

JPRS 69899

3 October 1977

U S S R

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY
BIOMEDICAL SCIENCES

No. 9

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BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS 69899	2.	3. Recipient's Accession No.																
	4. Title and Subtitle TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY BIOMEDICAL SCIENCES No. 9		5. Report Date 3 October 1977																
7. Author(s)	8. Performing Organization Rept. No.		6.																
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201		10. Project/Task/Work Unit No.																	
12. Sponsoring Organization Name and Address As above		11. Contract/Grant No.																	
15. Supplementary Notes		13. Type of Report & Period Covered																	
16. Abstracts		14.																	
<p>The report contains information on aerospace medicine, agrotechnology, bionics and bioacoustics, biochemistry, biophysics, environmental and ecological problems, food technology, microbiology, epidemiology and immunology, marine biology, military medicine, physiology, public health, toxicology, radiobiology, veterinary medicine, behavioral science, human engineering, psychology, psychiatry and related fields, and scientists and scientific organizations in biomedical fields.</p>																			
17. Key Words and Document Analysis. 17a. Descriptors																			
<table> <tr> <td>USSR</td> <td>Medicine</td> </tr> <tr> <td>Aerospace Medicine</td> <td>Microbiology</td> </tr> <tr> <td>Agrotechnology</td> <td>Physiology</td> </tr> <tr> <td>Biology</td> <td>Psychology/Psychiatry</td> </tr> <tr> <td>Botany</td> <td>Public Health</td> </tr> <tr> <td>Epidemiology/Immunology</td> <td>Radiobiology</td> </tr> <tr> <td>Human Engineering</td> <td>Toxicology</td> </tr> <tr> <td>Marine Biology</td> <td>Veterinary Medicine</td> </tr> </table>				USSR	Medicine	Aerospace Medicine	Microbiology	Agrotechnology	Physiology	Biology	Psychology/Psychiatry	Botany	Public Health	Epidemiology/Immunology	Radiobiology	Human Engineering	Toxicology	Marine Biology	Veterinary Medicine
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Human Engineering	Toxicology																		
Marine Biology	Veterinary Medicine																		
17b. Identifiers/Open-Ended Terms																			
17c. COSATI Field/Group 2, 5E, 5J, 6, 8A																			
18. Availability Statement Unlimited Availability Sold by NTIS Springfield, Virginia 22151		19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 77																
		20. Security Class (This Page) UNCLASSIFIED	22. Price A05																

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ORIGIN AND FORMATION OF PHYSIOLOGICAL RACES OF PUCCINIA GRAMINIS F.
SP. TRITICI ERIKSS ET HENN. UNDER CONDITIONS OF NORTH CAUCASUS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 6, 1977 received 13 Jan 76 pp
107-114

Article by L. A. Smirnova, Ye. V. Kuznetsova and L. M. Andreychenko, recommended by the North Caucasus Scientific Research Institute of Phytopathology

Text The characteristics of formative processes in the pathogen of wheat stem rust under conditions of North Caucasus are examined. Data on the race variety of the fungus developing on various species of food plants are presented and the basic ways of population variability are shown. The role of species of wild cereals in the process of formation of the physiological races of the fungus is disclosed. It has been established that, as a result of an alternation of species of food plants, the correlation of races in the population changes in a season. Only the races infecting several species of cereal grasses and the basic regionalized wheat variety become predominant in the population. A selection of biotypes with an expanded spectrum of virulence occurs in nature. The virulence of the North Caucasian population of the fungus in relation to known wheat resistance genes is described.

A large number of studies are devoted to an investigation of the variability of the pathogen of wheat stem rust. Foreign and Soviet authors have established that the variability of the species *Puccinia graminis* Pers. is carried out through mutations and sexual and somatic hybridization. The possibility of appearance of mutant forms in this pathogen was experimentally demonstrated in tests with cultures 80-E-0 [14] and race 222 [13]. A study of the evolution of virulence in the fungus in Australia and New Zealand established [9, 10] that mutations were the most frequent causes of changes in the virulence of *P. graminis* f. sp. tritici. Using as an example the appearance of races 21-2 and 34-2, the role of somatic hybridization in the development of new forms was also shown [9].

The sexual process, as a result of which new races and biotypes appear on barberry, is the most active factor in form development in the pathogen of stem rust. Their appearance is due to the recombination of virulence genes during the crossing and self-fertilization of races in nature. Therefore, a large number of races of the fungus, including unique races, are noted in regions where barberry grows [6, 7, 8, 11]. Some of the new races can become widespread subsequently, as, for example, race 15B in the United States.

Thus, in every country or zone, depending on the characteristics of the life cycle of the pathogen, a specific way of variability has an advantage.

North Caucasus belongs to a zone where the pathogen undergoes a full life cycle and aecidiospores serve as the source of reinfection in spring. In our earlier studies [1, 2] we reported on the role of the sexual stage of the fungus in the origination of new races. As yet, however, little is known about the ability of newly appearing races to establish themselves in nature and to produce an infection in various species of cereals.

The results of the study of variability in the North Caucasian population of the fungus in the last 10 years are presented in this article.

Methods

Aecidial and uredial populations of the fungus collected from various species of food plants were used for analysis. Aecidia were collected during the first 10-day period in June in rayons where the largest number of barberry shrubs grow, that is, Georgiyevskiy, Predgornyy, Ust'-Dzhegutinskiy (Stavropol'skiy Kray) and Baksanskiy (Kabardino-Balkariya). In the same places samples of uredospores were collected from wheat crops of the Bezostaya 1 variety and from wild cereals growing in immediate proximity to barberry shrubs. Most often they were various species of Agropyron, Aegilops, Bromus, Hordeum and less commonly, Festuca and Digraphys. The susceptible Little Club wheat variety was infected by the collected spore specimens. After the disease was manifested, we separated monopustule isolates. From 30 to 40 isolates were separated from aecidial specimens, and from 20 to 30 isolates from every species, from uredial specimens.

Monocultures were identified on a standard set of 12 wheat varieties, on a set of isogenetic lines of the Marquis variety (Sr6-Sr14) and on the varieties Kanred (Sr5), Spica (Sr17) and Kavkaz (Sr5, Srx₁). Races were determined according to the international register. In case of detection of races not appearing in the register they were given an ordinal number with the index "H."

