An expanded, updated, and revised version of
SCIENCE AND PHILOSOPHY
IN THE SOVIET UNION

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Soviet philosophy of science—dialectical materialism—is an area of intellectual endeavor that engages thousands of specialists in the Soviet Union but passes almost entirely unnoticed in the West. It is true that a few Western authors have examined Soviet discussions of individual problems in philosophy of science, such as philosophical issues of biology, or psychology; nonetheless, no one else in the last twenty-five years has tried to study in detail the relationship of dialectical materialism to Soviet science as a whole. It is an unusual experience, rewarding yet worrisome, to be the only scholar making this endeavor. The Western neglect of Soviet philosophy of science is regrettable, as the attempt to provide a synthetic view of nature in its entirety is highly intriguing. Western studies of Soviet philosophy of science that do not engage with its universalistic aspiration miss one of its important characteristics.

One reason for the lack of Western interest in Soviet dialectical materialism has been the assumption that its influence on natural science was restricted to the Stalinist period and was an unmitigated disaster. Since most educated Westerners know about the harmful effects of the form of dialectical materialism promoted by the Soviet agronomist Trofim Lysenko in the Stalinist period, such an assumption is understandable; most Westerners tend to equate the sorry episode of Lysenkoism with Soviet dialectical materialism as a whole. Over thirty years after Stalin’s death and twenty years after the end of Lysenko’s reign in genetics, however, Soviet dialectical materialism continues to develop.

Today, dialectical materialism is elaborated by more Soviet authors than ever before, many of them mere political ideologists, to be sure, but a few of them able and prominent natural scientists and philosophers. The desire to create a synthetic view of nature has not diminished. Furthermore, this effort touches all educated Soviet citizens. Each student in every Soviet higher educational institution is required to take a course in dialectical materialism in which a unified picture of nature based on Marxism is presented; this requirement was as prevalent in 1986 as it
was in 1936, and by now has variously affected millions of Soviet citizens. In the mid-1980s the Communist Party took steps to increase the attention that was paid to Marxist philosophy in the study of natural science. No attempt to understand the mentality of the educated elite of the Soviet Union can succeed without attention to this aspect of Soviet ideology.

Despite their effort to create an integrated picture of nature, Soviet dialectical materialists of the eighties often disagree with one another; one camp, known as the "ontologists," constantly argues about the place of Marxism in science with the other camp, known as the "epistemologists" (see the discussion on pp. 58ff.). Nonetheless, dialectical materialism continues to have intellectual force. In the mid-eighties the "ontologists," the writers who insist that Soviet Marxism must explain nature as well as society, enjoyed something of a resurgence. The common Western assumption that dialectical materialism is a peculiarly Stalinist aberration that will soon disappear in the Soviet Union does not appear to be well founded.

The time will come, I believe, when the role played by natural science in the ideology of the Russian Revolution and of the regime that followed it will be seen as the most unusual characteristic of that ideology. Other great political revolutions of modern times, such as the American, French, and Chinese revolutions, have given some attention to science, but none of them resulted in a systematic, long-lived ideology concerning physical and biological nature, as has been the case with the Russian Revolution. An enormous attention to philosophy of nature has been a constant theme in Russian and Soviet Marxism for over seventy years. All of the early major Soviet leaders—Lenin, Trotsky, Bukharin, Stalin—studied science, wrote about topics as diverse as physics and psychology, and considered such issues to be intimate components of an overarching political ideology. The fourth member of this series, Stalin, converted this interest in philosophy of science into a dogmatic interpretation of natural phenomena that rivaled the scholastic system of the Catholic church in the Middle Ages. With the passing of the worst of Stalinism, the quality of Soviet philosophy of science has improved. What has not changed has been the Soviet conviction that Marxism must provide an explanation for both social and natural history.

In this book I give evidence that even now—in the 1980s—many standard science textbooks and occasional research papers in the Soviet Union have been influenced by Marxist philosophy. Sometimes the authors are aware of the influence, sometimes they are not. Occasionally the influence is a reverse one, with Soviet scientists expressing views best explained by their opposition to what they see as earlier erroneous Marxist positions. (This phenomenon is particularly clear in Soviet writings about cybernetics in the sixties and early seventies, and about human genetics today.)

I conclude that even good Soviet science bears the marks of Marxist philosophy, including "hard" sciences such as physics, a conclusion extremely difficult for most Western scientists to accept. Historians of science, more accustomed to the idea that social and political factors affect science, may find it more palatable. For the historians and sociologists of science, I would like to add that while I obviously support the "externalist" view that the social environment affects the development of science (in all nations), I do not agree with those extreme proponents of this approach who maintain that science is entirely a "social construction." The painful reentry of Soviet genetics into international biology after 1965 is evidence that a real world of nature does exist, and that social factors occasionally lead to such a marked departure from descriptions of that real world that a correction becomes necessary. But science inescapably remains under the influence of its social milieu, even after such changes in course, and cannot be accurately described as an objective mirror of nature.

