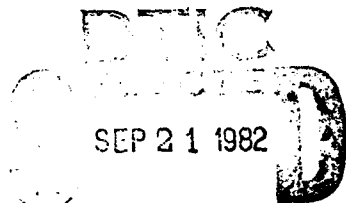


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STUDENT RESEARCH REPORT

SOVIET DISSIDENT SCIENTISTS,
1966-78: A STUDY

Marshall L. Brown, Jr.

GARMISCH, GERMANY

APO NEW YORK 09053

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SOVIET DISSIDENT SCIENTISTS, 1966-78: A STUDY

Marshall L. Brown, Jr.

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8 June 1979

F O R E W O R D

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ROLAND LAJOIE
LTC, MI
Commanding

SUMMARY

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This study is an analysis of the Soviet dissident scientists of the 1960's and 1970's - who they are, what they have protested, and why they have protested. Over 550 names of scientists involved in dissident activities have been culled from unofficial "samizdat" material available in the West and relevant biographical information on these scientists has been arranged in tabular form. On the basis of correlations found in this data conclusions have been reached on what has caused the scientists to turn to dissident activity. This study also includes a chronology of dissidence in the Soviet scientific community in the period 1966-78, an analysis of the groups within the dissident movement with which the dissident scientists have aligned themselves, and some predictions on the prospects of future dissidence among scientists.
↖

TABLE OF CONTENTS

Introduction	1
Chapter I. The Historical Development of Dissidence in the Soviet Scientific Community	4
1. 1966-68: The beginning of collective dissent and the resultant backlash	4
2. 1969-71: The beginning of dissident groups and the Jewish movement	13
3. 1972-73: Massive governmental crackdown: <u>Chronicle</u> suppressed and wide-scale persecution	13
4. 1974-78: Attempts by the authorities to eradicate dissident groups by selected arrests of leaders	23
5. Conclusion	31
Chapter II. Participation and Leadership by Scientists in Dissident Groups; Other Groupings of Scientists	32
1. Democratic/Human Rights Groups	33
2. Ethnic/Religious Groups	36
3. Revolutionary/Criminal Groups	43
4. Scientific/Professional Groups	47
5. Social-elite Groupings	50
6. Conclusions	53
Chapter III. Causes of Dissidence in Dissident Scientists	54
1. Theoretical Framework	54
2. Data (Biographical Tables)	57
3. Results	83
4. Conclusions	103
Conclusion	105

Appendix I	(Institutes at which dissident scientists have worked)	111
Appendix II	(Dissident scientists active in the Soviet dissident movement as of 1977-78)	116
Appendix III	(Jewish scientists who have been refused emigration and are still in the USSR)	117
Notes	Introduction (pp 1-3)	118
	Chapter I (pp 4-31)	118
	Chapter II (pp 32-53)	126
	Chapter III (pp 54-104)	137
	Conclusion (pp 105-110)	165
Bibliography		166

(The defense of human rights was) the natural continuation of his scientific work: a scientist cannot accept the lack of freedom of information, the forced conformity of convictions and lying. In his civic work (he) maintained the same principles that he did in science: full knowledge of the facts, responsibility for their exact formulation, and accuracy in the conclusion. And, openness and full disclosure...¹

We (scientists) have one or two good features. We have a comparatively high degree of honesty. That comes from our scientific style of thinking, which is carried out without reference to the opinions of other men. And we are comparatively independent, which also comes from our scientific training. We direct our thoughts to the problem we are working on. We are not easily distracted - comparatively, I mean...I think we are better educated than politicians...²

INTRODUCTION

Whether there is something special in a scientist that leads him into dissidence, something that is related to the scientific method, deductive reasoning, and experimental proof, as reflected in the two quotes above, is an interesting question, but not one that will be discussed in any depth in this study. True, even a cursory knowledge of the Soviet dissident movement of the 1960's and 1970's suggests the important role of the scientist. A great number of the most prominent and influential dissidents have been scientists, such as SAKHAROV, ORLOV, TURCHIN, TVERDOKHLEBOV, KOVALEV, CHALIDZE, LITVINOV, VOL'PIN, TSUKERMAN, PLYUSHCH, and SENCHARANSKIY.* But not all scientists have been or are dissidents. This study is an attempt to determine why some of the scientists have dissented. Why other scientists have not is left to another researcher.

The major questions this study will address are: who are they? (are there many dissident scientists, or does the prominence of the few simply leave that impression); what do they protest? (are dissident scientists involved only in matters that affect them as scientists, or do they become involved in such issues as religious freedom, human rights, or national minority rights); why do they dissent? (what are some of the

*The names of scientists who appear in the table in Chapter III are capitalized throughout the paper.

motivating factors behind their decision to dissent); what does all this mean in terms of future dissent among scientists? (what projections can be made).

The material used in researching these questions was almost exclusively "samizdat", the clandestinely-published dissident literature widely circulated in the Soviet Union. The "samizdat" sources employed in this study were issues 1-49 of Khronika tekushchikh sobytiy (Chronicle of Current Events), 30 April 1968 - 14 May 1978, Sooraniye dokumentov samizdata (Collection of Samizdat Documents), volumes 1-30, and Materialy samizdata (Samizdat Materials), 1971-77. The journal, The Chronicle of Human Rights in the USSR, volumes 1-31 (1973-78), which is published by former Soviet dissidents now living in the West; was also used to compile data. The chief editor of this journal, incidentally, is CHALIDZE, a physicist. Gary Penfield's comprehensive study, The Chronicle of Current Events: A Content Analysis (USARI, Garmisch, 1973), was an indispensable source for identifying many of the dissident scientists and for putting the scientists' contributions to the dissident movement from 1968 to 1971 into perspective. The biographical listing published by Radio Liberty, Sovetskiye grazhdane zashchishchayut molodykh literatorov (Soviet citizens defend young writers) (Guide #74, Munich, May 1968), was also of great assistance in the compilation of the biographical information. The personal working files of Peter Doran of Radio Liberty were likewise extremely helpful, and the author is greatly indebted to Mr. Doran for his interest in this study.

For the purpose of this study, a "scientist" is defined as a researcher-scholar involved in the natural sciences of physics, mathematics, biology, chemistry, geology, cybernetics, and oceanology. Linda Lubrano, incidentally, used similar criteria in her studies of Soviet scientists, confining her research to physicists, mathematicians, chemists, and biologists.³ Engineers were not included in this study unless the engineer was involved in research in one of the natural sciences. The primary reason for the exclusion of engineers is that the job title "engineer" in the Soviet Union is a nebulous, nondescriptive term; Albert Parry has suggested that no more than a third of all Soviets who hold the title of engineer actually have the education to merit it.⁴

Another caveat on the use of the term "scientist" in this study is that, because a scientist often ceased being an active researcher-scholar after his initial dissidence (he lost his clearances, his job, and the access to research laboratories) and had to turn instead to non-scientific jobs, all dissidents who were active scientists (according to the above definition) at the time of their initial dissent were included. Teachers in the natural sciences have also been included because their jobs often involve active research. Students in the natural sciences were also mentioned, primarily to show the existence of dissidence down at the level of the university science department. There is a chance, too, that the students might resurface as active scientists in the future, so their inclusion in this study might serve as a "Dissident Scientist Early Warning" system.

It is just as important to define what is meant by "dissident" for

the purposes of this study. A dissident is one who has taken an action or supported a position that has incurred the wrath of the authorities; thereafter the dissident is persecuted, ostracized, or cajoled into re-joining the fold. Barghoorn defines dissent as

a broad range of articulated negative attitudes regarding political matters...the ultimate object of (which) is to correct mistakes, to right wrongs, or ...to protest against...an intolerable evil,⁵

and this is a good summary of the various objectives of the dissident scientists. It should be noted that, in a free society, most dissent is legal; in a totalitarian state, almost no dissent is. A dissident then, is not, in the general sense of the word, a criminal.

To conclude this introduction, a few words should be said about the validity of any researcher's claim that he can explain human behavior (in this case, an act of dissidence) and even predict behavior on the basis of data. The author of this study assumes that there is some validity to this claim. There is no consensus in the social sciences on this matter, which complicates this study's theoretical underpinning somewhat. In any case, upon this "behavioralist" act of faith the author has constructed a model which purports to determine the "cause" of dissent from personal and environmental factors: date of birth, educational level, ethnic origin, and so on. All dissident scientists are examined on these factors, and factors showing up the same for a number of scientists are considered to be significant in understanding the causes of the dissident act. This model is presented in Chapter III. The first two chapters were added because of the author's desire to please the "traditionalists": both of these chapters offer data couched in historical-descriptive packaging. It is hoped that this "methodological fence-straddling" will not be disconcerting to the reader; it could even be suggested that by using this methodological mix all the relevant data will be analyzed; data not picked up using one technique should surface using another.

CHAPTER I

This chapter offers a historical overview of dissidence in the scientific community and focuses on the issues which have sparked dissent. Primary attention will be devoted to events in the 1966-78 time frame, and the events will be presented chronologically. The purpose of this chapter is to document the participation of scientists in the dissident movement and to establish the historical framework for the analysis in Chapter II of dissident groups in which scientists have been active. Some of the information in this chapter will also be the basis for statistical data included in Chapter III. While not all of the known events which have involved or affected scientists are included in this chapter in the interests of (relative) brevity, it is believed that all the significant events and issues are touched upon to the extent that some conclusions on the historical development of dissidence among scientists can be reduced.

1. 1966-68: The beginning of collective dissent and the resultant backlash.

The mass participation of scientists in the Soviet dissident movement began with the trial of writers A. S. Sinyavskiy and Yu. M. Daniel on 10-14 February 1966. Prior to 1966 there had been several instances of dissidence on the part of individual scientists (such as physicist KAPITSA, who refused Stalin's order to work on the atomic bomb in the 1940's,¹ physicist SAKHAROV, who, after helping to develop the hydrogen bomb, lobbied for various arms control measures in the late 1950's and in the early 1960's,² mathematician PIMENOV, who was convicted of forming an anti-Soviet group among students in Leningrad in 1957,³ mathematician VOL'PIN, who participated in an open meeting in Moscow's Pushkin Square in support of Sinyavskiy and Daniel in 1965,⁴ and mathematics student and later teacher MASHKOVA, who was convicted of forming an anti-Soviet group in 1958)⁵, but there had been no instances of scientists dissenting collectively.

Following the Sinyavskiy-Daniel trial two protest letters were sent to Soviet authorities. Neither directly protested the trial, but both expressed the concern of Soviet intellectuals, engendered by the trial, that Stalinism was being rehabilitated. The first letter, sent sometime in 1966, probably in February, was signed by twenty-five individuals, six of whom were scientists (all academicians and physicists).⁶ They expressed their support of the condemnation of Stalin as contained in Khrushchev's 20th CPSU Congress speech and warned that any rehabilitation of Stalin would lead to serious internal and international repercussions. Although he didn't sign this letter, Academician and radioengineer, A. I. Berg stated that if Stalin were rehabilitated at the forthcoming 23rd Party Congress, he would leave the Academy of Sciences as a sign of

protest.⁷ As it turned out, whether because of these protests or not, the Congress did not rehabilitate Stalin. The second letter, signed by twenty-one intellectuals, nine of whom were scientists, in the Fall of 1966, expressed the fear that changes approved in the Soviet criminal code, Articles 190-1 and 190-3, would be used indiscriminately and contrary to "Leninist principles of socialist democracy."⁸ These changes made it much easier for the government to prosecute individuals deviating from the official line, and were presumably adopted with the experiences of the Sinyavskiy-Daniel trial in mind, in anticipation of similar trials in the future.

Several prominent Soviet academicians, joined by over a hundred and fifty other intellectuals and scientists, signed a letter sometime in 1967 which called for the elimination of censorship and proposed draft legislation for the free exchange of information.⁹ This letter turned out to be the final attempt for many of these scientists to change the Soviet system through the signing of collective protest letters, probably because they realized the inefficacy of the letters and the risk involved of incurring the wrath of the authorities. In any case, of the seven members of the Academy of Sciences, only SAKHROV and LEONTOVICH were to continue active dissidence; GEL'FAND signed only one more protest letter, in 1968.

Several arrests and trials of dissidents in 1967 sparked the concern of scientists; by far the largest response was for the arrests (in January 1967) and forthcoming trial of A. I. Ginzburg, who had compiled and disseminated a "White Book" on the Sinyavskiy-Daniel trial, and YU. Galanskov, who was the editor of the underground magazine Phoenix. Prior to the dissidence surrounding the Ginzburg-Galanskov case, though, the trial of V. Bukovskiy, V. Delone, and V. Kushev in September 1967 brought two scientists, LITVINOV and VOL'PIN to the attention of the authorities. Delone and Kushev, incidentally, had been arrested for participation in a demonstration on 22 January 1967 protesting the arrests of Ginzburg and Galanskov. Bukovskiy was involved in planning the demonstration. VOL'PIN had written to a Moscow newspaper on inaccuracies he had found in an article on the Bukovskiy-Delone-Kushev trial, indicating that such mistakes were inevitable when a trial was not open to the public.¹⁰ LITVINOV was called into the KGB on 26 September 1967 and warned not to publish and distribute a transcript of the trial, under the threat of criminal prosecution.¹¹ He did not, however, stop collecting documents for the transcript.¹²

In November 1967 a petition was sent to the Procurator-General of the USSR by 116 individuals, twenty of whom were scientists, asking for permission to attend the Ginzburg-Galanskov trial, scheduled for early 1968.¹³ A second petition was sent a month later by forty-two individuals, of whom fourteen were scientists.¹⁴ Five scientists who had not signed the earlier protest signed the second one. Thus, by the end of 1967 twenty-five scientists, none of whom was an academician or noted scientist, had taken steps which would single them out as dissidents in the eyes of Soviet authorities. Because of their lack of notoriety and high academic position, they were probably much more likely to elicit repressive measures from the authorities. There may have been security in numbers, though, for in 1968 they were joined by nearly one hundred

and fifty other scientists, who protested the Ginzburg-Galanskov trial itself.

The floodgates of dissidence in the scientific community opened wide in January 1968 with the Ginzburg-Galanskov trial. The impetus for much of the dissent was the conviction of Ginzburg, Galanskov and their co-defendants, Dobrovol'skiy and Lashkova, but some of the protests in 1968 were in support of those who, after protesting the trial, were themselves arrested, harrassed, relieved of their jobs, or kicked out of the Party. The Chronicle of Current Events, which, according to Rothberg, was the product of top Soviet scientists and technologists having access to sophisticated communications systems,¹⁵ began publication on 30 April 1968, after the Ginzburg-Galanskov trial but in the midst of the protesting about the trial. The Chronicle from the beginning recorded a lot of information on illegal reprisals accorded those who protested, a significant number of whom were scientists.

On the eve of the Ginzburg-Galanskov trial, thirty-one of Ginzburg's friends, six of whom were scientists, sent a letter to the Moscow Municipal Court in which they expressed their concern on a number of alarming circumstances preceding the trial: the long pre-trial confinement, the absence of information in the press on the reason for the arrests, and the prolonged investigation.¹⁶ The signers of this document vouched for Ginzburg's honesty and propriety, and claimed that he didn't participate in political matters as such. They further asserted that his compilation of documents from the Sinyavskiy-Daniel trial could not be sufficient reason for his arrest and trial; that, if so, this could not be a healthy move for a society which recently had witnessed the mass rehabilitation of people falsely convicted under Stalin. They asked that the trial be open and fair.

Another protest letter was sent during the trial. This one was signed by eighty individuals, fourteen of whom were scientists.¹⁷ The letter appealed to the Soviet authorities to prevent the trial from becoming "closed", under the cover of which, it was asserted, the KGB would settle accounts with people it didn't like. The signers further claimed that there had been flagrant violations of legal procedure at the trial and they called for the initiation of legal action against the appropriate court officials.

The largest show of support in connection with the Ginzburg-Galanskov trial come in response to the open letter, "To World Public Opinion," written by Daniel's wife, L. Bogoraz, and LITVINOV.¹⁸ The letter, which was released 11 January 1968, eventually elicited the support of nearly 235 Soviet citizens. Bogoraz and LITVINOV alleged in the letter that during the trial the most important Soviet legal norms had been violated, due to the actions of the judge and prosecutor, who had not allowed defense witnesses to exercise their legal rights. They claimed that the courtroom was filled with specially selected people who harassed the defendants and defense witnesses. They appealed to Soviet and world public opinion to demand public condemnation of this "shameful" trial, release of the defendants from custody, and a retrial which would include international observers. This letter was sent directly to the West with an appeal to disseminate it as quickly as possible. The authors thought,

correctly, that it would be hopeless and futile to send it to Soviet newspapers.

The Bogoraz-LITVINOV letter was supported on every account by nearly 235 individuals, as mentioned above. The first letter of support, signed by 170 people, sixty of whom were scientists, was sent 5 February 1968 to Procurator-General Rudenko at the conclusion of the trial.¹⁹ The letter repeated the charges that the defendants, witnesses and close friends of the defendants had been harrassed and that legal procedure had not been followed. The signers claimed that the conviction and sentence were not supported by the evidence presented at the trial. They also maintained that over the previous several years dissidents had been tried in a more arbitrary manner, and that until this arbitrariness was stopped and condemned, no one could feel secure. They called for a retrial, the inclusion of some of the signers of the letter at the trial as public representatives, and for the appropriate punishment of those who were responsible for conducting the trial. An additional sixty-five signatures were collected between February and April, when the case was taken to appeals court.

In the three months following the Ginzburg-Galanskov trial additional scientists protested the sentences and improper trial procedures. Of the 306 individuals signing these protest letters from Moscow, Novosibirsk and Kiev, ninety-eight were scientists. The Novosibirsk letter, signed by forty-six people, fifteen of whom were scientists, decried the fact that in order to get information on the trial they had to turn to foreign Communist publications, and asserted that a sense of civic responsibility forced them to denounce "closed," political trials as intolerable.²⁰ The signers claimed they could not allow the Soviet judicial system to be removed again from the control of public opinion. They called for the reversal of the judge's decision and a review of the case, with full disclosure in the press of the relevant materials.

In February 1968 121 Soviet citizens, including forty-nine scientists, most of whom were from Moscow, sent a letter of protest on Ginzburg's conviction to Brezhnev, Kosygin, Podgorny, the chairman of the Supreme Court and the Prosecutor-General.²¹ In the letter they claimed that there was no evidence connecting Ginzburg with anti-Soviet emigre organizations and that the insinuation that this was the case, as Soviet newspapers had reported, was similar to the tactics used in the Stalinist trials of 1937. They requested a review of the Ginzburg case.

The letter sent from Kiev in April 1968 was addressed to Brezhnev, Kosygin, and Podgorny, and was signed by 139 people living in the Ukraine, thirty-four of whom were scientists.²² The letter expressed concern of the individuals signing it about the numerous political trials of young people from the scientific and cultural intelligentsia in the preceding years. The signers were bothered by the "closed" nature of a number of trials in the Ukraine from 1956-66, claiming that this was done in violation of the Soviet Constitution. They feared that because of the "closed" nature of the trials illegalities would tend to occur, and they cited as an example the Ginzburg-Galanskov trial, about which they had heard from the Bogoraz-LITVINOV letter. They claimed that in many of the trials the defendants had been convicted for views that were not anti-

Soviet at all but were critical of isolated incidents. The Ukrainians further maintained that these recent political trials were a form of suppressing the civic activity and social criticism which are absolutely essential for the health of any society, and that these trials witnessed a restoration of Stalinism. Finally, they called on Brezhnev, Kosygin and Podgorny to intervene to ensure that the judicial authorities strictly adhered to Soviet law. They also expressed the wish that the difficulties that had arisen in Soviet socio-political life could be kept within the realm of ideas and not handed over to the KGB and the procurator.

Before moving on to subsequent issues in 1968, a few conclusions should be reached on the preceding protest letters. First of all, one should be struck by the similar tone and content, couched in legal terminology and anti-Stalinism, with concern for full disclosure of the judicial proceedings and the power of the KGB. Since the drafters of these protest letters didn't always have a sample protest letter at their side when drawing up the letter, these similarities must reflect common views and concerns. Secondly, the protest letters criticize more than the issue at hand. In the case of the Bogoraz-LITVINOV letter, the appeal for international observers at a future political trial implies that only under foreign pressure and intervention is justice preserved in any political trial. The supporters of the Bogoraz-LITVINOV letter used their letter to denounce previous trials of dissidents; the Novosibirsk protesters assailed the Soviet press for insufficient coverage of the trial. The Ukrainians denounced trials in the Ukraine from 1956 and asserted that social criticism was necessary. Finally, these protest letters united over one hundred and seventy scientists in a common cause, showing them that there were like-minded scientists in other parts of the Soviet Union. While it is doubtful that a strong feeling of solidarity was evoked by the signing of these collective protest letters, it must be acknowledged that the phenomenon of collective protest in a totalitarian state is so rare and potentially dangerous (to the state) that the signers must have realized the importance of their act and felt strongly about it. The fact that they had all made a commitment exposing themselves to similar reprisals should have unified them to some extent.

A few days after the Ginzburg-Galanskov trial a new incident arose which greatly affected part of the scientific community, the forceable incarceration of mathematician VOL'PIN in a psychiatric hospital on 14 February, presumably for his active participation in the dissident movement since 1965. A protest letter was sent to the Minister of Health and the Prosecutor-General by ninety-five people, primarily mathematicians, who expressed concern for VOL'PIN's well-being at the hospital.²³ The protesters claimed that VOL'PIN's hospitalization was a flagrant violation of medical and legal standards, and they requested that he be released. VOL'PIN was finally released 12 May 1968, without having been charged with a crime. The mathematicians who signed the letter, however, were not as lucky. They were under substantial pressure to modify their position, which seemed to be critical of the Soviet judicial system. The denouement of this pressure was a letter, broadcast by Radio Moscow on 26 March 1968, which denounced the attempts of the foreign press to exploit the earlier letter. This latest letter was signed by fifteen of the original ninety-five, all from Moscow State University.²⁴ The fifteen claimed

that they had been concerned only with the conditions at the particular hospital in which VOL'PIN was placed and the fact that his family had not been consulted. They stated further that they were "pleased" to find out that he had been transferred to another hospital "more suited to his case." The fifteen also mentioned that they had been aware that VOL'PIN had been under psychiatric observation for a number of years and had been in mental hospitals before. Further, they claimed that their concern was for a colleague, "a sick man but a capable mathematician." It cannot be overlooked that only fifteen were cowed into issuing this retraction. One must assume, moreover, that the Soviet authorities would have preferred a unanimous retraction, as so much of Soviet life is conducted under the ruse of unanimity. The remaining eighty who refused to retract the letter, then, risked the increased displeasure of the authorities. In fact, the refusal to retract assumes nearly as much importance, in terms of commitment to dissidence, as the decision to sign it in the first place. One could plead ignorance of the ensuing political repercussions in the latter case; there would be no such defense in the former.

At the Moscow Party Conference in March 1968 the main topic of the speeches was the collective protest letters of the previous two months on the Ginzburg-Galanskov trial and VOL'PIN's confinement. Academy of Sciences President M. V. Keldysh presented a speech on the Academy's gratitude for the Party's trust and support of scientists, most of whom in turn "sincerely support the Party line in all matters."²⁵ There were a few scientists he admitted, who, succumbing to provocations, took incorrect moves in their public lives by sending letters in support of people who were conducting hostile activities. Keldysh expressed his belief that the overwhelming majority of these scientists who had strayed had done so out of political immaturity, not understanding the tense political situation in the world. To correct this situation Keldysh said that the Academy of Sciences would take greater effort to explain the real nature of things to these people, but that these people ought to understand that it wasn't they who determine what Soviet science would be, that science will progress in any case.

Keldysh, after receiving a letter from an American mathematician on the fate of VOL'PIN, had an answer drafted which alluded to VOL'PIN's sickness, and forced his brother-in-law, Academician P. S. NOVIKOV, to sign it, after four hours of haranguing him.²⁶ NOVIKOV, his wife (Keldysh's sister) L. V. KELDYSH, and their son, S. P. NOVIKOV had all signed the letter in support of VOL'PIN and two letters in support of Ginzburg.

In March 1968 the Party organizations in Akademgorodok (Novosibirsk) began a witch hunt which led to administrative punishment for signers of the collective letters on the Ginzburg-Galanskov trial.²⁷ The Party organization also closed a number of cultural organizations, young people's clubs and galleries.²⁸ Members of the Party who belonged to or were in sympathy with these organizations were expelled from the Party, apparently because the authorities thought that these cultural organizations harbored the liberal attitudes which led to the protest letters.

In April 1968 there were several meetings in Moscow institutes at which the signers of the collective protest letters were publicly re-

buked. At Keldysh's institute, the Institute of Applied Mathematics, ten scientists, including academicians ZEL'DOVICH and GEL'FAND, had signed protests. Keldysh appeared at an open meeting, where he condemned his colleagues and expressed his sorrow that mathematicians had not lived up to the Party's trust in them.²⁹ He further stated that the actions of the dissident scientists hindered the Party's progress towards democratization and made contacts with foreign scientists more difficult, since many Soviet scientists would not be able to be sent abroad. At a meeting of the Party committee of the Institute of Atomic Energy the case of Academician LEONTOVICH was discussed.³⁰ LEONTOVICH, the head of one of the most important departments at the Institute, had not only signed one of the collective letters on the Ginzburg-Galanskov trial, he also had composed its text. At the meeting it was reported that the Moscow Party Committee had directed that LEONTOVICH be removed from his job. To effect this a representative of the Moscow committee presented the members of the institute committee with material on the Ginzburg-Galanskov trial. Several members of the institute committee complained that the material brought (only the summary of the accusations) was not sufficient, and the institute committee did not adopt the Moscow committee's decision. On the very same day, senior workers at the institute were given commemorative medals at an assembly in honor of the 25th Anniversary of the institute. The greatest applause was accorded LEONTOVICH when he was handed his award.

In June 1968 SAKHAROV's famous essay, "Thoughts on Progress, Peaceful Coexistence and Intellectual Freedom," called by Harrison Salisbury "a high watermark in the movement for liberalization within the Communist world,"³¹ began circulating in "samizdat."³² The essay, SAKHAROV's first public statement that could be considered a legitimate threat to the existing Soviet regime, propounded the view that the world was on the brink of disaster and that only through cooperation between the US and USSR could this fate be averted. SAKHAROV believed that this cooperation was inevitable because the US and USSR were converging as a result of mutual political, economic and technological borrowing, leaving eventually no grounds for hostility between the two countries. While SAKHAROV probably reflected the world outlook of a member of his fellow scientists, there were other views held by dissident scientists. One such view, from "numerous representatives of the technical intelligentsia of Estonia," issued in July 1968 in "samizdat," called for a more activist program, seeing in SAKHAROV too much faith in scientific and technological progress in achieving world peace and too little recognition that the USSR had to change radically before any convergence of the US and USSR could take place.³³ The Estonians called on the leading minds of Soviet society to come up with programs which would fundamentally change Soviet reality in a moral, political, and economic sense.

Soviet attempts at interference in Czechoslovak internal affairs in July 1968 led five Communists, one of whom was the physicist PAVLINCHUK, to write an open letter of support to the Czechoslovak Communists and all the Czechoslovak people on 28 July 1968.³⁴ In the letter the five expressed their conviction that the Soviet Party-government leadership would not use armed force against Czechoslovakia for fear of being discredited and losing the confidence of the people. The five disassociated themselves from the "unobjective and one-sided" reporting of the events in

Czechoslovakia in the Soviet press, and indicated that the Russian people had a genuine feeling of friendship for the Czechoslovak people.

The Soviet government's failure to realize the five Communists' hope for non-intervention in Czechoslovakia was a shock to many Soviet citizens. LYUBARSKIY called the Soviet invasion of Czechoslovakia a heavy blow for himself, for many of his friends and for many of his later acquaintances.³⁵ Five people, including LITVINOV and V. Delone, grandson of Academician and mathematician B. Delone, and son of chemist I. O. Delone, demonstrated at Red Square on 25 August 1968 in protest of the Soviet action in Czechoslovakia.³⁶ They were brought to trial in October and convicted. On 1 December 1968 a letter, signed by ninety-five people, sixteen of whom were scientists, was sent to the deputies of the Supreme Soviets of the USSR and Russian Soviet Federative Socialist Republic (RSFSR) protesting the conviction.³⁷ It was alleged in the letter that there had been no legal basis for initiating criminal proceedings against the defendants, and that the main problem was not procedural irregularities, but violations of the civil rights guaranteed in the Soviet Constitution, the freedom of speech and the freedom of demonstration. The ninety-five called upon the deputies to perform their duty of defending these freedoms by moving for the dismissal of the sentences and cessation of the criminal proceedings.³⁸

The arrest of writer A. T. Marchenko in late July 1968 sparked a letter of protest to the procurator of the region in which Marchenko was arrested. The letter was signed by five individuals, including LITVINOV, RUDAKOV and BELOGORODSKAYA.³⁹ BELOGORODSKAYA was arrested 8 August 1968 for having in her possession petitions calling for Marchenko's release. Her arrest, in turn, was protested by LITVINOV, KAPLAN and RUDAKOV. BELOGORODSKAYA was tried in February 1969 and became the first person to be tried since Stalinist times for merely supporting a dissident.⁴⁰ Up to this time, people had been fired from their jobs, expelled from the Party, or kicked out of school, but none had been brought to trial. BELOGORODSKAYA had not written or even distributed the petitions she was accused of having in her possession; in fact, the petitions, in the form of letters addressed to various Soviet writers asking for Marchenko's release, were found in a purse she had left by mistake in a taxi. BELOGORODSKAYA's step-sister, L. Bogoraz, composed the letters but was not subjected to criminal proceedings.⁴¹ BELOGORODSKAYA was sentenced to one year confinement.

Mathematician BURMISTROVICH, who had been involved in dissident activities to a greater extent than had BELOGORODSKAYA, was arrested in May 1968 but was not brought to trial until May 1969.⁴² BURMISTROVICH was accused of distributing "samizdat" copies of the literary works of Sinyavskiy and Daniyel to his friends, who were, as it turned out, scientists themselves. BURMISTROVICH had hired typists to copy various unpublished (in the USSR) literary works, including Bulgakov, Kafka, Joyce, Mandel'shtam, Tsveytaya, Sinyavskiy, and Daniyel, because he was unable to acquire them in editions that were not "samizdat." BURMISTROVICH gave copies of these works to an old acquaintance from his student days at Moscow State University, mathematician TURUNDAYEVAKAYA, and to an acquaintance of hers, chemist BAGATUR'YANTs. BURMISTROVICH, at one point, had asked BAGATUR'YANTs to reproduce material on the Ginzburg-Galanskov trial and some

poetry by Mandel'shtam and Tsvetayeva. None of these scientists believed that "samizdat" was harmful to the Soviet system or that they were doing anything illegal. At the trial however, BAGATUR'YANTS indicated that he was ready to accept the official position on "samizdat" and have nothing to do with it in the future, and it was BAGATUR'YANTS who, five months after BURMISTROVICH's arrest, went to the KGB and signed a statement apparently disassociating himself from BURMISTROVICH. TURUNDAYEVSKAYA testified that she enjoyed "samizdat" but that she was threatened by the KGB to renounce it, under the threat of being arrested herself, her husband, TURUNDAYESKIY, a Party member and also a mathematician, testified that he had read some of the "samizdat" his wife had acquired and thought that the "harmfulness" of the material depended on who was reading it. At the end of the trial BURMISTROVICH indicated that he would no longer insist that the works of Sinyavskiy and Daniel were not slanderous, but he repeated his assertion that he turned to these materials to "know the truth." He asked rhetorically, can it be that the truth is ideologically harmful, and answered that he believed that the Soviet system was strong enough to endure any truth. His confidence in the system, however, did not spare him from receiving a three-year sentence. His wife, biologist KISLINA, wrote a letter to several Soviet newspapers and the procurator to complain about the illegalities manifested during the investigation of her husband's case, but the protests came to naught.⁴³

In August 1968 two other scientists, chemist KVACHEVSKIY and physicist STUDENKOV, were arrested for alleged dissident activities.⁴⁴ They were tried, together with their cohort Gendler, in late December 1968 in Leningrad. KVACHEVSKIY was accused of having led anti-Soviet discussions at his home in 1964 and 1965 and of having distributed LITVINOV's questionnaire on trial and prison procedures to former political prisoners. KVACHEVSKIY had been acquainted with Leningrad Marxists and fellow chemist RONKIN since 1957 and had obtained material from RONKIN and fellow Marxist KHAKHAYEV only two days prior to their arrest in 1965.⁴⁵ KVACHEVSKIY had also signed one of the letters protesting the Ginzburg-Galanskov trial and had been fired from his job because of it.⁴⁶ He refused to admit any guilt during the trial and was sentenced to four years confinement. STUDENKOV was accused of anti-Soviet agitation and propaganda, as well as illegally brewing alcohol and forging documents. He admitted his guilt and was sentenced to only one year confinement. STUDENKOV had constructed a still because, as Gendler testified, "We were too poor to buy vodka." STUDENKOV had been associated with Gendler and KVACHEVSKIY only since 1967, apparently out of the spirit of adventure. STUDENKOV had prepared microfilms of "samizdat" using equipment from his place of work and, after being released from KGB custody for a short period of time and subsequently destroying the microfilm, he went around the institute bragging about how easily he had made it through the KGB. He had also forged documents, enabling a group of people to travel at a cut rate. STUDENKOV's sentence was comparatively light because of his confession of guilt and the important scientific research he was involved in. He worked in a laboratory, which was involved in highly classified explosives work, at the Leningrad Physico-Technical Institute; the laboratory was so important that it allegedly was subordinate not to the director of the institute but to the Minister of Defense himself. STUDENKOV's attorney used the importance of STUDENKOV's scientific work to obtain a reduction in his sentence. One point made by the attorney was that even in prison

STUDENKOV had been working on scientific matters. In STUDENKOV's final words to the court he promised to devote the rest of his life to science.

Another point to make about the KVACHEVSKIY-STUDENKOV-Gendler trial is that KVACHEVSKIY's older brother, geologist O. KVACHEVSKIY, had wanted to serve as his brother's attorney (KVACHEVSKIY had refused to use the state-appointed attorney) but was sent on temporary duty out of town during the trial.⁴⁷ O. KVACHEVSKIY showed up much later, in 1977, signing a protest letter to the Politburo on the new Constitution.⁴⁸

To sum up the period 1966-68, let us examine the official backlash, other than arrests, which accompanied the collective letters. At least eight scientists were kicked out of the Party,⁴⁹ fifteen were removed from their institutions,⁵⁰ at least two received Party reprimands,⁵¹ and three were not allowed to continue teaching.⁵² In all, at the very least thirty-five scientists were, without benefit of trial, punished for their actions in this period. It is clear that the message from the authorities was received by the other protesting scientists, for only about forty of the more than two hundred and eighty scientists who first protested in 1967 and 1968 continued to dissent afterwards.⁵³

2. 1969-71: The beginning of dissident groups and the Jewish movement.

The first "legal" dissident group in the USSR, in the sense that it was not formed underground and that it strictly adhered to Soviet law, was created in May 1969 by fifteen individuals, five of whom, T. VELIKANOVA, KOVALEV, LAVUT, PLYuShch and POD'YAPOL'SKIY, were scientists.⁵⁴ The group, called "The Initiative Group for the Defense of Human Rights in the USSR" (The Initiative Group), performed basically the same functions as did the compilers of the Chronicle of Current Events, collecting and disseminating information on violations of human rights in the USSR. It would not be surprising, in fact, if the Initiative Group turned out to have been the driving force behind the Chronicle, for in 1974, over a year after the suppression of the journal, three people, all members of the Initiative Group (KOVALEV, T. VELIKANOVA and T. Knodorovich), publicly assumed responsibility for its resurrection and continued life.⁵⁵ A second "legal" dissident group, the "Human Rights Committee," also known as the "Sakharov Committee," was organized on 4 November 1970 by three physicists, SAKHAROV, CHALIDZE and TVERKOKHLEBOV.⁵⁶ This group assumed a more legalistic tack than did the Initiative Group, concentrating much more of their effort on legal research and consultation in matters concerning human rights. Together, these two groups formed rallying points for dissidents in the 1969-71 period and thereafter, and provided valuable leadership and research experience for their members, many of whom later formed new dissident groups. Without these groups, it is doubtful that the dissident movement could have continued following the reprisals meted out by the authorities to signers of the collective protest letters of 1967-68.

The Jewish emigration movement began with protests over the arrests of

200 Jews in the wake of the 15 June 1970 hijacking attempt of a Soviet aircraft in Leningrad and the subsequent trials in December 1970, and in May and June 1971. The first trial, which heard the case of the so-called "Leningrad 11," who were the Jews who had actually boarded the aircraft, resulted in death sentences for two of the alleged hijackers.⁵⁷ In protest of these sentences, five scientists, two of whom were Jews and all of whom were connected with the "Human Rights Committee," sent a telegram to Podgornyy on 27 December 1970, in which they asked that the two hijackers not be executed and that the accused, along with other Jews wanting to emigrate, be allowed to leave the Soviet Union.⁵⁸ SAKHAROV also wrote an open letter to Presidents Nixon and Podgornyy in which he called on the former to guarantee a fair trial for Angela Davis and on the latter to lessen the sentences of the "Leningrad 11."⁵⁹ Also protesting the trial were fifty-nine Soviet Jews, eleven of whom were scientists.⁶⁰ The two trials in 1971, that of the "Leningrad 9" in May and of the "Kishinev 9" in June, had several scientists as defendants; more about these trials will be included in Chapter II.

A number of other significant events occurred in the 1969-71 period which affected dissident scientists, events which witness the continuing pressure brought to bear on all dissidents by the authorities and the activism on the part of scientists in support of their own dissident goals as well as other dissidents.

On 24 March 1969 former kolkhoz chairman and dissident I. A. Yakimovich was arrested for allegedly slandering the Soviet system. Yakimovich had previously protested the Gihzburg-Galanskov trial in a personal letter to Suslov which was later published abroad and had protested the Soviet invasion of Czechoslovakia. On 2 April twenty-five people, eight of whom were scientists, signed a protest letter in his support, expressing shock that Yakimovich had been arrested and confidence that he was innocent.⁶¹ The protesters further stated that they considered it their duty to do everything possible within legal limits to stop this "shameful action of the punitive organs."

On 13 April 1969 a mathematics student at Latvian State University, Il'ya RIPS, attempted self-immolation at the foot of the Freedom Monument in Riga in protest of the Soviet occupation of Czechoslovakia.⁶² He was later accused of anti-Soviet agitation and on 2 October was sentenced to a period of hospitalization at a psychiatric hospital. He was released 23 April 1971 and was allowed to emigrate to Israel in January 1972. RIPS was an outstanding mathematician and was slated to go to the Institute of Physics of the Latvian Academy of Sciences at the end of the school year in 1969. He was one of the winners of the International Mathematics Olympics for Schoolchildren at the age of 15, had entered the university at age 16, and his senior paper, in the opinion of his professors, could have served as the basis for a doctoral dissertation. RIPS' physics teacher, LADYZhENSKIY, was questioned about RIPS' after the incident - apparently LADYZhENSKIY had supported RIPS' protest - and was later fired from his job at the university. LADYZhENSKIY was convicted of distributing "samizdat" in December 1973 and sentenced to three years imprisonment.⁶³

DZHEMILEV participated in the 6 June 1969 Crimean Tatar demonstration

in Moscow on Mayakovskiy Square.⁶⁴ The demonstrators demanded a solution to the Crimean Tatar nationality problem and the release of political prisoners. Although the demonstrators were not subsequently arrested (they were merely beaten and expelled from the city), DZHEMILEV had expected arrest for the protest. He stated that he had to protest because he refused to give in to the abominations then running rampant in the USSR through his own inaction and passivity.

The arrest of religious writer A. Levitin-Krasnov on 12 September 1969 for his support of dissidents and freedom of worship in the USSR elicited a protest letter, signed by thirty-two individuals, six of whom were scientists, on 26 September.⁶⁵ One of these scientists also signed a letter from seven Christians to the World Council of Churches in September calling for Levitin-Krasnov's release, along with the release of mathematics teacher TALANTOV, who had previously been sentenced to two years confinement for religious dissidence.⁶⁶ The seven Christians signing the letter asked the Council to intercede on behalf of these two dissidents and to assist in the normalization of religious life in the USSR.

Solzhenitsyn was expelled from the Union of Soviet Writers in December 1969 for his political views, and his expulsion touched off a protest from a number of Moscow intellectuals. One letter, sent to the Writers' Union on 9 December 1969, expressed the view that Solzhenitsyn's expulsion was another manifestation of Stalinism in Soviet society. The letter was signed by thirty-nine people, ten of whom were scientists.⁶⁷

In March 1970 physicists SAKHAROV and TURCHIN and historian R. A. Medvedev, brother of biologist MEDVEDEV, released an appeal for the gradual democratization of the USSR in a letter addressed to Brezhnev, Kosygin and Podgornyy.⁶⁸ The three dissidents asserted that technological and economic progress was integrally connected to the democratization of the state, and that without the freedoms of information and speech the state could not continue to develop in science and technology. They cited as an example the decline of Soviet technology by failure of the USSR to send a man to the moon ahead of the US. They did not question the role of the Party in the governing of the USSR, but they did maintain that democratization should be thorough, including, presumably, the Party itself. The authors further asserted that these views were not theirs alone, but were shared to one degree or another by a significant part of the Soviet intelligentsia.

Mathematician CHERNYSHOV was arrested in March 1970 for anti-Soviet propaganda and was incarcerated in a psychiatric hospital.⁶⁹ He had written a number of philosophical studies on such subjects as the spiritual liberation of the Russian people and had given this material to two people, for which he was arrested. While there were no protest letters which accompanied ChERNYSHOV's arrest, he was a popular teacher at a technological institute and was on good terms with the administration and his colleagues, so it could be assumed that his arrest aroused some feeling of sympathy and support for him among fellow scientists.

The forceable incarceration of MEDVEDEV in a psychiatric hospital on 29 May 1970 evoked a wave of dissent from the scientific community.

MEDVEDEV was a highly influential scientist and a firm anti-Stalinist Marxist who had written several books on Soviet science and scientists which appeared in "samizdat." On 4 June 1970 twenty scientists signed a letter to the Ministers of Health and Internal Affairs and to the Procurator General in which they expressed their conviction that the hospitalization was an illegal act, one which had aroused their concern and alarm.⁷⁰ They called for MEDVEDEV's release and for legal action to be taken against those who had illegally deprived MEDVEDEV of his freedom. The scientists further saw in MEDVEDEV's hospitalization a danger for them all, that

no honest and principled scientist can be assured of his own security if similar reasons can cause repression in the form of incarceration in a psychiatric hospital for an indeterminate period of time with the loss of all human rights, except the right to be the object of the doctor's examination.⁷¹

Also on 4 June 1970 an open letter to "Scientists, Scholars, and Artists of the Whole World" was written by an anonymous group of "scientific workers" of the Academy of Sciences who called for support of MEDVEDEV.⁷² MEDVEDEV's incarceration was viewed by this group as only one example of many of lawlessness in the USSR, but it did evidence an escalation in arbitrariness in that it was the first time the authorities did not try for even a semblance of legality. The group indicated that it was appealing to the rest of the world as a last resort, for it had learned that appealing to Soviet authorities meant only further repression. The "scientific workers" called on their colleagues throughout the world to boycott all Soviet scientific, technological and cultural exchanges and to stop negotiations with the USSR until MEDVEDEV's release. Otherwise, they saw the beginning of a new mass pogrom of Soviet scientists.

MEDVEDEV was released on 17 June 1970, after a meeting of the Minister of Health, Academy of Sciences President Keldysh, SAKHAROV, KAPITSA, ASTAUROV and other scientists who had supported MEDVEDEV.⁷³ MEDVEDEV's release was apparently contingent on his promise not to participate in further dissident activities.⁷⁴

On 20 June 1970 thirty-one people, seven of whom were scientists, signed an open letter expressing the fear that MEDVEDEV's experience could mean that anyone, regardless of his scientific or social contributions, could be dealt with "medically."⁷⁵ They also expressed the hope that the scientific community would be as vocal in support of other people facing the threat of hospitalization as it had been of MEDVEDEV. They recognized that a "corporation of scientists" had defended MEDVEDEV and they maintained that those who did not belong to any "corporation" needed support that was just as whole-hearted and passionate. The scientists who signed this letter, it should be noted, were not from the scientific elite which had signed the earlier protests. As "ordinary" scientists, they might have been trying to cast off the tinge of parochialism and elitism that might have surrounded the massive support of MEDVEDEV from the scientific community.

Mathematician PIMENOV, who had been in trouble with Soviet authorities

in the past, was arrested in July 1970 and tried and convicted in October of the same year for distribution of "samizdat" which slandered the Soviet system.⁷⁶ PIMENOV had been sent to a psychiatric hospital in 1949 for submitting a request to leave the Komsomol and was arrested in 1957 for writing articles on the Hungarian Revolution and for attempting to form an anti-Soviet group among university students. He received a ten-year sentence for his activities, of which he served only six years. He subsequently went on to get his candidate and doctoral degrees.⁷⁷ On 11 November 1970 ten scientists wrote a letter to the Supreme Court of the USSR in which they expressed their concern over the severity of PIMENOV's sentence (five years in exile) for actions that in a democratic society would be considered normal.⁷⁸ They also protested the ambiguous nature of the crime of slandering the Soviet system and the fact that such trials were "closed." It was a sign of PIMENOV's importance as a mathematician that, not only did he not receive a prison term, he did not have to curtail his scientific activity while in exile. A special department of the Komi Branch of the USSR Academy of Sciences was established for him in Syktyvkar so that he could continue working in his mathematics specialty.

The hospitalization of dissident N. Gorbanevskaya on July 7, 1970 and the arrest of her friends, V. Tel'nikov and Yu. Vishnevskaya, who had attempted to attend her trial, evoked a letter of protest in July from nineteen people, seven of whom were scientists.⁷⁹ The protesters complained that these incidents showed that all it took to be persecuted by the authorities now was friendship with a dissident, the first time this had happened since Stalinist times. They further asserted that a man can lose all his rights and freedoms except one without losing his humanity. The final freedom was the right to love someone else. The motivation for sending this protest letter, they affirmed, was to show that they had not lost their humanity.

On 25 September 1970 a memorial to biologist N. I. Vavilov, who had been persecuted by Stalin and had perished in a labor camp, was dedicated in a Saratov cemetery by Vavilov's son.⁸⁰ The younger Vavilov had collected money for two years from Soviet biologists and the elder Vavilov's students, colleagues and friends. The authorities monitored who was collecting money for the memorial and in connection with this questioned a number of important scientists from Moscow, Leningrad and Saratov at their institutes. Several of them, in fact, received Party reprimands.

The decision of the Nobel Committee to award Solzhenitsyn the Nobel Prize in 1970 was applauded by a group of thirty-seven people, twelve of whom were scientists, in a letter to the Committee on 10 October 1970.⁸¹ The signers of the letter, recognizing that the awarding of the Nobel Prize to Solzhenitsyn might lead to a new wave of denunciations of the writer, considered it their duty to express their gratitude publicly to Solzhenitsyn for his work and to condemn the denunciations as a national shame.

Biologist STROKATAYA, wife of convicted dissident S. Karavanskiy, was arrested 8 December 1970 and charged with the distribution of "samizdat."⁸² She had been a witness at her husband's trial and had been accused of bad conduct during it; in fact, she was threatened with the loss of her job unless she changed her behavior. On 21 December 1970 five dissidents,

including historian P. Yakir and Ukrainian nationalist V. Chornovol, announced the formation of a "Citizen's Committee for the Defense of Nina StrokataYa," which was to collect information pertaining to STROKATAYa's case, collect money to aid STROKATAYa and her husband, and demand that STROKATAYa be given her rights to choose a lawyer and to have an "open" trial.⁸³ In case the demands of this committee were not met, the five dissidents vowed to turn to the United Nations' Committee on the Rights of Man. STROKATAYa was sentenced 19 May 1972 to four years confinement.

On 24 March 1971 ChALIDZE's apartment was searched and a number of documents and files were confiscated, including issues of the Chronicle of Current Events.⁸⁴ SAKHAROV protested this search in a letter to the Minister of Internal Affairs, saying that the archives and materials were necessary for the work of the Human Rights Committee, to which both of them belonged.⁸⁵ On 30 March 1971 ChALIDZE had to report to the KGB to answer questions on foreigners he had met with during the month and what he had given them.⁸⁶

The arrest and psychological testing of dissident V. Bukovskiy on 29 March 1971 elicited a protest letter from fifty individuals, thirteen of whom were scientists.⁸⁷ Scientists SAKHAROV, LEONTOVICH and SHAFAREVICH and writer A. Galich also wrote a letter to the Procurator General and the Minister of Justice in December 1971, just before Bukovskiy's trial, in which they expressed their conviction that there was no basis for Bukovskiy's arrest and trial and conveyed their hope that his trial would be objective, "open", and would honor all the defendant's rights.⁸⁸

3. 1972-73. Massive government crackdown: Chronicle suppressed, wide-scale persecution.