Formation of Physiological Races of the Fungus

The existence of the sexual process in the life cycle of the fungus is primarily reflected in the variety of formed races. This is manifested in respect to the number of detected races and the number of analyzed isolates.

Earlier we showed [1] that approximately one out of four or five isolates separated from aecidia represents a different physiological race. Our latest data indicate that these correlations remain comparatively stable. For example, in 1974, when 131 monocultures of the fungus were analyzed, 21 races were isolated, that is, on the average, one out of six isolates corresponded to a specific physiological race. The presented correlations point to the high activity of formative processes ensuring the regeneration of a large number of known races and the appearance of new ones.

During the first years of investigations (1964-1966) in North Caucasus we isolated 23 standard and 30 new races of the pathogen [1]. At present the list of races has increased considerably owing to the races detected in the last few years. Among standard races the following were isolated more often than others: 11, 14, 16, 21, 34, 39, 40, 98, 116, 117 and 130. They were accompanied by races 9, 10, 17, 15, 19, 24, 75, 77, 184, 107, 208, 243 and 267. Of the number of races not indicated in the international register, 1k, 4x, 37H and 41H were most widespread [1].

Despite the large variety of isolated cultures, individual races predominate in all aecidium specimens, regardless of the place of collection. Races 1k and 40, comprising 40 and 30.5 percent respectively, predominated throughout the populations. Race 117 (7.0 percent) accompanied these races more often than others. The predominance of races 1k and 40 in aecidium populations was first noted in 1966. At that time race 1k comprised 10.8 percent of the isolates (in 1964, 0.55 percent), and race 40, 7.2 percent (table 1). In the frequency of occurrence they were second to races 34 and 14.

The race composition of individual specimens differed in the presence or absence of some rarely occurring races. For example, in Baksanskiy Rayon, in addition to the three mentioned races, races 9, 34, 53, 116, 37H and 41H were isolated, in Georgiyevskiy Rayon, 9, 34, 49, 184 and 36H, in Predgornyy Rayon, 4x, 16, 116, 194, 208, 37H and 41H, and in Ust'-Dzhegutinskiy Rayon, 4x, 21, 56, 184, 187, 267 and 53H.

Thus, during the 1964-1967 period the correlation of basic races in aecidia changed considerably. The proportion of races 1k and 40 increased, the frequency of occurrence of races 34 and 21 was reduced significantly and races 14, 11, 39 and 98 were not isolated at all.

The virulence of races 1k and 40 in relation to the species of cereals growing there is one of the main reasons for an increase in their number in the population. The specific resistance of the basic regionalized Bezostaya 1 wheat variety and the characteristics of the biology of the races themselves are of special importance in the accumulation of individual races. To clarify the role of every factor, it is necessary to observe the characteristics of formation of races on species of food plants in a season.

Table 1. Races of *Puccinia Graminis* F. Sp. *Tritici* Predominating in Natural Aecidium Populations

(1) Год	Проверено изолятов (2)	(3) Количество обнаруженных рас. %									
		1к	4х	11	14	21	34	39	40	98	117
1964	189	0,55	1,1	4,4	39,4	2,25	10,6	4,9	0,55	2,25	0
1966	73	10,80	9,0	3,6	7,2	9,00	24,1	7,2	7,20	1,8	0
1974	131	40,00	2,2	0	0	0,80	1,5	0	30,50	0	7,0

Remark. The predominating races in 3 years, that is, 1964, the first year of investigations, 1966, the year when there was an increase in the size of race 1к, and 1974, the last year of investigations, are presented in the table.

Key:

1. Year
2. Isolates checked
3. Number of detected races, %

Formation of Physiological Races of the Fungus on Species of Cereals

Under conditions of North Caucasus the pathogen develops with an alternation of species of food plants according to the barberry-cereal grasses-wheat-grasses scheme. Thus, in a season there is an alternation of the types of resistance of host plants, which has a significant effect on the number of developing races and their representation. At the same time, not all the races originating in aecidium populations become widespread on cereals. Owing to avirulence, many of them do not find the appropriate species of food plants. The species of such wild cereals distinguished by a specific resistance frequently limit the spectrum of races in the population of the fungus.

Observations of the development of the first uredogenerations showed that a smaller number of races are widespread on species of wild cereals than on crops of susceptible wheat varieties when infected by aecidiospores. For example, in 1974 a total of 21 races were detected in the aecidial population of the fungus, of which seven races were isolated on five species of wild cereals (*Agropyron repens*, *A. trichophorum*, *Koeleria* sp., *Digraphys* sp. and *Festuca orientalis*) growing near infected barberry shrubs. In the same places during the same period 11 races were registered on wheat crops of the Bezostaya 1 variety. Races 1к and 40 predominating in aecidial populations were also the basic races in uredial specimens. Furthermore, the representation of races 4х and 34 sharply increased on species of cereals (table 2).

Table 2. Correlation of Physiological Races in Populations of Puccinia Graminis F. Sp. Tritici Isolated From Various Species of Food Plants (1974)

Питающие растения (1)	(2)		(3)																					
	Исследовано количество	Исследовано количество	1к	4х	9	15	21	34	36н	37н	40	41н	49	53	53н	56	116	117	184	194	208	267	187	
Барбарис (эцидии) (4)	131	131	40,0	2,2	1,5	1,5	0,8	1,5	0,8	3,0	30,5	2,2	0,8	0,8	0,8	0,8	1,5	7	2,2	0,8	0,8	0,8	0,8	0,8
Злаковые травы (5)	85	85	51,2	23,3	—	—	1,2	1,2	—	3,7	18,3	—	—	—	—	—	—	—	—	—	1,2	—	1,2	1,2
Пшеница Безостая (6)	108	108	27,2	18,4	1,0	2,0	1,0	15,8	—	2,0	23,7	—	2,0	—	—	—	7,0	—	—	—	—	—	—	1,0

Key:

1. Food
2. Isolates checked
3. Number of races
4. Barberry (aecidia)
5. Cereal grasses
6. Bezostaya 1 wheat

Race 4x accumulated basically on species of cereal grasses, and race 34, on wheat crops. The specialization of physiological races in relation to species of food plants is the cause of this. For example, race 4x was mostly noted on *Aegilops squarrosa* and *Hordeum jubatum*, and race 1k, on *Agropyron trichophorum*, *A. repens* and *Bromus benekeni*.