Although I hope that many readers will wish to read this entire book, it is not necessary to do so in order to learn what role Marxist philosophy has played in the Soviet Union in a given scientific field. Chapters 3 through 12 are parallel chapters about different scientific disciplines, any one of which can be read separately. All readers should, however, examine chapters 1 and 2, which give necessary political and philosophical background for understanding the subsequent chapters. After reading these opening chapters, a physicist may wish to skip ahead to the chapters on quantum mechanics and relativity physics, while a psychologist, biologist, or computer scientist may go directly to the appropriate chapters for those fields.

Much of the material in this book was first published in 1972 by Alfred A. Knopf, Inc., under the title Science and Philosophy in the Soviet Union. In the present version I have added two entirely new chapters on human behavior, a topic omitted in the earlier book (hence the new title), and I have revised and reordered each of the other chapters, adding much new material and deleting some of the old. Soviet scientists and authors who are extensively discussed in this version who were not in the earlier volume include the philosophers I. T. Frolov, E. K.
Chernenko, K. E. Tarasov, S. A. Pastushnyi, P. V. Kopnin, V. G. Afanas'ev; the geneticists V. P. Efroimson, N. P. Dubinin, V. A. Engel'gardt; the historian-ethnographer L. N. Gumilev; the psychologists A. N. Leon'tev, A. R. Luria, B. P. Niki tin; and the physicists and astrophysicists V. S. Barashenkov, V. S. Ginzburg, I. A. Zel’dovich and I. D. Novikov. Many other prominent Soviet scholars were discussed in the earlier book, and most of these sections have been retained in revised form. The 1972 version covered Soviet philosophy of science up to 1970; this volume includes material up to mid-1985. The most distinctive aspect of this version is the description and analysis of the most interesting development in Soviet philosophy of science in the last fifteen years: the new debate over human nature, the relative role of genetics versus environment in determining human behavior, and issues of biomedical ethics, which are covered in chapters 6 and 7.

The information presented in this book is based on repeated research trips to the Soviet Union over a period of twenty-five years, starting in 1960–61 and continuing every several years since—most recently, in December of 1985. I am indebted to a host of institutions and individuals for support during these years, including the International Research and Exchanges Board, the Department of State, the Academy of Sciences of the USSR, the National Academy of Sciences of the United States, the Institute for Advanced Study, the Guggenheim Foundation, the American Council of Learned Societies, the National Endowment for the Humanities, the Kennan Institute for Advanced Russian Studies, Columbia University, the Massachusetts Institute of Technology, and Harvard University.

As was the case with the first version, I am deeply indebted to colleagues and friends who have helped me with this volume, although no one of them has read the entire manuscript in its new form. They include: Mark Adams, Harley Balzer, Marjorie Mandelstam Balzer, Joseph Brennan, Peter Buck, Michael Cole, Sheila Cole, Paul Doty, Erich Goldhagen, Seymour Goodman, Patricia Albjerg Graham, Gregory Gur- off, Thane Gustafson, Bert Hansen, Paul Josephson, Edward Keenan, Mark Kuchment, Linda Lubrano, Everett Mendelsohn, Robert Morison, Philip Pomper, David Powell, Douglas Weiner, James Wertsch, and Deborah Wilkes. I would like to pay special tribute to Carl Kaysen, Director of the Program on Science, Technology, and Society at the Massachusetts Institute of Technology, and to Adam Ulam, Director of the Russian Research Center at Harvard University, for providing such stimulating environments for conducting research.

Loren Graham
Grand Island, Lake Superior
September, 1986
CHAPTER 1
HISTORICAL OVERVIEW

Ontological meanderings have still not been eliminated in our philosophy. On the contrary, recently they have gotten a sort of "second breath." There are plans for the conversion of Marxist philosophy into a system of ontological knowledge.

The origin of the philosophic schools of materialism and idealism is to be found in two basic questions: What is the world made of? How do people learn about the world? These questions are among the most important ones that philosophers and scientists ask. They have been posed by thinkers for at least twenty-five hundred years, from the time of such pre-Socratic philosophers as Thales and Anaximenes.

Materialism and idealism were two of the schools of thought that developed as attempts to answer these questions. Materialists emphasized the existence of an external reality, defined as "matter," as the ultimate substance of being and the source of human knowledge; idealists emphasized the mind as the organizing source of knowledge, and often found ultimate meaning in religious values. Both schools of thought have usually been connected with political currents and often been supported by political establishments or bureaucracies. This political element has not, however, always destroyed the intellectual content of the writings of scholars addressing themselves to important philosophical questions. For example, the support of the Catholic church for the scholastic system of the Middle Ages, despite the well-known restrictions of that system, was one of the causes for the innovations in Aristotelian thought in Oxford and Paris in the fourteenth century. This new scholastic thought had an impact on subsequent scientific development, leading to a new concept of impetus, or inertia. It is the thesis of this book that despite the bureaucratic support of the Soviet state for dialectical materialism, a number of able Soviet scientists have created intellectual schemata within the framework of dialectical materialism that are sincerely held by their authors and that, furthermore, are intrinsically interesting as the most advanced developments of philosophical materialism. These natural scientists are best seen, just
as in the case of the fourteenth-century scholastic thinkers, not as rebels against the prevailing philosophy, but as intellectuals who wish to refine the system, to make it more adequate as a system of explanation.

