physicists Rolan Kadiyev, Iosif Zisels and Iosif Dyadkin; chemists Valery Abramkin and Juri Kukk; philologists Igor Ogurtsov and Mustafa Dzhemilev; and Vladimir Balakhonov. (I have only recently received word of the tragic death of Juri Kukk in a labor camp.)

A common violation of human rights, and one which especially affects scientists, is denial of permission to emigrate. The names of many "refuseniks" are known to the West.

I was banished without a trial to Gorky more than a year ago and placed under a regimen of almost total isolation. A few days ago the KGB stole my manuscripts and notebooks which contained extracts from scientific books and journals. This is a new attempt to deprive me of any opportunity for intellectual activity, even in my solitude, and to rob me of my memory. For more than three years Elizaveta Alexeyeva, my son's fiancee, has been arbitrarily prevented from leaving the Soviet Union. I have mentioned my own situation because of the absence of any legal basis for the actions taken and because the detention of Elizaveta is undisguised blackmail directed against me. She is a hostage of the state.

I appeal to scientists everywhere to defend those who

have been repressed. I believe that to protect innocent persons it is permissible and, in many cases, necessary to adopt extraordinary measures such as an interruption of scientific contacts or other types of boycotts. I urge the use, as well, of all the possibilities of publicity and of diplomacy. In addressing the Soviet leaders, it is important to take into account that they do not know about—and probably do not want to know about—most letters and appeals directed to them. Therefore, personal interventions by Western officials who meet with their Soviet counterparts have particular significance. Western scientists should use their influence to press for such interventions.

I hope that carefully thought out and organized actions in defense of victims of repression will ease their lot and add strength, authority and energy to the international scientific community.

I have titled this letter "The Responsibility of Scientists." Tatiana Velikanova, Yury Orlov Sergei Kovalev and many others have decided this question for themselves by taking the path of active, self-sacrificing struggle for human rights and for an open society. Their sacrifices are enormous, but they are not in vain. These individuals are improving the ethical image of our world.

Many of their colleagues who live in totalitarian countries but who have not found within themselves the strength for such struggle, do try to fulfill honestly their professional responsibilities. It is, in fact, essential to work at one's profession. But has not the time come for those scientists, who often exhibit their perception and nonconformity when with close friends, to demonstrate their sense of responsibility in some fashion which has more social significance, and to take a more public stand, at least on issues such as the defense of their persecuted colleagues and control over the faithful execution of domestic laws and the performance of international obligations? Every true scientist should undoubtedly muster sufficient courage and integrity to resist the temptation and the habit of conformity. Unfortunately, we are familiar with too many counterexamples in the Soviet Union, sometimes using the excuse of protecting one's laboratory or institute (usually just a pretext), sometimes for the sake of one's career, sometimes for the sake of foreign travel (a major lure in a closed country such as ours). And was it not shameful for Yury Orlov's colleagues to expel him secretly from the Armenian Academy of Sciences while other colleagues in the USSR Academy of Sciences shut their eyes to the expulsion and also to his physical condition? (He is close to death.) Many active and passive accomplices in such affairs may themselves someday attract the growing appetite of Moloch. Nothing good can come of this. Better to avert it.

Western scientists face no threat of prison or labor camp for public stands; they cannot be bribed by an offer of foreign travel to forsake such activity. But this in no way diminishes their reponsibility. Some Western intellectuals warn against social involvement as a form of politics. But I am not speaking about a struggle for power. This is not politics. It is a struggle to preserve peace and those ethical values which have been developed as our civilization evolved. By their example and by their fate, prisoners of conscience affirm that the defense of justice, the international defense of individual victims of violence, the defense of mankind's lasting interests are the responsibility of every scientist.