The Soviet authorities had their greatest successes in the 1972-73 period in terms of crushing dissent: The Chronicle of Current Events was forced to cease publication, a number of prominent dissidents were arrested, and SAKHAROV, the acknowledged leader of the human rights movement in the USSR, was publicly condemned. It probably seemed to many dissidents at the time that the Soviet dissident movement was approaching its final days. It is difficult to determine exactly what was the turning point. It might have been the outrage over the terrorization of SAKHAROV in late October 1973 or the establishment of the Soviet Section of Amnesty International in the same month. Whatever the case, by 1974 the dissident movement had regained its vitality, despite the continuation of arrests and persecutions.

According to TVERDOKHLEBOV, from the beginning of 1972 to March 1973 at least thirty-five people, seven of whom were scientists, had been interrogated by the KGB on the publication and distribution of the Chronicle of Current Events.⁸⁹ As a result of the authorities' pressure, the Chronicle ceased publication from October 1972 until the spring of 1974, depriving the dissident movement of a mouthpiece and source of information.

Mathematician PLYuShch, a member of the Initiative Group, was arrested 15 January 1972 for distributing "samizdat" and for allegedly anti-Soviet conversations. PLYuShch had also written a letter to the editors of the newspaper Komsomolskaya pravda in January 1968 protesting the Ginzburg-Galanskov trial, for which he was removed from his job.⁹⁰ He was ruled mentally ill at his trial in late January 1973 and was incarcerated in a psychiatric hospital. One of the witnesses at PLYuShch's trial, a mathematician and Candidate of (Physico-mathematical) Sciences identified only as V., had been pressured by the KGB into denouncing PLYuShch and testified that PLYuShch had given him "samizdat" material.⁹¹ The mathematician had been close to PLYuShch in the years prior to his arrest and, whether because of his relationship with PLYuShch or the fact that he was caught with "samizdat" in his apartment, he was fired and was without work for a period of time. The KGB worked on him, alternating threats with enticements (a job and an apartment), and finally achieved its goal. The striking similarity of this "betrayal" to the "betrayal" at LYuBARSKIY's trial only three months later (see below) leads one to believe that the authorities had decided that pitting one scientist against another was a very useful tactic.

LYuBARSKIY was arrested 17 January 1972 and was sentenced to five years confinement at the conclusion of his trial in late October 1973 for possession and distribution of "samizdat."⁹² LYuBARSKIY had not participated in any demonstrations, signed any protest letters, or written any "samizdat"; he simply turned to "samizdat" in the aftermath of the Soviet invasion of Czechoslovakia to acquire additional information on the event. LYuBARSKIY admitted that he had received some of his "samizdat" from VOL'PIN, who, in the meantime, had emigrated to the US. A fellow scientist, close friend, and co-author of LYuBARSKIY's, B. M. Vladimirov, was apparently pressured into testifying against LYuBARSKIY at the trial; the fact that a personal conversation between the two friends had been used as evidence of a criminal act was cited by LYuBARSKIY as a dangerous precedent. Mathematician KRISTI was placed in a psychiatric hospital on 2 November 1972 for attempting to attend LYuBARSKIY's trial;⁹³ she was released only after SAKHAROV's intercession on 29 November.

Mathematician BOLONKIN was arrested in June 1972 for dissemination of the Chronicle and other "samizdat" documents, for which he was sentenced to four years confinement and two years exile.⁹⁴ During his imprisonment his doctorate was annulled and his scientific works on cybernetics confiscated. He was arrested again in April 1978, just weeks before the end of his exile, for allegedly stealing government property and sentenced to another three years in confinement.⁹⁵ SAKHAROV, believing that the reason for BOLONKIN's second sentence was the KGB's fear that he might emigrate, wrote a letter on 15 August 1978 to participants of the International Congress of Mathematicians in Helsinki with an appeal to come to their colleague's aid.⁹⁶

On 28 September 1972 mathematician SHIKHANOVICh was arrested and placed in complete isolation pending investigation of his case.⁹⁷ On 23 January 1973 SAKHAROV and his wife attempted to have SHIKHANOVICh released into their custody, but their attempt was unsuccessful. Finally, on 5 July 1973 SAKHAROV, his wife, and geophysicist POD"YAPOL'SKIY, having found out that SHIKHANOVICh had undergone a psychiatric examination and

had been determined to be mentally ill, wrote an open letter to all psychiatrists, doctors, and mathematicians of the world, as well as all people on earth, appealing for an end to psychiatric repression.⁹⁰

In June 1972 the Supreme Soviet of the RSFSR issued a decree setting minimum fines to be imposed on people giving prisoners "illegal" provisions. SAKHAROV and LEONTOVICH, appealing as fellow scientists, sent a telegram to the Chairman of the Supreme Soviet of the RSFSR, Academician and physicist M. D. Millionschikov, who was also the deputy director of the Institute of Atomic Energy (LEONTOVICH's Institute), in which they expressed their fear that the decree would mean worse conditions for prisoners, who existed in a state of chronic starvation as it was.⁹⁹ SAKHAROV and LEONTOVICH wrote that they wanted to believe that Millionschikov would not refuse to take part in overturning this decree; it is likely that both scientists knew Millionschikov personally. They also called on the delegates to the Supreme Soviet to speak up for reform of penal legislation to eliminate starvation in prisons.

In September 1972 two letters calling for amnesty for political prisoners and the abolishment of capital punishment were sent to the Supreme Soviet of the USSR. These measures, to be in honor of the 50th Anniversary of the Formation of the Soviet Union, were proposed by a group of fifty-odd people, nearly half of whom were scientists. The first letter called for the release of all prisoners convicted of (Soviet Criminal Code) Articles 190-1, 190-2, 190-3, 70 and 72, or in connection with religious beliefs or the desire to emigrate.¹⁰⁰ The second letter requested the repeal of capital punishment on moral grounds and on the grounds that it was not socially justifiable.¹⁰¹

One minor, although quite pathetic, trial involving a number of scientists was the trial of physicist TEMKIN for custody of his daughter. TEMKIN had received permission to emigrate on 19 October 1972 with his daughter, but, when they went to pick up the visas on 23 October, he was told that his wife, from whom he was divorced, had refused to let her daughter leave the Soviet Union.¹⁰² After TEMKIN and his daughter, who wanted to emigrate, had written to a number of agencies and officials in both the USSR and abroad, his wife took him to court to deprive him of his parental rights. At the 17 January 1973 trial the scientists V. LEVICH, KHAIT, RAYEVSKIY, Yakhot, and KUSTANOVICH all vouched for TEMKIN's character and parental qualities;¹⁰³ the court, however, decided in favor of TEMKIN's wife. In February 1973 his daughter was seized at TEMKIN's mother's apartment by the police and returned to her mother; TEMKIN was arrested for resisting the police. On 18 June 1973 he declared a hunger strike, and emigrated several days later.¹⁰⁴

On 3 January 1973 BELOGORODSKAYA was arrested for anti-Soviet propaganda in connection with the dissemination of "samizdat". She had been arrested in 1968 (see above) on a similar charge. During the summer of 1973 her husband's grandfather, Academician E. Delone, and KAPITSA interceded on her behalf, and their support was apparently significant, for she was released 16 November 1973 and all charges were dropped.¹⁰⁵

In February 1973 the Soviet press delivered its first attacks on SAKHAROV's dissident activities, a series of attacks which culminated in

the 28 August 1973 letter signed by forty academicians,¹⁰⁶ at least seven of whom were fellow physicists and one of whom, ENGEL'GARDT, had signed a 1966 protest letter on changes in the Soviet criminal code which could be used to persecute dissidents (see above). The academicians censured SAKHAROV for his memoranda, which slandered "the governmental system and the internal and external policies of the Soviet Union." They also claimed that he was opposed to the USSR's policies on the "relaxation of international tensions," a position which hurt the reputation of the Soviet scientist.

On 15 August 1973 SAKHAROV was called in to talk with the First Deputy Procurator General and was given a warning to stop associating with foreigners.¹⁰⁷ SAKHAROV had several days previously granted an interview to a Swedish reporter, to whom he explained his evolution as a dissident. He admitted in the interview that when he wrote his famous 1968 essay, in which he saw the convergence of socialism and capitalism, he was too far removed from the basic problems of people because of his privileged status and environment.¹⁰⁸ He had then seen Soviet socialism as inherently positive, he claimed, but since then had come to see it mainly as a form of state capitalism. Eventually, he lost faith in socialism completely. SAKHAROV saw the Soviet system as being internally quite stable and had little faith or hope in Western support of Soviet dissidents. The First Deputy considered this interview a violation of SAKHAROV's security pledge, despite the fact that the interview had nothing at all to do with SAKHAROV's field of physics:

Because of the nature of your previous work you had access to state secrets of the utmost importance. You made a signed statement to the effect that you would not divulge state secrets, that you would not meet with foreigners. But you are meeting with foreigners and giving them information, which might be of interest to foreign intelligence agencies. I ask you to consider the seriousness of this warning and draw the conclusions for yourself.¹⁰⁹

SAKHAROV replied to this charge, and the implied threat, that he never had and never would divulge military or military-technical secrets and that he had not dealt with secret work since 1968 anyway. The First Deputy, however, indicated that this made no difference at all.

SAKHAROV and Solzhenitsyn, who was also under attack at this time, were supported in a protest letter on 9 September 1973, signed by a group of ten Jews, eight of whom were scientists.¹¹⁰ The Jews, all of whom had applied to emigrate and realized that this protest letter might risk their chances of emigrating, felt that silence on the matter only made them party to the crime and believed that the risk was worth it. They viewed the repression of SAKHAROV and Solzhenitsyn as a harbinger of a return to the "darkest days in the history of the USSR." TURCHIN had also written a letter of support for SAKHAROV in September, decrying the campaign directed at SAKHAROV's discreditation and calling on all supporters of progress, democracy and peace to raise their voices in SAKHAROV's defense.¹¹¹ TURCHIN viewed the campaign against SAKHAROV as harmful to the international position of the USSR and to the policy of coexistence, because it provoked distrust as to the intentions of the USSR.

In a letter written to the President of the World Federation of Scientists by seven female prisoners, one of whom was the scientist SIFOKATAYA, in September or October 1973, the campaign against SAKHAROV, waged in part by establishment scientists, was cited as evidence that under the conditions of Stalinist tyranny was formed a generation of scientists who were capable of participating in scientific progress, but who were unable to understand the problems of social progress.¹¹²

Conclusive proof of this, according to the seven prisoners, was the fact that one of the scientists persecuting SAKHAROV, Academician and geneticist Dubinin, was himself a victim of Stalinist repression. The women called on Soviet scientists to become aware of this "ghost from the past," repression, which was being carried out with the participation of other scientists, and stated that Soviet scientists should realize that participation in police acts was incompatible with scientific work.

The worst fears of SAKHAROV's supporters were nearly realized when, on 21 October 1973, he was threatened in his apartment by two Arabs who claimed to be members of the Palestinian terrorist group "Black September."¹¹³ Ten days prior to this incident SAKHAROV had given an interview in which he refused to criticize the policies of Israel, stating that Israel was waging a war for its survival and that a repetition of the WWII genocide of the Jews should not be permitted to occur.¹¹⁴ The Arab terrorists demanded an explanation of this comment from SAKHAROV, telling him that they never warned a person twice. Solzhenitsyn came to SAKHAROV's defense in a letter on 28 October in which he expressed his conviction that this act was done with the full knowledge and encouragement of the Soviet authorities;¹¹⁵ moreover, he feared that this was a new method to be used by the authorities in dealing with dissidents, hiring professional killers. Solzhenitsyn vowed to devote the rest of his life to destroying the killers if such an event were to take place. Four other dissidents, three of whom were scientists, issued a statement on 30 October also expressing the opinion that this attack was not committed without the knowledge of the Soviet authorities.¹¹⁶

On 28 August 1973 TVERDOKHLEBOV's apartment was searched and a number of documents were confiscated, including all his legal literature, his human rights journals, and the part of the Human Rights Committee archives he maintained;¹¹⁷ CHALIDZE, another member of the Committee, had had his files confiscated in 1971 and had since emigrated to the US. Viewed together with the campaign against SAKHAROV, then, the confiscation of TVERDOKHLEBOV's files was an attempt by the authorities to eliminate the Human Rights Committee as a viable dissident organization by removing its information sources. The campaign against SAKHAROV was an attempt to silence the group's spokesman and leader.

One of the few occurrences favorable to the dissident movement in the 1972-73 time frame was the emergence of ORLOV as an active dissident. In an open letter to Brezhnev on 16 September 1973, ORLOV presented a well-conceived essay on the reasons for the backwardness of the USSR in its economy, science and culture and on possible solutions to this problem. ORLOV cited Marxist ideological interference as the reason the USSR was as far behind in science.¹¹⁸ The West was moving ahead in areas of technology which the ideologists in the USSR had dismissed as unacceptable,

despite the fact that these new areas of technology furthered science. ORLOV proposed the "experimental method" as the way changes in government should be effected, with complete openness and freedom of discussion. In other words, an end to ideological interference. He found fault with Marxism as a descriptive body of knowledge in that it ignored the contributions of morality and conscience in history, which ORLOV described as among the most powerful driving forces of history. In response to the apparent belief of the Soviet leaders that scientific development could continue without lifting censorship and repression, ORLOV asserted that a scientist's intellect was formed by both scientific tradition and his cultural environment, and that limiting artistic imagination limited scientific imagination.¹¹⁹ ORLOV, then, in the scope of his ideas and the breadth of his knowledge, almost immediately assumed a position in the dissident movement which was on the level of SAKHAROV, TURCHIN, and TVERKOKHLEBOV.

Between September and October 1973 a new human rights group, initially called "Group 73," later the "Soviet Section of Amnesty International," was formed by eleven people, seven of whom were scientists, including TVERDOKHLEBOV, TURCHIN, ORLOV, and KOVALEV.¹²⁰ Two of the scientists, TVERDOKHLEBOV and KOVALEV, had been members of earlier dissident groups. The authorities relatively quickly moved in to eliminate this new group, and the arrests and harrassment of its members are documented in the next section.

4. 1974-78: Attempts by the authorities to eradicate dissident groups.

In the period 1974-78 the Soviet authorities began a systematic series of arrests to deplete the dissident organizations of their leading activists and spokesmen, designed ultimately to eliminate the groups altogether. Because of the large number of scientists involved in dissident groups, this policy move affected dissident scientists in the most direct way, resulting in the arrests of six of the most active of them. Scientists did not, however, lessen their support of other dissidents during this period, and signed numerous protest letters in the latter's defense.

On 27 February 1974 the threat that V. Bukovskiy might be transferred to Vladimir Prison prompted the writing of a protest letter to the League of the Rights of Man by eight individuals, five of whom were scientists.¹²¹ The protesters called on the West to support Bukovskiy, citing Western support as having earlier saved Bukovskiy from a psychiatric hospital and more recently having saved A. Amal'rik. Bukovskiy was arrested on 29 March 1971 for anti-Soviet slander and had been, up to that time, a spokesman against the psychiatric repression of dissidents. He was sentenced to seven years confinement and five years exile.

The refusal of imprisoned literary critic G. Superfin to testify at dissident V. Khaustov's trial on 5 March 1974 garnered the support of forty-four people, eleven of whom were scientists, who demanded Superfin's release and the intercession of a commission from the International

Association of Jurists into his case.¹²² The protesters also decried the fact that Superfin had not been tried himself and that his testimony, which he later renounced, was obtained illegally by the KGB investigators.

In early 1974 KOVALEV, T. VELIKANOVA, and T. Khodorovich announced publicly that they had assumed responsibility for the resurrection and continued publication of the suppressed journal, Chronicle of Current Events,¹²³ the previous issue of which had been distributed in October 1972. This was a significant but dangerous move on their part, as it opened them up to charges of disseminating anti-Soviet propaganda, a criminal offense. No one had publicly admitted compiling or publishing the Chronicle in the 1968-72 time period. The Chronicle resumed publication in the spring of 1974, when four issues covering the period from October 1972 to May 1974 were distributed, and publication has continued up to the present time (1979), despite the subsequent arrest of KOVALEV and the emigration of Khodorovich.

SAKHAROV, in an open letter to fellow academician ENGEL'GARDT on 29 May 1974, denounced him for telling US and European scientists and public officials that open support of SAKHAROV in the West was not helpful to SAKHAROV or his family.¹²⁴ ENGEL'GARDT had also told Westerners that the August 1973 letter, in which forty academicians had condemned SAKHAROV (one of whom had been ENGEL'GARDT), had saved SAKHAROV from more serious consequences. ENGEL'GARDT's conversations had purportedly been rife with protestations of goodwill towards SAKHAROV and his position, with only a hint of condescension concerning SAKHAROV's naivete, carelessness and inexperience. In response SAKHAROV stated that he had consciously chosen his own life style, which admittedly might be far from pragmatic, and that he didn't need ENGEL'GARDT to correct it. SAKHAROV further maintained that open support of him in the West was the best way to help him. Whether ENGEL'GARDT was nothing more than the government's errand boy, sent abroad to pose as a liberal scientist while undermining SAKHAROV, is hard to determine. ENGEL'GARDT, it should be recalled, did take part in a protest in 1966. It is likely that, as a Jew and as a relatively liberal thinker, ENGEL'GARDT was forced to make certain concessions to keep his post as director of the Institute of Molecular Biology and to be allowed to travel abroad. It may well be that ENGEL'GARDT's ideas were close to SAKHAROV's, the difference being, of course, that SAKHAROV chose to elucidate his ideas publicly.

On 28 November 1974 V. Osipov, the editor of the "samizdat" journal Veche, was arrested, in protest of which a statement was released by sixteen individuals, seven of whom were scientists.¹²⁵ Veche, the first periodical devoted to the Russian nationalist movement, was published openly but unofficially from January 1971 until Osipov's arrest. Osipov had refused to confront the authorities politically in his journal, hoping that the regime would not oppose his patriotic activities. Since he gave less importance to the problem of human rights than to the problem of the decay of the Russian nation, he assumed that he was less of a threat than were most Soviet dissidents. Osipov's wife was mathematics teacher MASHKOVA, who was a poet who had contributed to Veche.¹²⁶ She was also a former political prisoner, arrested for the first time in 1958 for creating an anti-Soviet organization and for the second time in 1960 for attempting to illegally cross the border with her former husband. MASHKOVA

wrote an open letter in support of Osipov on 28 December 1974, in which she revealed that she had been persecuted by the police since her husband's arrest, a situation that was aggravated by the fact that she was seven months pregnant and was in dire financial straits.¹²⁷ She asked for financial assistance and support of the activists in the Christian and humanist movements in Osipov's defense.

KOVALEV was arrested on 27 December 1974, four days after his apartment was searched and a large amount of "samizdat" confiscated.¹²⁸ KOVALEV was the first of the dissident scientist leaders to be arrested in the 1974-78 period. The formal reason for his arrest was his alleged relationship to the "samizdat" Chronicle of the Lithuanian Catholic Church, which he purportedly used in compiling the Chronicle of Current Events. KOVALEV had been a "free-thinker" since 1956, when, as a student at Moscow State University, he was one of the authors of a letter to the dean of the Biology Department demanding the restoration of genetic (destroyed by Lysenkoism) as a scientific discipline, for which he was summoned to the KGB.¹²⁹ In February 1968 KOVALEV signed one of the protest letters in support of Ginzburg, and in 1969 he became a founding member of the Initiative Group, for which he was fired from his position at Moscow State University.¹³⁰ KOVALEV later became a member of the Soviet Section of Amnesty International, and he continued his work of supporting dissidents and disseminating "samizdat" up to his arrest.

A number of scientists wrote protest letters in support of KOVALEV immediately after his arrest. Mathematician GOL'FAND released a statement in which he expressed his conviction that the reason KOVALEV was accused of collaboration with the Chronicle of the Lithuanian Catholic Church was to enable the authorities to move KOVALEV's trial out of Moscow to Vil'nyus, away from his friends and foreign journalists.¹³¹ GOL'FAND vouched for KOVALEV's high moral convictions, stating that KOVALEV had personally helped a number of political prisoners and their families, as well as religious believers, and he called for a world-wide defense of KOVALEV. SAKHAROV wrote a letter on 28 December appealing for an international campaign for KOVALEV's release.¹³² On 30 December the Initiative Group and fifty-two supporters released a statement in support of KOVALEV; of the fifty-five people signing the document, twenty-five were scientists.¹³³ KOVALEV was tried 9-12 December 1975 and received a sentence of seven years confinement and three years exile.¹³⁴ KOVALEV's later persecution in prison, in 1976, was met by a protest from twenty-two people, eighteen of whom were scientists, who called on all biologists of the world to withhold scientific contacts with the USSR until KOVALEV's release.¹³⁵

On 18 April 1975 TVERDOKHLEBOV was arrested, after having been subjected to two searches and four interrogations from 27 November to 25 December 1974.¹³⁶ On the same day of TVERDOKHLEBOV's arrest the apartments of two other Amnesty International members, TURCHIN, the chairman of the Soviet Section, and AL'BREKHT, were searched and documents connected with the activities of the group confiscated.¹³⁷ Protesting TVERDOKHLEBOV's arrest in several letters were twenty individuals, ten of whom were scientists.¹³⁸ Additionally, TVERDOKHLEBOV, a Russian Orthodox, was denied the right to confess to a priest while in prison awaiting his trial. This was protested by fellow Christian AL'BREKHT in a letter to Moscow Patriarch Pimen on 10 November 1975.¹³⁹ CHALIDZE

considered TVERDOKhLEBOV the last representative of the "analytical school" in the human rights movement still living in the USSR (after the emigration of TsUKERMAN, VOL'PIN and himself), and he saw TVERDOKhLEBOV's arrest as confirmation that the Soviet authorities regarded TVERDOKhLEBOV's apolitical studies of the Soviet judicial system as being no less dangerous than loud protests.¹⁴⁰ TVERDOKhLEBOV was sentenced to five years exile on 16 April 1976, but, since his year in prison counted as three in exile, he remained in exile only until 1978, after which he apparently resumed his functions as secretary of the Soviet Section of Amnesty International.¹⁴¹

In June 1975 SAKHAROV released his third major essay, "Concerning the Country and the World," which, in its pessimistic view of the future of the USSR and world peace, reflected SAKHAROV's discouragement after the massive persecutions of dissidents by Soviet authorities in the previous several years.¹⁴² SAKHAROV expressed distrust of the Soviet compliance with arms control agreements and called on increased Western pressure to keep the USSR from gaining the upper hand in world politics. This essay, together with the Nobel Committee's awarding SAKHAROV the Nobel Peace Prize on 9 October 1975, evoked another wave of condemnation of SAKHAROV from establishment scientists.¹⁴³ On 25 October seventy-two members of the USSR Academy of Sciences, less than one third of the total, including ENGEL'GARDT and, inexplicably, KAPITSA, released a statement in which they protested the Nobel Committee's action. Writer L. Kopelov, a former prison camp comrade of Solzhenitsyn's, condemned the academicians' move, asserting that the most they would have risked by not signing the statement would have been the temporary displeasure of the authorities and a momentary setback in their careers.¹⁴⁴ Kopelev maintained that these academicians would suffer on account of their decision through the hatred of their contemporaries and followers, not to mention through the weight of their own consciences: "The most eloquent necrologies and the most luxurious gravestones do not counterbalance the shameful weight of signing."

On 12 May 1976 a group called the "Public Group to Assist in the Observance of the Helsinki Accords in the USSR," also known as the Moscow Helsinki Monitoring Group, was established by twelve people, four of whom including the chairman, were scientists: ORLOV (chairman), KORCHAK, LANDA, and ShCHARANSKIY.¹⁴⁵ The group, as its title indicates, watched for violations of the Helsinki Accords and reported them. In the period from November 1976 to April 1977 another four Helsinki monitoring groups were formed and were located, respectively, in the Ukraine, Lithuania, Georgia, and Armenia.¹⁴⁶ Five of the twenty-two founding members of these groups were scientists: STROKATAYa, FINKEL'ShtEYN, G. GOLDShtEYN, I. GOLDShtEYN, and NAZARYaN.

At some point prior to mid July 1976, twenty-four Soviet scholars, all but one of whom were scientists, signed an open letter to the President of the USSR Academy of Sciences, A.P. Aleksandrov, and Chairman of the State Committee on Science and Technology, V.A. Kirillin, in which they addressed the problem of the violation of Soviet scholars' civil and professional rights.¹⁴⁷ The scholars, while admitting that the persecution was not as bad as it had been under Stalin, cited the restrictions on publishing research papers, attending professional meetings, and traveling abroad as detrimental to the development of contemporary science. They

further stated that scholars had a responsibility far exceeding their own professional and personal affairs, that of defending human rights. In a sense, these scientists were attempting to justify the leading role of the scientist in dissidence by claiming that a scientist-scholar was obliged to advocate human rights issues.

Physicist ZAKS, who was TVERDOKhLEBOV's step-sister and ShUSTER's wife, attempted to engage a lawyer in Moscow in late September 1976 to defend Pavel Ye. Bashkirov, who had been persecuted for friendship with leading dissidents.¹⁴⁸ Bashkirov had been deprived of the right to choose his own counsel for his forthcoming trial. This illegal interference on the part of the authorities with Bashkirov's right to counsel was protested in a letter to the Minister of Justice of the RSFSR which was signed by eight individuals, four of whom were scientists.¹⁴⁹ Eventually, ZAKS was able to have the lawyer earlier selected by Bashkirov's relatives reinstated.

On 25 November 1976 a concert to be held at the club of the Institute of Atomic Energy in Moscow was cancelled because of the proposed participation of, among others, songwriter and physicist MIRZAYAN.¹⁵⁰ His concerts at the Moscow Physico-Technical Institute and the Architecture Institute, scheduled for November and December 1976, were also cancelled. MIRZAYAN had been questioned in May by Party officials concerning his participation in the so-called "Voskresen'ye" (Sunday) concerts, which were unofficial concerts held in the outlying areas of Moscow in 1976.¹⁵¹ He was accused of being one of the organizers.

The publication of the human rights document, "Charter 77," by 257 Czechoslovak intellectuals in January 1977 was hailed and firmly supported by sixty-two Soviet citizens, twenty-five of whom were scientists, on 12 February 1977.¹⁵² "Charter 77," which called for the humanization of society through the implementation of constitutional rights, was written originally in an attempt to urge official compliance with the human rights provisions of the Helsinki Accords, but became the symbol for liberalization in the Soviet bloc. Perhaps the most significant aspect of this document was that it came not from the West but from a socialist state; hence, it was more troublesome ideologically for Soviet authorities to combat. The thought that dissident intellectuals from various socialist countries could arrive at common positions and provide mutual support was also, no doubt, disconcerting and troublesome for the Soviet leaders.

The arrest of writer and founding member of the Helsinki Monitoring Group, A. Ginzburg, on 3 February 1977 was met by a protest from Soviet citizens which nearly matched the protest of his trial in 1968. A protest letter, signed by 325 individuals, sixty-eight of whom were scientists, was released the day after Ginzburg's arrest.¹⁵³ The letter called on the leaders of the countries adhering to the Helsinki Accords to recognize Ginzburg's arrest as an attack on a member of the Helsinki Monitoring Group and to realize that his arrest evidenced the existence of a political and social climate in the USSR which would have serious international consequences. Ginzburg was sentenced to eight years confinement and five years exile in July 1978. He was released, however, on 27 April 1979, in a prisoner exchange between the US and USSR.

On 10 February 1977 ORLOV was arrested after several searches of his

apartment, during which a number of "samizdat" documents were confiscated.¹⁵⁴ ORLOV's arrest, which came just three days after fellow Helsinki Monitoring Group member MEYUK's apartment was searched and seven days after Ginzburg's arrest, clearly indicated that the authorities had made the decision to eliminate the group altogether. ORLOV had been at odds with official policy in the USSR since 1956, when he and a group of colleagues presented a program for democratic reforms in the Party and the state.¹⁵⁵ This occurred at a Party meeting at the Institute of Theoretical and Experimental Physics in Moscow and resulted in his expulsion from both the Party and the Institute. He was unable to find work in Moscow after that and finally moved to Yerevan, where he was elected a Corresponding Member of the Armenian Academy of Sciences. In 1972 ORLOV returned to Moscow and began working at the Institute of Terrestrial Magnetism and Propagation of Radio Waves, located in the Krasnaya Parkra Science City just south of Moscow. He was fired from that institute in 1973 for his letter to Brezhnev on the reasons for the backwardness of the USSR (see above). Less than three weeks after his letter to Brezhnev ORLOV became a founding member of the Soviet Section of Amnesty International. He was unable, however to find any regular work after his dismissal from the Institute.

ORLOV's arrest was followed by a number of interrogations and other tactics designed to frighten off his prospective supporters; some of the scientists interrogated were GOL'FAND, LANDA, LAVUT, GASTEV, KORChAK and AL'BREKht.¹⁵⁶ Physicist BARABANOV was offered a chance to denounce ORLOV's political views in order to get promoted; he refused.¹⁵⁷ Corresponding Member of the USSR Academy of Sciences L.B. Okun' was brought before the director of the Institute of Theoretical and Experimental Physics, the secretary of the Party bureau and an "unknown person" and asked if he was planning to speak out on ORLOV's behalf.¹⁵⁸ He replied that he was not. ORLOV's trial was held 15-18 May 1978 and he received the maximum sentence for the charge of anti-Soviet propaganda and agitation: Seven years confinement and five years exile. Protesting his sentence were fourteen scientists.¹⁵⁹

On 4 March 1977 mathematician and Helsinki Monitoring Group founding member ShchARANSKIY and cyberneticist LERNER were accused of espionage and collaboration with the CIA in an open letter to the Presidium of the USSR Supreme Soviet, the United Nations, and the US Congress by ShchARANSKIY's former roommate S.L. Lipavskiy.¹⁶⁰ ShchARANSKIY was arrested 15 March 1977 after a search of his apartment five days earlier.¹⁶¹ A number of scientists were interrogated after ShchARANSKIY's arrest, including FAYN, ULANOVSKIY, LEVICH, BRAILOVSKIY, AL'BREKht, I. BEYLIN, KISLIK, and FINDEL'SHTEYN.¹⁶² ShchARANSKIY, who had applied for emigration in 1973 but was turned down for security reasons, had been active in both the Jewish emigration and the human rights movement. ShchARANSKIY, in fact, was a leading spokesman for both movements because of his command of English and his contacts with foreign journalists.

In June 1977 ShchARANSKIY's previous contacts with foreign journalists proved a major problem for his defense in court, for he was linked to alleged espionage conducted by US news correspondent Robert Toth. Toth was detained by the KGB on 14 June 1977 for allegedly receiving secret information on parapsychology from biologist PETUKhOV on 11 June.¹⁶³ Toth

claimed that he had heard about PETUKHOV from a Soviet scientist then living in Israel and that several months earlier ShchARANSKIY had informed Toth that PETUKHOV wanted to meet with him. When PETUKHOV finally did meet with Toth, the former asked for Toth's assistance in getting his research published in the US. Immediately after PETUKHOV handed Toth the materials Toth was picked up and interrogated. On 14 June Toth was questioned for four hours, primarily about PETUKHOV and parapsychology. On the next day though, Toth was informed that he was now testifying as a witness, and the questions primarily concerned ShchARANSKIY, who, at Toth's own admission, had assisted him in assembling information on Soviet developments in science on several occasions. It is not clear whether PETUKHOV was working for the KGB when he offered Toth the materials. It does seem clear, however, that the incident was not initially an attempt by the authorities to incriminate ShchARANSKIY, for Toth was questioned on ShchARANSKIY on the second, not the first, day of interrogation. It seems more likely that Toth was constantly under surveillance, that it was for this reason that he was picked up so quickly after being handed the "secret" material, and that the authorities learned of the Toth-PETUKHOV-ShchARANSKIY connection in the course of their investigation and decided then to exploit it.

Also in June 1977 twelve former students and teachers at ShchARANSKIY's alma mater, Moscow Physico-Technical Institute, released an appeal to "Professors, Teachers and Students of all the World's Universities" for support of ShchARANSKIY.¹⁶⁴ The twelve asserted that ShchARANSKIY did not have access to secret material while at the institute (which was the reason given for refusing his visa application in 1973) and that he had never done anything which could be construed as being inimical to the interests of the Soviet government or Soviet society. Despite this and other pleas in his defense, ShchARANSKIY was tried 10-14 July 1978 and found guilty of treason, for which he received thirteen years confinement.¹⁶⁵

In June 1977 an American tourist was found with an article on nuclear physics in his possession, written by chemist KISLIK, who had been refused emigration on security grounds in 1973.¹⁶⁶ In September 1977 KISLIK was threatened with the possibility of arrest. KISLIK was also an activist for the Jewish emigration movement and one of the organizers of the engineering symposium conducted in Kiev throughout 1975. Ten Jewish scientists came to KISLIK's defense in late 1977 with an appeal to Western scientific societies in which they stated their conviction that the persecution of KISLIK was an attempt by the authorities to completely crush all forms of scientific activity by Jewish scientists who had applied for emigration, including publication, scientific contacts, and seminars.¹⁶⁷ It might be that the special nighttime guard duty initiated at the Ukrainian Academy of Sciences' institutes in Kiev in October 1977¹⁶⁸ had some relationship to KISLIK's case, possibly to prevent the unauthorized use of copying machines or other activities in his support.

Further attempts of the authorities to curtail the activities of the Helsinki monitoring groups led to the arrest of a member of the Georgian group, physicist G. GOL'DSHTEYN, on 17 January 1978 for "parasitism"¹⁶⁹ and the arrest of a member of the Armenian group, physicist NAZARYAN, on 22 December 1977 for anti-Soviet agitation and propaganda.¹⁷⁰ NAZARYAN

was arrested after a sixteen-hour search of his apartment turned up numerous "samizdat" materials. GOL'DSHTEYN was arrested for refusing to accept jobs offered him by state agencies, preferring to live instead on money he earned tutoring. GOL'DSHTEYN had been refused an emigration visa in 1971 on the grounds of access to secret information and had later renounced his Soviet citizenship. He held no permanent jobs after that time. He defended his refusal to work as being motivated by the desire to stay clear of all research which could be construed as "classified," which would extend the period of time he would have to wait before emigrating. GOL'DSHTEYN was tried 20 March 1978 and was sentenced to one year confinement, the maximum sentence for "parasitism." NAZARYAN, who had not been brought to trial by late 1978, had enrolled in a seminary immediately after graduating from Yerevan University and eventually received the position of deacon.¹⁷² He served in the church for a short period of time and left to resume his work as a physicist, reportedly after a conflict with the church hierarchy. NAZARYAN became one of the three founding members of the Armenian Helsinki Monitoring Group in April 1977.

The final historical event to be discussed in this chapter involves, fittingly but purely by chance, SAKHAROV, beyond question the most important Soviet dissident scientist and probably the most important Soviet dissident. On 19 July 1978 SAKHAROV was summoned to the head scientific secretary of the Presidium of the USSR Academy of Sciences and was informed that his (SAKHAROV's) actions during ORLOV's trial (in May 1978) were considered impermissible and undermined the prestige of Soviet scientists.¹⁷³ The secretary indicated that he was carrying out the instructions of a resolution passed by the Presidium on the basis of USSR Academy of Sciences President Aleksandrov's report on SAKHAROV. SAKHAROV had struck a person apparently acting in an official capacity outside of ORLOV's court room who had hit his wife. At the time, SAKHAROV and his wife were trying to attend ORLOV's trial. SAKHAROV defended his actions, in this particular instance and in the human rights movement in general, before the secretary, daring the secretary to expell him from the Academy. SAKHAROV emphasized that as long as he was a member of the Academy, he expected to be treated as one. There was not much else the secretary could do or say: SAKHAROV had emerged unscathed again.

5. Conclusions

What are some of the conclusions that can be reached from the historical development of dissidence in the scientific community, as presented in this chapter? First of all, there has been a gradual but steady program of dissident scientists holding leadership positions, particularly since 1974. Coincident with the arrests of the leaders, other less known but nevertheless active dissident scientists have been subjected to interrogations and apartment searches and threatened with arrest if they continued their activities. As a result of this repression, by 1978 there were very few dissident scientists of international stature and repute left in the dissident movement, and the activities of many of the dissident groups suffered for lack of leadership.

Another conclusion that could be reached is that the mass persecution of the scientists who signed the 1968 protest letters was a successful move on the part of the government. The persecutions probably kept a number of scientists away from the dissident movement completely who might have been in agreement with post-1968 dissident activities and issues, and very few of the scientists who signed the 1968 protest letters appeared again in dissident activities. It cannot be said, however, that their dissatisfaction with the Soviet system was eliminated after the repression. It is more likely that their tactics simply changed from external to internal dissent. It is not unlikely, in fact, that, given an issue of extreme importance or a politically-relaxed atmosphere, these "internal dissidents" might re-emerge.

The conclusions must be, then, a relatively sober one: there were few scientists left in a dissident movement which was itself apparently declining for lack of leadership and excess of repression. There was, however, one major source of continuity, the organized dissident groups, which had been created during the period 1969-76, in many cases by dissident scientists. These groups, although deprived of membership through arrests, emigration and persecution, at least theoretically were capable of continuing the work begun in the late 1960's and early 1970's in the areas of, inter alia, human rights, religious freedom, and the right to emigrate. All that was needed was leadership. A number of these dissident groups will be discussed in the following chapter, for it is these groups which will probably remain as rallying points for dissidents in the USSR in the future.

CHAPTER II

Penfield, in his 1973 work, presents a good overview of all the dissident groups then extant in the Soviet dissident movement. The reader is referred to that work for a more comprehensive look at dissident groups. In this chapter, only those groups in which scientists held leadership positions or were active members will be discussed; although admittedly, few groups were without scientists. There are five categories of groups that will be described and analyzed in this chapter, three of which are concerned with formal groups, two of which are concerned with informal groupings. Because the 1977 Soviet Constitution requires that all organizations in the USSR be under the guidance of the Communist Party (Article 126), it is clear that dissidents belonging to the formal groups were in violation of the law, at least after 1977. The formal groups to be analyzed in this chapter are of the democratic/ human rights type, the ethnic/religious type, and the revolutionary/criminal type. The informal groupings to be examined are the scientific/professional and the social elite.

1. Democratic/Human Rights Groups

The democratic/human rights groups have been in existence since 1969, a year which, in retrospect, was a turning point in Soviet dissidence, a shift away from loosely-organized collective protest letters to organized groups. It could be suggested that the reason for this shift was to ensure the safety of those relatively few dissidents who continued to dissent after 1968: by achieving Western notoriety and public support the groups might have attained semi-official recognition which allowed them to exist, albeit for short periods of time.

There have been seven human rights groups in the USSR, all of whom have had scientists as active members. It is important to note that all of these groups were considered "legal" by their members. None demanded an end to Communist Party rule or a transformation of the USSR into a bourgeois democracy; rather, the groups demanded the unbiased observance of Soviet law. In keeping with their "legal" status, the methods of the groups were not overtly subversive or illegal: legal demonstrations, letters to Soviet and foreign officials and organizations, news conferences, and publication and distribution of "Samizdat," which they refused to admit was illegal. The immediate goal of these groups was to gain publicity, both in the USSR and in the West, of Soviet infractions of Soviet laws, and it was assumed that public opinion would force the USSR to fulfill its legal obligations. All of these groups were Western oriented: they all needed the moral and political support of the West to survive and exert pressure on the Soviet authorities.

A. The Initiative Group for Defense of Human Rights in the USSR

The first of the human rights groups in the USSR, the Initiative Group for Defense of Human Rights in the USSR (Initiative Group), was founded in May 1969 with fifteen members, five of whom were scientists: T. VELIKANOVA, KOVALEV, LAVUT, PLYuShch, and POD"YaPOL'SKIY.¹ The group's primary role has been the collection and dissemination of data on violations of human rights in the USSR; these violations have been reported both to international and to Soviet authorities. The Initiative Group has made no overtly political statements and has no program, rules, or organizational structure. There were no formal ties, in fact, linking the members, who were both Communist and non-Communist, religious and non-religious, but they did share the conviction that the rights of the individual had to be preserved in any society. They were also committed to working in the open in a clearly legal manner.

The impetus for forming this group was the arrest of dissidents Grigorenko and Gabay in 1969.² For the first six months of its existence, the Initiative Group directed all its letters to the United Nations, seeing it as the most representative body called upon to defend universal interests: "Human rights in any country - is a matter the same for all

people, regardless of nationality and state boundaries."³ The group believed that the Soviet leadership listened to Western public opinion, and for this reason sent their letters abroad. When, however, the UN failed to respond, the Initiative Group turned to other international organizations and to Soviet authorities. The group only considered human rights violations in the USSR, despite calls for them to widen their scope. The group responded to such calls by stating that the USSR, by its international posture, prompted violations of human rights in other countries, and that, if the USSR's violations were to be curtailed, the other countries would change for the better.

Of the fifteen members, six were arrested within one year. One document signed in 1970 listed only eight members, among whom were all five scientists.⁴ By 1975 only three members were left to sign the group's letters, including scientists POD"YaPOL'SKIY and T. VELIKANOVA.⁵ In 1976 only T. VELIKANOVA and Khodorovich remained,⁶ and in 1977 Khodorovich emigrated, leaving T. VELIKANOVA the sole representative of the group. Other scientists who have supported the Initiative Group at one time or another are LANDA, TIMACHEV, VOL'PIN, GAYDUKOV, DZHEMILEV, KAPLAN, MYUGE, PONOMAREV, ROKITYANSKIY, RUDAKOV, BELOGRODSKAYA, DIKOV, MILASHEVICH and KOSTERINA.

B. The Human Rights Committee

The Human Rights Committee was formed 4 November 1970 by three physicists, SAKHAROV, CHALIDZE, and TVERDOKHLEBOV.⁷ The principles of the Committee firmly stated that the group would not be political and that the members would not strive for any political positions. Its goals were to create favorable living conditions, to strengthen peace, and to develop mutual understanding, all through the medium of the guarantee of human rights. Some of the functions of this group were: consultations with governmental authorities on human rights, research assistance on the theoretical aspects of human rights in a socialist society, legal assistance, and the dissemination of human rights information found in International and Soviet law. The Committee expressed its readiness to establish contacts with social and academic organizations as long as the organizations were not guided by the desire to harm the USSR.⁸ The Human Rights Committee rarely signed protest letters or took part in other dissident activities, but proceedings of its meetings were published in "Samizdat," much of it in CHALIDZE's journal Obshchestvennyye problemy (Public Problems).⁹

In June 1971 the Committee became affiliated with the International League for the Rights of Man (New York),¹⁰ and in August 1971 with the International Institute on Human Rights (Strasbourg).¹¹ The Committee elected two other scientists, mathematician VOL'PIN and physicist TSUKERMAN, as "experts" of the group.¹² CHALIDZE left the group in 1972 upon his emigration and was replaced by mathematician SHAFAREVICH.¹³ After TVERDOKHLEBOV resigned in 1972, geophysicist POD"YaPOL'SKIY became a member.¹⁴ The emigration of CHALIDZE, VOL'PIN, and TSUKERMAN,

the arrest of TVERDOKhLEBOV, and the death of POD"YaPOL'SKIY left only SAKHAROV and SHAFAREVICH in the group after 1976, and the Committee as such has done little since that time.

C. Group-73/Soviet Section of Amnesty International

Group-73 was founded 1 September 1973 as a benevolent society to help political prisoners and their families, taking Amnesty International as a model.¹⁵ The founding members of the group were TVERDOKhLEBOV, mathematician AL'BREKht, V. Arkhangel'skiy and Korneyev. The group resolved to assist political prisoners regardless of political orientation, race, nationality, class, or religion, and to provide consultation. TVERDOKhLEBOV apparently was the guiding light behind this group, as he had published since early 1973 a "Samizdat" journal, Amnesty International, and had incorporated its ideas into the group.¹⁶

On 6 October 1973 this group, expanded to eleven members, applied for membership in Amnesty International and became known as the Soviet Section of Amnesty International.¹⁷ The executive group of the section was composed of physicists TURChIN (Chairman), TVERDOKhLEBOV (Secretary), BELOOZEROV and mathematician AL'BREKht. Of the remaining seven members, three were scientists: ORLOV, ORLOVSKIY and KOVALEV. The executive group was to meet no less than once every two months, and a general meeting of the section was to meet no less than once a year. KOVALEV and TVERDOKhLEBOV were arrested, according to SAKHAROV, because the authorities wanted to demonstrate their opposition to the existence of such an organization, particularly because of its international ties and tight structure.¹⁸ When TURChIN emigrated in 1977, the position of chairman was assumed by AL'BREKht.¹⁹

The Soviet Section committed itself to fight for the release of prisoners whose rights had been violated, despite their political beliefs, and took upon itself the protection of three prisoners, one from the East European countries, one from the West, and one from the Third World. The group was not allowed to monitor prisoners from the USSR in the interests of political objectivity. It is interesting to note that some Western sections of Amnesty International protested the fact that Soviet dissidents headed the Soviet Section, claiming that they were not objective and impartial because of their situation.²⁰ It is not known whom the Western sections preferred.

D. Public Group to Assist in the Observance of the Helsinki Accords in the USSR

This group, also known as the Helsinki Monitoring Group, was formed in Moscow on 12 May 1976 by eleven individuals, four of whom were scientists:

ORLOV (Chairman), KORChAK, LANDA, and ShchARANSKIY.²¹ Of the seven members added later to the group, three were scientists: MNYUK, MEYMAN, and POLIKANOV.²² The group was founded at the initiative of ORLOV to monitor the observance of the humanitarian articles (Basket 3) of the Final Act of the Conference on Security and Cooperation in Europe (CSCE), signed 22 July 1975.²³ On 15 May 1976, ORLOV was picked up and taken to the KGB, where he was warned that his activity was in violation of the Constitution and hindered the process of detente. With ORLOV's and ShchARANSKIY's arrests in 1977 and MNYUK's and POLIKANOV's emigration, the only scientists left in the group after 1977 were MEYMAN, LANDA, and KORChAK.

The main task of the Helsinki Monitoring Group was to supply information on violations of the articles to the heads of the governments which signed the Final Act and to the people of those countries.²⁴ The group proceeded from the conviction that human rights had a direct relationship to the problem of international security, and the group called upon people from the other co-signing nations to set up similar national monitoring groups. To gather this information the group offered to accept directly from Soviet citizens complaints on violations. In cases of extremely inhumane acts, such as removing children from religious parents, forced psychiatric treatment and separation of families, the group proposed to turn to the heads of the governments as well as the people with a request that an international commission be established to check out the information at its source. The group hoped that its information would be considered at all official meetings which were scheduled in the Final Act.²⁵

In Autumn 1976, the Moscow-based Helsinki Monitoring Group called for the national republics to form their own monitoring groups.²⁶ A Ukrainian group was established on 9 November 1976,²⁷ and was followed by the establishment of Lithuanian,²⁸ Georgian²⁹ and Armenian³⁰ groups on 25 November 1976, January 1977, and 1 April 1977, respectively. The participation of scientists in each of these groups was significant. One of the nine founding members of the Ukrainian group, STROKATAYa, one of the five founding members of the Lithuanian group, FINKELShTEYN, two of the three founding members of the Georgian group, G GOLDShtEYN and I. GOLDShtEYN, and one of the three founding members of the Armenian group, NAZARYAN, were scientists. The goal of these groups was to document specific violations of human rights in their respective areas, although certain nationalist views entered into the charters of the groups which only peripherally could have been regarded as defense of human rights. In the Ukrainian group, for example, the declaration of the aims of the group included the goal "to strive for accreditation in the Ukraine of foreign press correspondents and representatives, for the formation of an independent news agency and for other measures towards the promotion of the free flow of information and ideas," and to have the Ukraine made "a sovereign European nation and a member of the UN, to be represented by its own delegation at all international conferences on the implementation of the Helsinki Accords."³¹ Similarly, the Lithuanian group included a reminder that the Lithuanian Soviet Socialist Republic was established as the result of Soviet occupation in 1940.³² The goals of the Armenian group included Armenian membership in the UN and the reunification of a part of Azerbaidzhan with Armenia.³³

E. The Working Commission to Investigate Misuse of Psychiatry for Political Purposes

This Commission was formed on 5 January 1977 under the auspices of the Moscow Helsinki Monitoring Group, and one of its five founding members was mathematician BAKHMIN.³⁴ The activity of this group consisted of writing letters to Soviet organizations, psychiatric hospitals and foreign psychiatric associations about the misuse of psychiatry in the USSR. The group published a "Samizdat" newsletter, "Information Bulletin," starting in June 1977. By Summer 1978, through a process of imprisonment and harassment, only BAKHMIN was left of the original five members to continue the work of the commission.