The history of materialism is to a large degree a story of exaggerations built on assumptions that in themselves have been quite valuable to science. Those assumptions have been that explanations of nature and natural events should avoid reference to spiritual elements or divine intervention, should be based on belief in the sole existence of something called matter or (since relativity) matter-energy, and should to a maximum degree be verifiable by means of people's perceptions of that matter through their sense organs. The exaggerations based on these assumptions have usually been attempts to explain the unknown in terms of materialistic knowns that were quite inadequate for the task at hand. Forced to rely upon that portion of the constantly developing knowledge accepted by science at any one point in time, materialists have frequently posed hypotheses that were later properly judged to be simplistic. Examples of such simplifications—materialists' description of spontaneous generation in the mid-nineteenth century, or their defense of man as a machine in the eighteenth century, or their defense of spontaneous generation in the mid-nineteenth century—are often taken by readers of a later age as no more than amusing naivetés. But the oversimplicity of these explanations, now evident, should not cause us to forget that the accepted science of today, from which we look back upon these episodes, does not contradict the initial materialistic assumption upon which these exaggerations were constructed. It is this continuity of initial assumption that continues to sustain the materialist view.

Materialism, like its denial, is a philosophical position based on assumptions that can neither be proved nor disproved in any rigorous sense. The best that can be done for or against materialism is to make a plausible argument on the grounds of adequacy. Important scientists of modern history have included both supporters and detractors of materialism, as well as many who consider the issue irrelevant. The sophistication of a scientist's attitude toward materialism is probably more important than the actual position—for, against, or undecided—he or she chooses to take. Yet it is also probably safe to say that since the seventeenth century, supporters of materialism have forced its detractors to revise their arguments in a more fundamental way than the reverse. In that sense, the materialists have won many victories.

Within the Soviet Union in recent decades there have been a number of important discussions concerning the relation of dialectical materialism to natural science. Many outside the USSR are familiar with the genetics controversy and the part played in it by Lysenko, but few are aware of the details of other debates over human behavior, psychophysiology, origin of life, cybernetics, structural chemistry, quantum mechanics, relativity theory, and cosmology. The two editions of the present volume, which treat each of these topics at length, have been first attempts at sketching out what is the largest, most intriguing nexus of scientific-philosophical-political issues in the twentieth century. The thousands of Soviet books, articles, and pamphlets on dialectical materialism and science contain all sorts of questions deserving discussion. Historians and philosophers of science will long argue over the issues raised in these publications: Were they real issues, or were they only the artificial creations of politics? Did Marxism actually influence the thinking of scientists in the Soviet Union, or were their statements to this effect mere window dressings? Did the controversies have effects that historians and philosophers of science outside the field of Russian studies must take into account? I have posed tentative answers to these questions, based on information I have been able to obtain in the Soviet Union and elsewhere. Much of this voluminous Soviet discussion was the immediate result of political causes, but the debates have now gone far beyond the political realm into the truly intellectual sphere. The political influence is neither surprising nor unique in the history of science; it is, rather, part of that history. Marxism is taken quite seriously by some Soviet scientists, less seriously by others, and is disregarded by still others. There is even a category of Soviet philosophers and scientists who take their dialectical materialism so seriously that they refuse to accept the official statements of the Communist Party on the subject; they strive to develop their own dialectical materialist interpretations of nature, using highly technical articles as screens against the censors. Yet these authors consider themselves dialectical materialists in every sense of the term. They are criticized in the Soviet Union not only by those scientists who resist any intimation that philosophy affects their research (a category of scientist that exists everywhere), but also by the official guardians of dialectical materialism, who believe that philosophy has such effects but would leave their definition to the Party ideologues. I am convinced that dialectical materialism has influenced the work of some Soviet scientists, and that in certain cases these influences helped them to arrive at views that won them international recognition among their foreign colleagues. All of this is important to the history of science in general, and not simply to Russian studies.
One of the more specific conclusions issuing from this research is that the controversy known best outside the Soviet Union—the debate over Lysenkoism—is the least relevant to dialectical materialism in a philosophical sense. Nothing in the philosophical system of dialectical materialism lends obvious support to any of Lysenko's views. On the other hand, the controversy known least well outside the Soviet Union—that over quantum mechanics—touches dialectical materialism very closely as a philosophy of science. Not surprisingly, the terms of this particular controversy most closely approach those of discussions of quantum mechanics that have taken place in other countries.

