Trends in Some Areas of Soviet Biomedical Research

The outcome of conflict between ideology and scientific research will affect future accomplishment.

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Seven years ago, systematic perusal of Soviet literature revealed striking differences between Soviet and Western cardiovascular research—differences in approach, methods, evaluation, and interpretation (*1*). Although dogmatic "Pavlovism" was beginning to lose its grip, Soviet biomedical research was still largely dominated by the ghost of I. P. Pavlov, officially enthroned in the early 1950's (*2*).

Physiology in the U.S.S.R. was "Pavlovian." But Pavlovism had come to dominate a much larger area. Hardly any medical paper (even in fields as remote from Pavlov's investigative work as otolaryngology, dermatology, or gynecology) was without a bow in the direction of Pavlov, with the cited references going back as far as 1882. Over 400 papers *on* Pavlov were published between 1949 and 1952, 335 between March 1953 and April 1954. The bibliographies appended to two editorials published in the *Sechenov Physiological Journal* (*3*) include the most prominent names in all fields of medicine. Obviously the authors felt "encouraged" to stress the significance of Pavlov for their particular areas of specialization (*4*).

Thus Pavlov became a symbol for the direction and methodology of Soviet biomedical research. In a general way, though perhaps somewhat superficially, this direction may be characterized by its emphasis on the dominance of the central nervous system in the control of all physiological processes. Tsaregorodtsev (*5*) feels that such an interpretation is a "vulgarization," but the points he brings out in attempting to define "Pavlovian medicine" are far less characteristic; many of his quotations could have been derived as well from the works of other great physiologists. Be this as it may, for an outside observer the most striking feature of the overwhelming majority of Russian biomedical publications was emphasis on the dominance of the central nervous system, together with insistence on the supremacy of the Pavlovian interpretative framework. Thus, the central nervous system was accorded a major role in the pathogenesis of coronary artery disease; diet and disturbance of lipid metabolism were not disregarded, but they were relegated to a secondary role (*6*). Essential hypertension was considered to be a cardiovascular neurosis, with secondary renal involvement (*1, 7*).

Much of the biomedical research was directed toward a verification of the importance of central nervous system disturbances for the pathogenesis of a multiplicity of diseases or for their course. In so directing it, the Russian authors accumulated important data, more systematically and, in some areas, on a greater scale than was done elsewhere.

While Pavlov's influence, reinforced ex officio, enhanced research on the central, peripheral, and autonomic nervous systems, it retarded development in other areas. Russian authors may not share this view, at least not publicly, but a comparison with developments in Western countries is quite conclusive. For instance, in the Soviet Union there was no journal devoted to cardiovascular disease (there are four in the United States, with a total of over 6000 pages annually). This is surprising in view of the large number (over 500) of Russian biomedical periodicals.

The general situation has changed radically during the past few years. In biomedical publications, irrelevant references to Pavlov have all but disappeared. In Dekhtar's textbook on electrocardiography (*8*), published in 1955, Pavlov was quoted very frequently, although he never worked in this field. In contrast, in Dolabchyan's *Synthetic Electrocardiography*, published in 1963 (*9*), there is only one reference to Pavlov in a bibliography of 33 pages (and this reference is not concerned with electrocardiography). Lempert's *Fundamentals of Electrocardiography*, published in 1963 (*10*), contains not a single reference to Pavlov in its extensive bibliography.

One would expect to find most of the references to Pavlov in the *Journal of Higher Nervous Activity*, a bimonthly periodical which carries on the tradition of Pavlov's work on conditioned responses. In the first four issues published in 1964 (volume 14), out of a total of 1716 references in 86 articles, there were only 14 references to Pavlov. The term "Pavlovian physiology," in the 1950's ubiquitous in Russian biomedical literature, has become rare in original articles. Now it is found almost exclusively in programmatic articles or in papers directly concerned with methodology and its underlying philosophy of dialectic materialism.

More significant than the abrupt decline in the number of *ad hoc* references to Pavlov are the changes in procedures, evaluation, and emphasis.

A bimonthly journal for research on cardiovascular diseases, *Kardiologiya*, was founded in 1961. While the volume of reported research (576 pages annually) is still small, it indicates an encouraging development.