An autobiographical note

I was born on 21 May 1921, in Moscow. My father was a well-known physics teacher and the author of textbooks and popular science books. My childhood was spent in a large communal apartment where most rooms were occupied by our relatives with only a few outsiders mixed in. Our home preserved the traditional atmosphere of a numerous and close family—respect for hard work and ability, mutual aid, love for literature and science. My father played the piano well; his favorites where Chopin, Grieg, Beethoven and Scriabin. During the Civil War he earned a living by playing the piano in a silent movie theatre. I recall with particular fondness Maria Petrovna, my grandmother and the soul of our family, who died before World War II at the age of 79. Family influences were especially strong in my case because I received my early schooling at home and then had difficulty relating to my own age group.

After graduating from high school with honors in 1938, I enrolled in the Physics Department of Moscow University. When war began, our classes were evacuated to Ashkhabad, where I graduated with honors in 1942. That summer I was assigned work for several weeks in Kovrov, and then I was employed on a logging operation in a remote settlement near Melekess. My first vivid impression of the life of workers and peasants dates from that difficult summer of 1942. In September I was sent to a large arms factory on the Volga, where I worked as an engineer until 1945.

I developed several inventions to improve inspection procedures at that factory. (In my university years I did not manage to engage in original scientific work.) While still at the factory in 1944, I wrote several articles on theoretical physics which I sent to Moscow for review. Those first articles have never been published, but they gave me the

Sakharov's 60th birthday

Andrei Sakharov was 60 years old on 21 May. To honor the occasion, the New York Academy of Sciences, The American Institute of Physics and The American Physical Society sponsored an international conference, held in New York City on 1–2 May.

Sakharov prepared the accompanying article for presentation at the conference. Although it is traditional for the honored scientist to be present at such celebrations, to receive the kudos in person, Sakharov was of course not able to attend. However, a film was shown at the conference of Sakharov reading the article, in Russian, at his apartment in Gorky, at the end of March 1981. The autobiographical notes were prepared for Russian readers of *samizdat*, the privately circulated, unofficial publication system in the USSR. (The English translations are courtesy of Khronika Press.) The photographs that illustrate this article were taken by Jeri Laber of the U.S. Helsinki Watch in Moscow, September 1971.

The accompanying contributions by Ronald Reagan, I. I. Rabi and Sidney Drell are based on presentations at the conference.

Sakharov's exile continues to become more repressive. According to his latest report, his diaries (scientific and personal), correspondence, scientific notebooks and manuscripts of his autobiography were stolen from his apartment, presumably by—or at least with sanction from—the KGB. Tanya Yankelovich, Sakharov's stepdaughter, said that he is allowed to receive reprints, but he is not allowed to see colleagues nor to visit libraries, since last June.

At the conference, Antonio Zichichi announced that a thousand European scientists have agreed that all their scientific papers will say on the front page: Dedicated to Andrei Sakharov on his 60th birthday. There will also be a concert in Milan, Italy, to raise funds for his defense, and a conference in Rome in the fall in his honor.

The New York conference included a concert, informal discussions, and formal sessions on:

- Sakharov's contributions to science, with lectures by John Wheeler of the University of Texas, Val Fitch of Princeton University and Harold Furth of the Princeton Plasma Physics Laboratory.
- Issues of war and peace, with talks by Herbert York, of the University of California at San Diego; Stanislaw Ulam, of Los Alamos; and McGeorge Bundy, of New York University.
- Human rights and justice, with contributions from Sir Karl Popper, of the University of London, Bayard Rustin of the A. Philip Randolph Institute, Harrison Salisbury, of the New York Times, Philip Handler, of the NAS, and Ernest Nagel, of Columbia.

confidence in my powers which is essential for a scientist.

In 1945 I became a graduate student at the Lebedev Institute of Physics. My advisor, the outstanding theoretical physicist, Igor Tamm, who later became a member of the Academy of Sciences and a Nobel laureate, greatly influenced my career. In 1948 I was included in Tamm's research group which developed a thermonuclear weapon. I spent the next twenty years continuously working in conditions of extraordinary tension and secrecy, at first in Moscow and then in a special research center. We were all convinced of the vital importance of our work for establishing a worldwide military equilibrium, and we were attracted by its scope.