In the genetics debate, Lysenko advanced the position that affirmed the inheritance of acquired characteristics, together with a vague theory of the "phasic development of plants." Nowhere in systematic dialectical materialism can support for these views be found. The claims advanced by Lysenko were staked outside the small circle of Marxist biologists in the Soviet Union as well as outside the established groups of Soviet philosophers. Contrary to the views of a number of non-Soviet authors, there did not exist a peculiarly "Marxist" form of biology from Marx and Engels onward. The concept of the inheritance of acquired characteristics was part of nineteenth-century biology, not specific to Marxism. True, an assumption of the inherent plasticity of man was consonant with the desire of Soviet leaders to create a "new Soviet man," and the inheritance of characteristics acquired during one's lifetime might seem a promising function of such plasticity. Surprisingly, however, the application of Lysenkoism to human genetics was not supported in the Soviet Union; this was a common interpretation of Lysenkoism outside the Soviet Union rather than the justification for it given within that country. Close reading of Soviet sources lends no support to the view that Lysenkoism prospered because of its implications for eugenics. During the entire period of Lysenko's influence the shaping of human heredity was a subject frowned upon in the Soviet Union. The rise of Lysenkoism was the result of a long series of social, political, and economic events rather than connections with Marxist philosophy. These events, together with their results, have been well described in the works of David Joravsky and Zhores Medvedev. Since the decline of Lysenkoism in the Soviet Union after 1963, however, the vestiges of that doctrine have affected discussions of other issues in the philosophy of science in a rather paradoxical way. Some Soviet biologists have been so eager to show that they disagree with Lysenko's rejection of genetics that they have elevated the role of genetics in human behavior to a level higher even than most supporters of sociobiology in the West. These Soviet geneticists have been sharply criticized by some Marxist philosophers and scientists, leading to a great debate in the seventies and eighties over nature vs. nurture (see pp. 220-244).

In the Soviet discussions over quantum mechanics an approach was made to the heart of dialectical materialism as a philosophy of science. Because of different political factors, however, the result was quite unlike that of the genetics affair. The core of dialectical materialism consists of two parts: an assumption of the independent and sole existence of matter-energy, and an assumption of a continuing process in nature in accordance with dialectical laws. Quantum mechanics, in the opinion of some scholars, undermined both parts: Its emphasis on the important role played by the observer seemed to favor philosophical idealism, while the impossibility of predicting the path of an individual particle called into question the concept of causality implicit in the assumption of a continuing process in nature. During the course of the discussions several interpretations of quantum mechanics were developed in the Soviet Union that were considered consonant with dialectical materialism. They also have interest from a scientific point of view. The Soviet theoretical physicist Fock, a frequent writer on science and dialectical materialism, debated the issue with Niels Bohr and, according to Fock, helped to shift Bohr's opinion away from emphasis on measurement to a more "realist" view (see pp. 337-338).

One of the most notable characteristics of the Soviet controversy over quantum mechanics was its similarity to the worldwide discussion on this topic. If Omel'ianovskii objected to the idea that the macrophysical system surrounding the microparticle somehow caused the particle to display the particular properties with which we describe it, so did many non-Soviet authors, such as the American philosopher Paul Feyerabend. If Blokhintsev rejected von Neumann's claim to have refuted the possibility of hidden parameters, so did some scientists elsewhere, including David Bohm. If Fock refused to accept the idea that quantum theory implied a denial of causality, so did the French scientist de Broglie and (for different reasons) the American philosopher Ernest Nagel. What seems most striking in the quantum controversy is the similarity between views advanced by Soviet scientists and dialectical materialists on the one hand, and by non-Soviet scholars with rather different philosophies of science on the other. From this one might be tempted to conclude that dialectical materialism is meaningless. But one may also conclude
that the concerns of dialectical materialists in the Soviet Union and those of philosophers of science in other parts of the world are in many ways similar, and that one of the reasons for this is the essential character of the problem of materialism. One should not forget the fact that the debate between materialism and idealism did not arise with the Soviet Union but is, instead, more than two thousand years old. Soviet and non-Soviet interpreters of nature frequently ask the same questions, and occasionally they give very similar answers.

Great harm was done to science in the Soviet Union, particularly to genetics, by the wedding of centralized political control to a system of philosophy with claims to universality. Observers outside the Soviet Union have frequently placed the blame for this damage on the philosophy concerned rather than on the system of political monopoly that endeavored to control it. As a philosophy of science, dialectical materialism has been significant in the Soviet Union, not in promoting or hindering fields of science as a whole, but rather in subtle areas of interpretation. Occasionally a certain formulation of Marxist philosophy of science has been converted to an official ideological statement by endorsement from Party organs. Then harmful effects have indeed occurred; the genetics controversy was the most tragic of these events.