Such a specialization of the races of *P. graminis* f. sp. *tritici* on wild cereals undoubtedly affects the formation of uredopopulations. The richer the specific composition of cereals in the regions where barberry grows, the greater the number of races that can become widespread. However, the number of affected cereal grasses in the same region fluctuates during years depending on weather conditions. During years of an early and intensive development of the aecidial stage of the fungus both annual and perennial species of wild cereals are infected. During a late development of the aecidial stage such cereals as *Aegilops* and *Hordeum* "escape" the infection owing to an early ripening. In such cases the range of food plants on which the originated fungus races could undergo their formation is reduced.

As an example, we will discuss the development of the pathogen in Georgiyevskiy Rayon in 1966 and 1974. An intensive development of the aecidial stage of the fungus was observed there in 1966. The first uredogeneration was noted on four species of cereal grasses: *Agropyron intermedium*, *A. trichophorum*, *Bromus japonicus* and *Hordeum jubatum*. On the whole, eight races, that is, 1k, 34, 40, 14, 21, 98, 54H and 4x, were detected in the uredopopulations developed on cereal grasses. Of them four races--1k, 40, 34 and 21--became widespread on wheat crops of the Bezostaya 1 variety. In 1966 wheat was grown on fields remote from the places where barberry grew and crops were infected by cereal grasses. In 1974 barberry in Georgiyevskiy Rayon was infected to a very slight degree. Isolated aecidiopustules developed late on young growing shrub shoots. In 1974 wheat was sown on fields located near (no more than 1 km away from) the place where barberry grew. The first uredopustules were registered simultaneously on *Diglyphys* sp. and on wheat of the Bezostaya 1 variety. The wheat form of the pathogen isolated from *Diglyphys* sp. was represented by two races--1k and 40. Seven races--1k, 40, 116, 9, 15, 21 and 49--were isolated from the specimens collected from crops.

Thus, not only species of cereals, but also the characteristics of spread of the primary infection can have a considerable effect on the formation of individual races. When wheat is infected directly by aecidiospores, even under conditions of a weak development of the aecidial stage, quite an extensive spectrum of races of the pathogen becomes widespread in nature. This is due to the fact that the Bezostaya 1 wheat variety regionalized there has a specific resistance, which, in fact, in mature plants is controlled by one gene *Sr5* [4]. Therefore, the selective effect of this variety on the population of the pathogen is basically manifested in the selection of races virulent to *Sr5*. Earlier L. A. Smirnova [3] showed the effect of specific resistance of the Bezostaya 1 variety on a reduction in the number of races

avirulent to Sr5 and on an increase in the size of race lk. The advantage of race lk, as compared with the other basic races infecting wheat of the Bezostaya 1 variety, also lies in its biological characteristics. This race forms spores on the Bezostaya 1 variety more intensively, as a result of which it can increase more rapidly in populations [5].

It is evident from the examined examples that, as a result of an alternation of species of food plants, the correlation of the basic races in populations can change considerably in a season and during years. Knowledge of the patterns of these changes makes it possible to some extent to foresee the possible predominance of individual races in a season. Long-term observations of the race composition of the pathogen showed that, if races lk, 34, 40 and 4x are detected at the aecidial stage, they become the basic races in uredopopulations. These races, as compared with others, are characterized by a wider specialization--they are noted on many species of cereal grasses and are capable of infecting wheat of the Bezostaya 1 variety.

Distribution of Virulence Genes at Different Stages of Development of the Fungus

There are different opinions of the connection between the sign of virulence of races and their ability to survive in populations. Van der Plank [12] believes that races possessing a high virulence are characterized by a weaker survival rate. He introduces the concept of stabilizing selection active in the populations of the fungus in favor of the preservation of races that do not have "unnecessary" virulence genes.

From this point of view it is interesting to examine the data on the changes occurring in the populations of the fungus on individual species of food plants in a season.

Having used the isogenetic lines of the Marquis variety, we described the virulence of individual races in relation to known resistance genes. In such a way we determined the efficiency of individual resistance genes and their combination. Furthermore, by comparing the frequency of occurrence of certain combinations of virulence genes on various species of food plants, we judged the direction of the changes occurring in populations.

It is evident from the data presented in table 3 that gene Srx₁ provides resistance against all the detected races of the fungus. On the other hand, gene Sr5 is totally ineffective for the North Caucasian population of the fungus.

The high percentage of biotypes virulent to genes Sr7, Sr9b, Sr10 and Sr17 in populations should also be noted. At the same time, the representation of fungus cultures virulent to the last resistance genes is higher in populations collected from wheat of the Bezostaya 1 variety. An inverse relationship was revealed for gene Sr6. The content of fungus cultures virulent to Sr6 is higher in aecidial populations than in uredial populations.

The accumulation of virulence in uredopopulations of the fungus occurs not only in the direction of an increase in the representation of individual genes, but also in the direction of an increase in the representation of biotypes possessing a large number of virulence genes. One can be convinced of this if all the biotypes isolated from aecidial and uredial populations are divided conventionally into the following seven groups: 1) biotypes virulent only to Srg; 2) biotypes additionally virulent to one resistance gene; 3) biotypes additionally virulent to two resistance genes; 4) biotypes additionally virulent to three resistance genes; 5) biotypes additionally virulent to four resistance genes; 6) biotypes additionally virulent to five resistance genes; 7) biotypes additionally virulent to six resistance genes.

Table 3. Frequency of Occurrence of Virulent Biotypes in Populations of Puccinia Graminis F. Sp. Tritici Collected From Various Species of Food plants

(1) Виды питающих растений, с которых собраны образцы спор	(2) Количество культур, %, вирулентных для генов устойчивости											(3) Sr ₅ +Sr ₆ (Kavkaz)
	Sr 5	Sr 6	Sr 7	Sr 8	Sr 9b	Sr 9c	Sr 10	Sr 11	Sr 13	Sr 14	Sr 17	
Барбарис (эцидии) (4)	91,4	17,7	30,0	7,7	27,7	11,5	26,6	1,1	13,3	3,0	31,1	0
Злаковые травы (5)	98,3	8,3	11,6	6,6	23,3	10,0	43,3	0	0,0	2,0	56,6	0
Пшеница сорта Безостая 1 (6)	99,1	4,6	50,0	6,1	39,4	14,9	75,8	1,5	10,6	7,6	43,9	0

Key:

1. Species of food plants from which spore specimens were collected
2. Number of cultures, %, virulent to resistance genes
3. (Kavkaz)
4. Barberry (aecidia)
5. Cereal grasses
6. Wheat of the Bezostaya 1 variety

Table 4 demonstrates the representation of these seven groups of biotypes on various species of food plants. Two patterns are obvious from the results obtained.