F. Armenian Political Prisoner Fund

Physicist NAZARYAN organized the fund to collect donations for fourteen Armenian prisoners and their families in February 1976.³⁵ The prisoners had been sentenced in nine political trials in Yerevan from 1973 to 1974, and NAZARYAN, indicating that he was acting in accordance with the UN Charter and the Universal Declaration of Human Rights, as well as with the Final Act of the CSCE, stated that it was the obligation of one's conscience to do this. He appealed to all Armenians in the world to support the fund, saying that the political views of the political prisoners should not play a role in the decision to support them, that the issue was a moral one, and should be supported by all good Armenians.

G. The Russian Public Fund to Aid Political Prisoners

This fund was established by Solzhenitsyn shortly after his forced emigration to the West in 1974, and was managed by Ginzburg until the latter's arrest in February 1977.³⁶ The fund provided food and clothing to political prisoners, exiles, people hospitalized for political reasons, and to defendants awaiting trial. The fund also gave financial assistance to recently-released political prisoners and to the families of political prisoners to enable them to visit the prisoners and support themselves. The fund administrators maintained lists of political prisoners eligible for such aid, and among those scientists helped by the fund were ORLOV, ShCHARANSKIY, DAVYOV and KAMPOV. After Ginzburg's arrest the management of the fund was turned over to Khodorovich, who was assisted in this by scientists LANDA and LYUBARSKIY.³⁷ After LYUBARSKIY's and Khodorovich's emigration in 1977, LANDA was left with the primary responsibility for administering the fund.

2. Religious/Ethnic Groups

This section deals with dissident groups which represent religious or ethnic interests. In most cases the ethnic groups were loosely organized and had spokesmen rather than leaders to present demands to Soviet authorities and information to Western newsmen. The religious dissident groups, on the other hand, were more tightly structured and had definite leaders. Scientists participated in significant numbers in only two ethnic groups and two religious groups, as far as could be determined. The fact that the main "Samizdat" sources used for this paper were Moscow based, Russian and secular might be the reason that more information was not found on such large religious/ethnic movements as the Ukrainian, Baptist, Pentecostal, Lithuanian Catholic, Meskhi-Turk, Georgian and ethnic German movements.

A. The Jewish Dissident Movement

The Jewish movement is the most significant, in terms of international support and numerical strength, of all the religious/ethnic dissident groups. The movement is vastly different from most of the others, though, in that its main goal was the free emigration of Soviet citizens of Jewish ethnic background to Israel, i.e., not to change the Soviet system but to abandon it. The Jewish movement is also unique in that the USSR has partially acceded to this goal, albeit inconsistently and belatedly, Jewish dissident scientists are subjected to more harassment and administrative malice on the part of Soviet authorities than any other dissident group. The Jewish scientist is automatically removed from his job upon his request for emigration, regardless of whether his request is accepted. Jews are also liable for military call-up after their request for emigration, which further prolongs the period of time they must spend in the USSR without their regular jobs. To protest their treatment, Jewish dissidents have taken such measures as hunger strikes, news conferences, sit-down protests, demonstrations, and, particularly for scientists of Jewish background, international scientific symposia not officially authorized.

The starting point of the organized Jewish emigration movement could be considered the 1970-71 trials of nearly thirty Jews accused of the 15 June 1970 attempted hijacking at Leningrad's Smolnoye Airport.³⁸ Nearly two hundred people were arrested in Riga, Odessa, Khar'kov, Kishinev, Kiev and Leningrad after the attempt, and the first trial was held 15-25 December 1970. Two of those convicted at the trial received death sentences, later commuted to prison terms in the wake of the intense Western and Soviet dissident protest.³⁹ The protest united the non-Jewish Soviet dissident movement and those Jews awaiting emigration,⁴⁰ and as such gave the Jews a sense of community and a specific issue around which they could unite.

Jewish scientists, except for those in physics and electronics, were allowed to emigrate with relatively little harassment from the Fall of 1971 until the Spring of 1972.⁴¹ After 1972, however, the emigration of specialists was sharply curtailed, first, by the imposition of an emigration tax allegedly to pay the state back for educational expenses,⁴² and later, after the abolishment of the tax in 1973, by purported security considerations. The emigration of all Jews was low from 1974 to 1977, because of official harassment and rejection of prospective emigrants. Only in 1978 did the Soviets again allow emigration on a pre-1974 scale (30,000 per year).⁴³ In fact, if emigration were to continue in the second half of 1979 as it did in the first half, the emigration of Jews would be well over 30,000 for the year.⁴⁴ Thus, it seems that emigration is getting easier for Jews in general, but it is too early to determine whether Jewish scientists will also share in this.

As mentioned above, one way the Soviet authorities dealt with prospective Jewish emigrants was to call them up for military service upon their requests for emigration. This happened to a number of Jewish scientists, including BOYKO, Ye. LEVICH, M. AZBEL', AYNBLINDER, GURVITS, VORONEL', ROGINSKIY, YaKHOT, FINKELSHTEYN and SHEPELEV.⁴⁵ After their tour of duty the Soviet authorities could "legally" refuse their emigration requests, for a military security clearance prohibited emigration for seven years after access to the appropriate material and equipment.⁴⁶ The call-up was also used to remove Jewish activists from Moscow during President Nixon's visit in 1972, when a number of them received notices to report to "training camps."⁴⁷ SAKHAROV saw this kind of action as an attempt to frighten people who wanted to emigrate.⁴⁸

Jewish scientists were able to maintain some semblance of scientific activity after the perfunctory firings following their requests for emigration. The scientists organized and conducted scientific seminars at each other's apartments, inviting even foreign scientists to participate. The best known of these seminars were those organized by Moscow physicists VORONEL', M. AZBEL' and ROZENSHTEYN, and Kiev physicist KISLIK.

VORONEL' held weekly Sunday physics seminars at his apartment in Moscow from 1972 to 1974.⁴⁹ The goal of these seminars was to keep abreast of the latest scientific research and to exchange competent evaluations of each other's scientific work. VORONEL' planned an international seminar for July 1974, but the KGB arrested and confined him, M. AZBEL' and BRAILOVSKIY on 25 June for fifteen days to prevent the seminar from being held.⁵⁰ None of the foreign scientists was given a visa and the KGB placed all the other members of the seminar under surveillance.⁵¹ Scientists who had participated in VORONEL's seminars included AGURSKIY, M. AZBEL', I. BRAILOVSKAYA, BRAILOVSKIY, LUNTS, LERNER, MIKULINSKIY, RAM, GURFEL', SHEPELEV, KHAIT, SHCHARANSKIY, FINKELSHTEYN, BUYKO, ROZENSHTEYN, VAYNER, YAKIR and GERBER.⁵² In the fall of 1974, the members of the seminar were subjected to a great deal of persecution, including accusations of parasitism, cutting off the postal service, and surveillance. Finally, on 6 October 1974, VORONEL's apartment was locked by the police and the members were ordered to disperse.⁵³ They went to BRAILOVSKIY's apartment instead and held the seminar there. It is not known what happened the following week, but the seminar did continue.

M. AZBEL' took over responsibility for VORONEL's seminar after the latter emigrated in late 1974.⁵⁴ The seminar continued to meet on a regular basis until 28 May 1975, when AZBEL' was called into the KGB and told that the scientific seminar was considered a Zionist gathering whose goal was anti-Soviet propaganda, i.e., a criminal offense.⁵⁵ AZBEL' was told that if he did not cease this activity, he would be liable for criminal prosecution. It is clear that this threat did not stop AZBEL', as on 17-20 April 1977 a scientific seminar was held in his apartment; it is possible that numerous others occurred between May 1975 and this date. BRAILOVSKIY probably assumed the leadership of the seminar after AZBEL's emigration in 1977, for he reportedly had been holding weekly scientific seminars with Jewish scientists prior to December 1978, when his apartment was searched and papers related to a planned international scientific conference were confiscated.⁵⁷

Other scientific seminars were ROZENShtEYN's seminar on theoretical biology in Moscow, which was active at least in late 1975,⁵⁸ and KISLIK's semi-weekly engineering seminar in Kiev, active in the fall of 1975.⁵⁹ KISLIK's seminar was particularly persecuted by the KGB because people other than Jewish scientists who had been refused emigration participated in it. KISLIK was told by the KGB that he would be responsible if anyone got hurt for attending the seminars.

Jewish scientists were also active in promoting Jewish culture and history within the Jewish movement. Physicist FAYN organized a three-day international symposium on the state and future development of Jewish culture in the USSR, scheduled for late December 1976,⁶⁰ and VORONEL' and YaKhOT published a "Samizdat" journal, Jews in the USSR, which dealt with the history, culture and problems of Soviet Jews and appeared from October 1972 to at least 1975.⁶¹ Although FAYN's symposium was shortened to a one-day seminar after all the members of the organizing committee and most of the speakers were arrested, it was an important unifying force among Jewish dissidents. The organizing committee, incidentally, was composed of thirty Jews, eleven of whom were scientists,⁶² and of the seven speakers arrested, three were scientists.⁶³ Among the other participants at the symposium were the scientists FAYERMAN, Shch-ARANSKIY, ULANOVSKIY, GOL'DFAND, ASKHAROV, MNYUK, B. BEYLIN, MEYMAN, GILDENGORN, and SHEPELEV.⁶⁴ The majority of the Jews working on VORONEL's and YaKhOT's "Samizdat" journal were also scientists: M. AZBEL', BRAILOVSKIY, LUNTS, AGURSKIY, GITERMAN and FINKEL'ShtEYN.⁶⁵ The journal was considered a major contribution to the attempts of Soviet Jews to maintain their national values.

What is the future of Soviet Jews in science? It is likely that in the future there will be no more Jews, at least those who affirm their ethnic background, involved in Soviet science. There seems to be an effort to keep Jews out of the scientific departments of the universities and institutes, particularly since 1978 in the field of mathematics.⁶⁶ There have even been allegations that mathematicians who are Jewish were treated worse than other Jews in the USSR. It is likely that this process of purging Jews from science, through emigration as well as exclusion, will take at least a generation, so it would be very difficult to determine its effect on Soviet science and technology at the present time. It would not be surprising, though, if a lack of continuity were felt in the

next decade because of the large number of middle-level scientists who have emigrated and will not be filling senior positions in the future.

B. The Crimean Tatar Dissident Movement

The Crimean Tatar movement has the goal of returning the Crimean Tatar people from Central Asia, where they were deported by Stalin in 1944 for alleged Nazi collaboration, to the Crimea.⁶⁷ In 1967, the Crimean Tatar people were officially rehabilitated, meaning that they were no longer accused of treason; they were not, however, allowed to return to their homeland. Crimean Tatars have been protesting their forced exile since 1957, by sending representatives to Moscow to talk with governmental and Party officials and by collecting signatures for protest letters. Although there had been intermittent arrests and trials of Crimean Tatar activists since 1959, the wave of repression began in earnest only in 1967, after the Crimean Tatars threatened to carry out mass demonstrations. Scientists involved in the movement have included KHALILOV, DZHEMILEV, KADYYEV, Yu. OSMANOV, S. OSMANOV, GODZHENOV, KHAIROV, and MEMETOV.

KHALILOV was one of sixty-five Crimean Tatars chosen as representatives to present demands for repatriation to the 23rd CPSU Congress in Moscow in 1966.⁶⁸ DZHEMILEV, the leading Crimean Tatar dissident scientist, has been involved in the movement since 1965, when he, too, was sent as a representative of the Crimean Tatar people to Moscow.⁶⁹ DZHEMILEV was also one of the twenty Crimean Tatars received by governmental officials Andropov, Georgadze, Rudenko and Shchelokov on 21 July 1967;⁷⁰ DZHEMILEV, moreover, incurred the wrath of the authorities by openly accusing Georgadze of lying at the meeting. He was soon afterwards tried and convicted of organizing the large demonstration of Crimean Tatars in Tashkent of 27 August 1967.⁷¹ From November 1967 to October 1968 another five scientists were arrested for inflaming discord among the nationalities and for slandering the Soviet system: MEMETOV, Yu. OSMANOV, S. OSMANOV, KHAIROV, and KADYYEV.

MEMETOV, Yu. OSMANOV, and S. OSMANOV were tried together in Tashkent in 1968.⁷² MEMETOV was arrested on 26 November 1967 during a trip to Tashkent, Yu. OSMANOV was arrested in January 1968, and S. OSMANOV was arrested in February 1968. Additional information is known only about Yu. OSMANOV, primarily because he was a prolific writer of Crimean Tatar "Samizdat." He was warned on 16 May 1967 by the procurator to stop writing under the threat of criminal prosecution.⁷³ He refused, however, stating that he was acting within the spirit of the 20th and 22nd Party Congresses and the Party's program on the nationality question. On 22 November 1967 he was called before the director of the Institute of High Energy Physics and a Central Committee representative and was apparently reprimanded. OSMANOV had earlier been expelled from the Joint Institute of Nuclear Research in Dubna for being a member of an underground organization of young Crimean Tatars.

KHAIROV was arrested in September 1968 after a search of his apartment

uncovered incriminating documents, including SAKHAROV's "Thoughts on Progress, Peaceful Coexistence and Intellectual Freedom," transcripts of trials of Crimean Tatars, and Persian poetry.⁷⁴ KADYYEV was arrested in October 1968 and accused of compiling documents which defamed the USSR.⁷⁵ These two scientists were tried along with eight other Crimean Tatar activists in the so-called "Tashkent Trial" of 1 July - 5 August 1969.⁷⁶ KHAIROV's wife had asked dissident P. G. Grigorenko to appear at the trial as a public defender, to which he agreed.⁷⁷ When he arrived in Tashkent, however, he was arrested. KADYYEV's background was similar to the other Crimean Tatar dissidents: he had been given a mandate in the summer of 1968 to represent the interests of a group of Crimean Tatars living in Samarkand before governmental and Party officials,⁷⁸ and had been one of the ten Crimean Tatars to sign an open letter in July 1968 appealing for help in stopping the genocide of the Crimean Tatar people.⁷⁹

DZHEMILEV participated in the 25 August 1968 demonstration in Moscow's Red Square against the Soviet occupation of Czechoslovakia⁸⁰ and in the June 1969 Crimean Tatar demonstration in Mayakovskiy Square, also in Moscow.⁸¹ In May 1972, DZHEMILEV, together with KHALILOV and KHAIROV participated in a meeting of nearly sixty representatives of the Crimean Tatar people, during which the representatives reasserted the determination of the people to return to the Crimea, despite the persecution and repression.⁸² DZHEMILEV was arrested in October 1972 and was sentenced to a term of three years confinement.⁸³ In 1977 he applied to emigrate but was refused.⁸⁴ DZHEMILEV is the only Crimean Tatar scientist to actively dissent since 1972. In 1977 he held a press conference in Moscow where he told Western correspondents about the problems of the Crimean Tatar people, apparently becoming their spokesman.⁸⁵ He has been described as one of those activists in the nationalities' movement who have understood that the solution of the nationality problem was inseparably linked with the problem of democracy in the USSR, and that the tragedy of the Crimean Tatar people was not only the result of the evil deeds of individuals, but was the product of totalitarianism.⁸⁶ Thus, DZHEMILEV seems to bridge the gap between the ethnic movement and the human rights/democratic movement, an achievement potentially quite significant for both movements. This would widen the scope of dissidence among Crimean Tatars to include support of human rights, and would increase the support for the Crimean Tatar cause by enlisting the more powerful and influential human rights activists, with the accompanying foreign press coverage.

C. Christian Committee for the Defense of Believers in the USSR

The Committee was formed on 27 December 1976 with three members, all Russian Orthodox, one of whom was chemist KAPITANCHUK, who served as the secretary of the organization.⁸⁷ Mathematician ShchEGLOV joined the group in 1978⁸⁸ and physicist REGELSON has signed documents emanating from the group.⁸⁹ The Committee was formed because, in the words of the members, the leadership of the Russian Orthodox Church and the leaders of other religious organizations had not defended the rights of believers, so they

had to defend their own rights. Even though all the members were Russian Orthodox, the Committee has defended Baptists, Roman Catholics and Jews, one of whom was mathematician BEGUN.⁹⁰ The Committee has collected studied and disseminated information on the condition of believers in the USSR, has rendered consultative assistance to believers, and has tried to improve Soviet legislation on religion. The Committee has claimed that it was loyal to the USSR and Soviet law and that it was willing to work with governmental organizations if such a collaboration would improve the situation of believers in the USSR.

D. Buddhist Group in Ulan-Ude

A group of intellectuals, headed by a leading scholar of Buddhism, met to study and practice Buddhism in private apartments in Ulan-Ude from 1970 to 1972.⁹¹ Nine of the participants were arrested in 1972 and the leader, B. D. Dandaron, was tried 18-25 December 1972 for leading a religious sect. Of the twenty or so people who were involved in this group, one was a scientist, physicist ARANOV, and the wife of one of the members was a biologist, ZhELEZNOVA. ZhELEZNOVA's husband, Dandaron's first "disciple" and an Asian historian, was declared mentally irresponsible and was confined to a psychiatric hospital. Apparently, ZhELEZNOVA was herself persecuted for her husband's crime, although the information on this was not very clear.

3. Revolutionary/Criminal Groups

There are relatively few known revolutionary/criminal groups in the Soviet dissident movement, and of the few only five can be determined to have had scientists as members: one was an Anarchist group; two were Marxist; one was Christian Socialist; one was Zionist. Because of the small number of members in all of the revolutionary/criminal groups and the limited nature of their activities, it is highly doubtful that the groups posed credible threats to the Soviet system; the Zionist group, in fact, wanted only to leave the Soviet Union, not disrupt it. To the Soviet authorities, however, the existence of such groups in the USSR was an anathema, particularly since it was a revolutionary/criminal group, the Bolshevik Party, which overthrew the existing government in 1917.

A. The All-Russian Socialist Christian Union for the Liberation of the People (VSKhSON)

VSKhSON was formed on 2 February 1964 by four Russian Orthodox students

studying at Leningrad State University: I. V. Ogurtsov, M. Yu. Sado, Ye. A. Vagin and B. A. Averichkin.⁹² The group lasted for three years and eventually had a membership of about thirty individuals, two of whom were scientists.⁹³ VSKhSON was a secret, neo-Slavophile, military-political organization, an "underground army,"⁹⁴ which was committed to liberate the USSR from a tyrannical totalitarian regime and to establish a socialist-Christian society and government. The group boasted of a large library, a translating-research staff, a propaganda-ideological department, fifteen typewriters, photoenlargers, and over ten cameras. At the time of its forced dissolution, the group had a military structure of "squads" and "platoons," although the plans for military training had not been implemented by this time. The KGB first heard of VSKhSON in March 1966,⁹⁵ and in June and July of that year the KGB interrogated five of its members.⁹⁶ The only concrete thing the group ever attempted to do, however, was to repair a printing press so that they could print leaflets with the heading, "Fifty Slogans of Liberation," for distribution during festivities surrounding the 50th Anniversary of the Bolshevik Revolution in 1967, which they failed to do.⁹⁷ None the less, in late 1967 and early 1968 twenty-one of its members were sentenced to terms ranging from ten months to fifteen years for conspiracy with intent to seize power, and the group ceased to exist.⁹⁸

Twenty-six of VSKhSON's members had attended university, two of whom were the chemist IVLEV, who became the organization's eighth member in January 1965,⁹⁹ and PETROV, who was brought into the organization in November 1966¹⁰⁰ and was one of its last members. While in VSKhSON, IVLEV distributed anti-Soviet literature and recruited other members. In the fall of 1965 he was instructed by one of the group's leaders to find out the reasons the neo-Marxist group, "Union of Communards," composed of chemistry students at Leningrad State University, was uncovered by the authorities.¹⁰¹ IVLEV was presumably chosen for this assignment because he was a chemist himself. PETROV was assigned to a squad which was purportedly training for a coup d'etat in Leningrad set for October 1967.¹⁰² Some of the meetings of the squad, in fact, were held in his apartment. PETROV also photo-copied anti-Soviet literature for the organization. On 4 February 1967 PETROV, who had joined VSKhSON out of disgust for the Communist Party, experienced a revived sense of loyalty to the Party and denounced the organization to the KGB,¹⁰³ and by 12 July 1967 all the members of the organization were under arrest. IVLEV received a comparatively mild sentence, only two years confinement. PETROV, not surprisingly, received no sentence at all. After his release from confinement, IVLEV worked as an engineer at the Obukovo Construction Combine.¹⁰⁴ He has not, as far as can be determined, resumed his dissident activities.

B. Society of Madmen on the Loose

This group was composed of young mathematicians, headed by PIMENOV, who were interested in studying the history of the Russian revolutionary movement.¹⁰⁵ The group, based in Leningrad, later became involved with a

group of students at the Leningrad Library Institute and some history students, also interested in the Russian revolutionary tradition. Although the society apparently made no plans to overthrow the Soviet government or implement a revolution, four of the society's members, including PIMENOV, were arrested and brought to trial in 1957. PIMENOV continued his dissident activities after the dissolution of the society, though, and it could be argued that whatever group is united around PIMENOV is a continuation of this society.

C. Leningrad Marxist Circle "Union of Communards"

This neo-Marxist group, composed of reportedly two hundred chemistry students at Leningrad State University,¹⁰⁶ was uncovered in the summer of 1965 and accused of clandestinely publishing and distributing a journal, "Kolokol" ("The Bell," from the name of Herzen's publication in the 19th century), which bore the epigraph, "From the dictatorship of the bureaucracy to the dictatorship of the proletariat." Only four issues of the journal were published before the KGB broke up the group.¹⁰⁷ Nine people were arrested for the publication of the journal, the group leaders, chemists RONKIN and KhAKhAYeV, and seven others, including the chemist MASHKOV. Interestingly enough, RONKIN, KhAKhAYeV, and MASHKOV continued their dissident activities in prison. On 12 February 1968 they took part in a hunger strike in one of the Morđovian labor camps, demanding they be recognized as political prisoners rather than criminals and that their living conditions be improved.¹⁰⁸

D. "Revolutionary Marxists"

The group, headed by Yu. V. Vudka and O. M. Senin, was composed of young (20 to 27 year old) Komsomol members who got together to study Marxist literature.¹⁰⁹ As far as can be determined, the group did not plan any subversive activities. Thirteen of its members were arrested during the July-September 1969 period, two of whom were involved in science. The "Revolutionary Marxists" group was apparently divided into two sub-groups, "The Marxist Party of the New Type," based in Ryazan', and "The Party of True Communists," based in Saratov.¹¹⁰ The Ryazan' group was headed by Vudka and was composed of at least five other members, four of whom were students at Ryazan' Polytechnical Institute. The Saratov group included as its members physicist KULIKOV and fourth-year Saratov State University biology student FOKEYeV, both of whom were arrested in 1969.

E. Zionist Groups: "Kishinev 9" and the "Leningrad 9"

These two Zionist groups were associated with the attempted hijacking of a Soviet aircraft at Leningrad's Smolnoye Airport on 15 June 1970. The Zionist group, the so-called "Leningrad 11," which included no scientists, actually attempted the hijacking, while the "Kishinev 9" and "Leningrad 9" groups supported its action and had even planned similar actions of their own. The "Leningrad 9" group, which included two scientists, was brought to trial 11-20 May 1971. The "Kishinev 9" group, which included three scientists, was brought to trial at the end of June in the same year. As was mentioned above, the trials of the "Leningrad 11," "Leningrad 9" and "Kishinev 9" led to the unification of the Jewish dissident movement.

The "Leningrad 9" group was accused of maintaining contacts with Israeli Zionist organizations, inciting Soviet Jews to emigrate, and disseminating anti-Soviet Zionist literature.¹¹¹ MOGILEVER, one of the scientists in the group, was one of the group's founders;¹¹² L. KORENBLIT, the other scientist, was one of the editors of the Zionist "Samizdat" journal, "Iton."¹¹³ At a meeting of about ten Jewish activists from Leningrad, Moscow, Riga and Khar'kov, probably in 1969 or 1970, MOGILEVER proposed that a single Zionist organization be created to unify the separate Zionist groups.¹¹⁴ The proposal was not accepted, though, in favor of maintaining contact among the groups and effecting some degree of coordination of their activities. MOGILEVER was also involved in preparing Hebrew language textbooks for the use of Jews wishing to emigrate, signing collective protest letters to Soviet officials, and in transmitting the protest letters to foreigners for dissemination abroad. He was sentenced to four years confinement in 1971 for his participation in the group. KORENBLIT, who had close contacts with the Zionist groups in Moscow and Riga on the publication of the Zionist journal,¹¹⁵ also taught Hebrew to Jews wishing to emigrate. He had not, however, supported those Jews who had planned to hijack the Soviet aircraft to Israel, and had even attempted to talk one of the "Leningrad 11," Dymshits, out of proceeding with the plan. KORENBLIT was sentenced to three years confinement in 1971.

The "Kishinev 9" group was a composite of former students from Leningrad who had joined forces with Jewish activists in Kishinev upon their transfer to the city in March 1970, and GAL'PERIN's group, which had been in Kishinev since about 1968.¹¹⁶ The Kishinev group maintained close contacts with the Leningrad group; it was the Kishinev group, in fact, which printed the Zionist journal "Iton" for the Leningraders. The Kishinev group also conducted lecture and study sessions on the history of the Jewish people and Soviet nationality policies.

GAL'PERIN, VOLOSHIN and LEVIT were the three scientists in the "Kishinev 9" group. GAL'PERIN was selected to take part in the hijacking plan as early as February 1970, and he got four other members of his group, including VOLOSHIN, to agree to go along with him. GAL'PERIN collected money to buy the airplane tickets, but once it was determined that Israel was not going to support such activity, the plan was dropped. GAL'PERIN and VOLOSHIN had also been involved in the acquisition of an electric duplicating machine in June 1969 to improve their "Samizdat" capabilities. The two had stolen the main components and parts of the machine from a design institute, but were unable to reassemble it. The parts were finally sent to Leningrad, where it was reassembled under the supervision of members

of the Leningrad group. LEVIT had been involved in copying "Samizdat" and had taught classes on Jewish culture in Riga in 1969. Another scientist, E. BONDAR', although not a member of the group, was convicted of refusing to give evidence at the trial of the "Kishinev 9" in August 1971.¹¹⁷ GAL'PERIN, incidentally, received two-and-a-half years confinement, and VOLOSHIN and LEVIT both received two years.

4. Scientific/Professional Groupings

In the category of "scientific/professional groupings" are those groups made up of Soviet dissident scientists who work together professionally. It is not known if the scientists were dissidents before they began working together or if one of them influenced his fellows to become dissidents; none the less, it does pose the interesting possibility that a dissident scientist's co-workers might be prone to dissidence. A particularly good source for identifying working relationships in the scientific field is the Letopis' zhurnalnykh statey (Guide to Periodical Literature), from which one can derive information on co-authors of scientific articles.

One professional group centered around the biologist KOVALEV. BERKEN-BLIT,¹¹⁸ CHAYLAKhYAN,¹¹⁹ and SMOLYANINIV,¹²⁰ all of whom signed the Galanskov-Ginzburg protest letter in 1968, have co-authored scientific articles with KOVALEV in the time frames, respectively, of 1962-72, 1961-72, and 1965-71. BOYTSOVA, KOVALEV's wife since at least 1975 and one who protested his arrest in 1974, co-authored an article with him in 1970.¹²¹ LIBERMAN, who had protested the threatened expulsion in 1969 of ABAKUMOV and DIONISIYEV from the Institute of Biophysics for anti-Soviet remarks¹²² was a co-author of a paper with KOVALEV in 1966¹²³ and with SMOLYANINOV in 1967.¹²⁴ KOVALEV, incidentally, had received his Candidate of Biological Sciences degree from the Institute of Biophysics.¹²⁵ KOVALEV also has co-authored with GEL'FAND in 1963;¹²⁶ GEL'FAND had protested the Galanskov-Ginzburg trial and VOL'PIN's incarceration in 1968. KARPOVICH, who had co-authored with SMOLYANINOV in 1972-73 but not with KOVALEV, protested KOVALEV's arrest in 1974 and his trial in 1976. Thus, eight scientists tied by professional interests were all dissidents. One can add to this number four of KOVALEV's co-workers at the Moscow Fish-Breeding and Improvement Station, ZhUKOVSKAYA, MIZYAKIN, RYVKIN and YANKELEVICH.¹²⁸ KOVALEV's group apparently shared his views on the Soviet system,¹²⁹ and all of them, with the exception of ZhUKOVSKAYA, had already or were later to become involved in dissident activities: MIZYAKIN supported TVERDOKhLEBOV in 1976 and Ginzburg in 1977;¹³⁰ RYVKIN protested KOVALEV's internment in 1974;¹³¹ and YANKELEVICH, SAKhAROV's son-in-law, signed protest letters on TVERDOKhLEBOV's, KOVALEV's and Ginzburg's arrests, as well as signing letters of support for Charter 77 and the Helsinki Monitoring Group in 1977.¹³²

The mathematicians who signed the protest letter on VOL'PIN's incarceration in 1968 were also bound by professional ties. S. NOVIKOV and POST-NIAOV co-authored in 1964,¹³³ LANDIS and KRONROD co-authored in 1947,¹³⁴

and GEL'FAND and PYATETSKIY-SHAPIRO co-authored in 1964,¹³⁵ as did GEL'FAND and SHILOV in 1956 and 1963,¹³⁶ S. NOVIKOV, PYATETSKIY-SHAPIRO and SNAFAREVICH in 1964,¹³⁷ GEL'FAND and FUKS in 1967,¹³⁸ MINLOS and SINAY in 1967,¹³⁹ GINDIKIN and VINBERG in 1967,¹⁴⁰ and DOBRUSHIN and MINLOS in 1967.¹⁴¹ It should be noted, though, that few of the mathematicians who signed the VOL'PIN protest letter continued to dissent after his release. Only thirteen of the ninety-five who signed the protest letter (SNAFAREVICH, ARNOL'D, GASTEY, GRABAR', KRISTI, LUNTS, MEYMAN, POD'YAPOL'SKIY, PONOMAREV, PYATETSKIY-SHAPIRO, SHIKHANOVICH, VIL'YAMS, and VINBERG) continued to dissent, an indication that the majority of the mathematicians had supported VOL'PIN not as a dissident but as a fellow mathematician.

Another interesting relationship among dissident mathematicians was displayed by the events surrounding VINBERG's doctoral dissertation defense in April 1977.¹⁴² VINBERG's dissertation had been ignored by the appropriate academic authorities for several years, out of spite towards VINBERG's dissident activities, and VINBERG finally sent his dissertation abroad to get an unbiased evaluation. When his defense was finally scheduled, fellow dissidents ARNOL'D and S. NOVIKOV tried to attend the process but were removed nominally because they were not on the dissertation committee. One member of the committee, MANIN, supported VINBERG's dissertation, but the other members refused to award VINBERG his doctorate for his alleged dissident act of sending the dissertation abroad.

In the field of chemistry there are a few interesting relationships centered around Academician KNUNYANTS, who had protested the introduction of new articles in the Soviet Criminal Code against dissidents in 1966 and had supported draft legislation for the elimination of censorship in 1967. KNUNYANTS had co-authored a paper with ROKHLIN in 1967.¹⁴³ ROKHLIN had spoken out against the Soviet invasion of Czechoslovakia in 1968, and when it was time for his re-election as Senior Scientific Associate at his institute in May 1969, the director of the institute asked that he not be re-elected.¹⁴⁴ In spite of this, he was re-elected. KNUNYANTS had also co-authored in 1967 with ARONOV,¹⁴⁵ who had abstained from voting at a meeting in support of the Soviet occupation of Czechoslovakia and was released at the expiration of his Moscow residence permit.¹⁴⁶ In 1976 ARONOV signed a letter of support for TVERDOKHLEBOV and in 1977 signed a letter of support for Ginzburg.¹⁴⁷ Two other chemists were also co-authors in 1967: BOCHVAR, who had protested VOL'PIN's hospitalization in 1968, and BAGATUR'YANTS,¹⁴⁸ who admitted to copying "Samizdat" he received from BURMISTROVICH in 1967-68 at the latter's trial in 1969, and who promised never to deal with "Samizdat" again in the future.¹⁴⁹

In the field of physics, GINZBURG, who had protested the change in the Soviet Criminal Code in 1966, and FAYN, who participated in AZBEL's scientific seminars in 1975 and had organized the Jewish cultural symposium in 1976, co-authored articles in 1957 and 1960.¹⁵⁰ SOKOLOV and KHRIPOVICH, both of whom signed the letter protesting the Galanskov-Ginzburg trial, co-authored an article on nuclear physics in 1968.¹⁵¹ LEVIN, who signed the Galanskov-Ginzburg protest letter in 1968 and, in 1976, along with SAKHAROV supported TVERDOKHLEBOV's and SHUSTER's scientific work,¹⁵² co-authored an article in 1944 with teacher, LEONTOVICH.¹⁵³ LEONTOVICH has himself supported a number of dissidents, including MEDVEDEV, PIMENOV,

Ginzburg and Bukovskiy, ... 1966.¹⁵⁴ SAKHAROV and ZEL'DOVICH co-authored a paper on nuclear physics in 1957;¹⁵⁵ ZEL'DOVICH has not appeared in any dissident contexts since 1966.

Other noteworthy professional ties between dissident scientists included: BRANOVER and TsINOBER, both Jews who wanted to emigrate (BRANOVER in 1972 did so), co-authored in 1965;¹⁵⁶ TVERDOKHLEBOV and MANDEL'TsVEYG, the latter of whom emigrated to Israel in 1973 after protesting a full year, co-authored in 1961;¹⁵⁷ KHRIPLOVICH and Okun', the latter of whom gave TVERDOKHLEBOV research assistance in 1967¹⁵⁸ and in 1978 was questioned to ascertain that he was not going to support ORLOV,¹⁵⁹ co-authored in 1967;¹⁶⁰ and KALLISTRATOVA and GURVICH, both of whom signed Galanskov-Ginzburg protest letters in 1968, co-authored an article in the year 1968.¹⁶¹ There are, likewise, strange bedfellows found in this type of investigation. One of the oddest was the association of ZASLAVSKIY and Sagdeyev, who co-authored an article in 1964.¹⁶² ZASLAVSKIY had signed one of the 1968 protest letters on the Galanskov-Ginzburg trial, and Sagdeyev was known for his comment on the best way to deal with scientists who had signed that very letter: "Get rid of them all."¹⁶³

KOLMOGOROV and TURCHIN worked together on what is known in parapsychology circles as the "Great Telepathy Controversy."¹⁶⁴ The newspaper Literaturnaya gazeta sponsored a telepathy experiment in 1968, for which it recruited scientists as judges and referees. KOLMOGOROV was one of the three academicians selected to evaluate the results of the experiment, and TURCHIN was named head of a special supervisory committee of ten scientists and engineers which was to monitor the experiment. The experiment was held between 10 and 13 May 1968 in Moscow and Kerch and no evidence was found to support the existence of telepathy. TURCHIN, incidentally, wrote a letter to the editor of the newspaper soon after this experiment to protest the newspaper's criticism of Solzhenitsyn, and he stated that he refused to write for the paper or subscribe to it until the present editor was removed.¹⁶⁵

On the other side of the parapsychology credibility line was NAUMOV, who worked together with REGEL'SON at the All-Union Scientific Research Institute of Medical Instruments and Equipment from 1972 to 1974, investigating the biophysical basis for acupuncture and biological fields.¹⁶⁶ NAUMOV was an amateur parapsychologist and lecturer, who was sentenced to two years confinement in 1974 for accepting money for his lectures.¹⁶⁷ It could also be added that A. ShTERN worked in an official, secret parapsychology laboratory in Novosibirsk in the late 1960's, researching the physical basis of psychic energy.¹⁶⁸

Finally, in discussing professional relationships among dissidents, one tends to lose sight of the more frequent phenomenon of dissidents having professional relationships with non-dissidents. Do the dissidents influence their colleagues in any way? Does the respect a scientist has for another stop at the latter's scientific achievements, or does it spill over to his other activities? One can cite the tremendous achievements of SAKHAROV in the field of controlled thermonuclear fusion, one of the most highly researched and financed non-military Soviet science projects. SAKHAROV and TAMM developed the theoretical basis for the entire field in the year 1950.¹⁶⁹ Do the researchers in this field hold any special regard

for their scientific "benefactors," or have they been able to isolate SAKHAROV the physicist from SAKHAROV the dissident. KAPITSA is another example of a very influential dissident scientist. Has he influenced younger scientists in any way, particularly when they realize that he has been able to avoid the worst persecutions because of his scientific prestige? Will the younger scientists wait until they have made significant scientific contributions before they dissent? These are questions that cannot be answered in this paper but unquestionably are of prime importance in determining the extent and future of dissidence in the scientific community.

5. Social-elite Groups

A large number of scientists about whom biographical information could be found come from families that could be considered as belonging to the Soviet "elite," whether in the field of culture, politics or science. This sociological phenomenon will be discussed in this section.

A. Cultural Elite

Seven dissident scientists can be identified as having been born into families belonging to the cultural elite, perhaps the most famous of whom was VOL'PIN's father, the poet Sergey Esenin. Although Esenin apparently spent little more time with VOL'PIN's mother, Nadezhda Vol'pin, than was necessary to create the future dissident scientist,¹⁷⁰ and, in fact, died the same year VOL'PIN was born, the prestige of having such a famous father must have had some bearing on VOL'PIN. TVERDOKHLEBOV was also brought up among the cultural elite. His natural father, Nikolay Ye. Tverdokhlebov, was chief of the Main Administration on Art of the Ministry of Culture in 1953-54 and Deputy Minister of Culture in 1954-55.¹⁷¹ TVERDOKHLEBOV's step-father, and ZAK's father, Boris G. Zaks, was on the editorial board of the literary journal Novyy mir from the time the liberal poet Tvardovskiy assumed the position of editor until 1966;¹⁷² in 1977, moreover, he signed a protest letter on the arrest of writer Ginzburg.¹⁷³

Mathematician GASTEY's father, Aleksey K. Gastev, was a writer and political activist who founded the Central Institute of Labor in 1920 and is considered one of the founders of Soviet proletarian literature.¹⁷⁴ Gastev was a revolutionary and member of the Russian Social Democrat Workers' Party from 1901 to 1908. He was later arrested and shot during the Stalinist purges of the late 1930's. Chemist BELOTSEKOVSKIY's father, Vladimar N. Bill'-Belotserkovskiy was also a writer and revolutionary.¹⁷⁵ He worked in the United States for seven years prior to the Russian Revolution but returned in time to participate in it. Bill'-Belotserkovskiy is the author of the famous Soviet play about

the Civil War, "Shtorm," (The Storm), which is recognized as having set the model for the "Soviet" play.

Biologist KOSTERINA's father, Aleksey Ye. Kosterin, was a popular writer, an old Bolshevik, and later dissident, who was known for his support of national minorities in the USSR.¹⁷⁶ During the Civil War, he was one of the leaders of the partisan movement in the North Caucasus and wrote for the Bolshevik press. He published a great deal in the 1920's but little in the 1930's. He was arrested in May 1938, and spent the next seventeen years in prison camps and exile. When he finally returned to writing he was able to publish just a few works; most of his writing circulated in "samizdat." Less than two weeks prior to his death in 1968 he was secretly removed from the Union of Soviet Writers; just three weeks prior to his death he quit the Communist Party in protest of the Soviet occupation of Czechoslovakia.

Mathematician GPABAR' is presumably the son of the Russian impressionist painter and art historian Igor' E. Grabar'. Grabar' was an academician of both the Academies of Sciences and of Arts of the USSR. He headed the Tret'yakovskiy Gallery from 1913-25, and was instrumental in establishing workshops to restore works of art in the Soviet Union after the revolution. Grabar' was also a professor at Moscow State University and was awarded two Orders of Lenin. Several of Grabar's paintings were in the collection of one M. I. Grabar' of Moscow, presumably Grabar's son.¹⁷⁷

B. Military-political Elite

There are at least eight dissident scientists whose families belonged to the military or political elite. The most significant one was LITVINOV's grandfather, M. M. Litvinov, Stalin's foreign minister prior to WW II and ambassador to the United States during the war; his grandmother was British.¹⁷⁸ LITVINOV's privileged status in Soviet society was, in fact, alluded to in a bitter letter sent to him by "an ordinary Soviet woman," who was reacting to LITVINOV's statement on KGB harassment which was broadcast by Western Russian-language radio stations in late 1967. While her reaction may not be completely accurate, it might be a common (mis)perception shared by many Soviets on the children of the elite. The woman described LITVINOV as one

to whom the Soviet power has given everything, for whom from infancy all roads have been open,...who (has) always been able to go wherever (he) wanted, who could choose whatever university (he) liked, who (has) always enjoyed material security, who (was) given an apartment inside Sadovoye Kol'tso.. who (has) made a habit of capitalizing on (his) forefathers' services and all for nothing, taking all the good things of life as (his) due.¹⁷⁹

This view is probably shared by Soviet authorities, although it undoubtedly raises unpleasant questions regarding their own children's status.

Other dissident scientists from the military-political elite were MEDVEDEV, whose father was a Soviet Marxist philosopher and a member of the Red Army, who taught at the Military Political Academy and Leningrad State University;¹⁸⁰ TVERDOKHLEBOV, whose father was also a member of the State Committee for Vocational and Technical Education collegium in 1962 and had served as the Soviet ambassador to Bonn at some point;¹⁸¹ AGURSKIY, whose father was one of the founders of the Communist Party of the United States prior to coming to the USSR;¹⁸² AL'BREKHT, whose father was an old Bolshevik who was exiled by the czarist police for distributing "samizdat" and for belonging to the Russian Social Democrat Workers' Party;¹⁸³ GENKIN, whose father was also an old Bolshevik;¹⁸⁴ KISLINA, whose father was apparently a former political big-wig who as of 1969 was on pension and lived in the same apartment building as did Brezhnev;¹⁸⁵ and LOZANSKAYA, whose father was a senior Soviet general stationed in Moscow who had refused to help her emigrate to be with her husband in the United States.¹⁸⁶

C. Scientific Elite

Most of the scientists in this study who have come from elite families have come from the scientific elite: SAKHAROV, LEONTOVICH, both TURCHIN's, all four VELIKANOV's, both VENTsEL's, MARKOV, BOCHVAR, NOVIKOV, FRANKKAMENETSKIY, LANDA, KELDYSH, and LITVINOV are all from the scientific elite.

The VELIKANOV's are children of Academician and hydrologist Mikhail A. Velikanov (1879-1964), who had received the Order of Lenin and was head of the Department of the Physics of River-Bed Processes at Moscow State University.¹⁸⁷ SAKHAROV's father was physicist Dmitriy Sakharov, author of a physics textbook and professor at the Lenin Pedagogical Institute.¹⁸⁸ LEONTOVICH's father, Aleksandr V. Leontovich (1869-1943), was a noted physiologist,¹⁸⁹ and FRANK-KAMENETSKIY's father was presumably D. A. Frank-Kamenetskiy, the physicist who worked with ZEL'DOVICH in the 1940's on a flame development theory.¹⁹⁰

Physicist BOCHVAR's father was metals specialist and academician Andrey A. Bochvar, who received the Order of Lenin, a Stalin Prize, Hero of the Soviet Union, and was a deputy to the RSFSR Supreme Soviet in 1955, 1959, and 1963.¹⁹¹ At one time Bochvar headed a research institute in Leningrad. Mathematician S. P. NOVIKOV is the son of mathematicians Academician P. S. NOVIKOV and L. V. KELDYSH, the sister of former Academy of Sciences President M. V. Keldysh.¹⁹² KELDYSH's father was an Academician himself, a professor at the Military Engineering Academy in Moscow, a Major-General in the Engineering-Technical Services, and a Party member.¹⁹³

Mathematician V. F. TURCHIN and chemist K. F. TURCHIN are presumably the sons of agro-chemist and professor Fedor V. Turchin (1890-1960), a recognized world-authority on nitrogen fertilizers.¹⁹⁴ LITVINOV's father, M. M. Litvinov, was a physicist and senior engineer at a design bureau, and his mother, F. P. Yasinovskaya, was a Senior Scientific Associate at

the Institute of Cardiology.¹⁹⁵ The VENTSEL brothers' mother, Ye. S. Ventsel, was a mathematics professor at the Military Air Academy imeni Zhukovskiy, as well as a writer,¹⁹⁶ MARKOV's father was the mathematician A. A. Markov (1856-1922),¹⁹⁷ and LANDA's father was a professor and head of the School of Pathological Anatomy of the Saratov Veterinary Institute.¹⁹⁸

6. Conclusions

What conclusions can be reached on the involvement of Soviet dissident scientists in groups? First, scientists have played a major role in dissident groups, particularly human rights groups and ethnic groups. Scientists have not, however, been particularly active in the criminal/revolutionary groups, possibly out of concern for their careers or out of a basic loyalty to the Soviet system. The professional groups among scientists are significant in that they suggest that there might be numerous other prospective dissident scientists among the co-workers of known dissidents. Finally, that fact that a number of the dissident scientists were from the Soviet elite suggests that Soviet authorities have lost the loyalty and support of a group that should be among the most loyal to the regime, as it enjoys its privileges at the pleasure of the authorities.

CHAPTER III

1. Theoretical Framework

In this chapter, information on the 565 scientists found in the "samizdat" sources who have dissented, requested emigration, or otherwise incurred the wrath of the authorities is presented in tabular form and analyzed. Given the closed nature of Soviet society, the information available on scientists, particularly dissident scientists, is relatively sparse; accordingly, certain variables have been chosen which conceivably might be relevant to the causes of dissidence for given scientists, and data which pertains to these variables has been collected. Obviously, since an equal sample of non-dissident scientists has not been included, a comparison cannot be drawn between the dissident and non-dissident scientists to determine what variables do, in fact, indicate a proclivity towards dissidence. Nor has the hypothesis behind the selection of each variable (as relevant to understanding the causes of dissent) been experimentally tested by psychological or sociological means; the hypotheses are unproven and untested. What this collection of data does provide, however, are experiences and personal backgrounds among scientists in the dissident scientist community. Correlations drawn from this data suggest factors which might have led to or impacted on the scientists' dissidence. It might even be suggested that these correlations could be used to predict the prospects of dissidence among scientists in the future.

The variables selected were: date of birth, ethnic origin, religion, educational level, job title, place of work, field of science, Party affiliation, relationship to the purges (self or family member), imprisonment and hospitalization, dates of first and last dissident act, and city of residence. A comprehensive description of these variables follow in the next few pages; this should make the conceptual model clear and enable the ensuing analysis to proceed with little further methodological explication.

The "date of birth" variable provides the following information: it determines the historico-political environment in which the scientist grew up and worked, his "life experience," whether he was touched by the Russian Revolution, Stalinist Purges, World War II, the "Thaw" of de-Stalinization after the 20th Party Congress, the re-Stalinization by Brezhnev, etc; secondly, the "date of birth" data, in combination with the "year of first dissent" data, gives the researcher the age of the scientist when he first dissented. The age of the scientist, as well as the era in which he grew up, might have a bearing on his decision to dissent.

The choice of "ethnic origin" as a variable rests on the assumption that ethnic discrimination plays a role in causing a person to dissent, particularly if the discrimination is supported by the authorities, as it is in the Soviet Union. This variable is meaningful not only to suggest a cause of dissidence but also to determine the participation in

dissident activities of particular ethnic minorities, such as Jews, Armenians, Crimean Tatars, Lithuanians, etc.

The "religion" variable was included because it could be assumed that Soviet policies of religious persecution would cause a religious scientist to dissent. This variable might also show a degree of personal commitment and the willingness to suffer, both necessary for a dissenter, for the religious scientist might be under attack from both fellow scientists, who would be guided by the materialistic and rationalistic nature of science, and the authorities, who would be supported by the Party's anti-religious policies. Another point is that Jew as an ethnic category is separate from Judaism as a religion; it is by no means a certainty that a Soviet Jew, even one requesting emigration, is a religious believer.

The "level of education" variable, one of the variables which indicates at what stage in the scientist's professional career he became a dissident, might show whether the level of education of a scientist had a bearing on his dissidence, whether the higher the level of education, with its attendant higher status and greater perquisites, the greater the motivation to become (or not become) a dissident. The "job title" variable is the other variable which indicates the scientist's professional level. This variable is used to determine whether the type of job the scientist held had a bearing on his dissidence.

The "place of work" variable provides data on the subordination of the institute in which the dissident scientist worked, for the purpose of determining in which administrative environment (Academy of Sciences, All-Union Ministry, Republican Ministry, etc.) the greatest number of dissident scientists are found. The assumption is made that institutional subordination does play a role in causing dissidence; the reasons might be more academic freedom in one administrative environment than in another, increased social pressure to conform, or heightened security measures taken with respect to employees. The data collected for this variable will indicate in which institutes there are significantly large numbers of dissident scientists. Why these institutes have such large numbers is open to speculation; in fact, it could be reasonably argued that, rather than creating or causing dissidents, these institutes merely attracted them. Whatever the reasons, these institutes will be singled out.