Yet it is clear that human beings, whether in the Soviet Union or elsewhere, will never be content without asking the kinds of ultimate questions that universal systems of philosophy attempt to answer. Dialectical materialism is one of these philosophical systems. If we admit the legitimacy of asking fundamental questions about the nature of things, the approach represented by dialectical materialism—science-oriented, rational, materialistic—has some claims of superiority to available rival universal systems of thought, claims it is appropriate to receive with respect. If dialectical materialism were allowed to develop freely in the USSR, it would no doubt evolve in a direction consistent with the common assumptions of a broad nonmechanistic, nonreductionist materialism (see pp. 30ff.). Such results would be fruitful and interesting. We can hope, therefore, that the day will come when this further development of dialectical materialism can take place under conditions of free debate; such conditions would contrast both with the official protectionism found in the Soviet Union, which makes it difficult to revise dialectical materialism substantially, and the informal hostility to it existing in the United States, which makes it difficult to speak of its strengths.

HISTORICAL AND POLITICAL BACKGROUND

The revolutions of 1917 occurred in a nation that was in an extremely critical position: On a gross scale the Soviet Union was a backward and underdeveloped country in which a quick solution to the major problems of poverty and suffering was inconceivable. The USSR inherited a tradition of autocratic government that strongly influenced the new regime. The new nation was subject to overwhelming pressures of military and economic rivalries. On the European scene it was viewed jealously before the successful Bolshevik Revolution and with quite extraordinary hostility after that event. The new Soviet Union possessed an able group of intellectuals, heir to a distinguished scientific and cultural tradition, whose members were, however, forcefully opposed to the new government. The political leaders of that new government were products of a conspiratorial tradition, hardened to the use of terror by having been previously the objects of terror; they were men who possessed a world view persuasive as an explanation of their role in history and convenient as a method of discipline.

Within this troubled context it should not have been surprising that the degree of intellectual freedom that developed in Soviet Russia was substantially less than in those countries in Western Europe and North America with which the nation would be most frequently compared. The possibility of unusual controls over intellectual life was heightened soon after the revolution by the elimination of all political parties other than that of the Bolsheviks, later renamed the Communist Party of the Soviet Union. The Party soon developed a structure paralleling the government's on every level and controlling the population in almost every field of activity. The population did not object to the controls nearly so much as non-Soviet observers have proclaimed; the government enjoyed the support or toleration of a majority of the workers, a minority of the peasants, and a dedicated small group of Marxist activists. The existence of this support strengthened the freedom of action of the Party leaders in intellectual fields although the intellectuals themselves, a relatively small group, were frequently opposed to Party politics. The possibility of intervention in intellectual fields was further strengthened by the Party leaders' past expressions of strong opinions and preferences on certain issues in the arts and sciences.

Nonetheless, in the years immediately after the Revolution almost no one thought that the Communist Party's supervision of intellectuals would extend from the realm of political activity to that of scientific
theory itself. Party leaders neither planned nor predicted that the Party would approve or support certain viewpoints internal to science; indeed, such endorsement was fundamentally opposed by all the important leaders of the Party. A specific Soviet Marxist philosophy of nature does not necessarily entail official pronouncements on scientific issues; indeed, a condition free of such entailment actually obtained in the early 1920s, in the late fifties and sixties for all the sciences except genetics, and for genetics as well since 1965. Besides, among Soviet scientists and philosophers there never was a single interpretation of Marxist philosophy of science.

During the early period of Soviet history known as that of the New Economic Policy (NEP), which lasted from 1921 to 1926, the intellectual scene was relatively relaxed. Usually, so long as scholars and artists refrained from political activity offensive to the Communist Party, they did not need to fear persecution by the police or interference from ideologists. Those persons whose backgrounds or previous political activities were considered particularly incriminating were exceptions to this generalization. But even people who previously had been members of non-Bolshevik political parties, as well as those with past connections to the tsarist bureaucracy, were able to maintain positions in cultural and educational institutions. The universities, the Academy of Sciences, health organizations, archives, and libraries all served as relatively secure refuges for “former people,” most of whom sought no more than living out their lives uneventfully under the drastically new conditions.

In the second half of the 1920s, there emerged two developments of critical significance for the future of the Soviet Union: the struggle between the leaders of the Party culminating in the ascendance of Stalin, and a decision to embark on ambitious industrialization and collectivization programs. The story of the rise of Stalin to supreme power has been told innumerable times (although there are many aspects of it that are still unclear), and no attempt will be made to retell that history here. But Stalin’s personal influence on subsequent developments in the intellectual world of the Soviet Union proved to be of tremendous importance. His intellectual predilections had impact on a number of fields, including certain areas of science. Most foreign historians of the Soviet Union have doubted that ideology played an important role in determining Stalin’s actions, preferring to believe that power considerations dominated his choices. These historians have noticed how Stalin retreated from ideological positions when such shifts seemed desirable from a practical standpoint, and they cite as an example the

turn in the Soviet government’s attitude toward the Church. More recent study of Stalin has indicated, however, that a simple interpretation of the man in terms of power is insufficient to explain him. Leader of the Soviet Union for a quarter of a century, Stalin was governed by a complex mixture of motivations. These drives were power-oriented in many respects, but they also contained ideological elements. Important leaders often combine ideological and power factors in their decisions; the history of the popes of the Catholic church, of many crowned rulers of Europe, and of leaders of modern capitalist countries illustrates this interplay of power and idea. In Stalin the ideological and power-oriented factors combined; moreover, the actual political power he possessed was truly extraordinary, and he used it with increasing arbitrariness.