First, in aecidial populations the representation of cultures is reduced in the direction from the group of biotypes with the smallest number of resistance genes to the group of biotypes with the greatest number of genes. The first group of biotypes virulent, out of the tested Sr-genes, only to Sr5 is more numerous at this stage of development of the pathogen. They are followed by the second and third groups. Only the fifth group of biotypes, whose percentage is slightly higher than that of the fourth group, constitutes an exception. Thus, in aecidial populations the representation of biotypes is in an inverse relationship to the number of the "unnecessary" virulence genes they possess.

Table 4. Representation of Biotypes of Varying Degree of Virulence at Individual Stages of Development of the Fungus

№ группы биотипов (1)	Содержание, %, групп биотипов, выделенных (2)		
	из эцидий (3)	со злаковых трав (4)	с посевов пшеницы Безостая I (5)
1	44,1	27,6	5,6
2	24,7	24,2	11,4
3	11,8	15,5	13,9
4	5,4	15,5	23,6
5	9,7	10,3	25,7
6	3,2	5,2	18,1
7	1,1	1,7	1,4

Key:

- | | |
|--|---------------------------------|
| 1. Number of group of biotypes | 3. From aecidia |
| 2. Percentage of groups of biotypes isolated | 4. From cereal grasses |
| | 5. From Bezostaya 1 wheat crops |

Second, in the specimens of uredospores collected from Bezostaya 1 in the same places where aecidiospores were isolated the first group of biotypes proved to be not numerous. The fourth, fifth and sixth groups of biotypes, each of which had virulence genes not only to Sr5, but also to three, four and five resistance genes, comprised the greatest proportion. A comparison of the representation of various groups of biotypes points to a selection of more virulent forms actively occurring in nature, although this virulence is unnecessary for infecting the cultivated variety. The effect of selection is obvious in every group of biotypes. The first two groups of biotypes on wheat are represented by a smaller number of isolates than in aecidia and beginning from the third group of biotypes the representation of isolates in populations developing on wheat becomes higher than in aecidia.

As yet it is difficult to explain the differences detected in the distribution of virulence genes among biotypes at different stages of development of the pathogen. In this respect the assumption [9] that specific virulence genes are connected with "adaptation" genes deserves attention. Biotypes with such a unique combination can be aggressive and carry more virulence genomes than necessary.

The results of our investigation make it possible to conclude that under conditions of North Caucasus the aecidial stage of the fungus is the basic source of appearance of new races. As a result of the crossing and self-fertilization of individual races new combinations of virulence appear at the aecidial stage.

The newly developed races undergo a period of formation on species of cereal grasses and wheat varieties. Species of cereals possessing a varying specific resistance have an effect on the number of developing races and their correlation. As a result of an alternation of species of food plants the correlation of the basic races in populations can change in a season. Only races infecting several species of cereal grasses and the basic regionalized wheat variety--Bezostaya 1--remain predominant in uredopopulations.

Biotypes virulent only to gene Sr5 are most often noted in aecidial populations. They comprise 44.1 percent of the isolates. The correlation of the remaining biotypes is in an inverse relationship to the number of the "unnecessary" virulence genes they possess. Conversely, in uredial populations the group of biotypes virulent only to Sr5 is represented by a smaller number of isolates (5.6 percent) and the number of isolates of other groups of biotypes depends on the number of virulence genes they possess. This points to a selection of biotypes with an expanded spectrum of virulence actively occurring in nature.

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PSYCHOLOGY

ROLE OF EDUCATION IN PERSONALITY FORMATION

Moscow NEDELYA in Russian 22-28 Aug 77 pp 2-3

[Article by Professor V. Davydov, director of the Scientific Research Institute for General and Pedagogical Psychology: "How is Personality Formed?"]

[Text] At the request of NEDELYA, this question is answered by Professor V. Davydov, director of the Scientific Research Institute for General and Pedagogical Psychology of the USSR Academy of Pedagogical Sciences.

How is a child's consciousness of self, its personality, formed?--millions of people ask themselves these questions. And they await an answer from one of the most modern sciences of man--psychology.

The increased attention of late to everything that in one way or another touches upon educational issues is not accidental. Look at article 20 of the new Draft USSR Constitution: "The Soviet state sets as its goal the expansion of real possibilities for developing and applying the creative forces, abilities and talents of citizens and for the all-round development of the individual." Think about it: the all-round development of the individual has become a task of the state. Only a society of developed socialism creates the social conditions known to be conducive to man's development.

So, the psychologists decided to find out: which individual characteristics are inherited and which are acquired, which are formed during socialization?

A team of researchers from our institute, under the guidance of I. Ravich-Shcherbo, are now conducting a study--at the crossroads of biology, physiology and psychology--using an

original "twin" method. While comparing children within and between pairs at different ages, the scientists determined the approximate specific weight of inherited factors--after all, in the opinion of bourgeois psychologists, heredity can set precise limits to intellectual development. Our studies are still far from complete, but it is now possible to propose the following: genetic factors determine only the most general properties of neural processes, and this means, they do not fatally influence personality traits. It follows that heredity does not limit the possibilities for intellectual development! And the favorable social conditions for this development are guaranteed, as is well-known, by the constitution. What does this all mean? It means that in our country the task of providing universal, compulsory secondary education (I emphasize, instruction which is educational and developmental) for all children without exception is more than just feasible.

Today, however, the accomplishment of this task frequently runs up against the situation where an interest in learning has not been formed in children and the ability to study has not been established--these two reasons at times give birth to chronically poor students. This is now not simply a pedagogical, but a socio-pedagogical problem.

What are the psychological conditions which enable one to overcome poor progress? A team of psychologists, led by professor N. Menchinskaya and doctor of psychology Z. Kalmykovaya, conducted a number of observations in one of the schools in the city of Gor'kiy (together with scientists from the Institute for the Retarded of the USSR Academy of Sciences). It turned out that, with serious attention to a child's age and individual traits, it is possible to significantly raise his educational level, to precisely mold his learning ability. First of all, it is necessary to organize a positive attitude toward learning--and then educational activities, self-evaluation and self-control are built on this foundation. Then scientific methods are required for controlling this development, its pace and results; precise standards are needed--how is a particular quality formed, what are the causes of poor progress.