The "field of science" variable indicates what field of science has attracted, or caused, the greatest number of dissident scientists. Whether a field of science could "cause" dissidence is unlikely, but the scientist's choice of a particular field of science could indicate a "mind-set," which itself might be the "cause" of dissidence.

The "Party membership" variable indicates the number of Komsomol, Communist Party, Marxist, and non-Party scientists within the dissident scientist community. This data might suggest a relationship between political orientation and dissidence. A methodological problem involved with the collection of data for this variable must be pointed out, particularly if one is interested in extrapolating the total number of scientists involved in such activities from the information available. Data on Party membership was drawn almost exclusively from information on

on expulsions from the Party. It cannot be ascertained, however, if all dissident scientists who were Party members were expelled for their dissidence or if all the expulsions were brought to the attention of those individuals who were assembling the various "samizdat" documents. Thus, the low numbers of Party members in this sample cannot be interpreted as a low number of Party members among dissident scientists with absolute assurance.

The "Purge" variable identifies whether the dissident had a direct or indirect personal contact with the Stalinist purges, a factor which would conceivably affect his loyalty to the Soviet regime, particular after Khrushchev's ouster with the re-Stalinization of Soviet society. Information has been collected on the family background of the dissident scientists to determine if their fathers, mothers, siblings or they themselves had been victims of the purges.

The "prison" and "hospitalization" variables show trends in the arrests and confinements of dissident scientists, trends which would presumably be considered by prospective dissident scientists to determine the risk involved in an act of dissent. When arrests and confinements were down, the scientist would presumably be less inhibited to dissent. It is left to the subsequent studies to compare the sentences given the scientists with those sentences given non-scientist dissidents to see whether the scientists were given preferential treatment. This would be a highly complex comparison, though, since one would have to consider different courts, different crimes, and different political atmospheres.

The "year of first dissent" variable indicates the number of new dissidents emerging each year from the scientific community and provides data used to chart the "progress" of dissidence among Soviet scientists. To determine a causal relationship, why an increase or decrease in the number of dissidents between certain years, one must refer back to the historical events of the given years for clues, and the historical account of dissidence contained in Chapter I should provide the necessary background. As mentioned above, this variable is also significant in that it indicates the age of the scientist at his first act of dissent.

The "year of latest dissent" variable is important primarily as a means to determine whether the dissident was active through a particular year or whether he had returned to normal, non-political life. This information is used, together with the "year of first dissent" data, to show the number of dissident scientists active in the USSR per year. The assumption is made that between the first dissent and the latest dissent the scientist could be classified as a "dissident," whether there is evidence that he participated in a dissident activity in each year or not.

The "city of residence" variable consists of the name of the city in which the scientist lived at the time of his first dissidence or during the greater part of his dissident activity, excluding exile or prison. Its significance is that residence in certain cities might lead to a greater proclivity to dissent for reasons of, conceivably, greater access to "samizdat" and the dissident community. This variable also includes information on emigrations and defections, and this information will be used to chart trends in the number of dissident scientists leaving the USSR between certain years.

2. Data

The purpose for the data contained in the following biographical table can be found in the notes for Chapter III, pp. 137-163 under the name of the scientist.

KEY TO THE ABBREVIATIONS IN THE TABLE

<u>Ethnic</u>		<u>Place of Work</u>	
Est	Estonian	Activ	Activity
Rus	Russian	Agric	Agricultural
Jew	Jewish	Appl	Applied
C-T	Crimean Tatar	Atcm	Atomic
Arm	Armenian	A-U	All-Union
Ukr	Ukrainian	Autom	Automation
Pol	Polish	Catal	Catalysis
Lit	Lithuanian	Cent	Center
Lat	Latvian	Comm	Committee
		Comp	Compounds
		Constr	Construction
		Cyb(er)	Cybernetics
		Destr	Destructive
		Dev	Development
		Disinf	Disinfection
		Elect	Electronics
		Elem	Elementary
		Eng(in)	Engineering
		Equip	Equipment
		Epid	Epidemiology
		Exper	Experimental
		Geochronol	Geochronology
		Ind	Industry
		Info	Information
		Inst	Institute
		Instr	Instrument
		Mech	Mechanics
		Metal	Metallurgy
		Meth	Methods
		MFTI	Moscow Physico-Tech
			Inst.
		Mosc	Moscow
		Nerv	Nervous
		Nucl	Nuclear
		Observ	Observatory
		Onco	Oncology
		Organ	Organic
		Ped	Pedagogical
		Polym	Polymer
		Prob	Problems
<u>Religion</u>			
Ort	Russian Orthodox		
Cat	Catholic		
Jud	Judasim		
Bud	Buddhist		
Ath	Atheist		
Bel	Believer		
Bapt	Baptist		
<u>Purge</u>			
F	Father		
B	Brother		
Y	Self		
<u>Field of Science</u>			
Phys	Physics		
Chem	Chemistry		
Math	Mathematics		
Geol	Geology		
Biol	Biology		
Astr	Astronomy		
Ocen	Oceanography		
Med	Medicine		
Cyb	Cybernetics		
BioP	Biophysics		
GeoP	Geophysics		
Zool	Zoology		
Geod	Geodesy		
Phy	Physiology		
Gene	Genetics		

Place of Work

Proc Processes
 Rep Republican
 Resear Research
 Sch School
 SRI Scientific Research Inst.
 Stat Station
 Tech Technical/Technology
 Terr Terrestrial
 Theor Theoretical
 Trans Transmission
 VINITI A-U Institute of Scientific
 and Technical Information
 Virol Virology

Job Title (cont.)

GrSt Graduate Student
 DepC Department Chief
 dDeC Deputy Department Chief

Education

D_ Doctor (of)
 K_ Candidate (of)
 PM Physico-Mathematical Sciences
 BS Biological Sciences
 GS Geological Sciences
 KS Chemical Sciences
 TS Technical Sciences
 MS Medical Sciences
 Ph Philosophical Sciences
 PS Pedagogical Sciences
 Dip University degree only

City of Residence

Em Emigrated
 De Defected
 Novosibir Novosibirsk

Job Title

Acad Academician
 CorM Corresponding member
 CMUk Corresponding member of the
 Ukrainian Academy
 Prof Professor
 Dots Docent
 SSA Senior Scientific Assoc..
 JSA Junior Scientific Assoc.
 Asst Assistant
 LabC Lab Chief
 Dir Director
 Stud Student
 Teac Teacher
 GruC Group Chief
 Eng Engineer

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Arrest	Latest Arrest	City of Residence
АГАКИЛОВ												1968	1969	Lushchino
АДАЕВ, Гари I		Jew			Depd	Inst of Biol. Physics	Med					1975	1975	Moscow
АДЯПИЛОВА, Таире		G-T			Teach	Inst of Epid. & Microbiol.	Biol					1976	1976	
АКАКИН, Валерий					Eng		Chem					1976	1976	
АКАНОВ, А				KPM								1968	1968	
АГАРАГОВИЧ, И				LPM			Math					1968	1968	
АГУРСКИЙ, Mikhail Samuilov.	1933	Jew	Jud	KIS			Cyb		F			1973	1975	
АЙНБИДЕР, Борис Yu		Jew			JSA	Inst of Phys. Chemistry	Phys					1971	1973	Enns 1975 Moscow Enns 1973
АХУРДОВ, Madzhid	1933				Eng		Geol			69-73		1969	1969	
АКИЛОВ, G					Dot		Math					1968	1968	Novosibir.
АЛБЕИ, Solomon Iosiforovich		Jew			Prof	Inst of Chem. Physics	Math					1976	1978	Moscow
АЛМЕТКИ, Vladimir Yanovich	1933	Pol	Cat		Prof	Moscow State U	Math	NP	F			1972	1975	Moscow
АЛЕКСАНДРОВ, Pavel Sergeev.	1896				Acad		Math					1968	1968	
АЛЕКСЕЕВ, Mikhail												1977	1977	
АЛЕКСЕЕВ, B												1968	1968	
АЛ'ПЕРИ, Yakov		Jew			Prof		Math					1977	1978	
АЛ'ТШУЛЕИ, Boris L'vovich												1975	1977	
АЛ'ТШУЛЕИ, L												1970	1972	
АЛ'ТШУЛЕИ, V												1968	1968	
АЛДОНОВ-ЛЕОНТОВИЧ, Ye.												1972	1974	Kiev
АЛ'ЦУК, Zinoviy Pavlovich	1933	Ukr				Inst of Oil Chemistry	Chem			72-78		1972	1974	
АРАКОВ, V												1972	1972	Ulan-Ude
АИХАМГЕЛ'СКИЙ, A												1968	1968	Moscow
АИГОЛ'Д, Vladimir Igor'ev.	1937					Moscow State U	Math	P				1968	1977	Moscow
АИШОВ, Yu						Inst of Elem. Organic Comp.	Chem					1968	1978	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dissert.	Latest Dissert.	City of Residence
ARTSIHOVICH, Lev Andreevich	1909			DPN Acad	Inst of Atomic Energy	Phys						1966	1966	Moscow
ASTAUROV, B L	1973			Acad Dir	Inst of Biol. of Development	Biol						1966	1966	Moscow
AVERKUNIN, B G	1974			KPM Lots		Math						1968	1968	Moscow
AVRAMEIKO, I				DIS Prof		Math						1968	1968	Moscow
AZBEL', David S	1911	Jew		DIS Prof		Chem		Y	35-51			1972	1974	Moscow
AZBEL', Mark Ya	1932	Jew		DPN Prof		Phys						1973	1977	Moscow
BADELYSHEV, Aleksandr														Moscow
BACHINSKIY, G A				KUS	Inst of Zool.	Math						1977	1978	Moscow
BAGATUN' YANIS, Aleksandr				KKS	Inst of Elem. Organic Comp.	Chem	K					1968	1968	Kiev
Aleksandrovich				KPM SSA	Computer Cent. Lat. State U	Math						1967	1968	Moscow
BAYTIANI, Mark Movshovich												1974	1974	Moscow
BAKHIII, Vyacheslav Ivanov.	1947			KPM		Math			69-70			1969	1978	Moscow
BALAKINA, L M						Phys						1968	1968	Moscow
BARABANOV, Aleksandr Fedor.	1933	Jew		JSA	Inst of Solid State Physics	Phys						1970	1977	Moscow
BARANOVICH, T M				KPI Dots		Math						1968	1968	Moscow
BARBOY, Vladimir N		Jew		DKS Prof	Kiev Tech Inst of Light Ind.	Chem		Y	42-52			1972	1972	Kiev
BASSALYGO, Leonid Aleksandr				KPM		Math						1968	1968	Moscow
BEGLIN, Iosif Ziselevich	1932	Jew	Jud	KTS Dots	Mosc Inst of Agric. Engin.	Math			72,77			1971	1978	Moscow
BEYLIN, Boris		Jew				Phys						1970	1977	Moscow
BEYLIN, Iosif		Jew				Math						1971	1978	Moscow
BEZLANGOVSKIY, Sergey						Math						1977	1977	Moscow
BEZTAKIY, Mikhail I						Math						1968	1968	Kiev
BEZLIK, Igor' Vasil'evich						Math						1962	1962	Moscow
BEZLOUBSKAYA, Irina Idikh. (former wife of I. RUDAKOV)	1938		Math	Eng	SRI of Comm. on Inventions	Chem			68-69 73			1967	1973	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dissent	Latest Dissent	City of Residence
BOLOZEMOV, Nikolay Nikolaevich	1928	Jew		BiP Teach			Phys Chem					1973	1976	Moscow
BOLOZEMOV, Vadim Vladimirovich							Chem					1972	1972	Moscow
BOBENZANSKIY, Yu H						Inst of Math Chernobyl State U	Math					1968	1968	Kiev
BOBKO, Ekaterina L							Biol					1968	1972	Novosibirsk
BOBOKIN, H B						Inst of Prob of Info Trans.	Biol					1968	1968	Moscow
BOBOSKIN, Nikolay Mikhailovich	1909						Math					1968	1968	
BOBICHEVSKIY							Math					1968	1968	
BOBYUKIN, V H							Biol					1967	1967	
BOGACHVAR, D Andreevich							Phys					1968	1968	
BOGACHVA						Inst. of Chem Physics	Phys					1968	1968	Moscow
BOGACHEV, Aleksandr							Chem			58-65		1958	1958	
BOYTSOVA, Lyudmila Yur'evna						Moscow State U	Biol					1975	1975	Moscow
BOYSHTEYN, Meyer Feliksovich							Math					1968	1968	Moscow
BOYTRUKOVICH, A V							Math					1967	1968	Moscow
BOYKOVA, Aleksandr Aleksandrovich	1933	Rus				Moscow Higher Technical Sch.	Math			72-75 78-80		1972	1978	Moscow
BOYDAR', Eta Davydovna	1947	Jew				A-U SRI of Dev. Non-destr. Math		NP				1971	1971	Kishinev
BOYDAR', V A							Chem					1968	1968	Kiev
BOYDAR'CHUK, Viktor G						Moscow State U	Chem					1968	1972	Kiev
BOYKO, H						Inst of Probl. of Info Trans.						1968	1968	Moscow
BOYKOV, Yu F						Inst of Math	Math					1968	1968	Novosibirsk
BOYKOV, V V							Math					1974	1974	Moscow
BOYSHTEYN, V H							Math					1968	1968	Moscow
BOYLOVSKAYA, Irina Yu		Jew				Computer Center Moscow State U	Math					1972	1977	Moscow
BOYLOVSKIY, Viktor L	1935	Jew					Cyb					1973	1977	Moscow
BOYLOV, German G	1932	Jew	Jud				Phys					1972	1977	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dismissal	Latest Dismissal	City of Residence
BUVKO, Yuriy Petrovich	1939				JSA	A-U SRI of Main Pipeline Construction	Phys				75-?	1975	1975	
BRUSHLINSKAYA, Madezhda Nikolaevna				KPH			Math					1968	1968	Moscow
BUYKO, Valeriy Pavlovich	1942	Jew			Eng	Inst of Elect. Curb	Math					1972	1975	Moscow
BURDISTRONOVICH, Il'ya Evseevich	1938	Jew		KPH	SSA	Inst of Epid. Med & Microbiology	Math	NP	68-71			1968	1977	Moscow
BUKHOVA, Elizaveta		Jew			JSA		Med					1971	1971	Moscow
CHAYLAKHVAL, L M		Jew		KIS		Inst of Probl. Biol of Info Trans.	Phys					1971	1977	Tbilisi
CHALIDZE, Valeriy Nikolaev.	1938				Gruc	SRI of Plastic Industry	Phys					1968	1968	Moscow
CHERJAVSKIY, Aleksey Viktor				KPH			Math					1968	1968	Moscow
CHERNYSHOV, Vasilii Ivanov.		Rus		Asst			Math				70-	1970	1970	Leningrad
CHIRNOV, Anntolii Fedorovich	1938						Chem				69-74	1968	1969	L'vov
CHUDNOVSKIY, David Vol'f.	1947	Jew		KPH		Inst of Mech.	Math					1976	1977	Kiev
CHUDNOVSKIY, Grigoly Vol'f.	1952	Jew					Math					1976	1977	Kiev
DANIEL, Aleksandr Yulievich		Jew				Computer Center of Moscow Inst of Constr. Engin.	Phys					1967	1968	Moscow
DAVIDOV, Georgiy Valentin.	1940	Rus			SSA	Inst of Geol. & Geochronol.	Geol		72-77			1972	1972	Leningrad
DAVIDOV, Vladimir		Jew					Phys					1974	1975	Moscow
DEKIN, V							Math					1963	1968	Moscow
DEGA, I Ye							Math					1968	1968	Moscow
DINKY, L A							Phys					1968	1968	Moscow
DIKOV, Yuriy					SSA		Geol	P				1968	1970	Moscow
DIRADUBIG					Eng	Inst of Chem Physics	Math					1968	1968	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dissect	Latest Dissect	City of Residence
DIOMISIYEV						Inst of Biol. Physics						1968	1969	Pushchino
DISKINA, Mlyuma S	1929	Jew		DRK		Inst of Biol. Physics	Biol					1969	1970	Moscow
DOBRUSHIL, Roland L'ovich				DRK	Eng	Inst of Info Trans Chemistry	Math	P				1967	1968	Moscow
DVORKIN, G A				DRK		Inst of Phys. Chemistry	Biol Chem					1968	1968	Kiev
DVORKO, G F				DRK		Inst of Phys. Chemistry	Chem					1968	1968	Kiev
D'YADKIN, Iosif							Phys					1977	1977	Moscow
DZBAYEVA, Zarina (Shekerglov's wife)	1932	C-T		PH	Eng		Phys Biol					1965	1978	Tashkent
DZHEILEV, Reshat							Phys					1968	1968	Kiev
DZYUB, Ivan F							Math					1967	1968	Moscow
EYDEL'MAN, G S							Phys					1966	1970	Moscow
EYDEL'MAN, V S	1894				Acad Dir	Inst of Molec Biology	Biol					1975	1976	
EGHEL'GARDI, Vladimir Aleks.												1977	1977	
ESSAS, Il'ya		Jew										1968	1968	Moscow
FAYELSHAU, Vladimir		Jew										1975	1977	
FADYEVA, I		Jew										1968	1968	Moscow
FAYN, Veniamin Moiseyevich		Jew		DRK	Prof		Geol Phys					1975	1977	Moscow
FAYTEL'SON, Feyga		Jew										1970	1977	Chernogolovka
FELDMAN, R P		Jew				Inst of Organic Synthesis	Chem					1970	1970	Moscow
FELIN, Yu I				PH			Phys					1968	1968	Moscow
FELINA, R A				SSA			Phys					1975	1975	Moscow
FEST, Abram I				DRK		Inst of Math	Math					1968	1968	Moscow
FILIPPOV, Andrey Grigor'evich				PH		Inst of Math. State U Leningr. State U	Math					1977	1977	Leningrad
FIL, Roman T	1941					Inst of Biol. Physics	Biol				71-74	1977	1976	Pushchino

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dissent	Latest Dissent	City or Residence
CHAIKIN, Eitan		Jew			Stud	Gorky State U	Phys	K				1971	1977	Vil'nyus
CHAIKIN, L				KPI			Phys					1968	1968	Gorkiy
CHAIKIN, Mikhail Georgievich	1947	Rus		DPI	Stud	Saratov State U	Math	K		69-72		1968	1968	Moscow
CHAIKIN, Sergey Vasil'evich	1917	Jew			Teac	Moscow State U	Math	P				1969	1969	Saratov
CHAIKIN-KAMENETSKIY, Maksim D						Inst of Atom. Energy, MFTI	Biol					1968	1968	Moscow
CHAIKIN, Grigoriy		Jew			Prof	Kalinin State U	Math					1975	1975	Moscow
CHAIKIN, Lev	1940	Jew			Eng		Geol					1979	1979	Kalinin
CHAIKIN, A M		Jew					Phys					1969	1970	Moscow
CHAIKIN, Borisovich					SSA		Math					1968	1968	Moscow
CHAIKIN, L L							Math					1968	1968	Moscow
CHAIKIN, Ya Ya							Math					1970	1970	Tartu
CHAIKIN, Ye Ye							Math					1970	1970	Tartu
CHAIKIN, Aleksandr Zeylink.	1946	Jew			JSA	A-U ERI of Dev Non-behr. Math	Math	MP		70-72		1970	1970	Kishinev
CHAIKIN, Yuriy Alekseevich					Teac	Moscow State U	Math		YFB			1967	1978	Moscow
CHAIKIN, Vyacheslav Aleksan	1937	Jew			Dots	Moscow Inst of Constr. Engin.	Math					1971	1971	Moscow
CHAIKIN, Yuriy Ya		Jew				Inst of Higher Nervous Activ.	Biol					1973	1973	Moscow
CHAIKIN, Izrail Moiseyevich	1913	Jew			Prof	Inst of Appl. Math.	Math	P				1968	1968	Moscow
CHAIKIN, Vladimir Yakov		Jew			Eng	Inst of Polym. Mech.	Phys					1971	1971	Moscow
CHAIKIN, U Ya		Jew			SSA	Inst of Cyber. Gyb	Gyb					1973	1973	Tbilisi
CHAIKIN, Sergey II												1975	1975	Tbilisi
CHAIKIN, L							Math					1967	1977	Moscow
CHAIKIN, Vladimir A		Jew					Math					1973	1973	Moscow
CHAIKIN, Irina		Jew					Math					1968	1972	Moscow
CHAIKIN, Isaac Borisovich	1939	Jew			SSA	Leningrad Forestry Eng. Academy	Math			75-76		1976	1976	Moscow
												1975	1975	Leningrad

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Arrest	Latest Arrest	City of Residence
CHAIKIN, S G	1916			KPI			Math					1968	1968	Moscow
CHAIKIN, Vitaliy Lvovovich				DPI Acad Prof	Inst of Phys.		Phys	P				1966	1966	Moscow
CHAIKIN, Moisey Sh		Jew		DPI Prof								1973	1973	Em: 1973
CHAIKIN, Aleksey V				DPI	Inst of Math		Math					1968	1968	Novosibir.
CHAIKIN, Il'ya I				KIS	Novosib. State U							1972	1972	
CHAIKINOV, Iefent	1938	C-U		Stud	Tashkent State U		Mol	P		72-74		1962	1962	Tashkent
CHAIKIN, Mikhail		Jew		KTS Lab C			Math					1970	1970	Moscow
CHAIKIN, Grigoriy Abram.	1931	Jew		KTS Lab C	A-U SRI of Metrology		Phys			78-79		1971	1978	Tbilisi
CHAIKIN, Isay Abramovich		Jew		KTS SSA	A-U SRI of Metrology		Phys					1971	1978	Tbilisi
CHAIKIN, Yuriy Abramovich		Jew		DPI			Phys					1974	1978	Moscow
CHAIKIN, Aleksandr		Jew		KPI			Math					1968	1968	Moscow
CHAIKIN, L												1961	1961	Sverdlovsk
CHAIKIN, Aleksey										?				Des: 1961
CHAIKIN, Aleksandr				Stud	Latv. State U			K				1974	1974	Riga
CHAIKIN, Roman I				Stud	Novosib. State U		Phys	K				1968	1968	Novosibir.
CHAIKIN, Mendel' Genakhovich	1937	Jew	Jud	KPI Eng	SRI of Math		Gyb					1976	1976	Leningrad
CHAIKIN, Yevgeniy S				KIS Lab C	Leningr. State U							1969	1969	Riga
CHAIKIN, P F				KPI	Rep. Tubercul. Prevent. Clinic		Phys					1968	1968	Sverdlovsk
CHAIKIN, Iosiflav Igor'evich	1925			KCS	Ural Polytech Inst							1968	1968	Kiev
CHAIKIN, A V				KPI Dots	Moscow Inst of Math Aviation Tech.		Geol					1968	1968	Moscow
CHAIKIN, S				KCS			Chem					1968	1968	Moscow
CHAIKIN, H				KPI			Phys					1968	1968	Kiev
CHAIKIN, H				KPI			Phys					1968	1968	Kiev

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dissent	Latest Dissent	City of Residence
GALSHIN, V GURVICH		Jew			SSA	Inst of Phys of Atmosphere	Math Phys					1964 1967	1968 1968	Moscow Moscow
GURVICH, Benor GURVICH, Aron Ye		Jew		DBS	Lab	Inst of Epid. & Microbiology	Phys Biol					1974 1968	1977 1978	Tallin Moscow
GURVITS, Sergey A GUSEV, Aleksandr Vladimirov. IL'ICHÉV, Kirill		Jew		KPM	SSA	Inst of Zool. Inst of Chem. Kinetics	Phys Zool Phys	P K				1971 1968 1968	1972 1968 1968	Leningrad Leningrad Novosibir.
ISHENNIK, V IOFFÉ, Veniamin IOFFÉ, Aleksandr ISAKOVA, Valeriya Ivanovna (wife of G. DAVYDOV)		Jew		KPM	SSA Eng	Inst of Math	Math Chem Math Geol					1968 1977 1978 1976	1968 1977 1978 1977	Moscow Leningrad Leningrad Leningrad
IVLEV, Anatolii Georgievich	1937	Rus	Ath		Eng	A-U SRI of Petrochem.Prof	Chem	NP		67-69		1965	1967	Leningrad
KABAKOV, F KABAKOV, S KADYEV, Kollan KAGANOV, M KAGANOVA, Z KALISTRATOVA, M KARHICHOVSKAYA, Susanna	1937	G-T		KPM DPI KPM	Teac Prof JSA	Samarkand State	Math Math Phys Phys Math Phys			68-71		1974 1968 1968 1968 1967 1968	1974 1968 1969 1968 1968 1968	Moscow Moscow Samarkand Moscow Moscow Moscow
KARHICHOVSKAYA, Susanna KAPPOV, PAVLO Fedorovich KAWAYEV, A KAMEVICIUTE, Donate KAPITANCHUK, Viktor A KAPITS, Petr Leonidovich	1929	Jew Ukr Lith		KPM KPI KPI	Teac	Inst of Phys. of Atmosphere Inst of Chem. Physics Uzhgorod State	Phys Phys Phys Math Geol Math Chem Phys			70-75		1970 1968 1973 1973	1974 1968 1973 1977	Moscow Uzhgorod Moscow Vil'nyus Moscow Moscow
KAPLAN, A Ye KARABEV, Vladimir	1894		Urt	KPI	Acad Dir	Inst of Phys. Problems Inst of Radio Eng and Elect	Phys Phys					1967	1978	Moscow
					Stud	Moscow State	Phys				68	1968	1968	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dismissal	Latest Dismissal	City of Residence
KARPOVICH, A L KASALIN, O G				DBS Lab	Prof Lab	Inst of Marine Biology	BioP Biol					1974 1974	1976 1974	Vladivostok
KASHINA, G KATSONIS, G KAZACHKOV, Mikhail Petrovich	1944				JSA	Physico-Tech Institute	Geol Biol Phys			75-90		1968 1974 1975	1968 1974 1978	Moscow Leningrad
KLEBER-STEFANOVA, I KLYAYsh, Lyudmila Vsevolodovna (wife of P.S. ROVIKOV)	1904	Rus		KBS DPI KTS	SSA Prof SSA	Inst of Probl of Info Trans Inst of Math	Biol Math					1968 1968	1968 1968	Moscow Moscow
KLEPFERUS, L Ya KHALIGOV, Izzet KHALIT, Mikhail KHALT, Yuriy Lazarevich	1938	C-T		DTS DPI	SSA Eng	Inst of Petro Chem Chem Synthesis	Chem Chem	P		68-70		1968 1968 1974 1973	1968 1972 1977 1973	Moscow Tashkent Moscow
KHAKHAYEV, Sergey KHALILOV, Mustafa KHAMALOV, B KHEISLI, Roman		U-T Jew			Eng Jorl Prof	Inst of Atom. Energy, Moscow State U	Math Biol	M		65-72		1965 1966 1968 1975	1977 1972 1968 1975	Leningrad Taku Moscow Moscow
KHILLEVSKIY, Yu I KHIDIPLOVICH, I B KILOV, Khaim Izrailevich				KPI KPI	Notes Eng		Math Phys Cyb					1968 1968 1974	1968 1968 1975	Moscow Novosibir. Kiga
KILU, K V KIDILLOV, A A KIKHITIS, D A KISALOVICH, Lev		Jew		KPI LPI LPI	Prof Prof	Computer Center State U	Math Math					1963 1968 1968	1963 1968 1968	Moscow Moscow Moscow
KISLIK, Vladimir Samuilovich	1935	Jew		KPI		Nuclear Resear. Institute Inst of Virol.	Phys Phys					1973	1977	Moscow Kiev
KISLINA, Olga Semenovna (wife of BURDUSTROVICH)		Jew		JSA	JSA		Biol					1969	1969	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dismissal	Latest Dismissal	City or Residence
AIT, Lazar Girshevich		Jew		KPM		Inst of Nucl. Physics	Phys					1971	1971	Lidn
KLISHAROVA, Lyudmila	1906			Acad	Acad	Inst of Organ. Chemistry	Chem	P		?		1976	1977	Leningrad
KHUNYANT'S, Ivan Lyudvigovich		Jew		Acad	Acad	Inst of Math Moscow State U	Biol Math					1966	1966	Moscow
KOGAN, Ginya	1903			Prof	Prof	Inst of Phys. Atmosphere of Moscow State U	Chem Phys	K				1970	1970	Moscow
KOLINGOLUV, Andrey Nikolaev.				JSA	JSA	Inst of Atmosphere of Moscow State U	Chem					1968	1968	Moscow
KOROLKOVA, N				Prof	Prof	Inst of Atmosphere of Moscow State U	Math					1963	1968	Moscow
KOROLKOVA, V A				Prof	Prof	Inst of Atmosphere of Moscow State U	Chem					1963	1968	Moscow
KOROLEV, A N				SSA	SSA	Inst of Terr. Magnetism	Math					1963	1968	Moscow
KOSTEVA, Yelena Aleksievna				SSA	SSA	Inst of Semi-Conductors	Phys			70-73		1970	1970	Leningrad
KOVALEV, Sergey Adamovich	1930	Rus		SSA	SSA	Moscow State	Biol			74-81		1963	1963	Kiev
KOVALEVSKAYA, I A		Jew		SSA	SSA	Moscow State	Biol					1963	1968	Moscow
KOVREK, Mark				JSA	JSA	Inst of Theor. Phys	Phys					1977	1977	Moscow
KRISTE, Irina Grigor'evna (2nd wife of VOL'PIN)				LabG	LabG	Inst of Theor. Phys	Phys					1967	1967	Moscow
KROKHIN, Aleksandr S				Prof	Prof	Inst of Theor. Phys	Math	P			Nov72	1966	1966	Moscow
KROKHIN, Lidiya A				LabG	LabG	Inst of Theor. Phys	Math					1966	1966	Moscow
KRUKHIN, S N				Dots	Dots	Moscow State Ped. Inst.	Math					1963	1963	Moscow
KRUKHIN, A L				Dots	Dots	Moscow State Ped. Inst.	Math					1963	1963	Moscow
KRUKHIN, Viktor				SSA	SSA	Computer Cent	Math					1975	1975	Novosibirsk
KULAGIN, C S				SSA	SSA	Computer Cent	Math					1968	1968	Moscow

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KULAKOV, V	1942	Rus		KPI	Eng SNI of Seismic Instr. Building		Phys	KM		69-74		1968	1968	Novosibirsk
KULLIKOV, Dmitriy Georgievich	1908			KPI	Eng SNI of Seismic Instr. Building		Phys	KM		69-74		1969	1969	Samtsov
KULYUPIN, Yu				KPI	Prof Moscow State U		Math					1968	1968	Kiev
KURASH, Aleksandr Gennadiev	1908			IPi	Prof Moscow State U		Phys					1968	1968	Moscow
KURSA, Gleg				IPi	Prof Moscow State U		Phys					1974	1974	Kalinin
KUSHEV, Vladimir V		Jew		IKS	Lab Moscow Inst of SS Vaccines & Sera		Biol					1968	1968	Leningrad
KUSHNAREV, V H		Jew		IKS	Lab Moscow Inst of SS Vaccines & Sera		Biol					1977	1977	Moscow
KUSTANOVICH, I H		Jew		KKS	Inst of Petrochem Synthesis		Chem					1973	1973	Moscow
KVACHEVSKIY, Lev Borisovich	1939	Jew			Eng Leningrad SNI of Polym. Plast		Chem	M	B	68-72		1968	1972	Leningrad
KVACHEVSKIY, Orion Borisovich		Jew		KPI	Lab Computer Center		Geol	NP	Y	73-76		1968	1973	Idga
LADYZHENSKIY, Lev Aleksandr					Latv. State U, Baltic SNI of Fishing Indust.		Math							
LADVA, Hal'va Iloyevna	1918	Jew			Prof Moscow State U		Geol	NP	F			1971	1978	Moscow
LADUIS, Ye H				IPi	Prof Moscow State U		Math					1968	1968	Moscow
LAVIG, V H				IGS	Depo A-U SNI of Geo		Geol					1969	1969	Leningrad
LAVUT, Aleksandr P				Eng	Moscow State U		Math					1968	1978	Moscow
LEBILKIN, Yuriy		Jew		Labo	Inst of Atom. Energy, MFTI		Biol					1975	1975	Moscow
LEBONTOVICH, Mikhail Aleksandr	1903			Acad	Inst of Atom Energy		Phys	NP				1960	1972	Moscow
LEBUNIN, Aleksandr Yakovlev	1913	Jew		DT	Prof Inst of Contr. Problems, MFTI		Cyb					1971	1978	Moscow
LEBVICh, Yevgeniy Veniaminovich		Jew		KPI	Labo		Phys					1972	1973	Moscow
LEBVICh, Veniamin Grigor'evich	1917	Jew		Corl	Inst of Electr. Prof Chemistry, Depo Moscow State U		Phys					1972	1978	Moscow
LEVIN, H L				DPi			Phys					1968	1970	Moscow

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LEVIT, Semen Abramovich	1947	Jew			Eng	Inst of Oncol	Phys	MP		70-72		1970	1970	Moscow
LEVSHENKO, I I				PHI			Math					1968	1968	Moscow
LEVIN, Yevgeniy A	1937	Jew		PHI	Asst	Kiev State U	Chem					1969	1971	Pushchino
LEVIN, Aleksandr				PHI			Math					1968	1968	Moscow
LEVIN, Gennadiy		Jew		PHI		Inst of Plant Physiology	Geod					1970	1970	Moscow
LEVIN, Nina Petrovna		Jew		PHI		Moscow Inst of Fine Chem Tech	Phys					1967	1978	Moscow
LEVIN, Pavel Mikhaylovich	1938	Jew	Ath		Asst	Moscow Inst of Fine Chem Tech	Phys					1967	1974	Moscow
LEVIN, A M	1953	Rus		PHI	Prof	Inst of Organ Chemistry	Chem					1968	1968	Moscow
LEVIN, Tat'yana				PHI			Chem					1979	1979	Moscow
LEVIN, Eduard		Jew		PHI			Phys					1970	1970	Moscow
LEVIN, A I				PHI	Prof	Inst of Psych.	Phys	K				1968	1968	Kiev
LEVIN, Vyacheslav				PHI			Math					1968	1968	Moscow
LEVIN, Aleksandr Lazarevich		Jew		PHI		Inst of Psych.	Math					1968	1970	Moscow
LEVIN, S				PHI	Prof	Phys Tech Inst	Phys					1970	1970	Moscow
LEVIN, Mariya				PHI			Phys					1970	1970	Leningrad
LEVIN, Kronid Arkad'ev.	1934	Jew	Ath	PHI		Inst of Solid State Physics	Astr			72-77		1974	1977	Moscow
LEVIN, Yuriy				PHI			Math					1969	1969	Leningrad
LEVIN, I B				PHI			Math					1968	1968	Kiev
LEVIN, Lazar' Aronovich	1899			PHI	Prof	Moscow State U	Math					1968	1968	Moscow
LEVIN, Ye G				PHI	Corr		Math					1968	1968	Moscow
LEVIN, Karl		Jew		PHI			Math					1968	1968	Moscow
LEVIN, Viktor B		Jew		PHI		Inst of Theor. & Exper. Phys.	Phys					1972	1972	Moscow
LEVIN, Gersh Heirovich		Jew	Jud	PHI	SS	Inst of Math Moscow State U	Math	P				1971	1971	Moscow
LEVIN, Yuriy Ivanovich				PHI			Math					1968	1968	Moscow

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CHUKOV, A S Valeriy Mikhaylovich				KIS SSA	SSA	Moscow Fish-Breeding Stat	Biol	P		1976		1974	1968	Moscow
CHUKOV, Andrey Andreyevich	1903			Prof	Prof	Moscow State Joint Inst for Nucl. Research	Biol					1974	1974	Moscow
CHUKOVA, Lyudmila Aleksandrovna	1942											1976	1976	Leningrad
CHUKOV, Sergey				Teac			Chem	M		65-70		1965	1977	Leningrad
CHUKOVA, Valentina Yefimov (wife of V.H. Gsipov)	1933		Orth				Math			58-63		1958	1977	Leningrad
CHUKOV, G F				KIS	JSA	Inst of Zool. Inst of Med. Radiology	Biol			63-72	May-Jun 70	1968	1973	Kiev
CHUKOV, Zhores Aleksandrov	1925						Gene	M				1968	1973	Moscow
CHUKOVSKAYA		Jev		DP	Prof	Inst of Theor. Math	Math	NP				1968	1978	Moscow
CHUKOV, Leonid	1911				SSA	Inst of Theor. Math & Exp. Phys.	Math					1968	1978	Moscow
CHUKOV, Oleg				K	JSA	Moscow State Computer Cent.	Biol					1968	1978	Moscow
CHUKOV, Evgen	1939	G-T		DP	Prof	Moscow State	Math					1968	1978	Moscow
CHUKOV, Dmitriy Yevgen'ev.	1892				Prof							1968	1978	Moscow
CHUKOVSKIIY, A G				DP		Inst of Theor. Phys & Exp. Phys.	Phys					1968	1978	Moscow
CHUKOVSKIIY, Yu				DP	Acad	Inst of Atom. Energy	Geop					1968	1978	Leningrad
CHUKOVSKIIY, Arkadiy Beisanovich	1911			DP	Prof		Phys					1968	1978	Moscow
CHUKAYLOVA, K A				KPI	GrSt	Moscow State	Math			70-78		1968	1978	Moscow
CHUKAYEV, Dmitriy Fedorovich	1941	Jev		KPI			Phys					1974	1978	Moscow
CHUKILINSKIY, Mikhail A				KPI			Phys					1968	1978	Moscow
CHUKILIN, A F				KPI								1968	1978	Moscow
CHUKOVICH, Vladimir				KPI		Inst of Water Problems						1968	1978	Moscow
CHUKOV, Robert Adol'fovich				KPI	SSA		Math					1968	1978	Moscow

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PIKUKHIN, Vadim				KGS		A-U SRI of Geol phys. Methods	Geol					1976	1976	Moscow Em: 1976
MIRZAYAN, Aleksandr S						Inst of Theor. Phys & Exper. Phys.	Phys					1976	1976	Moscow
MIZYAKIN, Ariy A		Jew		KPM	Eng	Moscow Fish Breeding Stat.	Phys					1974	1977	Moscow
MNYUK, Yuriy Vladimirovich		Jew			Eng	A-U SRI of Geol Prospecting	Math			70-74		1976	1977	Moscow Em: 1977
MOGILVER, Vladimir Oshegov	1940	Jew										1969	1969	Leningrad
MOYSEZON, Boris		Jew		KPM								1972	1972	Moscow
MOKARIK, I		Jew										1968	1968	Moscow
MOSTOVAIA						JS/Inst of Chem Physics	Math					1968	1968	Moscow
MOTYL', Dmitriy						Stud Moscow Inst of Chem Techn.	Chem					1968	1968	Moscow
MUCHNIK, Abram												1968	1969	Moscow
MYSLOBODSKIY, M S		Jew		DBS		Inst of Higher Nerv. Activity	Math Biol		Y			1974	1974	Moscow Em: 1974
MYGIE, Sergey Grigor'evich (husband of A. VELIKANOVA)		Jew										1971	1972	Moscow
MAYIKOR', Boris Yu		Jew				Teach Phys. & Math Sch	Phys					1968	1968	Novosibir
MANKHUMISOL, R			Ort	KPH								1968	1968	Novosibir
MVTAPOV, Grigoriy						A-U SRI of Med Instr & Equip.	Math Biol			74-76		1968	1976	Moscow
MVUKOV, Eduard Konstantinov						Lyrurakan Astro Phys. Observ.	Phys					1974	1974	Moscow
MUZAYAN, Robert Khachikov	1948	Arm	Bel			Inst of Mol. Biol of Development	Phys Biol					1969	1977	Yerevan
MEYFAKH, A						Tartu State U	Math					1968	1974	Moscow
MIKLAUS, Mart Yuliusovich	1934	Est		DBS	Lab					58-60 1976		1958	1976	Tartu
MIKOLAYEV, Yevgeniy Borisov	1939					Central SRI of Disinf.	Biol				70-72 74-78	1970	1978	Moscow

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BOGVAL'S, Yegidylus	1901	Lith		DPH	GrSt	USSR	Phys					1973	1973	Vil'nyus
NOVIKOV, Petr Serg'yevich	1930			DPH	Acad	Inst of Math	Math					1968	1968	Moscow
NOVIKOV, Sergey Petrovich				DPH	Corr	Inst of Math	Math					1968	1968	Moscow
OL'KHOVAYA, Il'ya P				DPH	Dots		Math					1976	1976	Moscow
OL'SHELIK, Arkady L'vovich				DPH	Corr	Inst of Theor	Phys	P		77-84		1968	1968	Moscow
OR'YEVSKIY, V N				DPH	(Arm)	& Exper. Phys	Math					1968	1968	Moscow
OR'YEVSKIY, V P	1924			DPH	Eng	A-U SRI of Metrology	Math					1956	1977	Moscow
ORLOVSKIY, Ernest Semenovich												1970	1970	Leningrad
OSIMOV, Sabri O	1936	C-T				Samarkand State U	Phys			68-69		1968	1968	Samarkand
OSIMOV, Yuriy B	1941	C-T				Inst of High Energy Physics	Phys	K		68-70		1967	1968	Serpukhov
PAL, Yannus		Est		DPH	Stud	Tartu State U	Biol					1971	1973	Tartu
PALANOV, V P					Prof		Math					1968	1968	Moscow
PANFILOVA, Inel' (wife of BRUK)				KTS			Phys					1968	1968	Moscow
PANOV, S A												1968	1968	Moscow
PANOVA, L							Math					1968	1968	Moscow
PAT'YSKIS, A				Cath	Teac		Phys					1974	1974	Uman
PAVLINCHUK, Valeriy Aleksand	1938-1968	Lit		DPH	JS	Phys-Tech Res. Institute	Phys					1968	1968	Oblinsk
PETREBKO, Mariya Gavrilovna (wife of POD'YAPOL'SKIY)							Geol					1969	1978	Moscow
PETROV, Vladimir Fedorovich			Ath			A-U SRI of Nuc Geophysics State Inst of Optics	Geol					1966	1967	Leningrad
PETUYAYEVSKIYA, V												1974	1974	Moscow
PETUKOV, Valeriy Georgiev.							BioP					1977	1977	Moscow
PEVZNER, Royeml							Biol					1970	1970	Moscow
PIREHOV, Levolt Ivanovich	1931	Jew		DPH	Inst	of Math	Math			57-63	1949	1957	1970	Leningrad
PLUTKIN				DPH	Prof	Latv. State U	Math					1968	1968	Riga
PLUTKIN, A							Geol					1967	1967	Leningrad

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ELYUSHCH, Leonid Ivanovich	1939	Ukr			Eng	Inst of Cyb.	Math	M			72-76	1968	1972	Kiev Em: 1976
POD'YAPOL'SKIY, Grigoriy Semenovich	1926-1976					Inst of Physics of the Earth	Geop					1968	1976	Moscow
POKROVSKAYA, K M							Phys					1968	1968	Kiev
POKROVSKIY, V		rus				Joint Inst for Nucl. Res.	Phys	P				1977	1978	Moscow
POLIKANOV, Sergey Mikhaylov.	1926						Phys					1975	1975	Em: 1978
POLYUSUK, Yu A					DepC	VINITI	Phys					1969	1974	Moscow
POL'SKIY, Viktor G	1930	Jew		KTS LabC	SRI of Introscopy		Phys					1968	1968	Em: 1974
POLYAK, B T				KPM SSA	Computer Cent. Moscow StateU		Math					1968	1968	Moscow
PONOMAREV, Vladimir					Eng	Ukrainian Phys Tech Inst	Phys		69-			1969	1969	Khmr'kov
PONOMAREV, V I							Math					1967	1968	
POPOV, A				DPM SSA			Geol					1968	1968	Moscow
POPOV, Aleksey.						Baltic SRI of Fishing Ind.	Phys					1976	1976	Riga
POPOV, Vadim							Biol		58-61			1958	1958	Moscow
POSTHIKOV, Ikhkhal Mikhaylov	1927			DPM SSA Prof	Inst of Math		Math					1967	1968	Moscow
POSTHIKOV', Tat'yana							Geol					1976	1976	Moscow
POSVYANSKIY							Math					1968	1968	Moscow
POVZHER, A Ya.				DPI Prof		Inst of Chem Physics	Math					1968	1968	
PRIVICROTAKIY, Il'ya Abramov.		Jew		DPM SSA	Inst of Theor. Physics		Phys					1973	1974	Chernogolovka
PUR', A L		Jew					Biol					1968	1968	Kiev
PYATETSKIY-ShAPIRO, Il'ya Iosifovich				KBS SSA	Inst of Zool.		Math					1968	1975	Moscow
RABINOVICH, A V				DPI Prof	Inst of Applied Math		Math					1968	1968	Em: 1976
RAYEVSKIY, Vitaliy Grigorev.				KTS	SRI of Rubber Ind.		Math Chem					1968	1973	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Arrest	Latest Arrest	City of Residence
RAYKHUUI, Arkediy L'vovich		Jew			LabC		BiOp					1970	1971	Odessa
RAUM, Dmitriy (husband of Bella Palatnik)		Jew										1973	1975	Moscow
RAZHAS, Alfonsas		Lith		KM		Khar'kov State U	Math Phys					1973	1973	Vil'nyus
RAFF, Irina		Lith	Cat	KPM	Teac	Inst of Phys & Tech Problems	Math					1967	1968	Khar'kov
RA'SHKINENE, D		Lith		KTS		Vil'nyus State U	Math					1973	1973	Kaunas
RA'SHKINIS, A		Lith				Inst of Phys & Tech Problems	Math					1973	1973	Kaunas
RATNER, Yevsey I	1899	Jew		DBS	LabC	Inst of Plant Physiology	BiOl					1972	1972	Moscow
REGEL'SON, Lev L'vovich			Ort			U-SRI of Med. Instr. & Equip.	Phys					1974	1977	Moscow
REKUBRATSKIY, Vitaliy Aleksandrovich						Inst of South. BiOl beans	BiOl					1974	1977	Sevastopol
REZNIKOV, B A	1940	Jew					Phys					1968	1968	Moscow
RIGERMAN, Leonid G							Phys			Nov70		1970	1970	Moscow
RIPS, Iliya	1948	Lat			Stud	Latv.State U	Math				69-71	1969	1969	Riga
RODIONOV, Vladimir M				DBS		Inst of BiOl & Med. Chem.	BiOl	P				1968	1968	Moscow
ROGINSKIY, Vladimir		Jew		DPM			Phys					1971	1973	Moscow
ROKHLIN, ie				KKS	SSA	Inst of Elem. Organic Comp.	Chem					1969	1969	Moscow
ROKITYANSKIY, Vladimir			Chr			Inst of Phys. of Atmosphere	Phys					1968	1973	Moscow
ROMANOVA, Nataliya I							Math	K				1968	1968	Moscow
RONKIN, Valeriy		Rus		DBS	Prof		Chem	M		65-72		1967	1978	Leningrad
ROZENFELD							BiOl					1968	1968	Moscow
ROZENSHTEYN, Grigoriy		Jew			GrSt		Phys	P				1974	1978	Moscow
ROZHKOV, S				KBS			Astr					1968	1968	Novosibir
ROBIN, H							BiOl					1968	1968	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Arrest	Latest Arrest	City of Residence
BLUD'KOV, Ivan (BELOGORUSKAYA's ex-husband)							Math					1967	1977	Moscow
BLUD'Y, Yu G		Jew		KPM			Phys					1968	1968	Moscow
BURZHITSKIY, Grigoriy							Phys					1969	1969	Moscow
BYVKN, Ye							Gene					1974	1974	Moscow
SANKHAROV, Andrey Dmitrievich	1921	Rus		DP	Head	Inst of Physics	Phys					1966	1978	Moscow
SALANSKIY, Naum H		Jew		DP	Prof	Inst of Physics (Krasnoyarsk)	Phys					1976	1977	Vil'nyus
SALOV, Galina Il'inichna (LYUBARSKIY's wife)							Astr					1974	1977	Moscow
SAMSONOV, Nikolay Nikolayev.	1906- 1971					A-U SRI of Geol phys. Methods	Geop			56-64		1956	1956	Leningrad
SARDEY, O G												1968	1968	Kiev
SELLENENKO, Leonid				KPM	Eng	Inst of Oil & Chemistry	Chem					1972	1972	Kiev
SELLIVANOV, Ye							Math					1968	1968	Kiev
SEMIENOVA							Biol					1968	1968	Kiev
SEMYACHKIN, D Ye					JSA							1968	1968	Novosibir.
SEMYEROV, Valeriy Anatol'ev.					Teac	Math School #2	Math					1977	1977	Moscow
SHABASHOV, Leonid		Jew			Teac		Phys					1975	1977	Moscow
SHABAT, V				KPM		Inst of Hydro- dynamics						1968	1968	Novosibir.
SHAFAROVICH, Igor' Kostislav	1923	Rus	Orth		Comm	Moscow State U	Math	P	Y			1968	1977	Moscow
SHAKHVERDYAN, Bograt Levonov	1940	Arm			Prof		Cyb			73-78		1973	1976	Yerevan
SHARIHA, B D					Eng		Phys					1968	1968	Kiev
SHAPIRO, I							Biol					1974	1974	Moscow
SHAPIRO, Z Ya												1968	1968	De: 1974
SHAROGIJI, I F						Inst of Biol of Development	Math					1968	1968	Moscow
SHUKA, V I							Math					1968	1968	Moscow
SHPELEEV, Mikhail		Jew								69-71		1974	1977	Moscow
SHUK							Biol					1969	1969	Rostov