The traumatic break that occurred in the years 1927-29, the abrupt shock of an industrial, agricultural, and cultural revolution, will always be causally linked with Stalin. True, it was not only Stalin but almost all of the Soviet leaders who had declared the need to industrialize rapidly and to reform cultural institutions. But it was Stalin who in large part determined the specific forms and tempos of these campaigns, and these in the end became as important as the campaigns themselves. Of the varieties of rapid industrialization programs proposed in the second half of the twenties, Stalin supported the most strenuous course; his choice required forcible methods for enactment. Similarly, Stalin’s collectivization program in agriculture was breathtaking in its tempo and staggering in its violence. Ten years after Stalin’s death, Soviet historians permitted themselves to observe on occasion that Stalin’s agricultural collectivization program had been premature and coercive, however much they agreed with its goal of creating large farms tilled by collective labor.

Accompanying the industrial and agricultural campaigns was the cultural revolution. Personnel of educational and scientific institutions were submitted to political examinations and purges. Here purge must be taken to mean not only imprisonment or execution, but the almost equally tragic dismissal of personnel from academic positions. Functionally, the purge had begun in Soviet academic institutions as a means of personnel replacement, often supported by young Communists eager for advancement. In the late 1920s, this renovative technique was used to oust bourgeois academicians of certain institutions in order to replace them with supporters of the Communist Party. These replacements were frequently persons of inferior scholarship whose enthusiasm for social reconstruction commended them to preferment. Later, under Stalin’s
complete control, the purge became quite arbitrary and violent. Dismissal and exile to labor camps were more common among social scientists than among natural scientists, but even in the institutions of the natural sciences a structure of control was created. In the period 1929–1932, the Academy of Sciences was thoroughly renovated and brought under the control of the Communist Party. Even at this time, however, no attempt was made to impose ideological interpretations upon the work of scientists; nonetheless, the precedent of forcing submission to specific political, social, and economic campaign pressures would later prove to be significant, especially immediately after World War II, when the ideological issues in the sciences became most aggravated.

The passing of the twenties into the thirties in the Soviet Union was marked by a growing tendency to classify science itself as "bourgeois" or "idealistic"—clearly something beyond the distinguishing of certain philosophers’ interpretations of science. While this tendency is now the subject of sharp criticism on the part of several leading Soviet philosophers of science, it had a long and harmful influence on Soviet science. The attribution of political character to the body of science itself eased the way for Lysenko's concept of "two biologies," as well as for ideological attacks on the substance of other branches of natural science. As early as 1926, V. P. Egorshin, writing in Under the Banner of Marxism, an influential philosophy journal of the time, declared that "modern natural science is just as much a class phenomenon as philosophy and art... It is bourgeois in its theoretical foundations." And an editorial in the journal Natural Science and Marxism in 1930 asserted that "philosophy and the natural and mathematical sciences are just as politically partisan as the economic and historical sciences."

Not all Soviet philosophers and very few Soviet scientists accepted the assumption that the natural sciences contained political elements in themselves and the corollary that Western science was implicitly distinct from Soviet science. Many scientists and philosophers of the strongest Marxist persuasion were still capable of drawing distinctions between science and the uses made of it, whether moral or philosophical. Even those who thought, with justification, that the theoretical body of science cannot be completely separated from philosophical issues usually realized that any attempt to determine those issues by political means would be quite harmful. The prominent Marxist scientist O. Iu. Schmidt, who will appear as an important participant in the cosmology debate, declared in 1929 that:

Western science is not monolithic. It would be a great mistake indiscriminately to label it "bourgeois" or "idealistic." Lenin distinguished unconscionable materialists, who included most experimenters of his time, from idealists... An unconscious attraction to the dialectic is growing... There are no conscious dialectical materialists in the West, but elements of the dialectic appear among very many scientific thinkers, often in idealistic or eclectic garb. Our task is to find these kernels and to refine and use them."