I will explain my idea. For example, in Estonia, the Ukraine and several other places, so-called remedial classes have been set up. Children who are lagging behind their peers and require a different pace of instruction and a different approach study in them. The remedial classes are a good and necessary thing. However, how are children selected, based on what principle? Are we able, today, to determine a deviation from the norm and to precisely determine the extent of this deviation? Unfortunately, not always... So, the quicker psycho-

logists develop a method for diagnosing different aspects of psychological development, the more successfully we will be able to solve a number of problems in universal secondary education.

Of course, all of this is not only being developed in laboratories but also in schools and kindergardens. The unique Children's Research Center, which is being built in Moscow, will certainly be a tremendous help. Children from ages 3 to 17 will grow up and study here.

Imagine: preschool and school institutes working in close proximity on the same grounds. Scientists will supervise the children on a daily basis. The children's center will enable specialists to study the child as a whole--in its biological, psychological and pedagogical aspects--and to establish a correlation between age and individual traits. And the main thing is that it will be possible to size up the problems and needs of each stage of childhood.

What can be said; today the content of school life is frequently taken up by studies alone. If a child lags behind in this area for any reason, he is practically deprived of the possibility of showing and proving himself in any other area. Is this really right? Everybody knows that the main activity for preschoolers is play and that the main thing for younger school age children is study. And the main activity for youth (10-14 years old) is, evidently, not study, but socially useful activity--art, sports and work (of course, I have in mind serious, productive work) and only partly study.

I would like to dwell on this idea in a little more detail. Today, the educator frequently runs into the situation where a youngster is doing poorly in the classroom, but proves himself in an outstanding manner in the school craft shops. Under present school practices, these successes will be of little use to the youth's self-esteem because work is located somewhere "on the periphery"; work does not carry equal weight with studies.

In the proposed center, we intend to reorganize the student's life so that the middle grades (fourth through eighth) are transformed from classes where there are only studies into classes where they engage in work, art and sports; at the same time, none of these areas will enjoy any advantages over the others.

While testing himself in different kinds of activities, the young person will inevitably be successful in one of them.

Of course, the center will also enable us to study the older students better. After all, the main concern for this age is to select a goal, form an ideal and select their occupation; it is precisely at this age that knowledge of self begins: the young person learns to analyze his personal behavior and to evaluate it.

We plan to begin working this fall in the children's center on Nakhimovskiy Boulevard in Moscow. In the beginning, we will enroll children from first through eighth grades; next year, we will start to enroll three-year olds--thus the "pre-schoolers" will be included in the work.

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PSYCHOLOGY

WORK EFFECTIVENESS AND QUALITY AND ENGINEERING PSYCHOLOGY

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA. EKONOMIKA, FILOSOFIYA, PRAVO
in Russian No 11, 1977 pp 75-79

[Article by A. A. Krylov]

[Text] The 25th CPSU Congress has defined the new goals of Soviet society's economic and social development. As the motto of the Tenth Five-Year Plan, effectiveness and quality express the "objective needs of the present stage of national economic development,"* a stage in which we must achieve "dynamic and proportionate development of social production, a rise in its effectiveness, acceleration of scientific-technical progress, growth in labor productivity, and the greatest possible improvement of work quality at all levels of the national economy."** Soviet science is called upon to play an important role in attaining these objectives, but the requirements are especially high toward scientific disciplines directly associated with research on the various problems of heightening work effectiveness and quality. We can include, with full grounds, engineering psychology among such scientific disciplines today.

Engineering psychology basically took shape as an independent scientific discipline in the Soviet Union in the 1950's. Development of new technology and transition to automated and mechanized production have raised the issue of studying the role of the human factor in achieving high effectiveness and reliability in "man-machine" systems.

At first, research in engineering psychology was directed basically at preventing gross errors, such as "forgetting" to account for the human factor when designing "man-machine" automated systems. The following can be included among such errors: Placement of visual displays outside the zone

*Brezhnev, L. I., "Speech to the CPSU Central Committee Plenum on 25 October 1976," KOMMUNIST, No 6, 1976, p 10.

**Brezhnev, L. I., "The CPSU Central Committee's Report and the Party's Immediate Objectives in Domestic and Foreign Policy," KOMMUNIST, No 4, 1976, p 32.

of visibility; use, as the encoding characteristics of signals, of inadequately distinguishable (lying below discrimination thresholds) gradations in size, shape, or color; placement of controls outside the zone of reach; inconsistency between resistance of controls and basic human characteristics; inconsistency between the way information is presented (in terms of quantity and presentation time) and the possibilities for perception, thinking, and memory, and so on. Such errors in equipment planning as a rule lead to errors just as gross and serious mishaps during the use of this equipment. Research in engineering psychology directed at preventing gross errors in accounting for the human factor has played a significant role in heightening the reliability of "man-machine" systems, and thus in heightening the real effectiveness of these systems. However, the first studies conducted in engineering psychology involved system productivity specifically to a much lesser degree. This situation has appeared fully justified, considering that the transition itself to fully automated and mechanized production have produced a dramatic shift in productivity.

Today we can observe a noticeable broadening of the applied directions of engineering psychology, and the results of research in engineering psychology are "working" not only in behalf of reliability but also in behalf of the productivity of "man-machine" systems. This situation has its objective causes as well, inasmuch as a transition from one ASU [automatic control system] to another, more sophisticated one is not as a rule accompanied by a shift in productivity. Meanwhile, we are finding it possible to achieve a significant rise in productivity which justifies outlays on the new technical versions only if engineering psychologists first conduct deep research. "All grounds exist for believing," B. F. Lomov notes in his analysis of the objectives of psychological science in the Tenth Five-Year Plan, "that as we make fuller use of reserves being revealed to us by technology and economics, the role of 'human factors' in labor productivity will constantly grow."* He later states: "...psychological factors are becoming a most important reserve for growth of the society's labor productivity, and their scientific analysis is a task of great importance to the state."**

The reserves for heightening labor productivity and product quality are being utilized in engineering psychology in such a way as to optimize human activity in the work of "man-machine" systems. From the standpoint of engineering psychology, optimization can be viewed, as a whole, as a certain controlled procedure for finding the best (according to prescribed criteria) organizational version of a system's operation, assuming that optimum organization would result in the system's greatest productivity (which is characterized by the least time outlays), its greatest reliability

*Lomov, B. F., "Decisions of the 25th CPSU Congress and the Tasks of Psychological Science in the Fight for Higher Work Effectiveness and Quality," VOPROSY PSIKHOLOGII, No 6, 1976, p 9.