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dismissal	Latest Dismissal	City of Residence
SHASTOPAL', Galina A				KPI		Moscow State Univ Inst	Math					1968	1968	Moscow
SHIFKIN, I Ye				KBS			Phys					1968	1968	Moscow
SHIK, M L				KPI	Teach	Moscow State U	Math			72-73	73-74	1968	1976	Moscow
SHIKHAROVICH, Yuriy Aleksand	1933			DPI	Prof	Moscow State U	Math					1968	1968	Moscow
SHILOV, Georgiy Yevgen'evich				KPI	SSM	Inst of Metal	Math					1968	1968	Moscow
SHIRAYIN, I Kh				KPI	SSM	Inst of Autom	Phys					1968	1968	Moscow
SHKIDT, V V				KTS	JSM		Biol					1973	1974	Novosibirsk
SHKINGEL', E	1945	Jew					Cyb					1974	1975	Chernovtse
SHTEIN, Avgust Mikhaylovich	1941	Jew					Phys					1975	1975	Vinnitsa
SHTEIN, Viktor Iukhaylovich	1950	Jew					Phys					1968	1968	Kiev
SHIL'KIN, Leonid Yefimovich					SSM		Phys					1967	1978	Moscow
SHUB, I I							Phys					1968	1968	Moscow
SHUSTER, Aleksandr (husband of ZAKS)					JSM	A-U SKI of Petroleum & Gas	Phys			77-90		1968	1968	Moscow
SHCHADIN, V							Math					1968	1968	Moscow
SHCHARANSKIY, Anatoliy Boris.	1948	Jew	Bel				Math					1968	1968	Leningrad
Shcheglov, Vadim (husband of DZEBAYEVA)												1968	1968	Moscow
SHOLUB, I												1968	1968	Moscow
SINAY, Ya G				DPI	SSM	Inst of Chem. of Silicates	Math					1968	1968	Moscow
SIPACHEV, V A							Chem					1968	1968	Moscow
SIROTTIN, Vladimir				DPI	Eng	Moscow State U	Chem					1977	1977	Krasnoyarsk
SITENKO, A G				DPI	Prof		Phys					1968	1968	Kiev
SIV'SHINSKIY, Grigoriy												1971	1971	Moscow
SKLYARENKO, L		Jew		KPI			Math					1968	1968	Kiev
SKOBEYEV, A				DPI	Prof	Inst of Math	Math					1968	1968	Kiev
SKOROKHOLOV, V						Chernobyl State U	Math					1968	1968	Kiev
SAVIRSKIY, Vladimir				DPI	Prof	Inst of Math	Math					1967	1977	Moscow
SALIMOV, Yu M				DPI	Prof	Inst of Math	Math					1968	1968	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Dismissal	Latest Dismissal	City of Residence
SHOLKIN, Valeriy GIGLYANILINOV, V V				Eng JSA	Eng JSA	Inst of Probl. of Info Trans.	Chem			?		1976	1977	Vil'nyus
SHOLYANSKIY, H A				KPM			Biol					1968	1968	Moscow
SOYDA, T				KPM			Math					1968	1968	Moscow
SOKOLOV				DPM			Biol					1968	1968	Leningrad
SOKOLOV, Yu D				QKUR								1968	1968	Novosibir.
SOKOLOV, Yu N							Math					1968	1968	Kiev
SOLOV'EV, Oleg Georgievich							Geop					1968	1968	
STAROSTIN, A	1937						Chem			69-70	70-72	1969	1977	Stavropol'
STOKHAYAYA, Nina Antonovna (wife of S. Karavanskiy)		Ukr			JSA	Odessa State Med Inst	Phys			72-76		1968	1968	Moscow
STUDENIKOV, Anatoliy Mikhail.	1935	Rus			Eng	Leningrad Phys Tech Inst	Phys	MP		68-69		1968	1968	Leningrad
SUSHKO, T							Chem					1968	1968	Moscow
SYROYECHUKOVSKIY, Ye V							Zool					1968	1968	Moscow
TAL'NINOV, Boris Vladimirovic	1901				Teac		Math			69-71		1969	1969	Kirov
TARB, Igor' Yevgen'evich	1895		Bel		Acad Prof	Inst of Phys. Moscow StateU	Phys					1966	1970	Moscow
TARTUT', A	1971						Math					1977	1977	Leningrad
TARTYKOVSKIY		Jew			Stud	Gor'kiy StateU	Phys	K				1968	1968	Gor'kiy
TAVRINSKIY, V I				DPII SSA	Inst of Phys. of Atmosphere		Phys					1967	1968	Moscow
TAVGER		Jew			Dots SSA	Gor'kiy StateU	Phys					1968	1968	Gor'kiy
TAVGER, Leontion A				DPII SSA	Inst of Semi-Conductor Phys		Phys					1972	1972	Novosibir.
TEKLI, Aleksandr Yakovlev.	1930	Jew		KPM	Inst of Petro-Chem. Synthesis		Phys					1972	1973	Moscow
TEKLI, GRIGOROV, V S				KIS	State Inst of Oncology		Med					1971	1971	Moscow
TEKHCHIROV, V H				KPI Dots	Moscow StateU		Math					1968	1968	Moscow
TEKHCHIROV, Viktor A							Geol					1967	1978	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Arrest	Last Arrest	City of Residence
ТУПАНОВ, К. Б.				ВПИ	Prof		Phys					1968	1968	Kiev
ТУГАЧУК, П. И.				ВПИ	СНДП		Phys					1968	1968	Kiev
ТУСНИНСКИЙ, И. И.				ВПИ	JSA	Inst of Autom. & Telemechan.	Phys	P				1968	1968	Gominsk
ТУВСТУХИНА, Т. И.						Inst of Atom. Energy	Mol					1974	1976	Moscow
ТУЛЕНКОВ, Edward		Jev												Moscow
ТУЛЕНКОВ, Владимир Ил'ич	1938				Student	Inst Ped	Phys				68-78	1968	1978	Moscow
ТУШЕНКО					Student	Moscow State U	Mol	P				1974	1974	Kalinin
ТУШЕНКО, Evgenol		Jev		ВПИ	Eng		Phys					1970	1970	Moscow
ТУШЕНКО, Юрий V							Phys	P				1968	1968	Kiev
ТУШЕНКО, Aleksandr	1944			ВПИ			Phys				72-77	1974	1977	Kalinin
ТУШЕНКО, L. I.		Jev		ВПИ			Phys					1974	1974	Moscow
ТУШЕНКО, Volodya B.		Jev		ВПИ			Phys					1977	1977	Kiev
ТУШЕНКО, Boris I.		Jev					Phys					1977	1977	Kalinin
ТУШЕНКО, V							Phys					1977	1977	Kalinin
ТУШЕНКО, Valentin Fedorovich	1931	Rus		ВПИ	SSA	Inst of Appl. Math	Math					1968	1968	Moscow
ТУШЕНКО, E. Fedorovich		Rus			JSA		Chem					1968	1968	Moscow
ТУШЕНКО, Irina Grigor'evna							Math					1968	1968	Moscow
ТУШЕНКО, Viktor Boris.							Math					1968	1968	Moscow
ТУШЕНКО, Valeriy Nikolaev.							Math					1968	1968	Moscow
ТУШЕНКО, Andrey Nikol.	1940	Rus		ВПИ	Dot	Moscow State U	Phys	K		75-76		1969	1978	Moscow
ТУШЕНКО, V. A.				ВПИ	JS	VINITI	Phys					1968	1968	Kiev
ТУШЕНКО, I. I.				ВПИ			Phys					1968	1968	Moscow
ТУШЕНКО, G.				ВПИ	SSA		Math					1968	1968	Moscow
ТУШЕНКО, Lev Gregor'evich				ВПИ	Eng		Phys			70-72	72-75	1970	1978	Sverdlovsk
ТУШЕНКО, Lev		Jev					Phys					1975	1977	Moscow
ТУШЕНКО, L.							Gene					1968	1968	Moscow
ТУШЕНКО, I. B.				ВПИ			Mol					1968	1968	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prison (dates)	Hospital (dates)	First Arrest	Last Arrest	Citizenship
UVUROV, Anatoly G		Jew				Computer Center	math				1976	1976	1976	Novosibirsk
VADIMSKI, II												1968	1968	Moscow
VADIMSKI, Yuriy Borisovich												1975	1975	
VADIMSKI, Svetlana												1968	1968	Leningrad
VADIMSKI, Svetlana												1974	1974	Vladivostok
VADIMOVSKIY, F L												1968	1968	Moscow
VASIL'EV, A G												1968	1968	Obninsk
VASIL'EVSKIY, Ya P L												1968	1968	Moscow
VASSILIANI, I												1968	1968	Novosibirsk
VENEL'OV, Yevgeniy		Jew										1975	1975	
VELIKOV, Andrey Ilkhaylov.												1975	1975	En: 1975
VELIKOV, A Ilkhaylovna (wife of IVUJE)												1968	1968	En: 1975
VELIKOVA, Kseniya Ilkhayl.												1968	1968	Moscow
VELIKOV, Tat'yana Ilkhayl. (wife of K. Babitskiy)												1968	1968	Novosibirsk
VERITSKIY, I D												1975	1975	En: 1975
VERITSKIY, I D												1968	1968	Moscow
VERITSKIY, Boris Nikol'yev.	1920											1968	1968	Moscow
VERETELOV, Vladimir	1931											1968	1968	Moscow
VERETKHOVSKIY, F Ya												1968	1968	Moscow
VIL'YANIS, Nikolay Nikolayev. (husband of L. Alekseyeva)												1968	1968	Moscow
VINBERG, Ernest Borisovich												1968	1968	En: 1977
VINKOVETSKIY, Yakov												1968	1968	Moscow
VITUSHKIN, Anatoly Georg'ev.												1974	1974	Leningrad
VITUSHKIN, Anatoly Georg'ev.												1968	1968	Moscow
VIL'DIMSKIY, B II												1972	1972	Moscow
VOLEVICH, L P												1968	1968	Moscow

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Prisons (dates)	Hospital (dates)	Arrest (dates)	Arrest (dates)	City of Residence
VOLKOV, Arkady Saulovich	1946	Jew		Stud SSA	Latv. State U			K		70-72		1974	1974	Riga
VOL'PIN, Aleksandr Sergeev	1925	Jew		KPM	Non-destr. Mat.		Math	CP			59-60, 1968	1959	1972	Moscow
VORONEL', Aleksandr V		Jew		Prof	VINITI		Phys					1972	1974	Moscow
VUL, Ye				KPM			Math					1968	1968	Moscow
VVELENSKAYA, N D				KPM			Math					1968	1968	Moscow
VYSHENSKIY, V A				SSA			Math					1968	1968	Moscow
YAKLOHNSKIY, Grigoriy S				Teach	Kiev State U		Math					1968	1968	Kiev
YAGLOH, A M		Jew		JSA	Inst of Catal.		Chem	P				1968	1968	Novosibir
YAGLOH, Isank M		Jew		Prof	Moscow State		Math					1967	1968	Moscow
YAKHOT, Viktor O		Jew		Prof	Ped Inst		Math					1968	1968	Moscow
YAKIK, Yevgeniy		Jew		Prof	Inst of Math		Phys					1971	1972	Moscow
YANKOLEVICH, Yefrem Vladimirovich	1950	Jew		Prof	Moscow State		Math					1975	1975	Moscow
(son-in-law of SAKHAROV)		Jew			Ped. Inst		Phys					1974	1977	Moscow
YANKOV, V A					Inst of High Temperatures		Phys					1968	1968	Moscow
YAKHIN-AGAYEV, Yuriy							Math					1977	1977	Moscow
YASHINOV							Phys					1969	1969	Moscow
YAVOR, Nikolay		Jew					Ocean			1973		1973	1973	Leningrad
YEFREMOVICH, V A							Math					1968	1968	Moscow
YEVULINOV							Biol					1968	1968	Moscow
YUKOVSKAYA, Genni (wife of BAKHAROV)		Jew		Prof			Biol					1970	1970	Moscow
YUSIN, K							Math					1968	1968	Moscow
YUSKA, Alfonso		Lith					Biol					1973	1973	Vil'nyus
ZUKH'KOV, V Ye				KPM			Phys					1968	1968	Novosibir

NAME	Date of Birth	Ethnic Origin	Religion	Education	Job Title	Last Place of Work	Field of Science	Party	Purged	Priison (dates)	Hospital (dates)	First Dismissal	Latest Dismissal	City or Residence
ZAKS, Yuliya Borisovna (step-sister of TVERDOUKHLEBOV)				SSA	SSA		Phys					1968	1978	Moscow Em: 1979
ZACHENKO, O V		Jew		KKS	SSA	Inst of Biol. & Med Chem	Math					1968	1968	Moscow
ZARETSKIY, Vladimir I				KPI		Inst of Semi-Conductors	Chem					1971	1971	Moscow
ZASLAVSKAYA, I G				KPI								1968	1968	Kiev
Z'SLAVSKIY, G N				KPI			Phys					1968	1968	Novosibir.
ZHOLINSKIY, N V				DP	Prof		Math					1968	1968	Moscow
ZDOROVYY, Anatolly Kuz'mich	1938	Ukr			Acad	Inst of Appl. Math	Math			72-79		1972	1974	Khark'kov
ZEL'DOVICH, Yakov Borisovich	1914	Jew			Prof	Moscow State U	Phys					1966	1966	Moscow
ZhAD'KO, I P				KPI			Phys					1968	1968	Kiev
ZHELEZHOVA, K							Biol					1972	1972	Ulan Ude
ZHUKOVSKAYA							Gene					1974	1974	Moscow
ZINOV'EV, Valentina Ivanov.					JSA	Inst of Phys. & Power Eng. Inst of Phys. of Atmosphere	Chem	K				1970	1970	Obninsk
ZUKOVSKIY												1968	1968	Moscow
ZUYEV, V							Phys					1968	1968	Kiev
ZYKINA, I S							Chem					1968	1968	Moscow

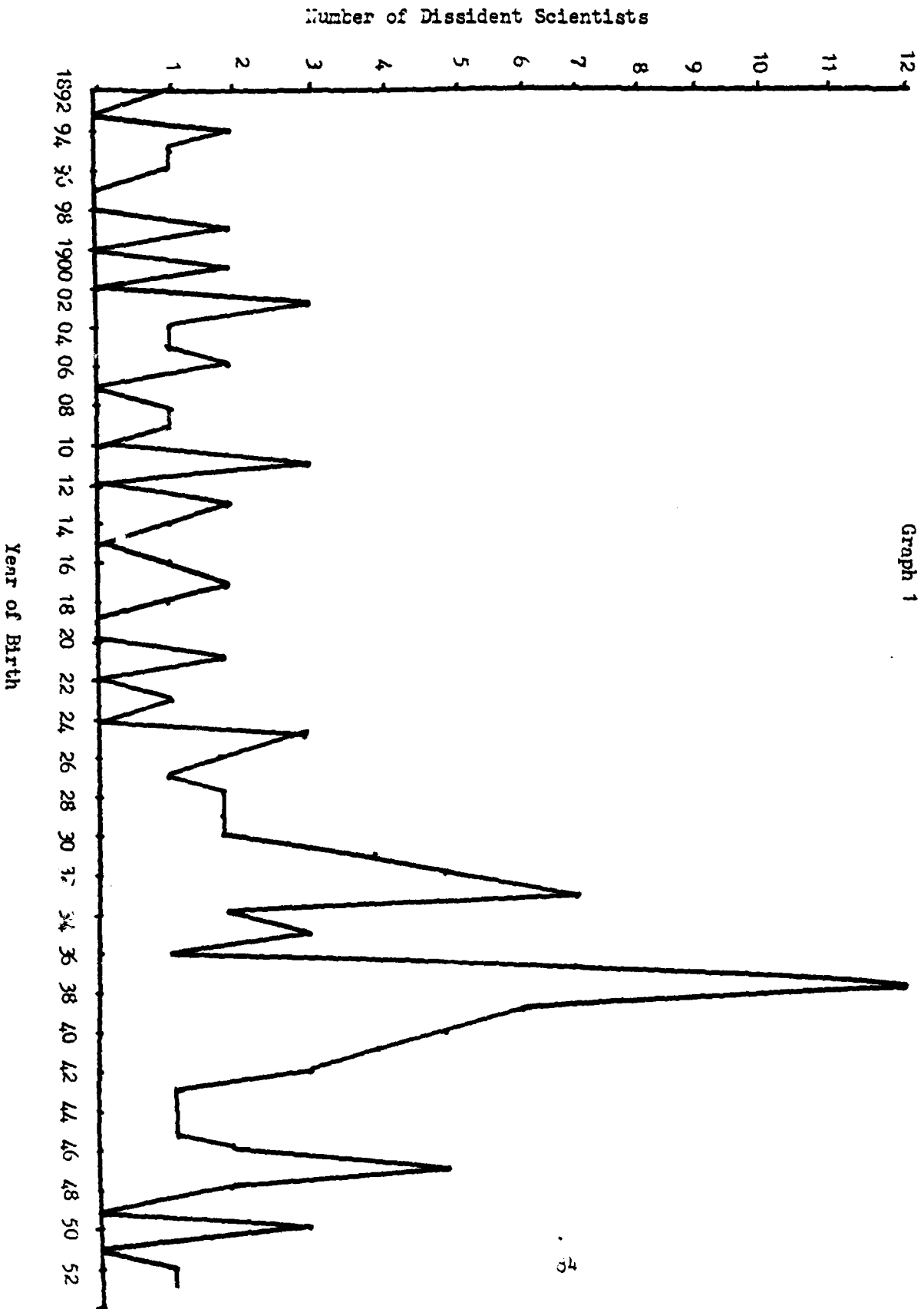
3. RESULTS

Results for the "date of birth" variable are presented in Graphs 1 and 2. Graph 1 shows that nearly 50% of all dissident scientists for whom there was data (124, or about 22% of the total) were born within a thirteen year period, from 1930 to 1942. What this means is that half of the dissident scientists in the sample share common experiences: childhood during at least one of the dual horrors of the Stalinist purges and World War II; absence of a father for significant periods of time, either because of the purges or the war; and secondary school, university or graduate school during the post-Stalinist "Thaw." During the "Thaw" (1956-58) and the liberalization period after it (to 1964), the young scientists in this generational group would have been old enough to appreciate the political and cultural freedoms then becoming available (the youngest would have been 14 in 1956, the oldest 34 in 1964) and presumably idealistic enough to believe in de-Stalinization.

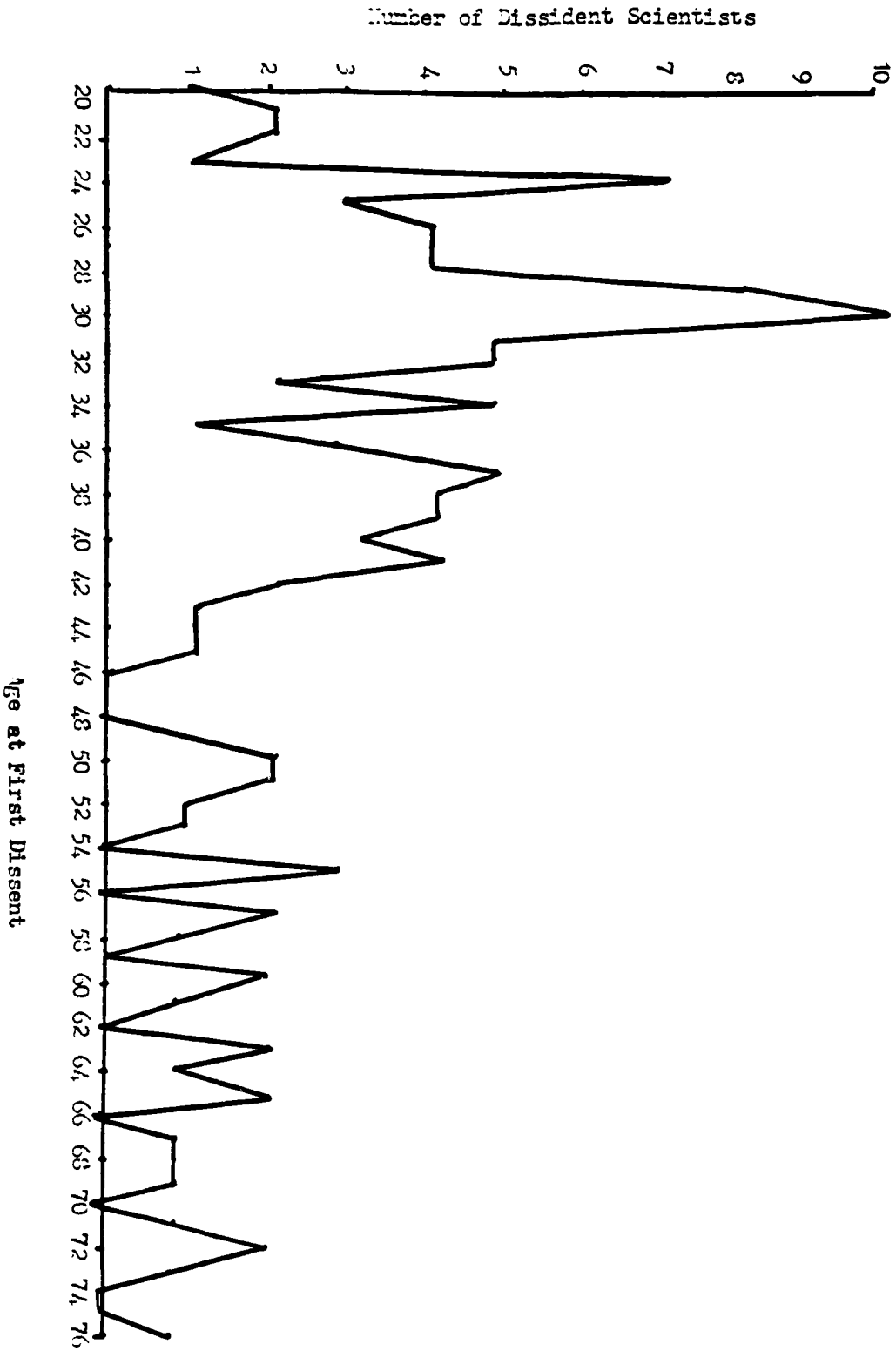
Graph 2 indicates that nearly two-thirds of the same sample began their dissidence between the ages of 24 and 41, with the greatest concentration from 28 to 32 years of age, 28% of the sample. In fact, only 29% of the sample were between the ages of 42 and 76. This might suggest a proclivity for dissidence among scientists at relatively early stages in their careers, certainly within the first twenty years.

It is interesting to note that relatively few dissident scientists were active scientists during the Stalin era, when physics and chemistry were rigidly controlled and genetics and cybernetics suppressed. It may be that there is a lingering fear of repression in the minds of these scientists, and it might be, too, that the ones most likely to have dissented were killed in the purges of the late 1930's. If one considers a date of birth of 1921 or earlier to be appropriate for scientists who would have been active during most of the period 1941-53, only 24% of the scientists in this sample were from this generational group.

What can be said about those people born during or after the war, 1942 to 1951? They would not have remembered Stalin, they would not likely have had a parent purged by Stalin, and they would have been adolescents, secondary school and university students during the "Thaw" and the period of liberalization. None would have entered the job market as a scientist until after the liberalization period, and the threat of not getting or keeping one's first job or getting expelled from school may have kept many members of this generational group from speaking out in the late 1960's. There were some exceptions, though. DANIEL, a physics student, was in his last year of secondary school when he protested the Ginzburg-Galanskov trial in 1968.¹ He was the son of convicted writer and dissident Yuliy Daniel, though, and this fact was presumably a much greater motivation to dissent than his age. Other members of this generation dissenting in the late 1960's were: GORBAN', a physics student who painted protests of the Ginzburg-Galanskov trial on a number of buildings in the Novosibirsk "Akademgorodok" in 1968 and was expelled from school;² MEL'NIKOV, a biology student in his final year of university who signed a petition at the Ginzburg-Galanskov court building in 1968 and was expelled



Graph 1



Graph 2

two months before graduation;³ MCTYL, a university chemistry student who actively supported the Crimean Tatar movement in 1968 and was expelled;⁴ FOKEYEV, a university biology student who was a member of a revolutionary Marxist group and was arrested in 1969;⁵ and RIPS, a final year university mathematics student who set himself afire in 1969 to protest the Soviet occupation of Czechoslovakia.⁶ These examples, however, seemed to be the extent of the dissent in the 1960's of this generation. With only few exceptions, the most notable of which is SNEHAPANSKIY, this generation has not been particularly active in the 1970's, even though it had, at this point, reached the 26-37 age range, which, for the 1930-41 generation, was one of the most common age spans for scientists initiating dissident activity.

If one looks at the generation of future scientists, those born after 1952, can anything be determined from their common childhood experiences that might cause them to dissent? They would not have been old enough to remember Stalin, the "Thaw" and period of liberalization would not have affected them to a significant degree, as the eldest of this generation would have been only in elementary school, and their secondary school and university experiences under Brezhnev's nonpermissive tutelage would have made them aware that official persecution accompanied all outbreaks of dissidence. More importantly, though, this is the generation that has grown up with the dissident movement. Members of this generational group, the oldest of which would have been only 14 years of age at the beginning of the dissident movement in 1966, have witnessed the continued existence of dissidence, despite governmental crackdowns, from early childhood. This experience may reflect on their proclivity for dissidence in the future.

Chart 1 provides information on the ethnic origin of 164 scientists, about 28% of all the dissident scientists in this study. The vast majority of the scientists on whom this data could be found were Jewish, presumably because of the nature of the Jewish dissident movement, in which ethnic origin is a major issue and is clearly identified. It is unlikely, though, that for purposes of extrapolating the ethnic origin of all dissident scientists these correlations are valid, for there are probably few additional known dissident scientists who have not revealed their Jewish ethnicity by requesting emigration. Even for those twelve Jews who did not seek emigration but whose ethnic origin was identified through other sources, the fact that they were Jewish could have been ascertained, in almost every case, by their family names; if we look at the family names of other scientists for whom ethnic data was not available, perhaps another sixty could be estimated as "Jewish." Thus, at the most, about 30% of dissident scientists in this study are Jewish. Barghoorn, incidentally, quotes a figure of 60-70% of all dissidents in the "democratic" movement as being Jewish or married to Jews.⁷ Although data on marriages to Jews was not considered in this study, the percentage is certainly not reflective of the dissident scientists in this study.

Only nine scientists were found to be of Crimean Tatar origin, a figure which would probably be unchanged if data on all this study's dissident scientists were available, due to the distinctive nature of family names among that group. The same could probably be said of the numbers of dissident scientists of Polish, Estonian, Latvian, and Lithuanian

background; possibly an additional five Armenians could be included on the basis of their family names. What this probably means is that the majority of dissident scientists are of Eastern Slavic ethnic background--Russian, Ukrainian, and Belorussian. Dissidence could not, then, be traced to ethnic discrimination in the majority of cases.

Chart 2 summarizes the data on the religious orientation of dissident scientists. Despite the fact that Parry asserts that religious scientists were rare,⁸ twenty-two were found to be believers, among whom were such prominent dissidents as AL'BREKHT, T. VELIKANOVA, TVERDOKHLEBOV, ANAFAREVICH, NAZARYAN, KAPITANCHUK, BEGUN and AGURSKIY. Only six were found to be confirmed atheists, but, because of the size of the sample and the paucity of data, this is probably not reflective of the number of atheists among dissident scientists. It is difficult to estimate how many more of the scientists are religious. TURCHIN asserts that "many young people with a highly-developed religious element in their make-up have a leaning towards science and become scientists," but he defined religion as "any system of supra-personal values showing an individual the way to a higher meaning of being," which may or may not include membership in an organized religion.⁹ Since being religious in the Soviet Union is not a personality characteristic encouraged by the authorities, it would make sense for scientists who are religious to keep this fact hidden. One might assume, however, that after the scientist had entered the dissident movement the persecution would be implemented regardless of his orientation, and that he might reveal his religious sentiments at the start of his persecution, either to unite with other religious dissidents or to gain the support of Western religious groups. If this were the case, then, there are probably few additional religious dissident scientists from all of the scientists in this study.

Chart 3 indicates that there were more Candidates of Sciences than Doctors of Sciences among dissident scientists at a ratio of about 3:2. Chart 4 reveals, however, that among all scientists holding advanced degrees the ratio of Candidates to Doctors is about 7:1, so the dissident scientist community includes a significantly high number of Doctors of Sciences. This result is somewhat surprising in that the Doctor of Sciences degree is usually awarded to the older, more experienced scientists (see Chart 5), and according to Graph 1, most of the dissidents were younger than 40 years of age at the time of their first dissident act. How could this be explained? It might be that many of the young dissidents are doctors but received their degrees at earlier ages than normal, i.e. the best and the brightest of the young scientists. Another reason for the large number of doctors might be that doctors assume that they have more leeway to hold different opinions from those officially expounded by virtue of their own scientific worth and achievements; hence, they might dissent with little fear of repercussions.

The largest number of advanced degrees was in the field of the physico-mathematical sciences, indicating that the majority of dissident scientists who hold advanced degrees are physicists or mathematicians. It is interesting to note that the proportion of dissident scientists holding advanced degrees in physico-mathematical sciences is over twice that of all scientists holding the same degrees; thus, there are twice as many physicists and mathematicians involved in dissidence as could have been predict-

ed on the basis of relative numbers of scientists holding advanced degrees in various scientific specialities.

Chart 6 indicates that about the same number of dissident scientists worked in university teaching positions as did in active research positions. Relatively few dissident scientists held administrative positions, but a significant number of the scientists were academicians or corresponding members of one of the academies of sciences. The jobs held by dissident scientists seem to be primarily in the middle and upper levels: over half of those involved in education jobs were professors, and nearly twice as many researchers were Senior Scientific Associates as were Junior Scientific Associates. The participation of members of the various academies of sciences undoubtedly added a measure of prestige and legitimacy to the dissident movement. Only one of the academy members, corresponding member of the Armenian Academy of Sciences, ORLOV, has suffered critical wrath to any great extent. SAKHAROV, of course, has been harassed, but has not been arrested or imprisoned.

From Chart 7 it is clear that the majority (55%) of organizations at which dissident scientists have worked are subordinate to one of the academies of sciences, and that relatively few (23%) are subordinate to ministries not connected with education. In terms of personnel, just half of all the dissident scientists in this sample work at an academy of sciences institute, while only 17% work at non-educational ministries. Chart 8 indicates that just 41% of all scientific institutes are subordinate to academies of sciences, and that 45% are subordinate to non-educational ministries. This means that the academy of sciences institutes are moderately over-represented in the dissident scientist community, and the non-educational ministries are significantly under-represented. The educational ministries were about twice as numerous among those entities employing dissident scientists as might have been expected from the relative number of institutes in the educational ministries. These correlations would lead one to believe that there is something inherent in the academy of sciences and the educational ministries that attracts, causes, or encourages dissidents, while there is something in the non-educational ministries that appalls, discourages, or subdues them.

The Academy of Sciences USSR has administrative control over 14% of all scientific institutes in the USSR, but 32% of all institutes at which dissident scientists have worked have been subordinate to the Academy. This may indicate that the Academy of Sciences USSR provides the most conducive atmosphere for dissidents, or creates dissidents, or simply attracts those scientists who eventually become dissidents. A variety of reasons could be suggested for the selection of an Academy of Sciences USSR institute as a place of work: better pay and perquisites, more prestige, Moscow location (55% of all the Academy of Sciences USSR institutes in this study were based in Moscow), priority given to theoretical and basic research, and a more liberal intellectual atmosphere. The Academy probably also attracts the best and the brightest of those scientists who do not want to get involved in research which is overly-classified and compartmented, which would be the case in the non-educational ministries.

Chart 9 shows the institutes with a significant (five or over) number

of dissidents, a fact that has no doubt been brought to the attention of the respective institute directors by the appropriate Soviet authorities. One might speculate as to the meaning of a relatively large number of dissidents in a specific institute: lax security, loose Party control, and administrative tolerance, or the reverse - very strict administrators, tight security measures, and overall repression. It could further be suggested that measures have been taken by the respective institutes to correct this situation, and it may be that these institutes are now models of decorum. It is significant that most are located in Moscow and are subordinate to an educational ministry or the Academy of Sciences USSR. Even more interesting is that two of these institutes are subordinate to the State Committee on the Peaceful Use of Atomic Energy, an employer which for security reasons would not ordinarily be thought to be lenient with or tolerant of dissidents.

Chart 10 reveals that the greatest concentration of dissident scientists was in the field of mathematics. This is probably due to the VOL'PIN arrest in 1968 which elicited support by eighty-seven mathematicians. It may be, though, that the number of dissident scientists in the field of physics represents a greater proportion of committed dissident scientists, for only twelve of the eighty-seven mathematicians dissenting in 1968 repeated a dissident act after VOL'PIN's arrest. There was no one dissident act supported by physicists comparable to the VOL'PIN dissent, so it is likely that there are more physicists than mathematicians committed to the dissident movement in general.

Why would there be, in any case, more dissident scientists in mathematics and physics than in chemistry, biology and geology? Chart 11 shows that under half of all scientists were involved in mathematics and physics, while over two-thirds of the dissident scientists were in these fields. It may be that the best and brightest of Soviet scientists went into physics and mathematics; mathematics might have been chosen for its abstract, non-ideological nature, and physics may have been attractive for the substantial financial support given it by the government and the resulting high quality research facilities (although physics was not ideologically neutral).¹⁰ Salisbury offers a theory that the mode of thinking engendered in physics is conducive to intense questioning and, presumably, dissent:

There is clearly something about the discipline of physics that causes a great physicist to look beyond the formulas, the theorems, the infinitely intricate hypotheses by which he tests and determines the natural laws of the universe and into the seemingly simpler but actually more complex phenomena of man's society. Or, perhaps, this is illusion. Perhaps it is simply that with their finely tuned minds the physicists are able to penetrate more swiftly and more deeply the murk and bias with which human beings normally shroud their affairs.¹¹

Although the relative number of biologists in the USSR is just over one-third that of chemists, there are twice as many dissident biologists as are biologists as those who are chemists. This could possibly be explained by the fact that biology has suffered greatly in recent years.

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SOVIET DISSIDENT SCIENTISTS, 1966-78: A STUDY. (U)
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particularly in the field of genetics, and that biologists are incensed by this ideological interference.

Chart 12 indicates that the majority of dissident scientists in the sample were members of the Communist Party or the Komsomol (68%), while only 10% were anti-Party Marxists, i.e. those who would dissent for political reasons. Non-Party scientists, who made up 22% of all dissident scientists in the sample, are probably ostracized to some extent even without performing dissident acts. The decision not to join the Party, too, might be considered an act of defiance on its own. Such decisions would be made by scientists with full knowledge of the consequences: more difficult career advancement, reduced travel opportunities, and administrative distrust. The same motivation behind the decision not to join the Party, then, might be behind the motivation to dissent.

Although Soviet dissident scientists are probably not much different from the rest of Soviet society in terms of the effect of the Stalinist purges on their families, it is none the less interesting to note the number of scientists affected (Chart 13): KOSTERINA, whose father was imprisoned,¹² TALANTOV, whose father was killed,¹³ GASTEY, whose father was shot in 1938,¹⁴ AGURSKIY, whose father was arrested in 1938 and exiled,¹⁵ AL'BREKHT, whose father was arrested in 1937 and shot in 1938,¹⁶ LANDA, whose father was arrested in 1932 and again in 1937, and died in 1939,¹⁷ VAKHTIN, whose father was imprisoned,¹⁸ MEDVEDEV, whose father was arrested in 1938 and died in 1941,¹⁹ and GENKIN, whose father was killed.²⁰ Among those scientists who were themselves purged were D. AZBEL', BARBOY, GASTEY, O. KVACHEVSKIY, MfUGE, SHAFAREVICH, VEPRINTSEV, and VIL'YAMS. It is not at all unlikely that the experience all these scientists had with the Stalinist purges in one way or another influenced their decision to dissent in the 1960's and 1970's.

Graph 3 indicates that the number of dissident scientists in prison has steadily declined since 1972. The same can be said for the number of dissident scientists in psychiatric hospitals, per Graph 4. Graph 5 shows that the number of dissident scientists arrested per year was the greatest between the years 1967 and 1972 and has fallen off to less than half the pre-1972 rate in recent years (1977-78). What this would mean in terms of motivation for dissidence is that the scientist dissenting for the first time after 1972 probably had less fear of arrest and imprisonment than did those scientists dissenting prior to 1972. This relative official tolerance might have prompted some scientists to dissent because the risk was no longer as great.

Chart 14 indicates that, as expected, the greatest number of dissident scientists in the Soviet dissident movement was in 1968, when the Ginzburg-Galanskov and VOL'PIN protest letters were signed. It is quite significant, though, that the number of new dissident scientists per year has remained remarkably stable since 1968, around twenty-five per year. One could conclude, then, that the authorities' attempt to scare the rest of the scientific community into submission - by denouncing and firing those scientists who signed the 1968 protest letters - was not completely successful. It could be argued, in fact, that the dissident scientists appearing after 1968 had stronger convictions and commitment, since they presumably recognized the consequences of their dissident actions. The

1968 protest letter signers, however, probably did not realize that they would be persecuted for their actions. The fact that the 1968 protest letter signers were not confirmed dissidents can be seen in the small number of them who continued to dissent (the recidivists) after 1968: only forty of those who had dissented prior to or during 1968 continued to take part in dissident activities. With this smaller number in mind, one can see that the twenty or thirty scientists becoming dissidents each year subsequent to 1968 is quite significant.

Chart 15 shows that the majority of dissident scientists lived in Moscow. Significant numbers are also found in Kiev, Leningrad, Novosibirsk and the Baltic republics. It is not at all surprising that the dissidents came from these areas, as the main scientific institutes of the country are located there. Additionally, the nature of "samizdat" is such that the greatest amount of information would have been obtained about people living in or near the major population centers. If one were to find a motivation for dissidence provided by place of residence, it might reside in the fact that these cities are European, with the looser and freer atmosphere that would allow scientists to express their views privately without reprisal and could lead them into dissident activities. The opportunities for finding like-minded, politically astute fellows would, in any case, be more readily available in such cities.

It might seem surprising that the number of dissident scientists is not particularly high in the "science cities," where it might be expected that the high concentration of scientists in relatively isolated areas would lead to active dissidence. One Soviet citizen, in fact, shared this view:

Whatever (the authorities') purposes may be, a thousand scientists, a thousand intellectuals gathered together in a single small town will create a fantastic effect! In such intellectual greenhouses a new philosophy of Russian life may suddenly spring into being!²¹

Popovsky writes, though, that despite all the good intentions, the "science city" scientists have lapsed into the same hierarchic and careerist frameworks that their "big city" colleagues enjoy and exist in, and that the "science cities" do not offer the intellectual salvation once associated with them.

Chart 16 shows that the majority of the dissident scientists have emigrated or defected between the years of 1973 and 1977. There are probably a very great number of Jewish scientists who have emigrated without dissenting, and these scientists are not included in the table, as the "samizdat" sources mentioned only those Jews who had experienced difficulty in emigrating and who had protested their treatment at the hands of the emigration authorities. Appendix III lists all those Jewish scientists who are seeking emigration but who have not yet been allowed to leave.

CHART 1

Ethnic Origin of Dissident Scientists

(Sample: 164)

Ethnic Origin	Number of Scientists	Percent of Sample
Jewish	120	73%
Russian	17	10%
Crimean Tatar	9	5%
Lithuanian	7	4%
Ukrainian	5	3%
Armenian	2	1%
Estonian	2	1%
Polish	1	
Latvian	1	

CHART 2

Religious Orientation of Dissident Scientists

(Sample: 28)

Religion	Number of Scientists
Judaism	5
Christian (unspecified)	4
Catholic	3
Orthodox	7
Protestant	1
Baptist	1
Buddhism	1
<hr/> Atheist	6

CHART 3

Level of Education Among Dissident Scientists

University Diploma Only	22	(9%)
Candidate of Sciences	129	(54%)
Doctor of Sciences	89	(37%)

<u>Degree In</u>	<u>Number Of Candidates</u>	<u>Number Of Doctors</u>	<u>Totals</u>
Physico-Mathematical Sciences	106	76	182 (80%)
Biological Sciences	14	15	29 (13%)
Chemical Sciences	6	3	11 (5%)
Geological Sciences	3	1	4 (2%)

CHART 4

(Source: E. Zaleski et al, Science Policy in the USSR, Paris: OECD, 1969, pp 148-149)

Level of Advanced Education in the Scientific Community (1965)

<u>Degree In</u>	<u>Number Of Candidates</u>	<u>Number Of Doctors</u>	<u>Total</u>
Physico-Mathematical Sciences	12151	1637	13788 (35%)
Biological Sciences	10557	1047	12204 (31%)
Chemical Sciences	7632	843	8475 (21%)
Geological Sciences	4484	763	5247 (13%)
	<u>34824 (88%)</u>	<u>4890 (12%)</u>	<u>39714</u>

CHART 5

(Source: Zaleski, p 338)

Percentage of Doctorates Awarded 1947-55 By Age

Under 39	14.8%
40 - 49	48.2%
50 - 59	29.2%
Over 60	7.8%

CHART 6

Jobs Held by Dissident Scientists

(sample: 246)

Type of Job	Number of Scientists	Percentage
Education	104	42%
Professor	59 (57%)	
Docent	20 (19%)	
Assistant	3 (3%)	
Teacher	18 (17%)	
Graduate Student	4 (4%)	
Research	107	43%
Senior Associate	47 (44%)	
Junior Associate	29 (27%)	
Engineer	31 (29%)	
Administrative	29	12%
Director	3 (10%)	
Department Head	6 (21%)	
Laboratory Head	19 (66%)	
Group Head	1 (3%)	
Academy	22	9%
Academician	14 (64%)	
Corresponding Member	8 (36%)	

CHART 7

Institutional Subordination of Dissident Scientists

(sample: 123 institutes/256 scientists)

Subordination	Number of Institutes (Percent of Total)	Number of Dissident Scientists (Percent of Total)
Academy of Sciences USSR (excluding Siberian Dept)	39 (32%)	92 (36%)
Siberian Department, Academy of Sciences USSR	8 (7%)	11 (4%)
Ukrainian Academy of Sciences	10 (8%)	14 (5%)
Latvian Academy of Sciences	4 (3%)	4 (2%)
Armenian Academy of Sciences	2 (2%)	2 (1%)
Georgian Academy of Sciences	1 (1%)	1
Lithuanian Academy of Sciences	1 (1%)	1
Moldavian Academy of Sciences	1 (1%)	1
Academy of Medical Sciences USSR	4 (3%)	7 (3%)
State Committees of the Council of Ministers USSR	8 (7%)	21 (8%)
All-Union Ministries	4 (3%)	6 (2%)
Union-Republic Ministries (non-Educational)	13 (11%)	15 (6%)
Union-Republic Ministries (Educational)	2 (2%)	35 (14%)
Republic Ministries (non-Educational)	2 (2%)	2 (1%)
Republic Ministries (Educational)	24 (20%)	44 (17%)

CHART 8

Institutional Subordination in the Soviet Scientific Community
(sample: 1200)

Subordination	Number of Institutes (Percent of Total)
Academy of Sciences USSR	162 (14%)
Siberian Department, Academy of Sciences USSR	36 (3%)
All republic Academies of Sciences	284 (24%)
Academy of Medical Sciences USSR	39 (3%)
Union-Republic and Republic Ministries (Educational)	136 (11%)
State Committee for Atomic Energy	13 (1%)
All other ministries and committees	530 (44%)

(source: Directory of Soviet Research Organizations
Washington, D.C.: National Foreign Assessment
Center, March 1978)

CHART 9

Institutes with Five or More Dissident Scientists

Moscow State University	33
Institute of Mathematics imeni Steklov, Moscow	10
Institute of Theoretical and Experimental Physics, Moscow	7
Institute of Atomic Energy, Moscow	7
Latvian State University, Riga	7
Institute of Chemical Physics, Moscow	6
Institute of Physics of the Atmosphere, Moscow	6
All-Union Institute of Scientific and Technical Information, Moscow	6
Institute of Problems of Information Transmission, Moscow	6
Kiev State University	5

CHART 10

Field of Science of Dissident Scientists

(Sample: 489)

Field of Science	Number of Scientists	Percentage of Total
Mathematics	183	39%
Physics	141	28%
Biology	88	18%
Chemistry	44	9%
Geology	27	5%
Astronomy	6	1%

CHART 11

Field of Science of All Scientists (1965)

(Sample: 140882)

Field of Science	Number of Scientists	Percentage of Total
Mathematics & Physics	63860	45%
Chemistry	33534	24%
Biology	27027	19%
Geology	16441	12%

(Source: Zaleski, p. 153)

CHART 12

Party Affiliation of Dissident Scientists

(Sample: 59)

Communist Party	23	(39%)
Non-Party	13	(22%)
Marxist, Non-Party	6	(10%)
Komsomol	17	(29%)

CHART 13

Purged Dissident Scientists and Their Families

Father Purged	6
Scientist Himself Purged	6
Brother Purged	1

CHART 14

Number of Dissident Scientists in Dissident Movement per Year

(scientists in prison are not included for dates of their imprisonment, nor are they counted as first-time dissenters when they return)

Year	Total Number of Dissident Scientists	Number of Scientists dissenting for first time	Number of Scientist dissenting for last time
1956	3	3	
1957	1		
1958	5		
1959	1		
1960	0		
1961	1		
1962	2		
1963	1		
1964	0		
1965	8	3	
1966	21	13	
1967	49	35	
1968	301	259	240
1969	83	23	21
1970	88	29	26
1971	85	25	11
1972	100	26	25
1973	104	25	25
1974	110	33	27
1975	110	22	23
1976	108	23	26
1977	100	18	
1978			