The debates over the nature of science in the late twenties and in the thirties did not touch most practicing Soviet scientists of the period. The majority of researchers tried to remain as far from considerations of philosophy and politics as scientists elsewhere. The importance of these discussions was not their immediate impact but the precedent they provided for the much sharper ideological debates of the postwar period, when Stalin accepted Lysenko's definition of "two biologies" and intervened personally in choosing between them. Without Stalin's arbitrary action the actual suppression of genetics in the Soviet Union would not have occurred, but the discussions of the thirties helped to prepare the way for the suppression by strengthening the suspicion in which Western science was held by some Soviet critics.

Another characteristic of Soviet discussions of the thirties that re-emerged after World War II was the emphasis on utility. In a nation rapidly modernizing in the face of external threats, the priority of practical concerns was not only understandable but necessary. As is often the case with underdeveloped nations that nonetheless possess a small highly educated stratum, Russia's past scientific tradition had been excessively theoretical. The emphasis on industrial and agricultural concerns in the thirties was a needed correction to this tradition. At its root, the high priority given to practice had a positive moral content, since the ultimate results of a growing economy were a higher standard of living, greater educational opportunities, and better social welfare. So long as the value of theoretical science was also recognized, a relative shift toward applied science was a helpful temporary stage. The new priority was carried to an extreme, however, and had results that were philistine and anti-intellectual. In art and literature the stress on industrial expansion buttressed "socialist realism," the art style supplanting the earlier experimental forms that sprouted immediately after the Revolution. Socialist realism commended itself to the bureaucrats who were gradually replacing the more sophisticated and cosmopolitan older revolutionaries. The situation in the arts in these years was only indirectly related to that of the sciences, but it was nonetheless a significant aspect of the general environment of the Soviet intellectual. Analogous
to the desired artistic concentration on themes calculated to inspire the workers aesthetically and emotionally was the role assigned to scientists as discoverers of new means to speed industrialization. Many scientists who had been trained in highly theoretical areas found themselves in the thirties closely involved with the industrialization effort. In addition to their research duties, they began to serve as industrial consultants.

Thus, a result of the industrialization and collectivization efforts in the Soviet Union was an increase in pressure upon scientists and intellectuals to mold their interests so that their work would benefit the construction of "socialism in one country." One of the effects of this pressure was the growth of nationalism in science, as in other fields. The very possibility of constructing socialism in one country had, of course, been the subject of one of the great debates among Stalin and his fellow leaders. The original revolutionaries had believed that the Revolution in Russia would fail unless similar revolutions occurred in other more advanced countries. Stalin announced that socialism could be constructed in one country and called for reliance upon native resources, scientific and otherwise. This shift in emphasis represented a weakening of the internationalist strain in the Communist movement that historians have linked with the name of Trotsky and that resulted, among other things, in a greater isolation of Soviet scientists. Stalin called for a maximum effort by all Soviet workers, including scientists, to achieve the nearly impossible—to make the Soviet Union a great industrial and military power in ten or fifteen years. An intrinsic part of this effort, Soviet nationalism, gradually gained strength in the thirties as the possibility of a military confrontation with Nazi Germany grew.

During World War II, as a result of stress upon patriotism and heroism, the nationalist element in Soviet attitudes emerged all the more clearly. In science, this emphasis on national achievement had many effects. Into controversies over scientific interpretation it introduced an element, national pride, that was totally absent from the dialectical materialism derived from Marx, Engels, and Lenin. It resulted in claims for national priority in many fields of science and technology. Many of these claims have now been abandoned in the Soviet Union, where they are regarded as consequences of the "cult of the personality." Others have been retained. Of these, some are justified or at least arguable in light of the long years in which appreciation of Russian science and technology by non-Russians was obstructed by linguistic barriers, ethnic prejudices, and simple ignorance.

Perhaps the most important characteristic of Soviet society contributing to the peculiar situation that developed in the sciences after World War II was the very high degree of centralization of control over public information, personnel assignment and promotion, academic research and instruction, and scientific publishing. This system of control had been completed long before Stalin decided to intervene directly in the biology dispute after the war. Indeed, any effort actively to oppose this awesome accumulation of power became unthinkable during the great purges of the thirties, when it became clear that not even the highest and most honored officials of the Party were immune to Stalin's punitive power. The atmosphere created by these events permeated all institutions of Soviet society. People on lower levels of power looked to those above for signals indicating current policy; as soon as these signals were discernible, the subordinates hurried to follow them. By the late thirties, for example, no local newspaper would have thought of contradicting or questioning a policy announced in Pravda, the official publication of the Central Committee of the Communist Party. Censorship was not left, however, to voluntary execution; it was officially institutionalized and extended even to scientific journals, although the limits of toleration there were usually greater and varied from time to time somewhat more than elsewhere. Appointment of officials influential in science and education—ministers of education and agriculture, presidents of the All-Union Academy of Sciences and of other specialized academies, rectors of the universities, editorial boards of journals—all were under the control of Party organs. Approval of science textbooks for use in the school system and even the awarding of scientific degrees to individual scholars were also under close political supervision. All these features of the Soviet power structure help explain the way in which Stalin was able, after the war, to give Lysenko's interpretation of biology official status despite the opposition of established geneticists, men of science who fully recognized the intellectual poverty of Lysenkoism.