**Ibid., p 10.

(as defined by the probability of maintaining the prescribed characteristics of the result of the system's operation), and significantly more economical operation (as defined by the outlays of energy and materials).* In this definition, reliability is characterized by the probability that the given result of the system's operation would be reached, the characteristics of which can define both the quality with which the system functions and the quality of the end product.

Practical optimization of labor by engineering psychology presupposes, first of all, purposeful work by psychologists in equipment planning and design. This work takes the form of support to system planning by engineering psychology. System planning is, at the same time, the planning of human activity. For this reason the better this planning is done, the greater would be the effectiveness and quality of human labor in the system being created. Support to planning by engineering psychology is found to effective today only when this support is provided in all stages of the system's planning. Support by engineering psychology foresees the following in the stage of defining the general requirements to be imposed upon a "man-machine" automated system:

Analysis of the conditions governing the system's operation;

analysis of the experience of operating systems of the given type designed earlier;

determination of the possibilities for human life support in the given conditions and for maintenance of high efficiency;

determination of the qualifications of operators and coordination of their training time with the time required to develop the system;

determination of the operator's main functions and the requirements on the precision and time of these functions;

determination of the requirements on human psychological and psychophysiological qualities that are most important in relation to the given type of activity;

initial determination of the operator's functional load and the number of operators required in the system;

initial determination of the different ways in which operators can perform their functions, and comparative assessment of these different ways.

Thus the general requirements on human activity take shape in the stage during which we define the general requirements on the system.

*See also: "Metodologiya issledovaniy po inzhenernoy psikhologii truda" (The Methodology of Research on Labor in Engineering Psychology), Leningrad, Part 1, 1974, pp 5-11; Part 2, 1975, pp 40-43.

The acquired data are used in engineering psychology as the foundation for developing the general principles to be followed in building the system.

Support by engineering psychology during development of the system's plan includes:

Elaboration upon and refinement of data obtained in the stage of defining the general requirements on human activity;

determination of the necessary information display resources and controls;

selection of the particular control console layout variant;

determination of the functional responsibilities of each operator and the possibilities for interaction among operators;

determination of the specific features of the activity and load of operators in different working conditions;

determination of the required relationship between automatic and manual control in the system.

The acquired data are used by engineering psychology as the grounds for the system's technical plan, and they are built into the system's experimental model. During creation of the experimental model we refine the recommendations of engineering psychology adopted earlier, with a consideration for the practical possibilities for satisfying these recommendations and for complying with the requirements of ergonomic GOST's [All-Union State Standard].

Support by engineering psychology in the stages during which the experimental model is tested foresees:

Expert assessment of the system's correspondence to ergonomic GOST's;

conduct of modeled, seminatural, and natural tests with operators participating;

acquisition of real data on the time required by operations and their precision;

determination of work intensity and distribution of the load of operators during a shift;

determination of the consistency between operator training level and the complexity of the operator's activity;

determination of the dynamics behind the state of operators and their efficiency during a shift and during the prescribed time of the system's operation. Data acquired by engineering psychologists during testing

of the experimental model are used when a need arises for making changes in the series-produced version of the system and for developing new models of systems of this type.

The support engineering psychology gives to planning in all stages of creation of "man-machine" systems affords a possibility for scientifically solving the complex problems of attaining the best correspondence between the equipment and human characteristics. Concurrently with planning the equipment, as a rule we also develop recommendations pertaining to the physiological-hygienic conditions of the environment, with a consideration for the specific features of the activity being performed. This line of optimizing activity with the assistance of engineering psychology has the goal of attaining comfortable conditions in relation to the parameters of the lighting, the acoustic background, air temperature, gas composition of the air, and so on. However, when attainment of comfortable conditions is impossible for one reason or another, limitations are placed on the time man can remain in the unfavorable conditions, and the resources of individual and group protection are developed.*

As follows from the name, "man-machine" systems contain two subsystems. Optimization of activity with the assistance of engineering psychology, described above and taking the form of support by engineering psychology to "man-machine" system planning, pertains only to the technical subsystem. If we are to achieve high work effectiveness and quality for the entire system, this optimization must also consider the second subsystem; such optimization is always based on our knowledge of the specific features of the occupation and the concrete activity. In application to man within a "man-machine" system, the essence of optimization with the assistance of engineering psychology boils down to the following:

Determination of the personnel contingent to be trained for the given type of activity;

organization of the training process in occupational training;

determination of the personnel contingent suited to the particular type of activity.

We define the contingent of personnel to be trained for a particular type of occupational activity in different ways depending on the complexity of the activity, its importance, and the frequency with which this activity is encountered. The contingent to be trained for each type of occupational activity frequently encountered is formed on the basis of occupational orientation, in which occupational propaganda, occupational education, and occupational consultation play the decisive role. The contingent to be trained for types of occupational activity involving strict limitations

*"Vvedeniye v ergonomiku" (Introduction to Ergonomics), Moscow, 1974, pp 177-178.

on the psychological and psychophysiological qualities of the individual and the training time is formed on the basis of occupational selection, which presupposes the conduct of an appropriate volume of psychodiagnostic, clinical physiological, and other tests.

The ergonomic aspects of organizing the training process in occupational training are defined chiefly by its structure, which includes:

General courses in the specialty;

special courses on the layout of the particular technical system and on its operation;

training in relation to individual operations and working conditions;

training in relation to the activity as a whole in different conditions.

The most pressing problems include developing the training program, introducing technical training resources, and developing trainers and training conditions applicable to different types of activity. These problems pertain not only to training but also retraining associated with mastering new, more complex, and improved equipment. The specific features of retraining are defined, first, by the effect of previous activity and, second, by the fact that different age groups of specialists are involved in retraining as a rule. The principal task of engineering psychology in optimizing the training process can be defined as reducing training (re-training) time while heightening the quality of knowledge, abilities, and habits.