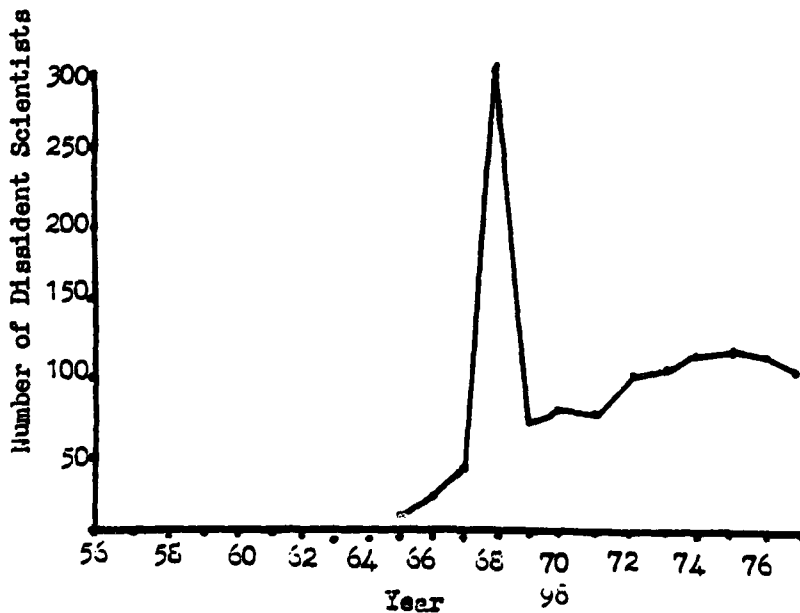


CHART 15

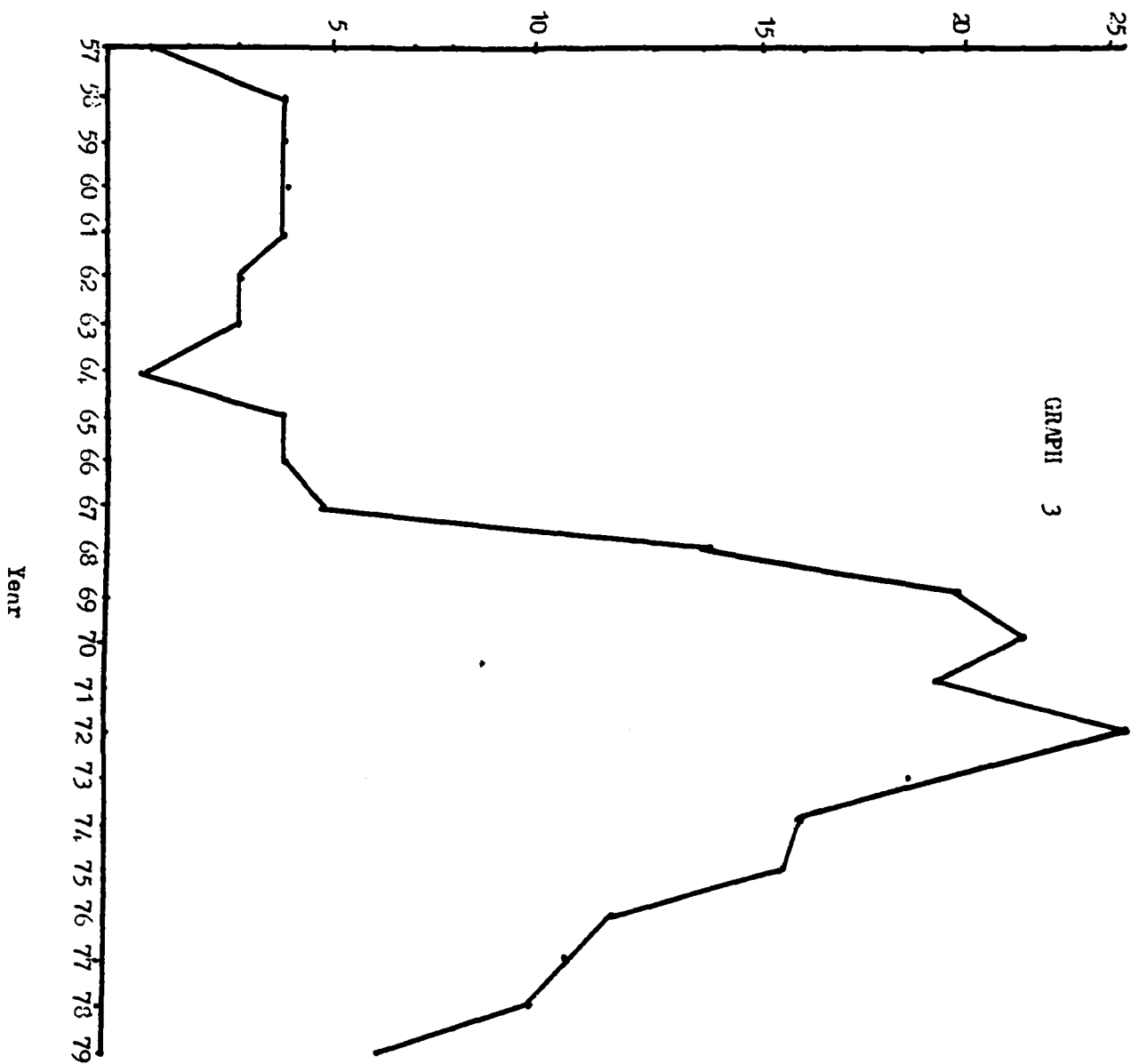
<u>CITY OF RESIDENCE</u>	(known - 486)	
Moscow	<u>300</u>	61%
Kiev	42	9%
Leningrad	33	7%
Baltic Republics	27	6%
Riga	13	3%
Vilnyus	7	
Tartu	3	
Kaunas	3	
Tallin	1	
Science cities	42	9%
Novosibirsk	24	5%
Obninsk	4	
Pushchino	5	
Sverdlovsk	3	
Chernogolovka	2	
Dubna	2	
Serpukhov	1	
Krasnaya Pakhra	1	
Tbilisi	4	
Tashkent	3	
Kharkov	4	
Erevan	3	
Samarkand	2	
Vladivostok	2	
Ulan Ude	2	
Gorkiy	3	
Krasnoyarsk	2	
Odessa	2	
Lvov	1	
Baku	1	
Saratov	2	
Kaliningrad	1	
Minsk	1	
Sevastopol	1	
Rostov	1	
Chernovtsy	1	
Vinnitse	1	
Kirov	1	
Kalinin	<u>3</u>	
Uzhgorod	1	
Stavropol	1	

CHART 16

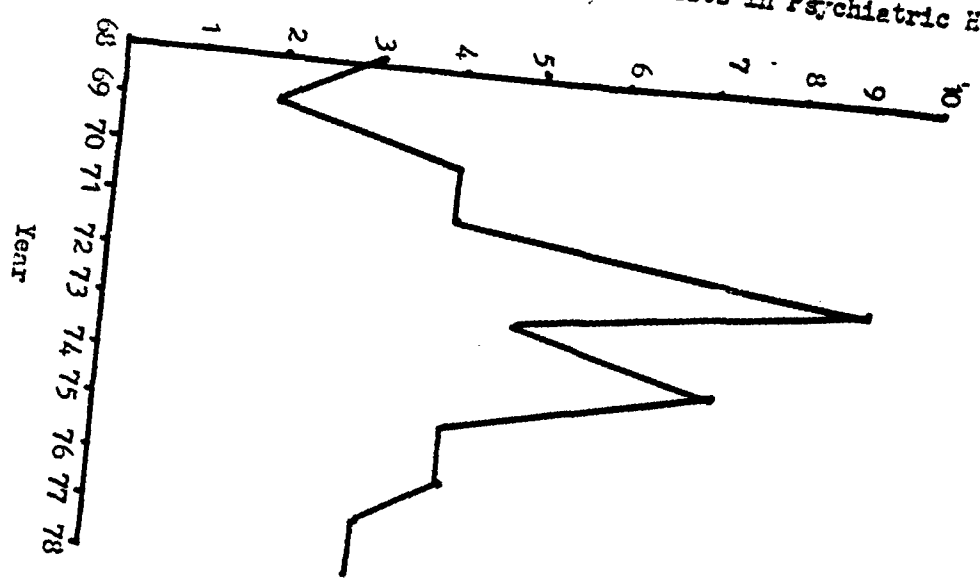
Number of Dissident Scientists Emigrating Per Year

<u>Year</u>	<u>Number Of Scientists</u>	<u>Percent Of Total Emigration</u>
1971	2	
1972	4	8%
1973	14	27%
1974	6	12%
1975	6	12%
1976	5	10%
1977	12	24%
1978	1	
1979	1	

Number of Dissident Scientists in Prison

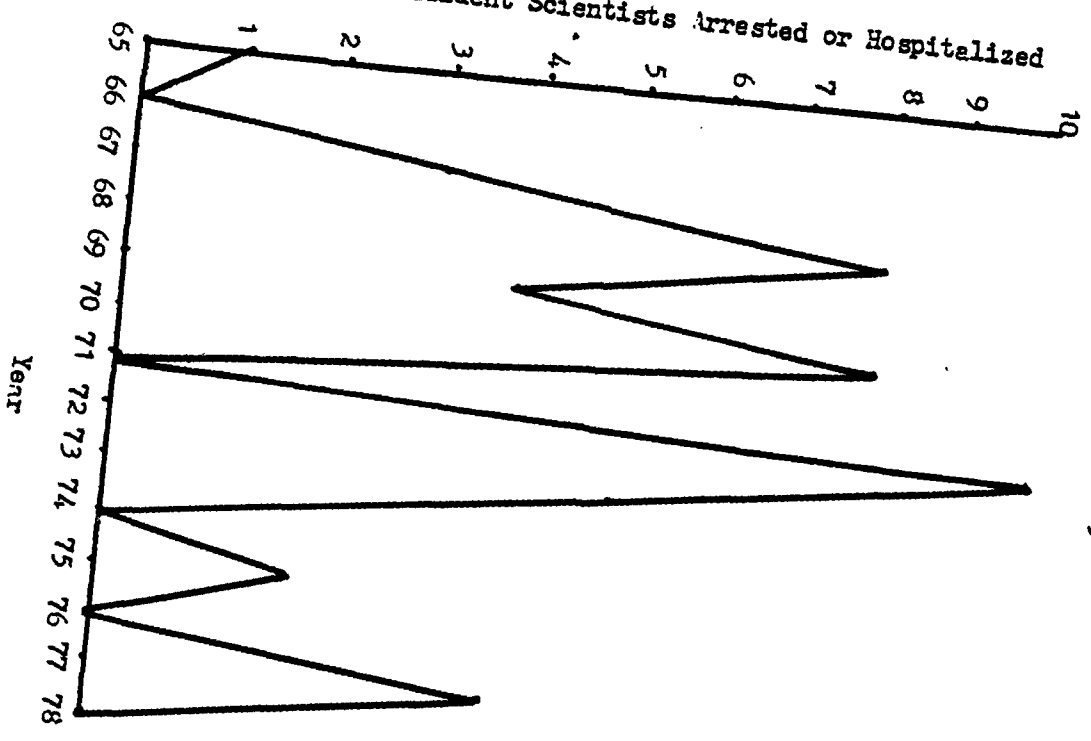


Number of Dissident Scientists in Psychiatric Hospitals



GRAPH 4

Number of Dissident Scientists Arrested or Hospitalized



GRAPH 5

4. CONCLUSIONS

What conclusions can be reached on the causes of dissidence among scientists? One is that the scientist's life experience played a role in the scientist's decision to dissent - a significant number of the dissidents in this study had grown up under both Stalin and Khrushchev and had attended secondary school or university during the "Thaw" and period of liberalization (1956-64). It was also found that the age of the scientist played a role, that the overwhelming majority of those dissenting for the first time were between the ages of twenty-four and forty-one - over a quarter of them were between the ages of twenty-eight and thirty-two. The psychological reasons for dissent at these ages are beyond the expertise of the author, but it could be suggested that job dissatisfaction, an awakened moral responsibility for one's privileged position in life, or an attempt to banish middle-aged ennui by political risk-taking might be reasons for dissent at these ages. One Soviet geodesist who defected in 1957, Lev Predtechevsky (not included in this study) explained his decision to defect as being motivated by a feeling of guilt, that once he had reached the middle strata of the Soviet elite he began to think of others:

I had until then been too preoccupied with my studies and my struggle up that ladder. Till that point, I had had time and thought for my books and instruments only. But now I was successful and, for a young man in my position, quite well off - and I began to feel guilty.²²

As the above quote makes clear, success in one's job also plays a role in the decision to dissent or, in Predtechevsky's case, defect. The dissident scientists in this study are, for the most part, successful scientists in relatively senior positions: Senior Scientific Associates, Professors, and as often as not Doctors of Sciences. Whether guilt is the psychological motivation, or whether it is a sense of social responsibility, it is still clear that doing well in one's job has been the rule as far as dissident scientists are concerned, not the exception. Dissidence has not, apparently, been the result of problems with one's job. It must be pointed out here that Jewish scientists have been subjected to administrative actions which have made their scientific research much harder to conduct, but it is significant that many of them have continued to carry out their research and attend scientific conferences. They were not, then, dissatisfied with their work, and the fact that they attempted to continue it despite all odds reflects a commitment to science. In other words, dissident scientists, Jews and non-Jews alike, have not turned to dissent because they have been dissatisfied with their chosen profession, science; rather, they have turned to dissidence, in some respects, because of their commitment to science which forced them to oppose arbitrary restraints on their work.

For religious scientists, Soviet official repression of religion presumably contributed to the scientists' decision to dissent. The authorities probably had a hard time themselves resolving the paradox of a man of science rejecting scientific materialism for metaphysical religion, in

particular scientists of the stature of TVERDOKHLEBOV, SHAFAROVICH, and AL'BREKHT. Presumably the authorities would prefer that religion, if it must remain in Soviet life, be confined to the older, the superstitious, and the less-educated citizens. With the appearance of well-educated scientists publicly affirming their faith in a Higher Being, though, the myth of the incompatibility of religion and science is dashed, and the attractiveness of religion is enhanced for the young and well-educated.

The affiliation of the scientist's institute and his field of science seem to be less causes of dissidence than they are reflections of the scientist's own mindset. A liberal scientist, i.e. one prone to dissent, presumably would choose a relatively liberal institute in which to work and would probably choose theoretical, rather than applied, research because of the greater freedom and less security matters involved with the former. Institutes subordinate to the academies of sciences are more apt to be concerned with theoretical work than are institutes subordinate to the ministries, so the scientist would probably choose to go to the academies to work. The field of science, likewise, is a choice made on the basis of one's preferences and persuasions. It may be that the logical, intensely-questioning minds are drawn to mathematics and physics, the more experimental and practical will choose chemistry and biology, and those most interested in the application of science will take cybernetics and geology: the proclivity for dissent might be inversely proportional to the applicability of the science to everyday life. Those choosing biology, though, realize that they are selecting a field that was taboo in the not so distant past. It may be that those who got involved in biology during or after Lysenkoism are motivated by a messianic desire to return Soviet biology to its proper place in world science, and that this scientific messianism spills over into political dissidence.

Ethnic discrimination has been a cause of dissidence among scientists who are Jewish, Crimean Tatar, Lithuanian, Armenian, Ukrainian and Estonian. What about the Russians who dissent, though? Does their ethnic background influence their decision to dissent? It could be suggested that the Soviet nationality policy, which could be characterized as Great Russian Chauvinism, might provoke in scientists of Russian descent a feeling of guilt because of the "privileged" nature of their nationality - much as an American of WASP origin might feel responsibility and guilt for policies directed against Americans of other ethnic backgrounds.

If the data on Party affiliation is representative, then it is clear that dissidence, as a rule, is not a manifestation of anti-Communist or anti-Marxist feeling, since most of the dissident scientists were associated with the Party. Very few of the dissident scientists have renounced socialism in favor of capitalism, fascism, monarchism, theocratism, or other politico-economic systems. The cause of dissidence, then, might be disillusionment with the Party's brand of Communism and Marxism. If one recalls the democratic/human rights groups, their platforms called not for the elimination of Party control but for the implementation by the Party of all the provisions of the Soviet Constitution and Soviet laws. A change in the Party's behavior, then, might satisfy a number of dissident scientists.

The imprisonment and hospitalization data shows the constraints on

dissidence among scientists - presumably the more scientists in prison at a given time, or the greater the number of arrests of dissident scientists, the greater the constraints on other scientists not to dissent. This "fear factor," however, has been significantly reduced since 1972 by the decline in arrests of scientists for dissident activities. It cannot be forgotten though, that the scientists who have been arrested since 1972 have been among the most active dissidents, so what the authorities are losing in quantity of dissidents arrested they are making up in "quality."

The city of residence indicates that dissident scientists are relatively few and far between outside of the major Soviet cities. Does place of residence cause dissent, though, or, like place of work and field of science, does it only represent a personal choice which reflects the scientist's mindset? In other words, did the dissident-to-be scientist decide to live in Moscow because of its relative liberal nature and urban mobility suited his personality, or did Moscow, with its assorted enticements, bewitch the scientist into becoming a dissident? The former seems the more likely.

Other possible causes of dissidence, some of which reflect back to Chapter II, are professional ties with dissident scientists, elite upbringing, and loss of parent in Stalinist purges. It would be difficult to determine whether peer pressure in professional groups caused dissidence or whether scientists of similar interests simply gravitated towards one another, the similar interests being dissatisfaction with Soviet society. The motivation for children of the Soviet elite to dissent might be the urge to gain the political power one's upbringing and background would seem to deserve, guilt for one's privileged position in an allegedly classless society, a sense of responsibility to one's family to preserve its good name, or upper-class thrill-seeking. The loss of a family member in the Purges would presumably leave the scientist with a profound antipathy for the Soviet system, and might make him feel morally bound to avenge the loss.

CONCLUSION

These last few pages of this study are devoted to a few summary statements and overall conclusions on the questions posed at the beginning: who are the dissident scientists, what have they protested, why have they protested, and what can be projected from this. This chapter is not intended to be merely a recapitulation of all the findings of the previous chapters; the analyses and concluding remarks in each chapter should serve such purposes. Rather, this chapter will touch on the highlights of the conclusions and then proceed to the crux of the matter, without which all the data compilation has been futile: what predictions can be made on the basis of this research concerning the future of dissidence in the scientific community. At the end of this concluding chapter a few afterthoughts and reservations about this kind of research will be offered, surfacing, if you will, as flotsam, for the possible edification of researchers attempting such a study in the future.

1. Who are the scientists who have dissented?

Dissident scientists have been primarily mathematicians and physicists, over half of whom held the doctorate degree, who were professionally well-established. More than one of every two dissident scientists worked in an institute subordinate to the Academy of Sciences; the same can be said for the number of dissident scientists who lived in Moscow. Less than a quarter of dissident scientists have worked for ministries other than the Ministry of Higher Education. One of every twenty was a member of the national or a republican academy of sciences, and at least the same number came from elite families. One of every five dissident scientists was Jewish. One out of every twenty joined a dissident group, usually as a founding member, and one out of every seven dissident scientists, regardless of membership in a dissident group, was arrested or confined to a psychiatric hospital for his dissidence. Nearly half of all the dissident scientists investigated in this study dissented only in 1968; less than a fifth, approximately one hundred scientists, were determined to be actively involved in the Soviet dissident movement as of 1977, and, by extrapolation, as of 1979.

2. What have the dissident scientists protested?

At first scientists appealed for freedoms that directly affected their work as scientists, such as freedom of information and less restrictions on scientific contacts. Although this appeal was never absent in subsequent protests, it tended to be outweighed by the more universal appeal for the defense of human rights. Scientists comprised over a third of the members of the Moscow Helsinki Monitoring Group and a quarter of those in the various republican monitoring groups; the groups protested infractions of the human rights articles in the Helsinki Accords. Other dissident groups led by scientists protested the arrests of prominent dissidents; still others researched the legal implications of the trials of dissidents. Individual scientists, of course, also continued to protest the arrests of dissidents and fellow scientists in collective protest letters. Religious scientists have called for freedom of religion, Jewish scientists have been joined by non-Jewish scientists in calling for freedom of migration, and Crimean Tatar scientists have protested in favor of repatriation of the Crimean Tatar people. Relatively few scientists, though, have been involved in activities aimed at overthrowing the Soviet regime or in activities employing illegal means.

3. Why have dissident scientists protested?

First of all, and quite obviously, dissident scientists protested

because there was something to protest, i.e. historical events which would have provoked protest by any citizen of any country. Beyond that, though, dissident scientists were psychologically prone to dissent because of certain personal and environmental factors (at least this was the assumption of the present study). What were these factors? The life experience of people who had been born between 1930 and 1942, which included Stalinist purges, Khrushchev's liberalization, and Brezhnev's crack-down on dissident writers in the mid-1960's, seemed to provide a motivation to dissent because of the ages of these people at these historical junctures and the clash of youthful idealism and the Soviet reality. The elite upbringing of a number of the scientists might have caused dissidence out of the desire for a share of the political power and the frustration at not receiving any of it; the progenies of elite families may have thought that they deserved more power than they got. Their high educational level, too, might have caused the dissident scientists to believe that they deserved better treatment and more say in the running of the Soviet system, particularly when they realized that the USSR's international status to a great degree depended on the level of Soviet science and technology. Residence in Moscow, too, may have been a factor which led to an act of dissidence: most of the arrests of writers took place in Moscow, information about dissidence presumably was widely circulated in Moscow, in particular since foreign journalists were stationed there, and Moscow, as any large, international center, was relatively liberal, so the environment was conducive for dissent. Jobs at Academy of Sciences institutes, likewise, provided the kind of liberal environment that might have produced a proclivity toward dissent.

What about the assertion, made by many scientists, that the scientist's mode of thinking is incompatible with the arbitrariness evidenced in totalitarian regimes and politicians? As was mentioned in the introduction to this study, to prove or disprove this assertion is outside the scope of the study, for research on this topic would require data on all scientists, not just dissidents. However, the special nature of the scientific mind has been given as a reason for dissidence by the dissidents themselves. Thus, LYUBARSKIY explained his interest in "samizdat" by affirming that in the very nature of the scientist is the striving to create one's own opinion about a problem...The scientist cannot take any opinion or other from the sidelines. The essence of the scientist is the need to know everything oneself.¹

O. OSMANOV stated that "physics doesn't hinder me, rather, it helps me be a citizen;"² likewise, PLYUSHCH was described by another dissident in the following manner:

The lack of conformism and the deep intellectual honesty characteristic of PLYUSHCH the scientist were characteristic of his usual behavior in life.³

What these dissidents don't explain is why, if the mindset of the scientist causes dissidence, all scientists are not dissidents. The answer to this question is that additional motivations and psychological factors are necessary to make the "potential" dissident an actual one. This study has provided the data on what these motivations might be.

4. What does all this mean?

It is relatively safe to conclude that, pending an act of God in the Kremlin, repression in the USSR will continue as long as there are dissidents and dissidents will remain active as long as there is repression. The authorities have been unable to significantly decrease the numbers of scientific dissidents, in particular, from 1969 to the present, regardless of the degree of persecution. The regime, then, is faced with a dilemma: should it maintain its tight control over Soviet scientists and intellectuals, and risk international repercussions in matters of detente and technology transfer and internal disquiet within the scientific community, or should it give in to some of the human rights demands of the scientists to gain their support in developing Soviet science and technology, which would, admittedly, decrease the regime's control over Soviet society. Obviously, the choice is not a simple or easy one: on the one hand, the regime needs the scientists in order to keep the USSR strong technologically; on the other, the regime, to maintain its power over the Soviet people, cannot share its power or allow the scientists freedoms which might encroach on the regime's power base. Since the regime would probably accept technological backwardness more readily than a loss of its power, it seems likely that official repression of scientific dissidents will continue, probably at the relatively limited level of the post-1976 period. Any greater repression of dissident scientists would probably be counter-productive in terms of US-USSR trade and detente. As it is, the Soviet authorities are able to maintain civil relations with the West at the same time they are refusing to allow their scientists even a modicum of intellectual and individual freedom.

What about numbers of future dissident scientists? Who will they be? Who are their future leaders? Some projections can be made on the basis of the data accumulated. First of all, in terms of numbers, it can be assumed that, because of the relatively steady nature of the numbers of dissident scientists per year since 1969 and the number of scientists who dissent in any year in the foreseeable future, barring a significant historical event, will be about one hundred. Because it was determined above that scientists with dates of birth from 1930 to 1942 were most prone to dissent, it might be that with the passing of the generation, dissidence among scientists might decrease somewhat. If the age 65 is taken as an age after which dissent is not likely to occur, for reasons of mortality or otherwise, then this decrease should not become evident until the year 2000. On the other hand, it was also determined above that a scientist was most likely to dissent between the ages of 24 and 41. If this is the case, and the date of birth correlation with dissidence is meaningful, then there should have been an increase in the number of dissident scientists between the years 1954 and 1983, particularly from 1961 to 1970, when the greatest numbers of scientists would have been in the 24-41 age group. Clearly, historical circumstances played a role in the dissident movement, so this increase is not tied to age alone. The only point that could be made here is that there might be a gradual decrease in the numbers of dissident scientists from 1976 to 1983, after which there might be a significant decrease. Because data is incomplete after 1977 in this study, though, no definite conclusion can be drawn on this.

The prospective dissident scientist should conform to the archetypical dissident scientist described in section 1 of this chapter: he will have an advanced degree in physico-mathematical sciences, will work at an Academy of Sciences institute in Moscow as a Senior Scientific Associate or Professor, and will be a member of the Party; the chances are great that he will have been brought up in an elite family. Obviously, this is a gross generalization, but it is a starting point.

The leaders of the future from the scientific community are many of the same old faces, but there are a number of dissident scientists who have had only relatively minor roles in the dissident movement up to this point and who may rise to assume higher positions. SAKHAROV will continue to be the most influential dissident scientist, even if the Academy of Sciences removes SAKHAROV from its membership. TVERDOKALEBOV, who returned from exile in 1978, will conceivably return to his former level of dissident activity. T. VELIKANOVA, who currently heads several of the dissident groups will probably continue to play a major role in the dissident movement unless she is arrested and prosecuted. KOVALEV and ORLOV, upon their release from confinement in 1981 and 1984, respectively, will probably return to their dissident activities. The dissident scientists who may be called upon in the meantime to fill in for ORLOV, KOVALEV and ShchERANSKIY are BAKHMIN, NAZARYAN, KORCHAK, MEYMAN, LANDA, FINKEL'SHTEYN, I. GOL'DSHTEYN and G. GOLD'SHTEYN, all of whom have had some organizational experience in dissident groups. There are some dissident scientists who have never assumed leadership roles, but, because they have been in the Soviet dissident movement almost from its inception, might eventually become leaders of dissident groups: DZEBAYEVA, GASTEV, GENKIN, PETRENKO, LAVUT, LISOVSKAYA, ShchEGLOV, SKVIRSKIY and TIMACHEV.

Is there a chance that dissident scientists would ever coalesce into an integrated pressure group, representing scientists? After all, one hundred people sharing professional interests and goals could present a formidable front. It is doubtful that this would occur because of the variety of Weltanschauungen evidenced in the scientific community, from SHAFAREVICH's Russian chauvinism a la Solzhenitsyn, REGEL'SON's and KAPITANCHUK's unshakable Christianity, and the Jewish refusenik's simple desire to emigrate, to SAKHAROV's democratic humanism and RONKIN's revolutionary Marxism. As long as dissident scientists have a common enemy in the Soviet regime, however, and are persecuted, it is unlikely that different world outlooks would cause one scientist to undermine the position of another.

5. Final Words

"I have come not to praise Caesar, but to bury him." What are some of the limitations of this study? First of all, as in any scientific or any pseudo-scientific endeavour, the data is incomplete. Official Soviet and even "samizdat" Soviet sources were not able to provide enough data of the type desired to completely analyze the dissident scientist phenomenon. It must be assumed that numerous dissident scientists, even those who were officially reprimanded, were not known to the compilers of the "samizdat"

documents and, accordingly, to the author. Another shortcoming is that the level or "degree" of commitment to dissent activity was not and probably could not be determined; without such a determination, though, the signer of one collective protest letter assumes the same numerical weight as does a SAKHAROV or SACHAPANSKIY. The author is uncertain how such a factor could be meaningfully determined. Other factors, such as marital status, career aspirations, or previous military service, might have been as relevant to the causes of dissent as the ones chosen for this study. The author, however, was limited to the data available.

The author makes no pretense that his evaluation of the data compiled is complete. This study was designed additionally, to be a vehicle by which the biographical data could be presented. Readers with access to computers will undoubtedly find relationships hidden to the author due to the number of variables involved. The author fully recognizes, though, that such relationships evidenced in data may not have caused the dissidence at all; in other words, the correlations may be interesting and fascinating but meaningless in terms of the motivations to dissent. The question of what factors were relevant and what factors were not relevant must be left to the psychologist for a definitive view.

In conclusion, the author's goal was to document the participation of the Soviet scientist in the dissident movement. He theorized that the reasons that a certain scientist dissented could be found in that scientist's biographical data, and this data was compiled. If the theory turns out to be invalid, the data will not be tainted in the least. Accordingly, this data is offered to other analysts to play with as they please, making models and establishing relationships. While the author does not subscribe to the view that a secret key to human behavior lies at the heart of every collection of data, he does believe that such studies as the present one are useful, heuristic games to play which lead to the discovery of trends not immediately obvious. If this study has uncovered just a few of these trends, the author will consider the game a success.

APPENDIX I

INSTITUTES AT WHICH DISSIDENT SCIENTISTS HAVE WORKED

(Number of Scientists in parentheses)

ACADEMY OF SCIENCES USSR

Institute of Mathematics imeni Steklov, Leningrad (1)
Institute of Organic Chemistry imeni Zelinskiy, Moscow (2)
Institute of Physical Problems imeni S.I. Vavilov, Moscow (1)
Institute of Physics, Moscow (3)
Institute of Geology and Geochronology of the Pre-Cambrian Era, Leningrad (1)
Institute of Biological Physics, Pushchino (4)
Institute of Physical Chemistry, Moscow (2)
Institute of Chemical Physics, Moscow (6)
Institute of Elemento-Organic Compounds, Moscow (3)
Institute of Solid State Physics, Moscow (2)
Institute of Molecular Biology, Moscow (1)
Institute of Higher Nervous Activity and NeuroPhysiology, Moscow (2)
Institute of Mathematics imeni Steklov, Moscow (10)
Institute of Physics of the Atmosphere, Moscow (6)
Institute of Zoology, Leningrad (1)
Institute of Radioengineering and Electronics, Moscow (1)
Institute of Petrochemical Synthesis imeni Topchiyev, Moscow (3)
Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation,
Krasnaya Pakhra (2)
Institute of Semiconductors, Leningrad (1)
Institute of Control Problems, Moscow (1)
Institute of Electrochemistry, Moscow (1)
Institute of Plant Physiology imeni Timiryazev, Moscow (2)
Institute of Psychology, Moscow (1)
Computer Center, Moscow (1)
Institute of Water Problems, Moscow (1)
Institute of Biology of Development imeni Kol'tsov, Moscow (3)
Physico-Technical Research Institute, Obninsk (1)
Institute of Physics of the Earth imeni Shmidt, Moscow (1)
Institute of Theoretical Physics imeni Landau, Chernogolovka (1)
Institute of Applied Mathematics, Moscow (4)
All-Union Institute of Scientific and Technical Information, Moscow (6)
Institute of Metallurgy imeni Baykov, Moscow (1)
Institute of Chemistry of Silicates imeni Gubenshchikov, Leningrad (1)
Leningrad Physico-Technical Institute imeni Ioffe, Leningrad (3)
Institute of Cytology, Leningrad (1)
Institute of Marine Biology, Vladivostok (2)
Institute of High Temperatures, Moscow (1)
Institute of Automation and Telemechanics (1)
Institute of Problems of Information Transmission, Moscow (6)

Institute of Mathematics, Novosibirsk (3)
Institute of Chemical Kinetics and Combustion, Novosibirsk (1)
Institute of Automation and Electrometry, Novosibirsk (1)
Institute of Semiconductor Physics, Novosibirsk (1)
Institute of Catalysis, Novosibirsk (1)
Computer Center, Novosibirsk (2)
Institute of Physics imeni Kirenskiy, Krasnoyarsk (1)
Institute of Hydrodynamics, Novosibirsk (1)

ACADEMY OF SCIENCES, UkrSSR

Institute of Mechanics, Kiev (1)
Institute of Zoology, Kiev (4)
Institute of Mathematics, Kiev (2)
Institute of Physical Chemistry imeni Pisarzhevskiy, Kiev
Institute of Cybernetics, Kiev (1)
Institute of Biology of Southern Seas imeni Kovalevskiy, Sevastopol (1)
Institute of Semiconductors, Kiev (1)
Nuclear Research Institute, Kiev (1)
Institute of Oil Chemistry, Kiev (2)
Ukrainian Physico-technical Institute, Khar'kov (1)

ACADEMY OF SCIENCES, LatSSR

Institute of Electronics and Computing Technology, Riga (1)
Institute of Polymer Mechanics, Riga (1)
Institute of Nuclear Physics, Riga (1)
Institute of Organic Synthesis, Riga (1)

ACADEMY OF SCIENCES, ArmSSR

Yerevan Institute of Physics (1)
Byurakan Astrophysical Observatory, Byurakan (1)

ACADEMY OF SCIENCES, GruzSSR

Institute of Cybernetics, Tbilisi (1)

ACADEMY OF SCIENCES, LitSSR

Institute of Physical and Technical Problems of Power Engineering, Kaunas (1)

ACADEMY OF SCIENCES, MoldSSR

Institute of Oncology, Kishinev (1)

ACADEMY OF MEDICAL SCIENCES, USSR

Institute of Epidemiology and Microbiology imeni Gamaley, Moscow (3)
Institute of Virology imeni Ivanovskij, Moscow (1)
Institute of Medical Radiology, Moscow (1)
Institute of Biological and Medical Chemistry, Moscow (2)

STATE COMMITTEES

Committee on Inventions and Discoveries of the Council of Ministers

Scientific Research Institute of the Committee on Inventions, Moscow (1)

Committee for Standards

All-Union Scientific Research Institute of Metrology imeni Mendeleev,
Tbilisi (2)
All-Union Scientific Research Institute of Metrology imeni Mendeleev,
Leningrad (1)

State Committee for Atomic Energy

Institute of Theoretical and Experimental Physics, Moscow (7)
Joint Institute for Nuclear Research, Dubna (2)
Institute of Physics and Power Engineering, Obninsk (1)
Institute of Atomic Energy imeni Kurchatov, Moscow (7)
Institute of High Energy Physics, Serpukhov (1)

ALL-UNION MINISTRIES

Ministry of Instrument Building

All-Union Scientific Research Institute of Developing nondestructive
Methods and Instruments for quality Control, Miskinev (3)
Scientific Research Institute of Introscopy, Moscow (1)

Ministry of the Defense Industry

State Institute of Optics imeni Vavilov, Leningrad (1)

Ministry of the Gas Industry

All-Union Scientific Research Institute of Main Pipelines
Construction, Moscow (1)

UNION-REPUBLIC MINISTRIES

Ministry of the Chemical Industry

Scientific Research Institute of Plastics, Moscow (1)
Leningrad Scientific Research Institute of Polymer Plastics, Leningrad (1)
Scientific Research Institute of the Rubber Industry, Moscow (1)
Scientific Research Institute of Physico-Chemistry imeni Karpov, Moscow

Ministry of Geology

All-Union Scientific Research Institute of Geophysical Methods of
Prospecting, Leningrad (2)
All-Union Scientific Research Institute of Geology, Leningrad (1)
All-Union Scientific Research Institute of Geophysical Methods
of Prospecting, Moscow (1)
All-Union Scientific Research Institute of Nuclear Geophysics and
Geochemistry, Moscow (1)

Ministry of Agriculture

Moscow Institute of Agricultural Engineers imeni Goryachkin, Moscow

Ministry of the Petroleum Extraction Industry

All-Union Scientific Research Institute of Petrochemical Processes,
Leningrad (1)

Ministry of Health

Central Scientific Research Institute of Disinfection, Moscow (1)
Moscow Institute of Vaccines and Sera imeni Mechnikov, Moscow (1)
All-Union Scientific Research Institute of Medical Instruments
and Equipment, Moscow (2)

Ministry of Higher Education

Moscow Institute of Construction Engineering imeni Kuybyshev,
Moscow (2)
Moscow State University, Moscow (33)

REPUBLIC MINISTRIES

Ministry of Health, USSR

Odessa State Medical Institute imeni Pirogov, Odessa (1)

Ministry of Health, R.F.S.R.

State Institute of Oncology, Moscow (1)

Ministry of Higher Education, RSFSR

Leningrad Forestry Engineering Academy imeni Kirov, Leningrad (1)
Scientific Research Institute of Cosmetics and Mechanics,
Leningrad State University, Leningrad (2)
Moscow Institute of Aviation Technology, Moscow (1)
Moscow Institute of Chemical Technology, Moscow (1)
Moscow Institute of Fine Chemical Technology imeni Lomonosov,
Moscow (2)
Moscow Higher Technical School imeni Bauman, Moscow (1)
Moscow Physico-Technical Institute, Moscow (3)
Moscow State Pedagogical Institute imeni Lenin, Moscow (4)
Gorkij State University, Gorkij (3)
Saratov State University, Saratov (1)
Novosibirsk State University, Novosibirsk (2)
Ural Polytechnical Institute, Sverdlovsk (1)
Kalinin Pedagogical Institute, Kalinin (1)
Kalinin State University, Kalinin (1)

Ministry of Higher Education, UkrSSR

Kiev Technological Institute of Light Industry, Kiev (1)
Kiev State University (5)
Uzhgorod State University, Uzhgorod (1)
Khar'kov State University, Khar'kov (1)

Ministry of Education, LatSSR

Latvian State University, Riga (7)

Ministry of Higher Education, LitSSR

Vilnius State University, Vilnius (2)

Ministry of Higher Education, EstSSR

Tartu State University, Tartu (1)

Ministry of Higher Education, UzSSR

Samarkand State University, Samarkand (2)
Tashkent State University, Tashkent (1)

Non-Ministerial Affiliation

Scientific Research Institute of seismic instrument building, Saratov (1)
State Scientific Research Institute of the Fishing Industry, Riga (2)
All-Union Scientific Research Institute of Petroleum and Gas, Moscow (1)

APPENDIX II

DISSIDENT SCIENTISTS ACTIVE IN THE SOVIET DISSIDENT MOVEMENT AS OF 1977-78 (EXCLUDING EMIGRES THROUGH EARLY 1979)

Name		(Years in dissident movement)	
ALBER	(1976-78)	KORCHAK	(1976-77)
ALEXSEEV	(1977)	KOSTERINA	(1974-77)
AL'PERT	(1977-78)	KOVALEV #	(1968-74)
B. AL'TSHULER	(1975-77)	KOVNER	(1977)
AR'NOLD	(1968-77)	KRISTI	(1968-77)
ARONOV	(1968-78)	KUSHNAREV	(1977)
BABENYSHOV	(1977-78)	O. KYACHEVSKIY	(1968-77)
BACHMIL	(1969-78)	LANDA	(1971-78)
BARABANOV	(1970-77)	LAVUT	(1968-78)
BEGUN *	(1971-78)	LERNER	(1971-78)
B. BEYLIN	(1976-77)	LISCVSKAYA	(1968-78)
I. BEYLIN	(1971-78)	LOZANSKAYA	(1979)
BELANOVSKIY	(1977)	MARESH	(1974-77)
BOLONKIN #	(1972-78)	MASHKOV	(1965-77)
BRAYLOVSKAYA	(1972-77)	MASHKOVA	(1958-77)
BRAYLOVSKIY	(1973-77)	MEYMAN	(1968-78)
BURMISTROVICH	(1968-77)	MIZYAKIN	(1974-77)
BYKOVA	(1971-77)	NAZARYAN	(1969-77)
DZEBAYEVA	(1968-77)	NIKOLAYEV #	(1970-78)
DZHEMILEV	(1965-78)	ORLOV #	(1972-77)
FAYERMAN	(1977)	PANFILOVA	(1977)
FILIPPOV	(1977)	PETRENKO	(1969-78)
FINKEL'SHTEIN	(1971-77)	PETURHOV	(1977)
GASDEV	(1968-78)	REGEL'SON	(1974-77)
GENKIN	(1968-77)	REKUBRATSKIY	(1974-77)
G. GOL'DSHTEIN	(1971-78)	ROMKIN	(1965-78)
I. GOL'DSHTEIN	(1971-78)	ROZENSHTEIN	(1974-78)
GOL'FAND	(1974-78)	RUDAKOV	(1966-77)
GOL'FERS	(1975-77)	SAKHAROV	(1966-79)
GURVICH	(1968-78)	SANDEROV	(1977)
ICFE	(1977)	ShABASHOV	(1975-77)
ICFFE	(1978)	ShAFAREVICH	(1968-77)
ISAKOV	(1976-77)	ShePELEV	(1974-77)
KAMENCHOSTSKAYA	(1968-77)	SHIKHANOVICh	(1968-76)
KAPCOV *	(1970-)	SHUSTER	(1968-73)
KAPITANCHUK	(1973-77)	ShchARANSKIY #	(1973-77)
KAPLAN	(1968-78)	ShchEGLOV	(1968-78)
KAZHUKOV	(1975-78)	SIROTIMIN	(1977)
M. KHAT	(1974-77)	SKVIRSKIY	(1967-77)
KHAYEVA	(1965-77)	SKOLNIN	(1976-77)
KISLIN	(1973-77)	SOLOV'EV	(1969-77)
		STROKATAYA	(1971-78)
		TARATTA	(1977)
		TIKACHEV	(1968-78)
		TRIFONOV #	(1966-78)
		TsELYKH #	(1972-77)
		TsLICOER	(1977)
		TVERDCKHLETCOV	(1969-78)
		UBOZHKO #	(1970-78)
		ULANOVSKIY	(1975-77)
		K. VELIKANOVA	(1974-77)
		T. VELIKANOVA	(1968-78)
		VINBERG	(1968-77)
		YARIN-AGAYEV	(1977)

* in exile

in labor camp or psychiatric hospital

APPENDIX III

JEWISH SCIENTISTS WHO HAVE BEEN REFUSED EMIGRATION
AND ARE STILL IN THE USSR (1978)

ALBER	LIFSht's
AL'PERT	LIPROVSKIY
BARABANOV	LITVINOV
BARBOY	MALKIN
BEGUN	MANEVICH
B. BEYLIN	MEYMAN
I. BEYLIN	MIKULINSKIY
BRATLOVSKAYA	MOGILEVER
BRATLOVSKIY	MOYSheZON
DISKINA	MYSLOBODSKIY
EhSSAS	PEVZNER
FAYerman	PRIVOROT'sKIY
FAYTEL' SON	PYaTET'sKIY-ShAPIRO
FINKEL' ShTEYN	RAYKMAN
FREYDEN	RAMM
GAL' PERIN	RATNER
GAUKhMAN	ROZENShtEYN
GEL' FANDEYN	RUZHIT'sKIY
GERShOVICH	ShABASHOV
GIL' DENGORN	ShEPELEV
GILYuTIN	ShTERN
GOL' DELAT	ShTILMAN
GOL' FAND	ShchARANSKIY
G. GOL' DShTEYN	TARATUTA
I. GOL' DShTEYN	TaKYTLIN
GOL' DFARB	TaINOBER
GORDIN	ULANOVSKIY
GURVIT's	VAYNER
IOFE	VOLOShIN
KAMENOMOSTSKAYA	YaKIR
KISELEVICH	YuROVSKAYA
KISLIK	ZARET'sKIY
KIT	
KOGAN	
KORENELIT	
KOVNER	
KUSHNAREV	
KUSTANOVICH	
LERNER	
LEVIT	

NOTES

The following abbreviations will be used in the footnotes: SDS (Sobraniye dokumentov samizdata) v (volume), XTS (Khronika tekushchikh sobitiy/Chronicle of Current Events) # (issue), KZP (Khronika zashchity prav v SSSR/Chronicle of Human Rights in the USSR), AS (Arkhiv samizdata), SOZ (Sovetskiye grazhdane zashchishchayut molodykh literatorov), LZS (Letopis' zhurnalnykh stat'ey), and MS (Materialy samizdata).

Introduction

1. MS 41/75 AS 2314 p1 (the statement is about KOV'LEV).
2. ARTSLIMOVICH, at the 1963 Pugwash Conference in Dubrovnik. Albert Parry, The New Class Divided (New York: MacMillan, 1966), p305.
3. Linda Lubrano and John Berg, "Academy Scientists in the US: and USSR: Background Characteristics, Institutional and Regional Mobility," in John R. Thomas and Ursula M. Kruse-Taucienne (editors), Soviet Science and Technology: Domestic and Foreign Perspectives (Washington, D.C.: The George Washington University, 1977). pp101-140.
4. Parry, p252. Penfield found, incidentally, that the greatest number of dissidents in his study from one occupational group was contained in the technocrat-engineer group (31%). He found that 21% of the dissidents were from the scientist group. If only a third of Soviet engineers are "true" engineers as Parry suggests, then it would be the scientists who compose the single largest occupational group among dissidents. Gary A. Penfield, The Chronicle of Current Events: A Content Analysis (Garmisch: US Army Russian Institute, 1973) p2.
5. Fredrick Barghoorn, Detente and the Democratic Movement in the USSR (New York: The Free Press, 1976), p6.

Chapter 1

1. Zhores Medvedev, Soviet Science (New York: Norton, 1978), p89.
2. Barghoorn, p28.
3. XTS #15, pp15-16.
4. SDS v3 AS163 p19.
5. SDS v29 AS1611 pp67-69.
6. ARTSLIMOVICH, K'PITS', LEGONTOVICH, MAYSKIY, SAKH'ROV, TUMAL. SDS v4 AS273 p

7. SDS v9 AS667 p8.
8. Academicians (physicists) GINZBURG, ZEL'DOVICH, LEONTOVICH, MIGDAL, SAKHAROV, T.KH., (chemist) KHUNYANTS, (biologist) ASTURCV, and (biochemist) ENGEL'GARDT. SDS v3 AS159 pp1-2.
9. Academicians GINZBURG, KAPITSA, KHUNYANTS, LEONTOVICH, SAKHAROV, and ZEL'DOVICH, corresponding member GEL'FAND, and scientists LEVIN, TAT'RSKIY A. YaGLCM, and DOBRUSHIN. SDS v23 AS1156 pp8-9.
10. SDS v3 AS165 p1.
11. SDS v3 AS168 pp1-5.
12. Karel Van Het Reve (editor), Dear Comrades: Pavel Litvinov and the Voices of Soviet Citizens in Dissent (New York: Pitman, 1969), pp.
13. BELOGORODSKAYA, VOL'PIN, GASTEV, GENKIN, GRABAR', GURVICH, DZEBAYEVA, DOBRUSHIN, K'GANOVA, KAPLAN, KRISTI, LISOVSKAYA, LITVINOV, PEK, RUDANOV, TIMACHEV, SHUSTER, ShebEGLOV, V. EYDEL'MAN, G. EYDEL'MAN. SDS v2 AS107 pp31-32.
14. BOLTUKHEVICH, VOL'PIN, GASTEV, GENKIN, DOBRUSHIN, LISOVSKAYA, LITVINOV, V. PONGHAREV, RAPP, TIMACHEV, V. EYDEL'MAN, G. EYDEL'MAN, POSTNIKOV, SKVIRSKIY. SDS v2 AS107 pp32-33.
15. Abraham Rothberg, The Heirs of Stalin: Dissidence and the Soviet Regime 1953-70 (Ithica: Cornell University, 1972), p330.
16. GEL'FAND, KILDYSH, P. KOVIKOV, ROZENTEL'D, SHAF'AREVICH, and A. YaGLCM. SDS v1 AS18 pp1-2.
17. VVEDENSKAYA, VIL'YAMS, A. VELIKANOVA, T. VELIKANOVA, GILDIKH, MELIOS, POLYAK, GASTEV, GRABAR', DOBRUSHIN, BELOGORODSKAYA, DANIEL', RUDANOV, KAPLAN. SDS v1 AS1 pp3-4.
18. SDS v1 AS17 pp1-4.
19. VIKHRENKO, BRYADINSKIYA, VASILEVSKIY, VOL'PIN, GENKIN, GERSHOVICH, GRIB, KRISHIN, DEBA, DZEBAYEVA, DERBIN, Z'KS, IMSHENNIK, K'NAYEV, K'SHIN', L.KVACHEVSKIY, KIRIENITS, KOPYLOV, KRISTI, MELNIK, MILASHEVICH, MICHNIK, NAT'POV, P.VLICHUK, POGOR'YANOVSKIY, PONGHAREV, POPOV, RAPP, REZNIKOV, RUBIN', SIPACHEV, ST'RGSTIN, TAT'RSKIY, TIMACHEV, TUPITAN, V. TURCHIN, K. TURCHIN, USPENSKIY, FADYEVA, KAZ'NICOV, SHAF'AR, SHUSTER, ShebEDRIN, ShebEGLOV, V. EYDEL'MAN, G. EYDEL'MAN, YAVGENCOV, KOV'LEVSKAYA, KOHENKO, LEVIN, MAKSIKOV', MEYMAN, ROKITYANSKIY, SERGEYCHENOVSKIY, ULITSKIYA, FEDORENKO, SH'PIRC, KUSHEV, and SCIDA. SDS v1 AS2 pp1-6.
20. KILCOV, BERG, BORISOV, VASSEMAN, GLADKIY, ZAKHAROV, ZASLAVSKIY, KUL'KOV, KUMAROVICH, SCHLOV, SEMIACHKIN, PET, FRIEMAN, KHRIPOVICH, and SH'BAT. A physics teacher at a physics and mathematics secondary school, HAYDORT, also signed. SDS v1 AS21 pp1-2.

21. MERICHOV-LEONTOVICH, BERKINLIT, BOVSHEROV, BOLOV', BOGARD, V'YENBERG, GRABAR', GURVICH, ' GURVICH, DIMIZ, DEN'BURG, Z'INCHENKO, ZVEROVSKIY, ZIKINA', KAGANOV, KAGANOVA, KALLISTRATOV', KAZENCHOSTSKAYA, KEDER-STEFAN V', KELDysh, KOVALEV, KOL, LAVUT, LEONTOVICH, KURCHUKOV, MEDVEDOVSKAYA, MESHKOVSKIY, MILLE KOKHNIK, MOSTOVAYA, S. NOVIKOV, POKROVSKAYA, POZVIANSKIY, RABINOVICH, RODIONO RGHANOVA, RUDOV, SENGLOE, SOKLIANINOV, SONOLOV, TAT'RSKIY, TOVSTUZH', CH'YLLA SHAN, SHIFRIN, SHLIDT, SHUB, YASINA, ' YaGLICH. SDS v1 'S72 pp1-6.

22. KOROLEV, TARDALSTREKO, SCHDARCHUK, ZASLAVSKAYA, LUBCHENKO, DEYAR, VYSHEVSKIY, GRIENIKOV, ZHAD'KO, GRIGOR'EV, SH'NINA, SELETSKIY, SOLOD'R', TYAGA KOLYUPIN, ZUYEV, S'REY, TOMCHUK, SHEK', SKROKHOD, OR'YEVSKIY, POKROVSKIY, SKLYARENKO, SONOLOV, BEREZANSKIY, SITENKO, DVORKO, PUT', BACHINSKIY, GCHIK, MATVIYENKO, LYURIN, TOLPYCO, SERENOV'. SDS v1 'S46 pp1-4.