In 1950 I collaborated with Igor Tamm in some of the first research on controlled thermonuclear reactions. We proposed principles for the magnetic thermal isolation of plasmas. I also suggested as an immediate technical objective the use of a thermonuclear reactor to produce fissionable materials as fuel for atomic power plants. Research on controlled thermonuclear reactions is now receiving priority elsewhere. The Tokamak system, which is under intensive study in many countries, is most closely related to our early ideas.

In 1952 I initiated experimental work on magnetic–explosive generators (devices to transform the energy of a chemical or nuclear explosion into the energy of a magnetic field). A record magnetic field of 25 megagauss was achieved during these experiments in 1964.

In 1953 I was elected a member of the USSR Academy of Sciences.

My social and political views underwent a major evolution over the fifteen years from 1953 to 1968. In particular, my role in the development of thermonuclear weapons from 1953 to 1962 and in the preparation and execution of thermonuclear tests, led to an increased awareness of the moral problems engendered by such activities. In the late 1950s I began a campaign to halt or to limit the testing of nuclear weapons. This brought me into conflict first with Nikita Khrushchev in 1961, and then with the Minister of Medium Machine Building, Efim Slavsky, in 1962. (This is the Ministry responsible for nuclear weapons and industry in the USSR.) I helped to promote the 1963 Moscow Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water. From 1964 when I spoke out on problems of biology (at the Academy of Sciences, during a debate on the election of one of Trofim Lysenko's associates), and especially from 1967, I have been interested in an ever-expanding circle of questions. In 1967 I joined the Committee for Lake Baikal, which was organized to protect one of the purest lakes in the world from industrial pollution. My first appeals for victims of repression date from 1966–67.

The time came in 1968 for the more detailed, public and candid statement of my views contained in the essay "Progress Coexistence and Intellectual Freedom." These same ideas were echoed seven years later in the title of my Nobel lecture: "Peace, Progress and Human Rights." I consider the themes of fundamental importance and closely interconnected. My 1968 essay was a turning point in my life. It quickly gained world-wide publicity. (It was published in English by *The New York Times*.) The Soviet press was silent for some time, and then began to refer to the essay very negatively. Many critics, even sympathetic ones, considered my ideas naive and impractical. But thirteen years later, it seems to me that these ideas foreshadowed important new directions in World and Soviet politics.

After 1970, the defense of human rights and of victims of political repression became my first concern. My collaboration with physicists Valery Chalidze and Andrei Tverdokhlebov, and later with the mathematician Igor Shafarevich and geophysicist Grigory Podyapolsky, on the Moscow Human Rights Committee was one expression of that concern. (Podyapolsky's untimely death in March 1976 was a tragedy.)

After my essay was published abroad in July 1968, I was barred from secret work and excommunicated from many privileges of the Soviet establishment. The pressure on me, my family and friends increased in 1972, but as I came to learn more about the spreading repressions, I felt obliged to speak out in defense of some victim almost daily. In recent years I have continued to speak out as well on peace and disarmament, on freedom of contacts, movement, information and opinion, against capital punishment, on protection of the environment, and on nuclear power plants.

In 1975 I was awarded the Nobel Peace Prize. This was a great honor for me as well as recognition for the entire human rights movement in the USSR. In January 1980 I was deprived of all my official Soviet awards (the order of Lenin, three times Hero of Socialist Labor, the Lenin Prize, the State Prize) and banished to Gorky where I am virtually isolated and watched day and night by a policeman at my door. The regime's action lacks any legal basis. It is one more example of the intensified political repression gripping our country in recent years.

Since the summer of 1969 I have been a senior scientist at the Academy of Sciences' Institute of Physics. My current scientific interests are elementary particles, gravitation and cosmology.

I am not a professional politician. Perhaps that is why I am always bothered by questions concerning the usefulness and eventual results of my actions. I am inclined to believe that moral criteria together with uninhibited thought provide the only possible compass for these complex and contradictory problems. I shall refrain from specific predictions, but today as always I believe in the power of reason and the human spirit. □