We define the contingent suited to the particular type of activity after training on the basis of the success the personnel exhibit in theoretical and practical sections of the course, on the basis of our observations of behavior during the training period, and on the basis of additional psychodiagnostic and other tests.

Thus transition to new equipment has qualitatively altered the nature of human work and has produced the need for accounting for the human factor on a scientific basis. Optimization of activity from the standpoint of engineering psychology has important significance to solving the problems of heightening work effectiveness and quality. Such optimization must take the form of support by engineering psychology to the planning of the equipment and working conditions, and support by engineering psychology to occupational selection, occupational orientation, and occupational training. If we are to be able to implement all measures of optimization, we would need to broaden the front of fundamental research in engineering psychology, and improve the organization of the work of ergonomic subdivisions in the various departments. Only a state service of engineering psychology would be capable of fully realizing the potentials of optimizing activity with the support of engineering psychology in order to insure continual growth of work quality and effectiveness. The need for creating such a

service stems from the objective conditions of our country's social and economic development. Meanwhile, the development experienced by the theory and practice of engineering psychology in the Soviet Union has created realistic grounds for organizing such a service.

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PSYCHOLOGY

DEVELOPMENT OF APPLIED SOCIAL PSYCHOLOGY IN LENINGRAD UNIVERSITY

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA. EKONOMIKA, FILOSOFIYA, PRAVO, in Russian No 11, 1977 pp 90-94

[Article by Ye. S. Kuz'min]

[Text] Social psychology has been developing actively at the university since the late 1950's. Collectives of the Department of Social Psychology, the Laboratory of Social Psychology, and the Laboratory of Small Groups and Collectives have been working on the various problems of social psychology.

The directions of the scientific research have been defined by the work on the methodological and theoretical foundations of social psychology and on its diverse methods and techniques; this work has also become a source of differentiation of fields within social psychology. As a consequence we have a diversity of courses specializing in different fields of social psychology: Research methodology, methods, and techniques; pressing problems in social psychology; the dynamics of small groups and collectives; industrial social psychology; perception and understanding of one person by another; mass media; psychosocial aspects of the personality, and others. Development of social psychology has promoted development of applied research, the practical significance of which cannot be overstated. Moreover the unfolding of the scientific-technical revolution and the awakening of the public's need for improvements in control over production and education have produced a demand for research on the psychosocial problems of control. The interests of the society and the trends of the scientific-technical revolution have coincided with the need for improving social psychology. This is precisely why, beginning in 1963-1965, applied fields, especially industrial social psychology, have been enjoying continually more persistent and effective development in the Department of Social Psychology. Key problems in industrial social psychology include work on the social psychology of labor collectives with the goal of prediction and social planning, control of labor collectives, development of a communist attitude toward labor, arousal of the public activity of laborers, the perspectives of social and occupational adaptation by young workers, analysis of the psychological climate, revelation and resolution of stresses and conflicts in labor collectives, personnel selection, and improvement of work with personnel. This cycle of work was started in 1965 with contracted research at the

Svetlana Association, where the first plan for social development of an enterprise collective was created in the USSR. This was followed by research at the Elektroapparat, imeni Kozitskiy, Pozitron, Kulon, and many other associations. The leading researchers are assistant professors A. L. Svetsitskiy and I. P. Volkov, senior scientists E. S. Chugunova and A. A. Rusalina, assistants A. A. Yershov, V. Ye. Semenov, V. V. Boyko, A. Yu. Shalyto, and Yu. N. Yemel'yanov, and many others. These studies have afforded a possibility for tying the problems of social psychology in with day-to-day life and for actively developing its diverse applied directions.

As of today the following basic fields and directions of applied psychosocial research have been defined: Industrial social psychology, the social psychology of mass media (propaganda and agitation), the social psychology of sports, and medical social psychology.

Industrial social psychology includes a broad range of problems in social planning and control of the labor collectives of enterprises, institutions, sovkhozes, and various sectors of the national economy, problems which are enjoying active study today. The most pressing problems in this field are those of competition, rivalry, and social competition. The problems of family, marriage, birth rate, and the organization and use of leisure time will be studied in social psychology. The work of the social psychology of mass media is directed at studying the ways for heightening the effectiveness of television, radio and the press. Group processes in their dynamics and their structure in collective forms of competition are the dominant problems of the social psychology of sports. Medical social psychology is an effective discipline for studying various sorts of frustration, the causes of alcoholism, drug addiction, and neurosis, and the methods of group psychotherapy.

However, the central place in the university's applied psychosocial research is occupied by work being done with the goal of creating plans for social development of enterprises, sectors, and cities. At the enterprise level we are devoting special attention to the life of the labor collective and to attaining a favorable psychological climate, which takes the form of satisfaction in work and in the mutual relationships within the production collective, mutual assistance and mutual exactingness, healthy criticism and self-criticism, and so on.

The means for attaining a favorable climate are: Improvement of working conditions and work organization; an attentive attitude on the part of executives at all levels to the needs of the workers, direct inclusion of the workers in control over the collective's affairs, development of business-like ties among workers in relation to production problems and sociopolitical problems, prompt resolution of stresses and conflicts through criticism and self-criticism, solution of the problems of selecting and placing personnel on the basis of sociopolitical, occupational, and individual psychological qualities of the personality with the assistance of expert certification, and coordination of the personal plans of workers with the perspectives for development of the production operation.

It is extremely important to create favorable conditions for harmonic, thorough development of the personality right at the enterprise level; an adequately developed personality displays balance, consistency with the needs of the society, the closest surroundings (the collective, the family, friends, social groups), and the self, and correct solution of sociopolitical, occupational, and personal problems. In general, all of this depends on the set of basic relationships to and attitudes toward work, other people, and the self, which define the individual. These relationships can be developed and reinforced by: a) Developing a communist attitude toward work through recognition of the significance of the activity, through a rise in its creativity and improvement of its content, through an increase in the diversity of the work (combination of occupations, alternation of operations, alteration of work rhythms), and through augmentation of its social ring and prestige (moral and material stimulation); b) development of a communist attitude toward other people on the basis of the fact that, in our society, one person is a brother, a friend, and a comrade to another. The attitude the individual has toward himself acquires exceptionally great significance in control. The problem is phrased today as: Without having control over himself, an individual does not have the moral right to control others.