In the Soviet Union, until recently, statistical evaluation of biomedical data was the exception rather than the rule. Consequently, it became the editorial policy for the *Translation Supplement* to *Proceedings of the Federation of American Societies of Experimental Biology* that absence of adequate statistical evaluation of results was not to be considered sufficient reason for rejecting a paper, as it quite frequently is in American periodicals. Otherwise, in 1962, publication of the *Translation Supplement* would simply not have been feasible. At present, statistical evaluation and analysis (*t*-test, chi-square test, regressions) are quite common, and oc-

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casionally one finds more sophisticated statistical procedures (*11*). In this respect the situation is similar to that prevailing in medicine in the United States some 10 years ago. In view of the typically rapid development in the U.S.S.R., it may be expected that within 2 years or so there may be no difference between the two countries in this important aspect of research.

Advances in Instrumentation and Techniques

Remarkable advances have taken place in recent years in instrumentation for biological and medical research, medical diagnosis, and treatment (*12*). Five years ago, many Russian research reports could have been cited to support the thesis that important results can still be obtained with simple methods. At present, the number of communications reporting advanced techniques is substantial. Many of the leading laboratories seem to be well equipped with Western instruments, but there has been also a rapid expansion of Soviet manufacture of laboratory equipment. While the variety of biomedical instruments is not yet comparable to that found in this country, progress has been remarkable. According to Gusenkov (*13*), the output of the medical-equipment industry was worth 87 million rubles in 1960 and 121 million rubles in 1963. It is expected to double by 1965.

Parin and Babskii (*14*) recently wrote an excellent review of the development of medical instrumentation in the U.S.S.R. While in most instances it is parallel to development in the Western countries, in several fields the Russian investigators are pioneering. Impressive is the development, for open-heart surgery, of a locator of His's bundle based on the high electrical conductivity of the bundle relative to the myocardial fibers. Use of the instrument has reduced to one-third the incidence of bundle-branch block produced during surgery.

Also far advanced is Soviet telemetric technique. A chart showing simultaneous electrocardiograph, electroencephalograph, and pneumograph recordings made from Cosmonaut Nikolaev in flight was presented by Akulinichev and Baevskii (*15*), together with diagrams of the electric circuitry. Telemetry is also used, as in this country, for electrocardiograph recording during occupational work and athletic activities. The quality of records made during running and weight-lifting, published by Rozenblat (*16*), is excellent and comparable to that of records that were obtained with similar U.S. equipment.

Heart catheterization has been introduced in the Soviet Union, despite Biryukov's (*17*) earlier objections to this procedure on ethical and humanitarian grounds. It is now used successfully (*18*) on a scale that is large though not quite comparable to the almost universal use of heart catheterization in large and medium-sized U.S. hospitals.

The fact that advanced biomedical equipment is now being produced in the Soviet Union does not mean that it is easily and generally available (*19*), as it is in the United States, where delivery time rarely exceeds 1 month and in most instances is immediate.

Chemical-Pharmaceutical Industry

In biomedical research as well as in therapy, the chemical-pharmaceutical industry plays an important role. The annual increases in pharmaceutical production since 1958 averaged 18 to 20 percent; Gusenkov (*13*) considered this to be too slow. A limiting factor was the scarcity of sulfur. With importation of sulfur assured, the production of drugs in 1963 increased 23 percent over 1962. The growth of production in 1964 is estimated to be 18 percent over 1963, and the growth in 1965, 22 percent over 1964. Pharmaceutical production is expected to double by 1970, relative to production in 1965, with a capital outlay of 320 million rubles (four new chemical-pharmaceutical plants, five new plants for antibiotics, two new plants for vitamins, two for hormone preparations, reconstruction of 81 existing plants, two new pharmaceutical research institutes, and enlargement of 12 existing institutes). While at present the volume of pharmaceutical research and production is below that in the United States, the prospect for growth is impressive.

Among Soviet research institutes, those associated with the Academy of Medical Sciences and the U.S.S.R. Academy of Sciences are the best staffed and equipped. The growth of the Academy of Medical Sciences is shown in Table 1 [adapted from Blokhin's article (*20*)].

Rapprochement with the West

In the last 5 years there has been a visible rapprochement between Soviet and Western biomedical research in approach, methods, and interpretation (for parallels in psychology, see *21*). It appears to many Russian biomedical investigators that Pavlovism has largely outlived its usefulness (*22*).

The present trend in research on atherosclerosis and arterial hypertension may serve as an illustration. It has been a generally accepted view in the U.S.S.R. that the central nervous system plays a dominant role in the pathogenesis of these diseases (*6, 23*). Other factors, such as diet, have been considered secondary. Importantly, the bulk of recent and current publications is now concerned with these "secondary factors," such as saturated and unsaturated fats or renin concentration, and with such matters as hemodynamics, electrical activity of the heart, coronary circulation, and pulse wave velocity (*24*).