The above description of the centralization of power in Soviet society is familiar to all students of Soviet history. What is much less well known, and indeed frequently entirely overlooked, is that beneath this overlay of centralized political power there existed among the Soviet population rather widespread support for the fundamental principles of the Soviet economy, and among intellectuals, increasing support for a materialist interpretation of the social and natural sciences. Studies of refugees from the Soviet Union during World War II have shown that despite a large degree of disaffection toward the political actualities of the Soviet Union, these people remained convinced, by and large,
the superiority of a socialist economic order. Similarly, there is much evidence that Soviet intellectuals of genuine ability and achievement found historical and dialectical materialist explanations of nature to be persuasive on conceptual grounds. O. E. Schmidt, I. I. Agol, S. Iu. Semkovskii, A. S. Serebrovskii, A. R. Luria, A. I. Oparin, L. S. Vygotsky, and S. L. Rubinshtein are examples of distinguished Soviet scholars who made clear their belief, in diverse ways, that Marxism was relevant to their work before statements of the relevance of Marxism were required of them. The views of Schmidt, Oparin, Luria, Vygotsky, and Rubinshtein will be discussed in some detail later, since their views continued to be influential after 1945. In the concerns of these men, science came first, politics second. But one should not assume that the presence of strong political motivation necessarily undermines the intellectual value of a person’s views. Nikolai Bukharin, a Party leader, was a Soviet politician to whom a materialistic, naturalistic approach to reality was far more than rhetoric; portions of his writings are remarkable for the degree to which they draw upon a materialist interpretation of natural science and for the intellectual clarity with which this view is presented. 

Several of the persons named above, and many more of their type, disappeared in the purges and had their writings banned in the Soviet Union. But unless one remembers that there existed before the forties a category of Soviet scholars who took dialectical materialism seriously, it will be difficult to understand why, after the passing of the worst features of Stalinism, scientists reemerged in the Soviet Union who combined a dialectical materialist interpretation of nature with normal standards of scientific integrity.

Immediately after World War II many intellectuals in the Soviet Union hoped for a relaxation of the system of controls that had developed during the strenuous industrialization and military mobilizations. Instead, there followed the darkest period of state interference in artistic and scientific realms. This postwar tightening of ideological controls spread rather quickly from the fields of literature and art to philosophy, then finally to science itself. Causal factors already mentioned include the prewar suspicion of bourgeois science, the extremely centralized Soviet political system, and the personal role of Stalin. But there was another condition that exacerbated the ideological tension: the cold war between the Soviet Union and certain Western nations, particularly the United States. This struggle was rising to a peak in the years immediately following the war. These were years in which ideological sensitivity ran feverishly high in both the United States and the Soviet Union; the two great countries reinforced each other’s fears and prejudices. The cold war involved passions of a sort reminiscent of past quarrels over religion. The Soviet suppression of genetics in 1948 has often been compared to the Catholic condemnation of Copernicus in 1616. The Catholic sensitivity to the astronomy issue at the time was in part a reaction to pressures upon the Church brought about by the Protestant Reformation. Similarly (although allowing for enormous differences), in the late 1940s the Soviet Union considered itself in the midst of a global ideological struggle, and the cold war produced emotions not unlike those current during the Counter-Reformation.

"Zhdanovshchina" is the name by which the postwar ideological campaign came to be known; it was named for Andrei A. Zhdanov, Stalin’s assistant in the Central Committee of the Party. Most Western historians of the Soviet Union believe that Zhdanov was in some personal way responsible for the ideological restrictions in all areas of culture, including science. There is, however, reason to doubt that Zhdanov was responsible for ideological interference in the sciences. Evidence exists that Zhdanov actually opposed the Party’s intervention in Lysenko’s favor, and even attempted to stop it. In any event, we know that Zhdanov carried out a campaign of intimidation and proscription in literature and the arts. A series of decrees laid down ideological guides for fiction writers, theater critics, economists, philosophers, playwrights, film directors, and even musicians. Until the month of Zhdanov’s death, however, natural scientists escaped the rule by decree that obtained in other cultural fields.

When Lysenko’s views of biology were officially approved in August 1948—an event to be reviewed in some detail in my analysis of the genetics controversy—a shock wave ran through the entire Soviet scientific community. No longer could it be hoped that Party organs would distinguish between science and philosophical interpretations of science. Evidently Stalin had no intention of making such distinctions, and he was in control of the Party. It soon became clear that other scientific fields, such as physics and physiology, were also objects of ideological attack, and Soviet scientists were genuinely fearful that each field would produce its own particular Lysenko.

Soviet scientists now found themselves in a difficult dilemma. By this time the Party’s control over scholarly institutions was almost absolute. Open resistance to the Party’s supervision was possible only if the