23. P. NOVIKOV, GEL'FAND, LYUSTERNIK, M'RKOV, MEN'SHOV, S. NOVIKOV, SHAFARZ ANGL'D, VITUSHKIN, KRONROD, KUNIN, MELAN, POSTNIKOV, BCKSHTEIN, BOCHV'AR, YAPRENOVICH, KELDysh, KIRILLOV, KONDRAT'EV, KUROSH, LANDIS, LODSHICH, POVZNER, ZOLINSKIY, FYATETSKIY-SH'PIRO, PAL'MODOV, SMIRNOV, FOMIN, SHILOV, I. YaGLICH, I. YaGLICH, UGRANOVICH, ARKHANGEL'SKIY, PONOMAREV, SINAY, AVERBUKH, ALEKSEEV, B'LAZINA, BARANOVICH, BASSALYCO, BESKIN, BLINCHETSKIY, BRUSLINSKAYA, VVEDEISK A. VENTTSEL', T. VENTTSEL', VETVICHNOVSKIY, VINBERG, VOLEVICH, VUL, GINDIKIN, GOLD, GRABAR', KABANOV, KID, KILPPERKS, KONSTANTINOV, L. KRONROD, KRUIZHCOV, KRILOV, KULGIN, LEVSHENKO, LUND, HINLOS, MIKHAYLOVA, ONISHCHIK, OREVOV, PANC POLYAK, SNOKEYEV, SHOLYANSKIY, TIKHOMIROV, TUTUBALIN, TYURINA, FLITZAK, FUKS, KHMELEVSKIY, TARMAN, CHERNAVSKIY, SH'PIRO, SHARYGIN, SHLIKHOVICH, YANCOV, VAP'KHOVSKIY, VIL'YANIS, GASTEV, KRISTI, SHESTOP'L, and geophysicist PCD'YAPOL SDS v1 'S20 pp1-4.

24. Only three were identified: KURCSh, LYUSTERNIK and MENSHOV. SDS v1 'S20 ;

25. SDS v20 'S1006 p3.

26. SDS v20 'S1006 p8.

27. SDS v24 'S1250 p79.

28. Ibid.

29. SDS v20 'S1006 p7.

30. SDS v20 'S1006 pp7-8.

31. Harrison Salisbury (editor), Sekherov Speaks (New York: Knopf, 1974), p15.

32. SDS v3 'S200 pp1-27.

33. SDS v1 'S70 pp1-6.

34. SDS v2 AS108 pp1-4.
35. SDS v28 AS1524 p5.
36. SDS v3 AS163 p21.
37. T. VELIKANOVA, VOL'PIN, KANAYEV, KAPLAN, KHMEDROVA, DIKOV, PLYuShch, ROKITYANSKIY, SELIVANOV, SYROYeCHKOVSKIY, MILAShevich, MEYFAKh, PANOVA, LAVUT, TIMACHEV, DZHEMILEV, KOVALEV, and RUDAKOV. SDS v4 AS 288 pp1-3.
38. SDS v1 AS 37 p1.
39. XZP #1 p11.
40. SDS v1 AS96 p1, AS 97 p2.
41. SDS v6 AS 469 p14.
42. SDS v4 AS 274 pp1-19.
43. SDS v1 AS44 pp1-2.
44. SDS v6 AS383 pp1-24.
45. Ibid., p6.
46. XTS #2 p19.
47. XTS #5 p48, SDS v1 AS57 pp1-2.
48. SDS v30 AS3008 p259.
49. KRONROD, YaBLONSKIY, ROZHKOVA, RODIONOV, LUCHKOVA, LUCHKOV, ROMANOVA, DVORKO. (See Notes for Chapter III).
50. PAVLINChUK, KRISTI, I. YaGLOM, KOVALEV, FET, MILAShevich, ShTENGEI', BERG, KVACHEVSKIY, BACHINSKIY, PUT', MATVIYenko, ZASLAVSKAYA, BONDARCHUK, PLYuShch. (See notes for Chapter III).
51. TseKhmISTRENKO, FOMIN. (See notes for Chapter III).
52. LILENKO, BEREZANSKIY, SKOROKhOD. (See notes for Chapter III).
53. ARNOL'D, BERG, CHAYLAKhYaN, DZEBAYeVA, GASTEV, GENKIN, GERShOVICH, GRABAR', GURVICH, KAMENOMOSTSKAYA, KOVALEV, LEONTOVICH, LITVINOV, KAPLAN, KRISTI, LAVUT, LEVIN, LUNTs, MEYMAN, NATAPOV, MEYFAKh, PAVLINChUK, PLYuShch, POD*YaPOL'SKIY, PONOMAREV, PYaTETsKIY-ShAPIRO, ROKITYANSKIY, RUDAKOV, ShAFAREVICH, ShIKhANOVICH, ShuSTER, ShchEGLOV, SKVIRSKIY, TIMACHEV, V. TURChIN, T. VELIKANOVA, VIL'YAMS, VINBERG, VOL'PIN, and ZAKS. (See notes for Chapter III).

54. SDS v2 'S126 p4.
55. ZTS #34 p5.
56. SDS v30 'S657b pp1-5.
57. SDS v9 'S624 pp1-3.
58. Ch'LIDZE, TVERDCKHLEBOV, VOL'PIN, TSUKERMAN, RIGERMAN. SDS v7 'S510 p1.
59. SDS v7 'S512 p1.
60. B'RAMANOV, PEVNER, LIPNOVSKIY, KAMENICHTSK'Ya, TSUKERMAN, RIGERMAN, TSEYTLIN, POL'SKIY, DISKINA, FREYDIN, MALKIN. SDS v9 'S624 pp2-3.
61. YaSHINOV, DZHEMILEV, KOVALEV, LAVUT, PLYUSHCH, ROKITYANSKIY, RUD'KOV, TELICHEV. SDS v1 'S103 p1.
62. SDS v2 'S110 p1.
63. ZTS #34 p11.
64. SDS v12 'S1629 p2.
65. T. VELIKNOVA, LAVUT, PLYUSHCH, POD'YAPOL'SKIY, ROKITYANSKIY, VOL'PIN. SDS v4 'S252 p2.
66. ROKITYANSKIY. SDS v4 'S253 p3.
67. BELOGORODSK'Ya, DZHEMILEV, KOSTERINA, VOL'PIN, PLYUSHCH, POD'YAPOL'SKIY, RUD'KOV, TELICHEV, UDCZHEO. SDS v4 'S269 pp1-2.
68. SDS v5 'S360 pp1-15.
69. SDS v6 'S604 pp1-6.
70. Only ten of the scientists were identified: SAMB'ROV, T'MI, LECHTCVICH, FURCHIN, L'ISHULLER, DVORNIK, KOVALEV, Ch'LIDZE, VOL'PIN and Hungarian biologist R. Kalash. SDS v6 'S417 p2.
71. Ibid., p1.
72. SDS v6 'S434 pp1-2.
73. Elnores Medvedev and Roy Medvedev, Question of Madness(New York: Knopf 1971), p120.
74. Rothberg, p300.

75. DIKOV, KOSTERINA, PLYuShch, POD*YaPOL'SKIY, RUDAKOV, SAMSONOV, TIMACHEV.
SDS v6 AS406 p2.

76. SDS v25 AS1460 p552.

77. XTS #15 pp15-16.

78. SAKHAROV, LEONTOVICH, TURCHIN, CHALIDZE, TVERDOKHLEBOV, KOVALEV, SHIKHANCVICH,
POD*YaPOL'SKIY, KRISTI and LAVUT. SDS v7 AS475 p2.

79. BELOGORODSKAYA, T. VELIKANOVA, VOL'PIN, KOSTERINA, LAVUT, POD*YaPOL'SKIY,
RUDAKOV. SDS v7 AS498 p2.

80. SDS 10B XTS #17 p39.

81. BELOGORODSKAYA, VOL'PIN, T. VELIKANOVA, DIKOV, KAPLAN, KOVALEV, LAVUT,
MILASHEVICH, POD*YaPOL'SKIY, RUDAKOV, TVERDOKHLEBOV, CHALIDZE. SDS v7 AS516 pp1-2.

82. SDS v23 AS 1176 pp1-3.

83. Ibid.

84. SDS v9 AS682pp3-8.

85. Ibid.

86. SDS v21 AS1022 pp1-5.

87. SAKHAROV, LEONTOVICH, BELOGORODSKAYA, T. VELIKANOVA, VOL'PIN, GERSHOVICH,
KOSTERINA, LAVUT, MILASHEVICH, PLYuShch, POD*YaPOL'SKIY, RUDAKOV, TIMACHEV.
SDS v9 AS696 p 2-3.

88. SDS v24 AS1283 p1.

89. BAKHMIN, BELOGORODSKAYA, GAYDEKOV, KRISTI, TIMACHEV, T. VELIKANOVA, CHALIDZE.
MS 11/74 AS1552 pp5-6.

90. SDS v28 AS1550 p336.

91. SDS v28 AS1422 p387.

92. SDSv28 AS1524 pp115-129.

93. SDS v28 AS1588 p1.

94. XZP #31, p30.

95. XZP #31, p22.

96. XZP #31, p30.

97. SDS v25 AS1445 pp1-2.
98. SDS v24 AS1244 p1.
99. SDS v10B XTS #26 p35.
100. VOL'PIN, LEONTOVICH, SHAFAREVICH, BERG, TVERDOKHLEBOV, MOYSEYEV, BELOTSER-KOVSKIY, Ye. LEVICH, V. LEVICH, LERNER, BRILLOVSKIY, POD'YAPOL'SKIY, L. AL'TSHULLER, SHIKHANOVICH, KOVALEV, CHALIDZE, T. VELIKANOVA, AL'BREKHT, KRISTI, D. AZEEL', SAKHAROV. SDS v24 AS1196 pp1-2.
101. Same people as those in Note 100 minus SHIKHANOVICH. SDS v24 AS1197 pp1-2.
102. SDS v25 AS1401.
103. SDS v25 AS1418 pp336-338.
104. SDS v25 AS1418 p318.
105. MS11/74 AS1552 p2.
106. At least nineteen of the forty are natural scientists: physicists Bairov, Bogolyubov, Vonsovskiy, Logunov, Obukhov, Prokhorov, Tushkevich, biologists ENGEL'GARDT and Dubinin, chemists Nesmeyanov, Ovchinnikov, Oparin, Semenov, Spitayn, mathematicians Keldysh, Sobolev, Tikhonov, and engineers Kotel'nikov and Paton. Pravda August 29 1973, p3.
107. SDS v25 AS1463 p560.
108. SDS v25 AS1455 p517.
109. SDS v25 AS1463 p561.
110. M. AZEEL', AYNBLINDER, BRILLOVSKIY, VORONEL', V. LEVICH, LUNTS, ROGINSKIY, TEMKIN. SDS v25 AS1485 p 710.
111. SDS v25 AS1464 p567.
112. SDS v28 AS1559 p446.
113. SDS v25 p721.
114. SDSv25 AS1490 pp719-720.
115. SDS v25 AS1491 p721.
116. KOVALEV, LITVINOV, T. VELIKANOVA. SDS v25 AS1497 pp1-2.
117. SDS v25 AS1478 pp1-2.

118. MS 11/74 AS1594 pp1-7.

119. The philosopher Karl Popper also saw the similarity between the scientist and the artists:

The scientist and the artist, far from being engaged in opposed or incompatible activities, are both trying to extend our understanding of experience by use of creative imagination subjected to critical control, and so both are using irrational as well as rational faculties. Both are exploring the unknown and trying to articulate the search and its findings. Both are seekers after truth who make indispensable use of intuition.

From this, it could be suggested that a scientist is unable to work in the parochial and constrained environment into which the Soviet authorities wish to place him, and that science cannot develop in a system which denies creative imagination or places limitations on it. Bryan Magee Popper (Glasgow Fontana, 1976), pp68-69.

120. The other scientists were AL'BEREKHT, BELOOZEROV, and ORLOVSKIY. SDS v28 AS1501 p1.

121. SARDAROV, T. VELIKANOVA, KOVALEV, LITVINOV, POD*YaPOL'SKIY. SDS v29 AS1622 pp161-162.

122. T. VELIKANOVA, GASTEV, GERKIN, KOVALEV, LAVUT, LITVINOV, POD*YaPOL'SKIY, RUDAKOV, TVERDOKHLEBOV, TIMACHEV, SHUSTER. SDS v29 AS1652 p326a.

123. MS 41/75 AS 2314 pp1-2.

124. SDS v29 AS1651 pp1-2.

125. ShAFAREVICH, TURCHIN, ORLOV, AGURSKIY, KOVALEV, T. VELIKANOVA, VORONEL'. XZP #13 p6.

126. SDS v29 AS1611 pp67-69.

127. XZP #13 p28.

128. XTS #34 p5.

129. XZP #31 p35.

130. XTS #34 p5.

131. XZP #14 pp9-12.

132. XTS #34 pp3-4.

133. T. VELIKANOVA, POD*YaPOL'SKIY, KOSTERINA, BAKMIN, LAVUT, TURCHIN, RYVKIN, AL'BEREKHT, GASTEV, LANDA, AGURSKIY, M. REESIN, SALOVA, ORLOV, ROZENSHTEYN, MIZYAKIN, TIMACHEV, REKHERATSKIY, GOL'FAND, YANKHELEVICH, KATSONIS, PETRYaYeVSKAYa, KARPOVICH, A. VELIKINOV, LISOVSKAYa. MS41/75 AS2314 p3.

134. XZP #18 p5.

135. SAKHAROV, TURCHIN, ORLOV, MNYUK, PANFILOVA, GOL'FAND, V. LEVICH, SALOVA, GASTEV, LAVUT, T. VELIKANOVA, LERNER, KORCHAK, AL'BREKHT, MEYMAN, YANKHELEVICH, SHIKHANOVICH, M. AZBEL'. MS 41/76 AS2756 p2.

136. XZP #14 pp31-51.

137. XZP #14 p5.

138. Shcharanskiy, V. DAVIDOV, LUNT's, I. BEYLIN, FINKEL'SHTEYN, GOLDFARB. MS19/75 AS2130 p1; LANDA XZP #15 p7; TURCHIN, ORLOV, AL'BREKHT XZP #15 p9.

139. Russkaya mysl', 29 April 1976, p5.

140. XZP #14 pp7-8.

141. XZP #29 p24.

142. Barghoorn, pp66-72.

143. ITS #38 p6; Izvestiya, 26 October 1975, p3.

144. ITS #38 p6.

145. ITS #40 pp117-119.

146. See Chapter II.

147. SAKHAROV, V. LEVICH, MEYMAN, LERNER, M. AZBEL', BRILLOVSKIY, E. TRIFONOV, AL'BER, ORLOV, KORCHAK, SALANSKIY, ROZENSHTEYN, GASTEV, TURCHIN, FINKEL'SHTEYN, BRILLOVSKAYA, GOL'FAND, G. GOL'DSHTEYN, I. GOL'DSHTEYN, KISLIK, GURFEL', SHEPELEV and KOSTERINA. MS34/76 AS2644 p4.

148. ITS #42 pp8-9.

149. T. VELIKANOVA, LANDA, ORLOV, Shcharanskiy. Ibid.

150. ITS #43 p100.

151. ITS #41 p70.

152. MEYMAN, ZAKS, REGEL'SON, BAKHMIN, GENKIN, LAVUT, LANDA, MASHKOVA, Shcharanskiy T. VELIKANOVA, TURCHIN, MNYUKh, I. BEYLIN, GOL'FAND, ULANOVSKIY, LYUBARSKIY, AL'PERT, SAKHAROV, YANKHELEVICH, LERNER, I. GOL'DSHTEYN, G. GOL'DSHTEYN, STROKATAYA, SALOVA, and M. AZBEL'. MS19/77 AS2966 pp1-2.

153. M. AZEEL', ALEKSEYEV, AL'EREKHT, AL'TSHULLER, BABENYSHEV, BARABANOV, BAKHMIN, B. BEYLIN, BOLONKIN, BRAILOVSKIY, BRAILOVSKAYA, K. VELIKANOVA, T. VELIKANOVA, VIL'YAMS, GAYENKO, GASTEV, GENKIN, G. GOL'DSHTEYN, I. GOL'DSHTEYN, DZEBAYEVA, ZAKS, V. IOFE, ISAKOVA, KAPITANCHUK, KLIMANOVA, KORCHAK, KOSTERINA, LAVUT, LANDA, V. LEVICH, LISOVSKAYA, LYUBARSKIY, MASHKOVA, MNYUKH, MASHKOV, NIKOLAYEV, PANFILOVA, SIROTININ, REGEL'SON, REKUBRATSKIY, ROZENSHTEYN, RONKIN, RUDAKOV, SALOVA, PETRENKO, SMOLKIN, STROKATAYA, TIMACHEV, TURCHIN, FINKEL'SHTEYN, SHABASHOV, SHEPELEV, SHUSTER, KHAYEV, SHECHARANSKIY, SHEGLOV, YANKELEVICH, MEYMAN, MARESLIN, MIZYAKIN, FAYN, BERGUN, FAYERMAN, I. BEYLIN, LERNER, DYAD'KIN, KRISTI. AS3051 pp25-32.

154. XTS #44 pp17-22/

155. Ibid., p23.

156. XTS #47 pp20-21.

157. XTS #47 pp21. .

158. Ibid.

159. AL'PERT, AL'BER, BRAILOVSKIY, GOL'FAND, V. LEVICH, LERNER, MEYMAN, AS3272 p1; LANDA, I. GOL'DSHTEYN, SAKHAROV; POLIKANOV, LAVUT, YARYM-AGEYEV and BAKHMIN, XZP #30 p7.

160. XTS #44 p25.

161. Ibid., p26.

162. XTS #46 pp29-30; XTS #45 pp20-21; XTS #47 p26, 28-29.

163. XTS #46 pp27-28.

164. ULANOVSKIY, YARYM-AGEYEV, LERNER, M. KHAIT, FAYN, FINKEL'SHTEYN, BAKHMIN, I. GUREVICH, Ye. Tsirlin, V. Rydus, V. Gertsberg, and Ye. Pargamanik. MS27/77 AS3035 pp1-2.

165. XZP #31 p16.

166. XTS #47 pp92-93.

167. AL'BER, BRAILOVSKIY, GOL'FAND, MEYMAN, V. LEVICH, ROZENSHTEYN, ESSAS, LERNER, KOVNER, GIL'DENGORN. MS2/78 AS3099 p3.

168. XTS #47 p139.

169. XTS #48 p31.

170. XTS #48 p31.
171. XTS #49 pp7-9.
172. XTS #48 pp31-33.
173. XZF #31 pp25-28.

Chapter II.

1. SDS v2 AS126 p4.
2. Ibid.
3. SDS v6 AS433 p4.
4. Ibid., p6.
5. MS41/75 AS2314 p3.
6. SDS v30 AS2548 p4.
7. SDS v6 AS448 p2.
8. Ibid.
9. SDS v16.
10. SDS v24 AS1270 p1.
11. SDS v16 AS660a p82.
12. SDS v16 AS657b p4.
13. SDS v24 AS1264 p1.
14. SDS v24 AS1258 p1.
15. SDS v25 AS1486 p1.
16. XZF #3 p14.
17. SDS v28 AS1501 p1.
18. SDS v30 AS2371 pp145-146.

19. SDS v30 p144.
20. SDS v30 AS2401 pp147-158.
21. SDS v30 AS2542 p5.
22. SDS v30 AS2903 p19; SDS v30 p1.
23. XZP #26 pp26-35.
24. XTS #40 pp118-119.
25. Ibid., p119.
26. SDS v30 p39.
27. SDS v30 AS2740 p46.
28. SDS v30 AS2841a pp65-66.
29. SDS v30 p73.
30. SDS v30 AS3059 pp78-81.
31. SDS v30 AS2839 p44.
32. SDS v30 AS2841a p66.
33. SDS v30 AS3059 p80.
34. XZP #25 p45.
35. SDS v30 AS3136 pp616-617.
36. SDS v30 p173.
37. Ibid.
38. SDS v13 AS600 pp48-50.
39. SDS v13 AS601 p67.
40. SDS v9 AS625 p1.
41. SDS v24 AS1212 p3.
42. Albert Axelbank, Soviet Dissent: Intellectuals, Jews and Detente (New York: Franklin Watts, 1975), p45.
43. International Herald Tribune, February 14 1979.
44. Ibid.

45. SDS v28 AS1522; MS27/74 AS1758; MS24/75 AS2099; SDS v13 AS1673 pp26-27.
46. XZP #19 p p42.
47. SDS v13 AS1673 p24.
48. SDS v28 AS1522 p1.
49. MS24/75 AS2156 p1.
50. AS1788
51. MS5/75 AS1964 p7.
52. MS32/74 AS1789; MS27/74 AS1758; AS1897; AS2094.
53. MS32/74 AS1897 p1.
54. MS24/75 AS2156 p1.
55. MS24/75 AS2154 p1.
56. XTS #45, pp80-81.
57. International Herald Tribune, 30-31 December 1978 p3.
58. XZP #19 p51.
59. XZP #19 p48.
60. MS21/77 AS2953, pp1-6; MS21/77 AS2956 pp1-2.
61. XTS #30 p112; XTS #37 pp77-79.
62. M. AZBEL', BEGUN, BRILLOVSKIY, FAYN, ESSAS, KISLIK, I. GOL'DSHTEYN, G. GOL'DSHTEYN, TsINOBER, SALANSKIY, GURFEL'. MS21/77 AS2953 p6.
63. LERNER, LEVICH, ROZENSHTEYN. MS21/77 AS2953 p6.
64. Ibid.
65. XTS #37, pp77-79; XTS #30 p112.
66. International Herald Tribune, March 6 1979 p4.
67. SDS c12 AS379 pp1-4.

68. SDS v12 AS1877 p38.
69. XTS #8 p28.
70. SDS v12 AS379 pp27-30.
71. Ibid.
72. SDS v12 AS379 pp31-33.
73. SDS v1 AS85 p1.
74. SDS v12 AS379 p49.
75. SDS v12 AS379 p51.
76. SDS v12 AS379 pp49-51.
77. SDS v3 AS192 p1.
78. SDS v1 AS40 p1.
79. SDS v1 AS45 p3.
80. SDS v12 AS1629 pp1-2.
81. Ibid.
82. SDS v12 AS1879 p3.
83. SDS v29 AS1629 pp1-2.
84. XTS #49 p72.
85. XTS #48 p101.
86. XTS #31 p131.
87. SDS v30 AS2862a pp109-110.
88. SDS v30 p107.
89. Ibid.
90. AS3142.
91. SDS v25 AS1409, AS1410.
92. SDS v23 AS1163 p1.

93. SDS v7 AS525 p1.
94. John B. Dunlop, The New Russian Revolutionaries (Belmont, Mass: Nordland, 1976), p13.
95. Ibid., p86.
96. Ibid., pp87-88.
97. SDS v23 AS1163 p3.
98. Ibid., p12.
99. Ibid., p1.
100. Dunlop, p235.
101. Dunlop, p96.
102. Ibid., pp93-94.
103. Ibid., p103.
104. SDS v23 AS1163 p13.
105. SDS v25 AS1460
106. Rothberg, p328.
107. George Sanders (editor), Semizdat: Voices of the Soviet Opposition (New York: Monad, 1974), p235.
108. SDS v1 AS88
109. SDS v8 AS564; XTS #15 p15; XTS #14 pp17-18.
110. Sanders, p416.
111. SDS v22 AS1085 p3.
112. SDS v22 AS1085 p5.
113. Ibid., p5.
114. SDS v9 AS684 p9.
115. SDS v9 AS684 pp52-54.
116. SDS v24 AS1191 p5.
117. SDS v25 AS1394 pp1-3.

118. MS10/75 AS2054 pp4-6.
119. Ibid., pp4-6.
120. Ibid., pp4-6.
121. Ibid., p5.
122. XTS #8 p37.
123. MS10/75 AS2054 p5.
124. LZS #35 1968 p35.
125. MS10/75 AS2054 p4.
126. Ibid.
127. MS41/75 AS2314 p3 (footnote 2).
128. Delo Kovaleva, p40.
129. Ibid., p41.
130. MS38/76 AS2633 p2; AS3051 p31.
131. MS41/75 AS2314 p3.
132. MS38/76 AS2633; MS41/75 AS2314 p3; MS19/77 AS2966 p2; AS3051.
133. LZS #3 1965. p21.
134. SGZ p179.
135. LZS #5 1965 p77.
136. Turkevich, p117.
137. LZS #3 1965 p23.
138. LZS #13 1968 p29; LZS #12 1968 p14.
139. LZS #9 1968 p37.
140. LZS #10 1968 p17.
141. LZS #11 1968 p27.
142. XTS #45, p81.

143. LZS #6 1966 p44; LZS #4 1968 p40.
144. XTS #8 p36.
145. LZS #4 1968 p45,
146. XTS #7 p17.
147. MS38/76 AS2633 p1; AS3355.
148. LZS #16 1968 p32.
149. SDS v4 AS274 pp8-11.
150. Turkevich, pp121-122.
151. LZS #24 1968 p39.
152. Dale Tverdokhlebova, p33.
153. Turkevich, p219.
154. SDS v1 AS72 p3; SDS v24 AS1283 p1; XTS #17 p11; XTS #14 pp4-6.
155. Turkevich, p321.
156. LZS #13 1965 p33.
157. Peter Dornan, "Who is Soviet Physicist Andrey Tverdokhlebov?" (Munich: Radio Liberty Research, November 17 1970), p4.
158. Ibid., p2.
159. XTS #4 p21.
160. LZS #3 1968 p44.
161. LZS #23 1968 p71.
162. LZS #8 1965 p24.
163. XTS #2 p19.
164. Henry Gris and William Dick, The New Soviet Psychic Discoveries (Englewood Cliffs, NJ: Prentice-Hall, 1978), pp43-51.
165. SDS v2 AS125 pp1-4.
166. MS42/74 AS1806.
167. MS42/74 AS1810 p1.
168. Gris and Dick, p291.

169. Turkevich, p321.

170. Gordon McVay, Esenin: a Life (London: Hodder and Stoughton, 1976), p 226. Nadezhda might be related to Valentin I Vol'pin, a poet and compiler of Esenin's works in the 1920's.

171. Peter Dornan, "Biographical Sheet - Andrey Nikolayevich Tverdokhlebov" (in Russian) (Munich: Radio Liberty, 12-14 March 1976) p1. It should be noted that TVERDOKhLEBOV's older brother, Vladimir, is also a scientist (Candidate of Chemical Sciences), but is not a dissident. Vladimir stole some of his brother's files to give to the authorities. TVERDOKhLEBOV thought, however, that Vladimir might have been forced into it. XTS #20 p37.

172. Novyy mir. July 1958-December 1966.

173. AS3051 p27.

174. O. Yu. Schmidt (head editor), Bol'shaya sovetskaya entsiklopediya v14 (Moscow: Sovetskaya entsiklopediya, 1929) pp664-665.

175. A.A. Surkov (head editor), Kratkaya literaturnaya entsiklopediya v1 (Moscow: Sovetskaya entsiklopediya, 1962) p615.

176. SDS v1 AS76 pp1-6.

177. Igor' Grabar', Pis'ma 1891-1917 (Moscow: Nauka, 1974) pp387, 390.

178. Rothberg, p204.

179. Van Het Reve, p31.

180. Zhores Medvedev, The Medvedev Papers (London: MacMillan, 1971), vii.

181. Conversation with L.A. Yudovich, TVERDOKhLEBOV's lawyer, Garmisch March 1979.

182. SDS v29 AS1601 p30.

183. SDS v28 AS1530 p169.

184. SDS v2 AS134 p3.

185. SDS v4 AS274 pp6, 14.

186. International Herald Tribune, April 27 1979 p5.

187. Turkevich, pp411-412.

188. Salisbury, p7.

189. Turkevich, p218.

190. A.M. Prokhorov, Bol'shaya sovetskaya entsiklopediya, v9 (Moscow: Sovetskaya entsiklopediya, 1972), p456.

191. SGZ p126.

192. SGZ p168.

193 Prokhorov v12, p22.

194. Yu. Medvedev, "Otkryto dlya neozhidannosti," ("Open for the unexpected"), Znamya #3 1968 pp 127-146. Medvedev mentions that Turchin had two children as of 1941, p137.

195. Delo Kovaleva, pp44-45.

196. SGZ p133.

197. Turkevich p233.

198. MS14/77 AS2902 p4.

Chapter III

The following 565 footnotes apply to the biographical tables. The notes are listed according to the last name of the respective scientist and are not numbered. At the conclusion of the footnotes for the biographical tables there are several numbered footnotes which apply to later sections of the chapter.

ABAKUMOV: XTS #8 pp36-37.

ABELEV: International Herald Tribune, November 24 1975; LZS #2 1968 p165 (with S.D. Perova), LZS #2 1968 p150 (with R.D. Bakirov).

ABLYAMITOVA: XTS #41 p59.

ABRAMKIN: XTS #43 pp93-94.

ABRAMOV: SDS v1 AS56 p2; possibly the A.A. Abramov who co-authored with Ye. B. Popov in 1967 in the field of physical chemistry - LZS #11 1968 p30.

AGRANOVICH: SDS v1 AS20 p2; LZS #13 1968 p27 (with V.V. Sukhorutchenko); LZS #1 1966, p23.

AGURSKIY: MS32/74 AS1789 p3; SDS v29 AS1601 pp29-33; SDS v28 AS1508 p17; XZP #26 p64; XTS #36 p59; MS41/75 AS2314 p3.

AYNBINDER: SDS v25 AS1485 p710; SDS v13 AS1125 p13; SDS v13 AS1391 p30.

AKHUNDOV: XTS #18 p10.

AKILOV: SDS v1 AS21 p1; SGZ p111.

ALBER: MS34/76 AS2644 p4; MS8/76 AS2422 p2; AS3272 p1.

AL'BERKHT: SDS v28 AS1530 pp167-193; MS18/76 AS2484 p1; SDS v30 AS2371 pp143-144; XTS #36 p19; AS3051 p26; MS41/75 AS2314 p3.

ALEKSANDROV: XTS #1 p10; LZS #3 1965 p21; LZS #1 1966 p23 (with N.A. Berikashvili) John Turkevich, Soviet Man of Science, (Westport: Greenwood Press, 1975), pp7-9.

ALEKSEYEV, M: AS3051 p26.

ALEKSEYEV, B: SDS v1 AS20 p2.

AL'PERT: SDS v30 AS2966; AS3272 p1.

AL'TSHULER, B: AS3051 p26.

AL'TSHULER, L: XTS #14 pp6-11; SDS v24 AS1196 p2.

ANDRONOV-LEONTOVICH: SDS v1 AS72 p2.

ANTONYUK: LZP #3 p28; XTS #33 pp25,28,40; XTS #27 pp280-281; XTS #28 p31.

ARANOV: SDS v25 AS1409 p238.

ARKHANGEL'SKIY: XTS #2 p15; SDS v1 AS20 p2; LZS #10 1968 p16.

ARNOLD: SDS v1 AS20 p1; SGZ pp114-115; XTS #45 p81; LZS #1 1968.

ARONOV: XTS #7 p17; AS2633; AS3355; SDS v30 AS3299 p466.

ARTSIMOVICH: SDS v4 AS273 p3; Turkevich pp26-29.

ASTAUDROV: SDS v3 AS159 p1; Turkevich pp31-32.

AVERBUKH: SDS v1 AS20 p2; LZS #1 1966 p22; SGZ p109.

AVRIMENKO: SDS v1 AS2 p2.

AZBEL', D: SDS v24 AS1212 p1; SDS v23 AS1173; SDS v28 AS 1598 pp645-646; SDS v24 AS1196 p2, AS1235 p3; SDS v25 AS1299 p2; LZS #1 1965 p91.

AZBEL', M: XTS #37 p26; XZP #3 p56; SDS v25 AS1485 p710; SDS v30 AS2604 p272; AS2966 p263; LZS #9 1968 p31; LZS #3 1965 p27 (with Ye. G. Skrotakaya); LZS #7 1 p20; MS32/74 AS1789 p3; AS3051 p26.

BAHENYSHEV: AS3051 p26; AS3355.

BACHINSKIY: SDS v1 AS 46 p3; XTS #8 p37.

BAGATUR'YANTS: SDS v4 AS274 pp8-11; SGZ p126 (co-authored with BOCHVAR in 19 LZS #16 1968 p32 (with BOCHVAR and A.V. Turkevich)

BAYTMAN: XTS #43 pp91-92.

BAKHMIN: XTS #15 pp12-13; XZP #3 p15; SDS v28 AS1552 p38; MS8/75 AS2006 p6; SDS v6 AS435 p1; AS3051 p26; MS41/75 AS2314 p3.

BALAKINA: SDS v1 AS20 p2; LZS #20 1968 p62 (with A.V. Vvedenskaya, L.A. Misha and Ye. I. Shirokova)

BARABANOV: SDS v13 AS422 p5, AS420 p17, AS426 p11, AS600 pp13,26; XTS #47 p27 AS3051 p26.

BARANOVICH: SDS v1 AS20 p2.

BARBOY: SDS v13 AS1391 p124; LZS #6 1965 p119 (with A.V. Yudin and Ye. S. Milchanosha); LZS #6 1965 p42 (with L.F. Chuprina and A.B. Pashkov).

BASSALYGO: SDS v1 AS20:p2; SGZ p120.

HEGHI: SDS v13 AS1390 p41; SDS v24 AS1212 p4; SDS v25 AS1299 p50; XTS #26 p15; XZP #25 pp26, 28; XZP #27 p21; XZP #29 p24; XZP #30 p20; SDS v22 AS1084 pp1-5; AS3051 p31; XTS #44 pp33-34.

HEYLIN, B: AS3051 p26; MS21/77 AS2956 p2; AS2646; MS24/76 AS2558 p4.

HEYLIN, I: AS3051 p31; MS19/77 AS2966 p2; MS8/76 AS2422 p6; MS19/75 AS2130 p1; SDS v28 AS1557.

HELANOVSKIY: XTS #45 p29.

HELETSKIY: XTS #2 p15; SDS v1 AS46 p2; LZS #5 1968 p216.

HELIR: SDS v22 AS1106 p29.

HELOGORODSKAYA: SDS v1 AS1 p4; AS37 p1, AS96 p1; SDS v12 AS399 p3; SDS v20 AS1007 p98; SDS v28 AS1552 p382; XZP #1 p11; XTS #8 p60; XTS #6 p57; SDS v4 AS289 p2; SDS v6 AS469 pp1-14; MS11/74 AS1552 p2.

HELOOZEROV: SDS v28 AS1501 p1 ; SDS v30 AS2371 pp143-144; MS1/76 AS2451 p1; MS8/76 AS2422 p2.

HELOTAKRNOVSKIY: SDS v25 AS1405 pp211-216, AS1406 p219.

HERZANSKIY: XTS #5 p19,50; SDS v1 AS46 p3.

HERG: XTS #2 p19; SDS v1 AS21 p1; SDS v24 AS1196 p2; SGZ p122 (co-author with A.L. Takhtadshyan in 1964).

HERKINELIT: SDS v1 AS72 p2.

HESKIN: SDS v1 AS20 p2; SGZ p122; LZS #10 1965 p14, 160.

HLINCHEVSKIY: SDS v1 AS20 p3; SGZ p123 (initials are probably either V.S. or I.M.)

HLUMKIN: SDS v2 AS107 p199; LZS #1 1968 p201 (with A.K. Shubladsa, T.M. Mayevskaya, and A.D. Kyaburu); LZS #10 1968 p176 (with V.M. Zhdanov and O.P. Peterson); LZS #11 1968 p182 (with G.T. Akinshina and D.N. Zasukhin).

BOCHVAR: SDS v1 AS20 p2; SGZ p126 (co-authored with BAGATUR'YANTS in 1966); LZS #10 1968 p55 (with N.P. Gambaryan, V.V. Mishchenko and L.A. Kazitayna); LZS #16 1968 p32 (with BAGATUR'YANTS and A.V. Tutkevich).

BODNOVA: SDS v1 AS72 p2.

BOGACHEV: SDS v23 AS1171 p2.

BOYTSOVA: MS6/77 AS2854.

BOKSHTEYN: SDS v1 AS20 p2; SGZ p125.

BOLTRUKEVICH: SDS v2 AS107 pp33, 199.

BOLONKIN: XZP #31 p22; XTS #29 pp51-52; XTS #30 pp88-89; MS34/76 AS2631 pp1-26; AS3051 p26; MS8/76 AS2422 p6; XTS #44 p65.

BONDAR', E: SDS v25 AS1394 p87.

BONDAR', V: SDS v1 AS46 p2.

BONDARCHUK: XTS #5 p50; SDS v28 AS1550 p13; SDS v1 AS46 p2.

BONGARD: SDS v1 AS72 p2.

BORISOV: SDS v1 AS21 p2.

BOROVIKOV: XTS #32 p86.

BOVSHETEROV: SDS v1 AS72 p2.

BRILLOVSKAYA: AS3051 p26; MS34/76 AS2644 p4; MS24/75 AS2156 p1; MS1/77 AS1857 p1; MS32/74 AS1789 p3.

BRILLOVSKIY: SDS v25 AS1485 p710; XZP #3 p56; MS24/75 AS3099 p3; AS3051 p26; MS1/76 AS2451 p1; MS8/76 AS2422 p6; MS42/75 AS2311 p2; MS32/74 AS1789 p4; LZS#5 1968 p193 (with M.I. Shrayber, S.N. Braynes, and A.B. Rusakov).

BRANOVER: XTS #26 p14; XZP #1 p22; LZS #2 1968 p32 (with A.S. Vasil'ev and Yu. M. Gal'fgat); LZS #13 1965 p33 (with TsINOBER and E.V. Shcherbinin); LZS #2 1968 p42 (with G.A. Vitolinysh and R.K. Dukure).

BROVID: XTS #35 p40.

BRUSHLINSKAYA: SDS v1 AS20 p3.

BRYADINSKAYA: SDS v2 AS107 p200; SDS v1 AS2 p2.

BUYKO: XTS #35 pp41-42; XTS #36 p59; AS1935; MS27/74 AS1758 pp1-2.

BURMISTROVICH: XTS #2 p24; XTS #6 p4; XTS #8 pp4-6, 30; XTS #10 p46; XTS #20 p27; SDS v4 AS274; XTS 45 p78.

BURSHTEYN: XTS #23 p22.

BYKOVA: SDS v13 AS1391 pp69,111.

CHAYLAKhYaN: SDS v1 AS72 p5; MS10/75 AS2054 pp4-6; LZS #1 1965 p55 (with BERKINSLIT, KOVALEV and Yu. I. Arshavskiy).

CHALIDZE: SDS v24 AS1196 p2; XZP #1 pp25-26; XTS #16 p36; XTS #10 p18; XTS #28 p43.

CHERNAVSKIY: SDS v1 AS20 p4.

CHERNYSHOV: XTS #18 pp3-5; SDS v8 AS604 pp1-6; XTS #39 p37.

CHIRNOV: XTS #26 p10; XTS #27 p29; XZP #2 p24; XTS #34 p34; XTS #39 p41.

CHUDNOVSKIY, D: XTS #46 pp45-46.

CHUDNOVSKIY, G: XZP #27 p23; XTS #46 pp45-46.

DANIEL: SDS v2 AS107 p33 ; SDS v1 AS1 p4; XTS #8 pp26,46.

DAVIDOV, G: XTS #29 pp51-53; XTS #42 p34.

DAVIDOV, V: MS32/74 AS1789 p4.

DEMNIH: SDS v1 AS2 p2.

DEZA: SDS v1 AS2 p2.

DIKIY: SDS v1 AS72 p2; LZS #3 1968 p65; LZS #1 1968 p44.

DIKOV: XTS #6 p60; SDS v4 AS288 p2.

DINABURG: SDS v1 AS72 p2.

DIONISIYeV: XTS #8 pp36-37.

DISKINA: SDS v13 AS420 p17, AS426 p11, AS600 p14, AS601 p55; LZS #3 1965 p62 (with T. Yu. Ugarova); LZS #8 1965 p147 (with Yu. Z. Gendon); SDS v4 AS278 p1; SDS v5 AS322 p2; SDS v6 AS440 p4.

DOBRUSHIN: SDS v1 AS1 p3; SDS v23 AS1156 p9; SGZ p153; LZS #11 1968 p27 (with MINLOS); LZS #12 1968 p95.

DVORKIN: XTS #14 pp6-11; LZS #1 1965 p47 (with Ye. I. Golub).

DVORKO: XTS #5 p50; SDS v1 AS46 p3; LZS #9 1966 p44 (with T.F. Karpenko, D.F.Mironova, and Ye. A. Shilov).

DYad'KIN: AS3051 p32; MS8/76 AS2422 p6.

DZEBAYeV: SDS v1 AS2 p2; AS2633; AS3051 p27; MS8/76 AS2422 p6.

DZHERILEV: SDS v12 AS379 pp27-30, AS1188 p3, AS1629 pp1-2, AS1879 p3;
SDS v2 AS109 p2; XTS #8 p28,59; XTS #31 p131; SDS v4 AS288 p2; SDS v1 AS103 p1.

DZYUB: SDS v1 AS46 p2; LZS #13 1965 p34; LZS #3 1965 p30.

EYDEL'MAN, G: SDS v1 AS2 p4; SDS v2 AS107 pp31-33.

EYDEL'MAN, V: SDS v1 AS2 p4; SDS v2 AS107 pp31-33; LZS #9 1966 p39 (with
M.S. Khaykin).

ENGEL'GARDT: Turkevich, p99 ; SDS v3 AS159 p2; XTS #14 p7; SDS v29 AS1651 p323;
SDS v25 AS1480 p678.

ESSAS: MS24/76 2558 p5; MS42/75 AS2311 p2; XTS #45 p72.

FAYERMAN: AS3051 p31.

FADEYEVA: SDS v1 AS2 p4.

FAYN: SDS v30 AS2604 p275, AS2953 p652; XTS #46 p26; MS5/75 AS1964 p14;
LZP #25 pp28,44; AS3051 p31; MS27/77 AS3035 p2; MS24/75 AS2156 p1; MS24/75
AS2099 p3; LZS #8 1968 p46; LZS #2 1966 p34 (with G.M. Genkin).

FAYTEL'SON: SDS v6 AS390 p3.

FEDORENKO: SDS v1 AS2 p6; LZS #7 1968 p22; LZS #1 1968 p114 (with V.N. Artemkin
and L.P. Babikova).

FENIN: XTS #37 p53; LZS #29 1968 p33 (with V.A. Konks and Yu. P. Popov).

FENINA: XTS #37 p53.

FET: XTS #2 p18; XTS #5 p49; SDS v1 AS21 p2; LZS #3 1966 (with V.N. Lagunov).

FILIPPOV: XTS #47 pp137-138.

FIN: XTS #18 p27; XTS #22 pp20, 23-24; SDS v30 AS2518 p3.

FINKEL'Shteyn: SDS v30 AS2841a p65; SDS v13 AS1673 p21; LZP #25 p42;
AS3051 p30; MS8/76AS2422 p6; MS32/74 AS1789 p4; MS24/76 AS2558 p4; XTS #45 p72.

FISMAN: XTS #6 p60.

FLITMAN: SDS v1 AS20 p3; possibly the L.M. Flitman who co-authored in the
field of geophysics with L.V. Molotova in 1965 - LZS #1 1966 p47 - and with
L.P. Zaytsev in 1965 - LZS #5 1966 p56.

FOXEYEV: SDS v8 AS564 p4.

FCMEN: XTS #1 p10; XTS #5 p49; SDS v1 AS20 p2; SGZ pp232-233; SDS v20 AS1006 p6.

FRANK-KAMENETSKIY: International Herald Tribune, November 24 1975; LZS #48 1966 p49 (with V. Yu. Gavrilov and A.D. Frank-Kamenetskiy).

FREEMAN: International Herald Tribune, March 6 1979.

FREYDIN: SDS v13 AS426 p11, AS600 pp4, 13, AS601 p55, AS420 p17; SDS v4 AS278 p1; SDS v5 AS322 p2; SDS v6 AS440 p4.

FRIDMAN: SDS v1 AS21 p2; LZS #9 1968 p37 (with A.B. Mikhaylovskiy).

FUKS: SDS v1 AS20 p4; LZS #12 1968 p18; LZS #13 1968 p29 (with GEL'FAND); LZS #27 1968 p34 (article about FUKS, written by GINDIKIN, B.V. Shabat, and L.A. Ayzenberg).

GABOVICH, L: XTS #12 p17.

GABOVICH, Ya: XSS #12 p17; LZS #1 1966 p23.

GAYDEKOV: SDS v28 AS1552 p386.

GAL'PERIN: SDS v24 AS1191 pp3, 25.

GASIEV: XTS #32 p89; XTS #34 p28; XTS #35 p45; SDS v1 AS20 p4; SDS v1 AS1 p3; AS3051 p27; MS41/76 AS2756 p2; MS41/75 AS2314 p3; SDS v29 AS1652 p326; XTS 43 pp50-51

GAUKMAN: SDS v13 AS1125 pp23-24; XTS #22 p14; LZS #6 1965 p23.

GEYNISMAN: XTS #40 p135; LZS #1 1968 p91 (with M.M. Aleksandrovskaya, V.N. Larina and V.N. Mats); LZS #4 1965 (with M.M. Aleksandrovskaya and L.G. Samoylova).

GEL'FAND: MS10/75 AS2054 p4; SDS v1 AS20 p1, AS18 p2; Turkevich, p116; SDS v23 AS1156 p9; SGZ p141; LZS #13 1968 p29 (with FUKS); LZS #12 1968 p14 (with FUKS); LZS #5 1965 p77 (with V.I. Bryzgalov, PYATETSKIY-ShAPIRO and M.L. Tsetlin); LZS #8 1966 p27 (with M.I. Grayev).

GEL'FANDEYIM: SDS v13 AS1125 p40.

GEL'MAN: XTS #37 p54; LZS #19 1968 p86 (with V.G. Yudin).

GENKIN: SDS v1 AS2 p2; AS 22 p1; AS3051 p27; MS19/77 AS2966 p2; MS8/76 AS2422 p6; SDS v29 AS1652; XTS #45 p78.

GERBER: MS24/75 AS2099 p2.

GERSHOVICH: SDS v1 AS2 p2; XTS #5 p52; XTS #19 p32; XTS #27 p33.

GIL'DENGORN: MS2/78 AS3099 p3.

GIL'FELIN: XTS #37 p23.

GINDIKIN: SDS v1 AS20 p3, AS1 p3; SGZ p143 (co-authored with PYATETSKIY in 1965); LZS #12 1968 p14 (with L.R. Volevich); LZS #10 1968 p17 (with VINBERG).

GINZBURG: SDS v3 AS159 p1; Turkevich, pp120-122; LZS #6 1965 p30 (with G.F. Zharkov); SDS v23 AS1156 p8.

GITERMAN: XZP #3 p56; LZS #6 1965 p30 (with V.M. Kontorovich).

GLADKIY: XTS #2 p16; SDS v1 AS21 p2; LZS #11 1965 p184; LZS #9 1966 p20.

GLEZER: XTS #27 p43; XTS #24 p22; LZS #6 1968 (with L.Z. Gaskin).

GODZHENOV: SDS v12 AS379 p6.

GOL'DELAT: SDS v13 AS426 p11.

GOL'DSHTEYN, G: SDS v13 AS1391 pp69, 111; XZP #2 p15; XZP #29 p5; SDS v30 AS3116, p76; AS3051 p27; MS19/77 AS2966 p2.

GOL'DSHTEYN, I: SDS v13 AS1391 pp69, 111; XZP #2 p15; AS3051 p27; MS19/77 AS2966 p2.

GOL'FAND: SDS v30 AS3265 p70; MS5/75 AS1964 p13; AS3272 p1; MS2/78 AS3099 p3; AS3051 p27; MS19/77 AS2966 p2; MS21/77 AS2956 p2; MS24/75 AS2156 p1; MS8/75 AS2314 p3; AS1/77 AS1857 p1; LZS #6 1965 p30; XZP#14 pp6-12.

GOL'DFARB: MS19/75 AS2130 p1.

GOLO: SDS v1 AS20 p3; LZS #9 1968 p24; SGZ p145.

GOLUB: XTS #4 p37.

GOLUBEV: XTS #34 p77.

GORBAN: XTS #11 p44.

GORDEYEV: XTS #40 pp127-128; AS2633; LZS #32 1968 p95 (with K.G. Sheremet'ev).

GORDIN: SDS v5 AS346a.

GORONKOV: XTS#5 p51; LZS #38 1968 p83 (with Yu. B. Chechulin and T.B. Satovskaya)

GOZHIK: SDS v1 AS46 p3.

GRABAR': XTS #2 p16; XTS #32 p78; SDS v1 AS20 p3; AS1 p3, AS72 p2; SGZ p148.