In their report on progress in research on atherosclerosis, Vasilenko and Zhukovskii (*25*) concentrated on lipid metabolism, protein metabolism, and degeneration of the arterial wall. They stated:

> The theory of neurogenic pathogenesis of arterial hypertension is now generally accepted but the neurogenic hypothesis of this and other diseases remains an abstract theory and does not clarify the concrete mechanisms of disease. The widely accepted cortico-visceral theory of pathology does not fully clarify the complex problems of pathogenesis. Only comprehensive investigations of biochemists, physiologists, morphologists, pathologists, and clinicians can solve the complicated problems of cardiology.

Of course, the neurogenic theory of pathogenesis is universally accepted only in the U.S.S.R.; in its generality, it is rejected by most research workers outside the U.S.S.R.

Countercurrents

The general trend toward East-West rapprochement in biomedical research has not been without opposition. This countercurrent is manifest in the first issue of the *Bulletin* [*Vestnik*] *of the Academy of Medical Sciences* for 1965, which contains several articles on methodology and ideology in medicine, in support of dialectical materialism and Pavlovism (*26*). In this connection, Biryukov's article "Is telepathy a

Table 1. Growth of the Soviet Academy of Medical Sciences.

Year	No. of institutes	No. of scientific personnel*	Budget (millions of rubles)
1945	24	6,717	8.14
1959	30	10,645	22.88
1963	50	15,953	34.44

* The numbers given probably include technicians.

science?" (*27*) is of interest for several reasons. The concept of extrasensory perception is foreign to classical dialectical materialism. Therefore, it would appear to be a foregone conclusion that the study of telepathy could not qualify as science. It is remarkable that not only has "telepathy" been discussed in the Soviet Union but that at least three books on this subject appeared recently (*28*). One written by Kazhinskii was published by the Ukrainian Academy of Sciences, and one written by Vasil'ev, by Leningrad State University.

Politically inspired articles claiming superiority of medical research and treatment in the U.S.S.R. because of its distinctive ideological orientation and socioeconomic framework were common in the early 1950's. Subsequently, they became quite rare. Still, in 1958 Gurevich (*29*) claimed that the recommendations of American cardiologists that saturated fats be restricted in the diet of the general population as a means of reducing the incidence of atherosclerosis were motivated by the attempt of industrialists to cut down the wages of the workers: eating cheaper carbohydrates in preference to expensive fats would lessen resistance to the wage cut. Actually, what the American worker needs, argues Gurevich, is more and not less fat—and this in the face of a value of 40 percent for average fat intake in the American diet! Gurevich's ignorance of the Western, as well as of the Russian, literature (Russian cardiologists also recommend restriction of dietary fat), and of the general Western socioeconomic background is so blatant that publication of his paper in one of the best Russian periodicals is almost unbelievable. However, it appears that Gurevich's article has been entirely ignored by Russian cardiologists. In any case, we have never seen any reference to it.

Recently, politically inspired articles have again become more frequent. Superiority of Soviet medicine, just because the U.S.S.R. is a "socialist" country, has been claimed by Preobrazhenskii (*30*). Eroshkin advanced such claims for psychiatry (*31*), and Pokrovskii for nutrition (*32*):

> Only under the conditions of a socialist country may we expect successful accomplishment of this tremendous . . . task, directed to a really balanced diet for different groups of the population, fully providing for man's physiological requirements.

Nevertheless, Pokrovskii's article contains much interesting factual information. "Mass vitaminization of food products" seems to have high priority. Vitamin treatment is used in the Soviet Union on a large scale for various diseases, including atherosclerosis (*33*).

Summary

In summary, there appear to be present in the Soviet Union two conflicting general trends in biomedical research. We have the impression that the trend toward rapprochement with Western research is dominant, as evidenced in the bulk of the current literature.

Is the opposing trend, emphasizing in a militant fashion the philosophical and political differences, a rearguard action of a few theoreticians, or is it a broader movement which may gain the upper hand? This is a question which cannot be answered from the available evidence, but resolution of this issue will have a telling impact on future biomedical work in the U.S.S.R. and beyond its borders.

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13. P. V. Gusenkov, *ibid.*, p. 96.
14. V. V. Parin and E. B. Babskii, *ibid.*, p. 8.
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