GRIB: SDS v1 AS2 p2.

GRIENIKOV: SDS v1 AS46 p2; LZS #9 1965 p25; LZS #8 1965 p75.

GRIGOR'EV: SDS v1 AS46 p2; LZS #3 1965 p29.

GRISHIN: SDS v1 AS2 p2.

GURFEL': KTS #45 pp80-81; MS32/74 AS1789 p4; MS24/76 AS2558 p5.

GURVICH: SDS v1 AS72 p2; probably the A.S. Gurvich who co-authored an article on atmospheric physics with KALLISTRATOVA - LZS #23 1968 p71.

GURVICH, A: KTS #2 p16; SDS v1 AS72 p2; SDS v30 AS3299 p466; LZS #1 1966 p55 (with Ye. V. Sidorova, A. Ye. Tumanova, and Syuy Fen'); MS42/75 AS2311 p2.

GURVITS: SDS v24 AS1212 p11; SDS v13 AS1391 p31, AS1125 pp56-57, AS1673 p26.

GUSEV: KTS #7 pp17,26; KTS #9 p19; KTS #8 p55; LZS #9 1966 p70 (two articles: one with B. Ye. Bykhovskiy and L.F. Nagibina; the other with N.G. Gavrilova and U. Dzhaliilov).

IL'ICHEV: KTS #2 p16.

IMSHENNIK: SDS v1 AS2 p3; SGZ p163; LZS #9 1966 p29 (with V.F. D'yachenko); LZS #7 1966 p30 (with D.K. Nadezhin).

IOFFE: AS3051 p27.

IOFFE: AS3200.

ISAKOVA: AS3051 p27; MS19/77 AS2966 p2; MS8/76 AS2422 p6.

IVLEV: KTS #1 p13; SDS v23 AS1163.

KABAKOV, F: KTS #32 p86.

KABAKOV, S: SDS v1 AS20 p3.

KADYAEV: KTS #8 p48; SDS v12 AS379 p51; SDS v1 AS40.

KAGANOV: SDS v1 AS72 p3; LZS #12 1968 p28 (with V.G. Peschanskiy); LZS #3 1965 p28 (with F.G. Bass and S.A. Gredeskul); LZS #7 1965 p28 (with A.M. Kadigrobov); LZS #6 1965 p28 (with A. Ya. Elank and Yuy Lu); LZS #8 1966 p35 (with I.M. Lifshits).

KAGANOVA: SDS v1 AS72 p3.

KALLISTRATOVA: SDS v1 AS72 p3; LZS #23 1968 p71 (with A.S. Gurvich).

KIMENOMOSTSKAYA: SDS v1 AS72 p3

KIMPOV: KTS #33 p53; KTS #45 pp60-61; KTS #47 p129.

KINAYEV: SDS v1 AS2 p3; SDS v4 AS268 p2.

KANEVICIUTE: XTS #29 p69.

KAPITANCHUK: AS3051 p27; SDS v30 AS3249 p563; AS3202 p1; SDS v30 AS3141 p118.

KAPITSA: XTS #14 pp7-11; SDS v28 AS1552 p382; SDS v23 AS1156 p8; International Herald Tribune, October 18 1978.

KAPLAN: SDS v1 AS1 p4; SGZ p166; AS3355; SDS v4 AS288 p2; SDS v5 AS302 p8.

KARASEV: XTS #7 p18.

KARPOVICH: MS41/75 AS2314 p3; MS8/76 AS2422 p6.

KASAKIN: XTS #34 p54.

KASHINA: SDS v1 AS2 p3.

KATSONIS: MS41/75 AS2314 p3.

KAZACHKOV: XTS #49 pp26-27.

KEDER-STEFANOVA: SDS v1 AS72 p3.

KELDYSH: SDS v1 AS18 p2; AS28 p2, AS72 p3; SGZ p168; LZS #28 1968 p32 (with A.N. Kozlov).

KELPPERKS: SDS v1 AS20 p3.

KHAIROV: SDS v12 AS379 p49, AS1879 p3; XTS 13 p40; XTS #8 p48.

KHAIT, M: AS1897; MS8/76 AS2422 p5; MS1/77 AS1857 p1; MS27/77 AS3035 p2.

KHAIT, Yu: SDS v25 AS1418 p337.

KHAKHAYEV: SDS v1 AS88 p2; AS3051 p30; AS2633; MS8/76 AS2422 p4.

KHALILOV: SDS v12 AS1877 p38.

KHAZANOV: SDS v1 AS2 p4; possibly the B.I. Kharanov who co-authored an article on measuring equipment in 1967 with L.S. Gorn - LZS #5 1968 p37.

KHEYSIN: International Herald Tribune, November 24 1975.

KHMELEVSKIY: SDS v1 AS20 p4; LZS #33 1968 p34.

KHRIPLOVICH: SDS v1 AS21 p2; LZS #12 1968 p34 (with L.B. Okun'); LZS #3 1968 p44 (with L.B. Okun'); LZS #24 1968 p39 (with V.V. Sokolov).

KILOV: XTS #43 pp 91-92.

KIL: SDS v1 AS20 p3; SGZ p169; LZS #13 1968 p30; SDS v5 AS302 p8.

KIRILLOV: SDS v1 AS20 p2; SGZ p169-170 (co-authored with GEL'FAND in 1964); LZS #9 1968 p25; LZS #12 1968 p15.

KIRTNITS: SDS v1 AS2 p3.

KISELEVICH: SDS v13 AS426 p11.

KISLIK: XTS #32 p85; XZP #27 p22; AS2951; XTS #45 pp73-74.

KISLINA: SDS v4 AS274 p14; Posey, 4th Special Issue, June 1970, pp43, 61; LZS #10 1966 p177 (with I.I. Nikol'skaya, N.M. Shalina and T.I. Tikhonenko).

KIT: SDS v13 AS1125 p39.

KLIMANOVA: AS3051 p28; MS8/76 AS2422 p6.

KNUNYANTS: SDS v3 AS159 p2; Turkevich, p166; LZS #9 1966 p44 (two articles: one with N.Ye. Golubeva and D.P. Del'tsova, the other with S.T. Kocharyan and ROKHLIN); LZS #6 1965 p42 (with S.E. Zurabyan, L.P. Rasteykene and O.V. Kl'disheva); LZS #4 1968 p44 (with B.L. Dyatkin, K.N. Makarov, and R.A. Bekker); LZS #4 1968 p45 (with ARONOV and Yu. A. Cheburkov); SDS v23 AS1156 p8.

KOGAN: SDS v13 AS420 p17, AS426 p11; SDS v5 AS322 p5.

KOLMOGOROV: XTS #1 p9; Turkevich p171.

KOMODROVA: SDS v4 AS288 p2.

KON: XTS #2 p16; SDS v1 AS72 p3; LZS #13 1966 p23.

KONDRAT'EV: SDS v1 AS20 p2; SGZ p171.

KONENKO: SDS v1 AS2 p5.

KONSTANTINOV: SDS v1 AS20 p3.

KOPYLOV: SDS v1 AS2 p3; SGZ p171 (probably G.I. Kopylov)

KORCHAK: SDS v30 AS2542 pp1,5; AS3051 p28; MS41/76 AS2756 p2; AS2633; MS8/76 AS2422 p3; LZS #1 1966 p26.

KORENBLIT: SDS v22 AS1071 p5, AS1085 pp11, 166; SDS v13 AS426 p24, AS601 p23, AS1390 p2, AS1085 p5.

KOROLEV: SDS v1 AS46 p2; LZS #46 1968 p37 (with B.D. Konstantinov).

KOSTERINA: AS3051 p28; MS8/76 AS2422 p4; MS41/75 AS2314 p3; MS8/75 AS2006 p6; SDS v4 AS289 p2.

KOVALEV: XTS #8 p25; XTS #9 p2; XTS #14 pp6-11, 34-35; SDS v30 AS3129 p359, AS2371 pp143-144; SDS v24 AS1196 p2; SDS v4 AS288 p3; XTS #34 p5; XTS 37 p24; SDS v4 AS264 p1; SDS v1 AS103 p1, AS72 p3.

KOVALEVSKAYA: SDS v1 AS2 p5.

KOVNER: MS2/78 AS3099 p3.

KRISTI: XTS #1 p10; XTS #27 p33; SDS v24 AS1196 p2; SDS v28 AS1552 pp384, 386; AS3051 p32; MS8/76 AS2422 p5; SDS v1 AS2 p3, AS20 p4.

KRONROD, A: XTS #1 p10; XTS #2 p17; SDS v1 AS20 p3; SGZ pp175-176; SDS v20 AS1001 p6.

KRONROD, L: XTS #2 p17; SDS v1 AS20 p3; LZS #10 1966 p39 (with N.I. Zhirnov).

KRUZHKOVA: SDS v1 AS20 p3; SGZ p176; LZS #10 1966 p30; LZS #1 1965 p23.

KRYLOV: SDS v1 AS20 p3; LZS #8 1965 p19.

KUDRIN: XTS #40 pp133-134.

KULAGIN: SDS v1 AS20 p3.

KULAKOV: SDS v1 AS21 p2; SGZ p177.

KULIKOV: SDS v8 AS564 p3.

KULYUPIN: SDS v1 AS46 p2.

KUROSH: SDS v1 AS20 p2; SGZ p178; LZS #27 1968 p34 (article about KUROSH, written by ALEKSANDROV, L.A. Skornyakov and B.I. Plotkin).

KURSA: XTS #38 pp35-37.

KUSHEV: SDS v1 AS50 p1; probably the V.V. Kishhev who authored article in the field of microbiology with S. Ye. Bresler, R.A. Kreneva and M.I. Mosevitskiy in 1964 - LZS #8 1965 p53.

KUSHNAREV: XTS #46 p48; LZS #34 1968 p159 (with A.S. Bykov, T.A. Smirnova and V.S. Tyurin).

KUSTANOVICH: SDS v25 AS1418 p338.

KVACHEVSKIY, L: XTS #2 p19; XTS #5 pp14-16; XTS #10 pp33, 43; XTS #11 pp16-17; XTS #13 p30; SDS v22 AS1102 p2; SDS v1 AS2 p3, AS50 p1; XTS #14 pp23-34; XTS #34 p68; SDS v6 AS383 p13.

KVACHEVSKIY, O: SDS v1 AS57 pp1-2; XTS #5 p48; SDS v30 AS3008 p259.

LADYZHENSKIY: XTS #30 pp93-94; XTS #32 p85; XTS #34 pp11, 32; LZS #4 1965 p15; Delo Tverdokhlebova (New York: Khronika Press, 1976), pp21-22.

LANDA: SDS v25 AS1408 pp225-236, AS1415 pp301-309; XTS #30 p114; XZP #26 p6; XZP #28 pp56-62; XZP #29 p5; AS3384 p3; MS19/77 AS2966 p2; MS8/76 AS2422 p5; MS8/75 AS2006; AS3051 p28; MS41/75 AS2314 p3; XTS #46 pp5-8.

LANDIS: SDS v1 AS20 p2; SGZ p179.

LAVROV: XTS #8 p36.

LAVUT: XTS #8 p25; XTS #10 p9; SDS v30 AS3299 p467; SDS v4 AS288 p3; XTS #3⁴ p28; SDS v1 AS72 p3; AS3051 p28; MS8/76 AS2422 p5; MS41/75 AS2314 p3; MS8/76 AS2006 p6; SDS v29 AS1652; SDS v30 AS2966 p263, AS2518 P159; SDS v1 AS103 p1.

LAZURKIN: International Herald Tribune, November 24 1975.

LEONTOVICH: XTS #14 pp4,6; XTS #17 p11; SDS v24 AS1196 p2; AS 1283 p1; SDS v23 AS1156 p8; Turkevich, p220; SDS v1 AS72 p3.

LERNER: SDS v30 AS2966 p263, AS3231 p304; SDS v24 AS1196 p2, AS1211 p2, AS1212 p1, AS1235 p5; SDS v22 AS1085 p164; SDS v13 AS1391 pp121-122; XTS #24 p36; AS3272 p1; MS2/78 AS3099 p3; AS3051 p31; MS19/77 AS2966 p2; MS41/76 AS2756 p2.

LEVICH, Ye: International Herald Tribune, November 17 1978; SDS v24 AS1235 p4; AS1196 p1; SDS v28 AS1522 p105; XZP #2 p16.

LEVICH, V: International Herald Tribune, October 24 1978, November 17 1978; SDS v30 AS2604 p273; SDS v24 AS1196 p2, AS1235 p4; XZP #3 p40; Turkevich, p220. AS3272 p1; MS2/78 AS3099 p3; AS3051 p28; MS41/76 AS2756 p2; LZS #3 1965 p32 (with V.S. Krylov); LZS #1 1965 p32 (with V.A. Kir'yanov).

LEVIN: SDS v23 AS1156 p9; Turkevich, p219; SDS v1 AS2 p5; Delo Tverdokhlebova, p33.

LEVIT: SDS v24 AS1191 pp3, 25.

LEVSHENKO: SDS v1 AS20 p3.

LIBERMAN: XTS #8 p32; LZS #1 1965 p55; LZS #39 1968 p35 (with SMOLYANINOV and L.N. Ermishkin)

LIFSHIT: SDS v13 AS1391 pp113, 123.

LILENKO: XTS #5 p50.

LIPKOVSKIY: SDS v13 AS426 p11, AS600 p13.

LISOVSKAYA: XTS #15 p21; SDS v30 AS3299 p466; XTS #39 p61; AS3051 p28; MS8/76 AS2422 p6; MS41/75 AS2314 p3; MS8/75 AS2006 p6; LZS #3 1965 p69 (with N.B. Livanova and G.V. Silonova).

LITVINOV: SDS v29 AS1609 pp57-59; SDS v20 AS1007 p98; SDS v2 AS107; XZP #1 XTS #4 p34; XTS#6 p63; SDS v1 AS68 pp1-2; SGZ p182.

LODShICH; SDS v1 AS20 p2.

LOZANSKIY: International Herald Tribune, April 27 1979, p5.

LOZANSKIY: International Herald Tribune, April 27 1979, p5.

LUBChENKO: SDS v1 AS46 p2; LZS #47 1968 p23 (with A.S. Davydov).

LUChKOV: SDS v1 AS2 p2; XTS #2 p17.

LUNT: SDS v25 AS1485 p710; XZP #3 p56; XTS #37 p26; SGZ p183; MS8/76 AS242 MS5/76 AS2355 p1; SDS v1 AS20 p3; LZS #11 1965 p80 (with B.B. Lapuk, S.N. Zaki and N.Kh. Garifullina); MS32/74 AS1789 p4.

LUR'E: XTS #43 p101.

LYSENKO: XTS#13 p35.

LYuBARSKIY, K: SDS v28 AS1524 pp115-129; SDS v30 AS2931 pp337-341, AS3019 p XZP #1 pp7-8; XTS #28 pp16-21; XTS #37 p50; XZP #28 pp24-25; AS3051 p28; SDS v. AS3031; MS19/77 AS2966 p2; MS8/76 AS2422 p5; MS11/74 AS1552 p3.

LYuBARSKIY, Yu: XTS #6 p60.

LYuRLIN: SDS v1 AS46 p3.

LYuSTERNIK: Turkevich, p228; SDS v1 AS20 p1.

MAKSIMOVA: SDS v1 AS2 p5.

MALKIN: SDS v13 AS426 p11, AS600 p13.

MANDEL'TsVEYG: SDS v24 AS1212 p1; AS1211 p2; SDS v13 AS1673 p28; LZS #1 1965 (with Perelomov, A.M.)

MANEVICH: SDS v29 AS1674 p493; SDS v28 AS1536 pp257-81.

MANIN: SDS v1 AS20 p2; SGZ p186; LZS #10 1966 p30.

MARCHUKOV: SDS v1 AS72 p3.

MARESin: MS41/75 AS2314 p3; MS41/75 AS2315 p1; XTS #35 p22; AS3051 p31; MS8/ AS2422 p6; XTS #40 pp70-74; MS2/75 AS1910 p1.

MARGULIS: XTS #32 p86; possibly the A. Ya. Margulis who co-authored an article with S.I. Zetel' in 1965 - LZS #10 1965 p14).

MARKOV: SDS v1 AS20 p1; SGZ p186; Turkevich, p233.
233

MARTEM'YANOVA: XTS #41 p78.

MASHKOV: SDS v1 AS88 p2; AS3051 p28.

MASHKOVA: SDS v29 AS1611 pp67-69; AS3051 p28; MS19/77 AS2966 p2; SDS v28 AS1582;
SDS v23 AS1171.

MATVIYANKO: XTS #8 p37; SDS v1 AS46 p3.

MEDVEDEV: XTS p62; SDS v24 AS1199 pp122-126; XTS #26 p22; XZP #1 p26; XZP #
pp37-39; XTS #14 pp7-8. 3

MEDVEDOVSKAYA: SDS v1 AS72 p3.

MEYMAN: SDS v30 AS2903 p19, AS2993 p294, AS3299 p467, AS3265 p703, AS2903 p19;
XZP #25 p49; XZP #26 p36; SDS v1 AS20 p2, AS2 p5; AS3384 p3; AS3272 p1; MS2/78
AS3099 p3; AS3051 p31; MS19/77 AS2966 p1; MS41/76 AS2756 p2; LZS #3 1965 p33.

MEL'NIKOV: XTS #5 p52.

MEMETOV: SDS v12 AS379 pp31,33.

MEN'SHOV: SDS v1 AS20 p1; SGZ p188; Turkevich, p240.

MESHKOVSKIY: SDS v1 AS72 p3.

METLIN: SDS v1 AS2 p3.

MIGDAL: SDS v3 AS159 p2; Turkevich, p242.

MIKHAYLOVA: SDS v1 AS20 p3; LZS #20 1968 p30.

MIKHAYEV: XTS #49 p74.

MIKULINSKIY: MS5/75 AS1964 p14; MS8/76 AS2422 p5; MS24/75 AS2156 p1; MS1/77
AS1857 p1; MS32/74 AS1789 p4.

MILLER: SDS v1 AS72 p3.

MILASHEVICH: XTS #15 p21; XTS #5 p49; SDS v1 AS2 p3; SDS v4 AS288 p3.

MINLOS: SDS v1 AS20 p3, AS1 p3; SGZ p189; LZS #11 1968 p27 (with DOBRUSHIN);
LZS #9 1968 p37 (with SINAY).

MINUKHIN: Mark Popovskiy, "A View from Inside; Three Letters on Soviet Science,"
Survey Volume 23 No2 (Spring 1977-78), pp143-144.

MIRZAYAN: XTS #41 p70; XTS #43 pp99-100; LZS #19 1968 p41 (with S.G. Al-
Ya. P. Matochkin and A.A. Podminogin).

MIZYAKIN: XTS #37 p24; AS3051 p31; MS8/76 AS2422 p5; MS41/75 AS2314 p3,

MNYUKH: SDS v20 AS2903 p19; XZP #25 p49; XZP #26 p17; AS3051 p28; MS19/
AS2966 p2; MS21/77 AS2956 p2; MS41/76 AS2756 p2; LZS #9 1965 p30 (with A.I.
Kitaygorodskiy and Yu. G. Asadov).

MOGILEVER: SDS v22 AS1071 pp3,7, AS1085 p11; SDS v13 AS1390 p2, AS1085 p
SDS v16 AS479v p10; SDS v6 AS431 p2.

MOYSHEZON: SDS v24 AS1212 p1, AS1211 p2.

MOKARIK: SDS v1 AS72 p4.

MOSTOVAIA: SDS v1 AS72 p4.

MOTYL': XTS #6 p61.

MUCHNIK: SDS v1 AS2 p3; SDS v4 AS278 p1; SDS v5 AS322 p2.

MYSLOBODSKIY: XTS #40 p135; LZS #3 1966 p54 (with A.M. Ivanitskiy)

MYUGE: XTS #22 pp20-21, 24; XZP #2 p13; XZP #3 p41; XTS #30 p116.

NAYDOFF: XTS #2 p17; SDS v1 AS21 p2.

NAKHMANSO: SDS v1 AS21 p2.

NATAPOV: SDS v1 AS2 p3; AS2504.

NAUMOV: MS42/74 AS1806 pp1-15; MS25/74 AS1719, AS1718.

NAZARYAN: XTS #48 pp31-33; XTS #47 p38.

NEYFAKH: XTS #6 p60; SDS v4 AS288 p3; XTS #32 p92; LZS #8 1965 p51 (artic-
about ENGEL'GARDT).

NIKLES: SDS v8 AS564 p13; MS26/77 AS2919 pp1-5; XTS #42 p22; XTS #43 pp45-
XTS #47 pp39, 41.

NIKOLAYEV: XTS #16 p36; SDS v30 AS3299 p467; AS3051 p28; MS8/76 AS2422 p6;
p89-91, 39; XZP #12 pp25-31, Vol'noye slovo v31-32 (Frankfurt:Posev, 1978) p1

NORVAISAS: XTS #29 p69.

NOVIKOV;P: SDS v1 AS20 p1, AS18 p2; Turkevich, p268.

NOVIKOV, S: SDS v1 AS20 p1, AS72 p4; SGZ p193.

OL'KHOVAYA: SDS v30 AS2522 p328.

ONISHCHIK: SDS v1 AS20 p3; SGZ p195-196; LZS #8 1965 p2.

ORAYEVSKIY: SDS v1 AS46 p3; LZS #9 1968 p36 (with S.M. Levitskiy); LZS #9 1966 p31 (with Ye. Ya. Kogan and S.S. Moiseyev).

OREVNIKOV: SDS v1 AS20 p3.

ORLOV: SDS v30 AS2903 p17, AS2371 p143; SDS v48 AS1501 p1; XTS #32 p11, 105, XTS #34 p15; XTS #36 p15; MS8/75 AS2006 p6; XZP #25 pp7, 87-88; XZP #30 p68; MS4/77 AS2795 pp1-7; MS34/74 AS1813 pp1-2; MS11/74 AS1594; LZS #10 1966 p36 (with V.N. Bayyer).

ORLOVSKIY: SDS v30 AS2371 pp143-144; SDS v28 AS1501 p1; XTS #16 p31; XTS #30 p113; XTS #34 pp60-61; XTS #41 p31; MS8/76 AS2422 p5; MS1/76 AS2373 pp1-8.

OSMANOV, S: SDS v12 AS379 pp32-33.

OSMANOV: SDS v12 AS379 pp31-33; SDS v1 AS91, AS85.

PAAL: AS2919, p4.

PALAMODOV: SDS v1 AS20 p2; SGZ p199; LZS #23 1968 p38.

PANFILOVA: AS3051 p28; MS41/76 AS2756 p2.

PANOV: SDS v1 AS20 p3.

PANOVA: SDS v4 AS288 p3.

PATATSKAK: XTS #41 p25.

PAVLINCHUK: XTS #1 p10; XYS #2 p17; XTS #3 p29; XTS #5 p51; SDS v1 AS2 ps; SDS v2 AS108 p1; LZS #5 1965 p29 (with L.N. Usachev and N.S. Rabotnov).

PEK: SDS v2 AS107 pp31-32; LZS #13 1966 p54.

PETRENKO: XTS #8 p35; SDS v30 AS3299 p467; AS3051 p29; AS3355; AS3200; AS2633.

PETROV: SDS v23 AS1163; LZS #50 1968 p130; LZS #24 1968 p126.

PETRYAYEVSKIYA: MS41/75 AS2314 p3.

PETUKHOV: XZP #26 pp17-18; LZS #6 1974 p73 (with T. Vitanov); LZS #31 1974 p91 (with V.I. Tishchenko).

PEVZNER: SDS v13 AS426 p11, AS600 p13.

PIMENOV: SDS v25 AS1460 p552; XTS #16 pp31-32; XTS #32 p88; XTS #15 pp15-16
LZS #13 1965 p28; SDS v21 AS1024 pp1-4.

PLOTKIN: XTS #11 p45.

PLIYuShch: SDS v30 AS1829 p325, AS2518 p159; SDS v29 AS1619 pp141-152; SDS v
AS1420 pp372-373; XZP #1 p10; XZP #5 p50; XZP #29 p60; SDS v1 AS 52 p2; SDS v
AS264 p1, AS288 p2; SDS v1 AS103 p1; SDS v28 AS1550 pp3-22.

POD*YaPOL'SKIY: SDS v30 AS2518 p161, AS2522 p328; XTS #8 p35; SDS v1 AS2 p
MS8/76 AS2422 p6; MS8/75 AS2006 p6; SDS v29 AS1652, AS1622; SDS v4 AS 264 p1,
AS289 p2.

POKROVSKAYA: SDS v1 AS72 p4.

POKROVSKIY: SDS v1 AS46 p3.

POLIKRANOV: SDS v30 AS3299 p466; XZP #28 p26; XZP #29 p23; XZP #31 pp9,24;
AS3355; AS3271; XTS #47 pp73-75.

POLYUSUK: XTS #37 p53.

POL'SKIY: SDS v24 AS1212 p2, AS1211 p2, AS1235 p4; SDS v13 AS1390 p45, AS13
pp17,31; SDS v9 AS628 p5; XTS #34 p68; MS1/76 AS2451 p2.

POLYAR: SDS v1 AS1 p3, AS20 p3; SGZ p203; LZS #13 1968 p29 (with L.G. Gurin
and E.V. Rayk).

PONOMAREV, V.V.: SDS v6 AS421 p2; SDS v4 AS251; SDS v1 AS2 p3; SDS v9 AS662

PONOMAREV, V.I.: SDS v1 AS20 p2; Turkevich, p9.

POPOV, A: SDS v1 AS 2 p3.

POPOV, Alek.: Delo Tvardokhlebova, p23.

POPOV, V: SDS v23 AS1171.

POSTNIKOV: SDS v1 AS20 p2; SGZ p205.

POSTNIKOVA: XTS #43 pp48-49.

POSVYANSKIY: SDS v1 AS72 p4.

POVZNER: SDS v1 AS20 p2; SGZ p201.

PRIVOROTSKIY: SDS v29 AS1604 pp43-44; SDS v28 AS1509 p27; MS1/76 AS2451 p1.

PUTI: SDS v1 AS46 p3; XTS #8 p37.

PYATETSKIY-ShAPIRO: MS5/75 AS1964 p14; SDS v1 AS20 p2; SGZ p206; MS24/75 AS2156 p1; MS24/75 AS2099 p3; LZS #3 1965 p23 (with S. NOVIKOV and ShAFAREVICH).

RASHNOVICH: SDS v1 AS72 p4.

RAYEVSKIY: SDS v25 AS1418 p337.

RAYKHMAN: XTS #18 p17.

RAMM: MS24/75 AS2156 p1; MS1/77 AS1857 p1; MS32/74 AS1789 p4; possibly the D.V. Ramm who co-authored in the field of measuring instruments in 1964 with L.G. Etkin and V. Ya. Yanovskiy - LZS #3 1965 p59.

RAMONAS: XTS #29 p70.

RAPP: XTS #7 p17; SDS v1 AS2 p3; SDS v2 AS107 p214; probably the I. Yu. Rapp who coauthored with I.N. Shklyarevskiy and R.G. Yarovaya in the field of physics in 1968 - LZS #48 1968 p49.

RASHKINENE: SDS v29 AS1654 p329.

RASHKINIS: SDS v29 AS1654 p329.

RATNER: SDS v25 AS1299 p49.

REGEL'SON: XTS #41 pp9-12; AS3051 p29; MS19/77 AS2966 p1; MS8/76 AS2422 p5; MS25/74 AS1718 pp1-5.

REKURRATSKIY: AS3051 p29; MS41/75 AS2314 p3.

REZNIKOV: SDS v1 AS2 p4.

RIGERMAN: SDS v13 AS601 p58; XTS #17 pp31-32; LZS #3 1966 pp29-30 (with Z.I. Shapiro, S.A. Fedulov and Yu. N. Venovtsev); SDS v6 AS440 p3.

RIPS: SDS v24 AS1274 p1; XTS #10 p21; XTS #11 p45; XTS #7 p17; XTS #8 pp30,56; SDS v2 AS110 p1.

RODIONOV: XTS #2 p18; XTS #1 p10; SDS v1 AS72 p4.

ROGINSKIY: SDS v25 AS1485 p710; SDS v13 AS1391 pp17,30; XZP#3 p56; SDS v13 AS1673 p26; MS1/76 AS2451 p2.

ROKHLIN: XTS #8 p36; LZS #4 1968 p40 (with S.T. Kocharyan and KNUNYANTs); LZS #6 1966 p44 (with S.T. Kocharyan and KNUNYANTs).

ROKITZANSKIY: SDS v1 AS2 p6; SDS v4 AS253 p3; XTS #29 p65; SDS v4 AS288 p2; SDS v1 AS103 p1.

ROMANOVA: XTS #2 p18; SDS v1 AS72 p4.

ROMKIN: XTS #36 p57; XTS #37 p61; SDS v1 AS88 p2; MS8/76 AS2422 p6; AS3051 1

ROZENFEL'D: SDS v1 AS18 p2; possibly the Ye.L. Rozenfel'd who co-authored an article in the field of biochemistry with D.M. Belen'kiy in 1967 - LZS #24 1968 p71.

ROZENShTEYN: SDS v30 AS2953 p653; XZP #25 p44; MS41/75 AS2314 p3; XTS #34 p4 XTS #35 p45; MS2/78 AS3099 p3; AS3051 p29; MS 1/77 AS1857 p1.

ROZHKOVA: SDS v20 AS1006 p9; SDS v1 AS21 p2.

RUBINIA: SDS v1 AS2 p4.

RUDAKOV: SDS v6 AS469 pp2,6; SDS v1 AS1 p4, AS103 p1; AS3051 p29; MS8/75 AS2 p6; SDS v29 AS1652; SDS v4 AS288 p2.

RUDOY: SDS v1 AS72 p4.

RUDZHITSKIY: SDS v22 AS1106 pp8-9.

RYVKIN: Delo Kovalaya (New York, Khronika Press, 1976), p40; MS41/75 AS2314

SAKHAROV: SDS v30 AS657b p204; SDS v29 AS1658 p353, AS1696 p755; SDS v28 AS1 p33, AS1541 p301, AS1545 p309; SDS v25 AS1463 pp559-566, AS1470 pp613-622, AS14 p676; XTS #7 p17; MS19/77 AS2966 p2; SDS v23 AS1156 p8.

SALANSKIY: XZP #26 p24; AS2646; LZS #13 1965 p42 (with A.I. Drokin, R.P. Smol and S. Sh. Gendelev); XTS #44 pp92-93; XTS #45 p72; LZS #46 1968 p36 (with A.I. Pol'skiy, R.G. Khlebopros, and L.V. Mikhaylovskaya).

SALOVA: XZP #28 p31; AS3051 p29; MS19/77 AS2966 p2; MS41/76 AS2756 p2; MS8/76 AS2422 p6; MS41/75 AS2314 p3; XTS #46 p79.

SAMSONOV: XTS #8 p30; SDS v22 AS1077 p8; XTS #18 pp36-37.

SAREY: SDS v1 AS46 p4.

SELEZHENKO: XTS #24 p7; XTS #26 pp18-19; XTS #27 pp2-5.

SELIVANOV: SDS v4 AS288 p2.

SEMIENOVA: SDS v1 AS46 p4.

SEMYACHKIN: SDS v1 AS21 p2.

SENDEROV: XTS #45 p79.

ShABASHOV: AS3051 p30; MS8/76 AS2422 p6; AS2264; New York Times, October 20,

ShABAT: SDS v1 AS21 p2.

ShAFAREVICH: International Herald Tribune, November 18-19 1978; SDS v30 AS2575 p533, AS3003zh p549; SDS v29 AS1658 p353; SDS v27 AS1300 pp1-71; XZP #2 p49; XTS #34 p84; Turkevich, p334; SDS v1 AS18 p2, AS20 p1; SGZ p241; AS3051; MS34/74 AS1813 p2.

ShAKhVERDIAN: AS2014; AS2285 p12; XTS #33 p44; MS8/76 AS2422 p6; XTS #42 p34; XTS #39 pp32-34.

ShANINA: SDS v1 AS46 p2.

ShAPIRO, I: XTS #32 p92.

ShAPIRO, Z: SDS v1 AS2 p6, AS20 p4; SGZ p240.

ShARYGIN: SDS v1 AS20 p4.

ShEKA: SDS v1 AS46 p2.

ShEPELEV: MS21/77 AS2956 p2; MS8/76 AS2422 p5; MS1/77 AS1857 p1; AS3051 p30; MS32/74 AS1789 p4; MS24/75 AS2156 p1; possibly the M.I. Shepelev who co-authored with T.N. Kamanshchikova and V.V. Chernaya in the field of meteorology in 1968 - LZS #46 1968 p71.

ShER: XTS #11 p54; XTS #9 p47.

ShESTOPAL': XTS #2 p18; SDS v1 AS20 p4.

ShIFRIN: SDS v1 AS72 p5.

ShIK: SDS v1 AS72 p5; LZS #1 1965 p55 (with V.I. Krinsky).

ShIKhANOVICH: XTS #2 p18; SDS v30 AS2522 p328, AS1829 p325; SDS v24 AS1196 p2, AS1244 p1; SDS v28 AS1552 p384; XZP #1 p14; XZP #2 p10; XTS #30 p88; XTS #32 p63; SDS v1 AS20 p4; MS41/76 2756 p2.

ShILOV: XTS #5 p50; SDS v1 AS20 p2; SGZ p242.

ShMAYN: SDS v1 AS2 p4.

ShMIDT: SDS v1 AS72 p5; LZS #17 1968 p45.

ShTENGEL': XTS #2 p19; SDS v1 AS21 p2.

ShTERN, A: XTS #34 pp15-19; AS1905.

ShTERN, V: XTS #34 pp15-19; AS1905; AS2354.

ShTIL'MAN: MS33/75 AS2267 pp1-3, AS2270 p1.

ShUB: SDS v1 AS72 p5.

ShUSTER: SDS v1 AS2 p4; AS3355; AS3051 p30; AS2633; MS8/76 AS2422 p5; SDS v29 AS1652 p3; Delo Tverdokhlebova, pp33-34.

ShchADRIN: SDS v1 AS2 p4.

ShchARANSKIY: XTS #34 p66; XZP #26 p78; XZP #31 p5; AS3051 p30; MS19/77 AS2956 p2; MS1/76 AS2451 p2; MS19/75 AS2130 p1; MS32/74 AS1789 p4.

ShchEGLOV: SDS v1 AS2 p4; AS3249; AS3202 p1; AS3051 p30; AS2633; MS8/76 AS2422 p4.

SIMOLON: SDS v1 AS72 p4.

SINAY: SDS v1 AS20 p2; Turkevich p172; SGZ p220; LZS #23 1968 p39.

SIPACHEV: SDS v1 AS2 p4; SGZ p220.

SIROTININ: AS3051 p28.

SITENKO: SDS v1 AS46 p3; LZS #34 1968 p38 (with V.F. Kharchenko and S.A. Shadchi

SIVASHINSKIY: XTS #23 p21.

SKLYARENKO: SDS v1 AS46 p3.

SKOBEYEV: SDS v1 AS20 p3.

SKOROKHOD: SDS v1 AS46 p3; XTS #5 p50; LZS #4 1965 p17.

SKVIRSKIY: AS3051 p31; SDS v2 AS107 p33.

SMIRNOV: SDS v1 AS20 p2; Turkevich, p8; SGZ p222.

SMOLKIN: AS3051 p29; AS2633; MS8/76 AS2422 p4.

SMOLYANINOV: SDS v1 AS72 p4; LZS #1 1965 p55; LZS #39 1968 p35 (with LIEBERMAN and L.N. Ermishkin).

SMOLYANSKIY: SDS v1 AS20 p3; SGZ p222.

SCYDA: SDS v1 AS50 p1.

SOKOLOV: SDS v1 AS21 p2; probably the V.V.Sokolov who co-authored with KhRIPLOVICH in the field of nuclear physics in 1968 - LZS #24 1968 p39.

SOKOLOV, Yu. D: SDS v1 AS46 p3; LZS #14 1968 p29.

SOKOLOV, Yu. N: SDS v1 AS72 p4.

SOLOV'EV: XTS #27 p31; AS3051 p6.

STAROSTIN: SDS v1 AS p4; LZS #9 1965 p27 (with V. Kas'yanov).

СТАРОВИТАЯ: SDS v30 AS2839 pp43,45, AS2966 p263, AS3195 p677; SDS v28 AS1559 p446; XTS #18 pp14-15; XTS #22 p10; AS3051 p29; XTS #43 p44; XTS #44 pp62-63; XTS #47 p129.

STUDENKOV: XTS #5 pp48-49; SDS v6 AS383 p8.

SUSHKO: SDS v1 AS2 p4.

SYROYeChKOVSKIY: SDS v1 AS2 p6; SDS v4 AS288 p2.

TALANTOV: XTS #18 p35; XTS #10 p5; XTS #8 p41; SDS v4 AS253 pp2-3.

TAMM: XTS #14 pp7-8; Turkevich p388.

TARATUTA: AS2909.

TARTAKOVSKIY: XTS #6 p60.

TATARSKIY: SDS v1 AS2 p4, AS72 p4; SDS v23 AS1156 p9; SGZ p226.

TAVGER: XTS #5 p51; XTS #6 p60.

TAVGER, B: SDS v13 AS1125 p21; LZS #9 1965 p32.

TEMKIN: SDS v25 AS1401abch p200, AS1401s p180, AS1418 pp318,332,336.

TER-GRIGOROV: XTS #23 p29.

TIKHOMIROV: SDS v1 AS20 p3.

TIMACHEV: SDS v1 AS2 p4, AS22 p1; AS3355; MSB/76 AS2422 p5; MSB/75 AS2006 p6; SDS v29 AS1652; SDS v4 AS288 p3, AS289 p2; SDS v1 AS103 p1; AS3051 p29.

TOLPYGO: SDS v1 AS46 p4; LZS #1 1968 p45 (with S.M. Zubkova); LZS #8 1965 p27 with G. Ye. Chayka).

TOMCHUK: SDS v1 AS46 p2; LZS #9 1965 p25 (with I.M. Dykman).

TOSHINSKIY: XTS #5 p51.

TOVSTUKHA: SDS v1 AS72 p4.

TRIFONOV, E: MSB/76 AS2422 p4; AS2644; AS2633; AS2527; AS2296; XTS #38 p86; International Herald Tribune, November 24 1975.

TRIFONOV, V: XTS #26 p10, Vol'noye slovo, v31-32 (Frankfurt: Posev, 1978), p36.

TsAPELKO: XTS #35 p43.

TsEYTLIN: SDS v13 AS601 p55; LZS #8 1965 p74 (with B. Ye. Kinber).

TsEKHMISTRENKO: XTS #2 p18; XTS #5 p49; SDS v1 AS46 p2; LZS #12 1965 p40.

TsELYKH: XZP #27 p11.

TsINMAN: SDS v1 AS20 p4.

TsINOBER: XTS #45 pp80-81; LZS #13 1965 p33 (with ERANOVER and E.V. Shcherbinin)
LZS #13 1965 p42 (with E.V. Shcherbinin and A.G. Shtern); LZS #14 1968 p42 (with
Kh. E. Kalis).

TsUKERMAN: SDS v30 p203; SDS v16 AS479a pp23,25, AS1056 pp1-26; XTS #18 p21; XZP
#14 p7; SDS v6 AS440 p3.

TUPITsIN: SDS v1 AS2 p4.

TURCHIN, V: XTS #14 pp4,9,36; SDS v25 AS1464 p567; XTS #7 p16; XZP #25 p32;
XZP #28 p25; SDS v1 AS2 p4; MS41/76 AS2756 p2; MS19/77 AS2966 p2; AS3051 p29;
LZS #20 1968 p32; XTS #45 pp77-78.

TURCHIN, K: SDS v1 AS2 p4; SGZ p229; LZS #45 1968 p50 (with M.N. Preobrazhenskiy
L.A. Savel'eva and N.N. Suvorov); LZS #4 1968 p84 (with V.F. Bystrov and M. Ya.
Karpeyskiy).

TURUNDAYEVSKAYA: SDS v4 AS274 p3.

TURUNDAYEVSKIY: SDS v4 AS274 pp13-14.

TUTUBALIN: SDS v1 AS20 p3; SGZ p229.

TVERDOKHLEBOV: XTS #24 pp19-20; AS2483 p1; SDS v29 AS1678 p551; SDS v24 AS1196
p2, AS1255 pp1-20, AS1290 p1; SDS v28 AS1519 p99, AS1552 p382; SDS v25 AS1478
pp 657-658; SDS v16 AS479a pp40-43; XZP #1 p43; XZP #3 p14; XTS #41 p27; XZP #29 p24

TYAGAY: SDS v1 AS46 p2; LZS #9 1965 p32 (with Yu. Ya. Gurevich).

TYURIN: XTS #43 p89; XZP #23-24 pp15-16.

TYURINA: SDS v1 AS20 p3.

UBOZHKO: SDS v28 AS1521 p103; SDS v4 AS289 p2; XTS 49 p39; XZP #1 p17;
XTS #13 p38; XTS #36 p56; XTS #37 p60; Vol'noye slovo v30-31 (Frankfurt: Posev, 1978)
p133.

ULANOVSKIY: AS3051; MS27/77 AS3035 p2; MS19/77 AS2966 p2; MS21/77 AS2956 p2; AS2264.

ULITSKIY: SDS v1 AS2 p6.

USPENSKIY: SDS v1 AS2 p4.

UVAROV: XTS #40 p130.

VAYNBERG: SDS v1 AS72 p2.

VAYNER: MS24/75 AS2099 p3.

VAKHTIN: SDS v1 AS13 p1; SGZ p130; LZS #1 1965 p47; LZS #1 1965 p151 (with N. Shvemberger).

VARDAPETYAN: XTS #34 pp53-54.

VARPAKHOVSKIY: SDS v1 AS20 p4; SGZ p128.

VASIL'EV: XTS #5 p51.

VASIL'EVSKIY: SDS v1 AS2 p2; SGZ p128.

VASSERMAN: SDS v21 p2; SGZ p129.

VEKLEROV: XZP #19 p50.

VELIKANOV: MS41/75 AS2314 p3.

VELIKANOVA, A: XZP #2 p13; SDS v1 AS1 p3.

VELIKANOVA, K: AS3051 p26; AS2633; MS8/76 AS2422 p4; AS2272; AS2237; MS8/75 AS2006a.

VELIKANOVA, T: SDS v30 p159, AS3299 p466; SDS v24 AS1196 p2; SDS v28 AS1552 p386; XZP v1 AS1 p3; AS3051 p26; AS3009; SDS v28 AS1578 p2; SDS v4 AS288 p2.

VENTSELI: SDS v1 AS20 p3; SGZ p133.

VENTSELI: SDS v1 AS20 p3; SGZ p133.

VEPRINTSEV: XTS #10 p23; XTS #8 p37.

VERETENOV: XTS #1 p17; XTS #19 p13.

VEYUKHOVSKIY: SDS v1 AS20 p3; LZS #13 1965 p24.

VIL'YANS: XTS #2 p15; XZP #26 p22; SDS v1 AS1 p3; AS20 p4; AS3051 p27.

VINBERG: SDS v1 AS20 p3; SGZ p134; LZS #13 1965 p25; LZS #10 1968 p17
(with GIIDIKIN).

VINKOVETSkiY: XTS #32 p27.

VITUSHKIN: SDS v1 AS20 p2; SGZ p135.

VLADIMIRSKIY: SDS v30 AS2522 p328; SDS v28 AS1524 pp116-129; LZS #6 1965 p25
(with A.K. Pankratov).

VOLEVICH: SDS v1 AS20 p3; SGZ p136.

VOLKOV: XTS #32 p77.

VOLOSHIN: SDS v24 AS1191 pp3,25.

VOL'PIN: SDS v30 p203; SDS v24 AS1196 p2, AS1262 pp1-21, AS1266 pp1-18;
SDS v28 AS1519 p99; SDS v16 AS479a pp4, 34, AS479b p25, AS479g pp26, 34; SDS v3
AS163 p18; XTS #1 p8, XTS #2 p27; SDS v3 AS163 pp18-20; SDS v1 AS2 p2; SDS v4
AS288 p2.

VORONEL': SDS v29 AS1632 p191; SDS v25 AS1485 p710; AS1964 p12; XTS #32 p65;
AS1993; MS1/77 AS1857 p1; MS32/74 AS1789 p4; LZS #48 1968 p49 (with S.R. Garber,
V.M. Mammitskiy, and V.V. Shekotchikhina).

VUL': SDS v1 AS20 p3.

VVEDENSKAYA: SDS v2 AS107 p200; SDS v1 AS1 p3, AS20 p3.

VYShENSKIY: SDS v1 AS46 p2; XTS #5 p18.

YaBLONSKIY: XTS #1 p10; XTS #2 p19; SDS v1 AS21 p2.

YaGLOM, A: SDS v23 AS1156 p9; SDS v1 AS18 p2, AS20 p2, AS72 p5; SGZ p249.

YaGLOM, I: SDS v1 AS20 p2; XTS #2 p19; SGZ p250.

YaKHOT: SDS v24 AS1212 p11; SDS v25 AS1418 p338; SDS v13 AS1391 p11, 135,
AS1673 pp24, 26; XZP #1 p22.

YaKIR: MS24/75 AS2099 p3.

YaKKELEVICH: XTS #37 p24; XTS #41 p72; XZP #27 p23; AS3051 p30; MS19/77 AS2966
p2; MS41/76 AS2756 p2; MS8/76 AS2422 p6; MS41/75 AS2314 p3; Delo Kovalaya, p40.

YaNKOV: SDS v1 AS20 p4.

YaRUM-AGAYEV: XTS #45 pp17-18; MS27/77 AS3035 p2.

YASHLNOV: SDS v1 AS103 p1.
YAVOR: SDS v1 AS20 p2.
YEVGENOV: SDS v1 AS2 p5.
YUROVSKAYA: SDS v13 AS600 p13, AS601 p55.
YUSINA: SDS v1 AS72 p5.
YUSKI: XTS #29 p69.
ZAKHAROV: SDS v1 AS21 p2; LZS #12 1965 p35.
ZAKS: SDS v1 AS2 p2; AS2633; AS3355; AS3051 p27; MS19/77 AS2966 p1; XTS #42 pp8-9; Delo Tverdokhlebova, pp31-33.
ZANCHENKO: SDS v1 AS72 p3.
ZARETSKIY: SDS v22 AS1085 p94, 161; XTS #23 p21; XTS #21 p26; LZS #10 1965 pp24-25 (with N.S. Vul'fson, L.S. Chetverikova and V.F. Zaikin).
ZASLAVSKAYA: XTS #5 p50; SDS v2 AS107 p205; SDS v1 AS46 p2.
ZASLAVSKIY: SDS v1 AS21 p2; LZS #8 1965 p24 (with S.S. Moiseyev and R.Z. Sagdeyev); LZS #3 1965 p31 (with B.V. Chirikov).
ZBOLINSKIY: SDS v1 AS20 p2.
ZDOROVYY: XTS #33 p50; AS2088.
ZEL'DOVICH: SDS v3 AS159 p2; Turkevich p435; SDS v23 AS1156 p8.
ZHAD'KO: SDS v1 AS46 p2; LZS #14 1968 p40 (with V.A. Romanov).
ZHELEZNOVA: SDS v25 AS1409 p237.
ZHUKOVSKAYA: Delo Kovaleva, p40.
ZINOV'EVA: SDS v25 AS1460 p552; XTS #15 p16; XTS #16 p31; XTS #13 p38; SDS v21 AS1024 pp1-2.
ZUEKOVSKIY: SDS v1 AS72 p3.
ZUYEV: SDS v1 AS46 p2.
ZYKINA: SDS v1 AS72 p3.

1. SDS v1 AS1 p4.
2. XTS #11 p44.
3. XTS #5 p52.
4. XTS #6 p61.
5. SDS v8 AS564 p4.
6. XTS #10 p21.
7. Barghoorn, p106.
8. Parry, p296.
9. Valentin Turchin, "Scientists among Soviet Dissidents," Survey, Vol 23 No (105) Autumn (1977-78), p87.
10. Loren Graham, Science and Philosophy in the Soviet Union (New York:Knopf, pp111-138. (GINZBURG and ZEL'DOVICH were both opposed to the intrusion of Marx into physics : p136)
11. Salisbury, p6.
12. SDS v1 AS76 p2.
13. XTS #18 p35.
14. XTS #43 p51.
15. SDS v29 AS1601 p30.
16. SDS v28 AS1530 p169.
17. MS14/77 AS2902 pp3-5.
18. SGZ p130.
19. The Medvedev Papers, p vii.
20. SDS v2 AS134 p3.
21. Mark Popovskiy, "Science Cities: Akademgorodok et al," Survey Vol23 No2 (Spring 1977-78), p165.
22. Parry, p295.

Conclusion

1. SDS v28 AS1529 p125.
2. SDS v1 AS91 p5.
3. SDS v25 AS1420 p8.

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-8