The problems of social planning of collectives become significantly more complex at the sector level. The structure of collectives at the sector level is complex. It includes labor collectives characterized by different degrees of community and scope: Primary collectives (teams, divisions), secondary collectives (sections, shops, institutions), third-degree collectives (enterprises, plants, scientific research institutes, design offices), fourth-degree collectives (production associations, scientific production associations) and, finally, fifth-, sixth-, and seventh-degree collectives (the collectives of trusts, subsectors, and sectors). The goal of social planning in the work with collectives is to improve intracollective and intercollective associations so as to create a normal work atmosphere and a favorable psychological climate promoting a rise in work quality and effectiveness as well as growth in the satisfaction the workers feel in their labor. Whether or not we achieve these goals depends on presence of a favorable psychological climate in the collectives of enterprises and the sector as a whole, on the dominant style of control in the collectives of the enterprise or sector, and on personnel policy.

A favorable psychological climate in a sector means a feeling of pride and prestige in relation to one's sector, confidence in fulfillment of plans, enthusiasm in work, and competitive activity. The characteristics by which we define a favorable climate include personnel turnover as compared to the national average and satisfaction in work. A favorable climate at the sector level is the product of favorable climates in subsectors, associations, and enterprises. Characteristics of the stability, steadiness, and lability of life and mutual relationships define the essence and nature of the climate in the sector and in the enterprises.

The stability and steadiness of labor collectives are defined by the system of traditions and rituals, by the steadiness of the basic core of the personnel, by the number of cliques, by the sector's prestige in the eyes of the society, by the relative dominance of workers with a long time of service, by the attitude toward such persons, and by relatively low personnel turnover.

Lability or variability factors have no less significance to a favorable climate. This aspect of the matter pertains to the specific features of working into a labor collective and the problems of social mobility and work career. To adequately work new personnel into a labor collective we must competently solve the problems of occupational orientation and occupational selection, and we must provide suitable grounds for occupational and social adaptation of new workers. Work that is compatible with capabilities and interests, rapid assimilation of occupational habits and skills, rapid attainment of output norms, and active inclusion within the system of official and unofficial mutual relationships within the collective are all important aspects of worker adaptation.

Social mobility, which associates most intimately the interests of the society and the sector with the personal interests of the workers, includes not only growth in social and occupational status but also self-improvement of the worker through continued education and development of occupational and social experience. Regular certification and recertification of personnel coupled with implementation of promotion plans and with the plans for personnel training and retraining is a highly important resource by which to insure an optimum level of social mobility within the sector.

Active, purposeful activity by enterprise collectives in improving psychosocial relationships is an extremely important foundation upon which to shape a favorable climate within the sector.

Sociological and psychosocial research has rooted the idea in the social consciousness of most people that executives at all levels must be attentive, just, benevolent, tactful, and honest in their relationships to people today. This idea is correct, but it is not enough. In these days of substantial growth of the complexity of the tasks and greater responsibility and awareness of the workers, executives must serve as an example and model of personal behavior, they must display high moral and political qualities, and they must exhibit a high degree of self-control. When an executive does not have these qualities, important mechanisms governing development of mutual relationships among people--imitation, following a model and an example, suggestion, persuasion, encouragement, and punishment--fail to go into action.

An executive at any level must solve procedural, administrative, and educational problems involved in work with people. While we are taught to solve procedural and administrative problems in various personnel training systems, for the most part we learn to solve psychological problems from experience,

on the basis of common sense. Many of the problems of working with people can also be solved satisfactorily on the basis of rich, diverse practical experience. However, if we are to improve work with people we must improve the level of psychological expertise of executives. We are doing this at the sector level by creating the appropriate forms of training for executives containing elements of substantial psychological and pedagogical training.

The question of the best styles of leadership is presently being discussed in the social and psychosocial literature, namely democratic (group leadership), autocratic (one-man command), and liberal. There are grounds for asserting that the best style of leadership is one in which the advantages of all styles of leadership are employed flexibly with the focus placed on the most suitable forms in the given specific situation. Research in the social psychology of control has established the basic causes of stresses and conflicts in labor collectives. Here are the main ones:

1) Inconsistency between the official, formally organized structure of the collective and its unofficial, interpersonal, psychological structure.

2) A break between formal management and personal leadership; arising of various groups. Tactful, timely, and competent work in bringing together the unofficial and official structures, formal management and personal leadership, is a dependable way to improve psychosocial relationships. The level and state of information flows, both vertical (from top down) and horizontal, play an extremely important role in the social psychology of control. Creation of a sector office of social-production information would satisfy the urgent needs of improvements in control.

While attempting to heighten the exactingness and responsibilities we impose upon executives at all levels of the sector, we must not forget the need for maintaining a protective, attentive attitude toward them, since today's health statistics prove executives to be in an unfavorable position.

At the level of social planning for cities, social psychologists participate in the work of categorizing the way different social groups live in a city. The strategic goal of improving the urban way of life can and must be based on the communist way of life as a standard.

The real pattern of life of the basic social groups, isolated on the basis of the accepted social-occupational and demographic structure with a consideration for the rules of statistical sampling and representativeness, must be analyzed on the basis of quantitative and qualitative characteristics. The quantitative side of the way of life is defined by the duration, frequency, and intensity of pursuits by representatives of the social group in various areas of life--work, leisure, education, family and personal pursuits, and so on. The qualitative side of the way of life is defined on the basis of subjective evaluations, on the basis of the significance of various types and forms of activities to the actors.

Improvement of occupational orientation and occupational consultation is no less significant to plans for urban social development. The main objective of such work is to achieve a harmonious, optimum relationship between the interests and capabilities of workers and the interests of enterprises, the city, and the country with the assistance of a well-organized state psychological service.

Psychosocial research in the interests of improving plans for social development of cities may involve important problems such as developing and introducing systems of new ceremonies, holidays, fashions, and traditions; heightening the effectiveness of public information and public communication; intensifying the fight against abnormalities in the behavior of people (religiosity, drunkenness, drug addiction, criminal behavior, parasitism); improving demographic processes (birth rate problems, gerontological problems) with the assistance of psychosocial resources.

It stands to reason that the range of problems in applied social psychology at our university and in the USSR is far greater than that discussed here. We have dwelled only on the most pressing aspects of applied research being conducted by social psychologists of Leningrad State University associated with social planning of enterprises, sectors, and cities, the need for which has been emphasized by the 23d, 24th, and 25th CPSU congresses.

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PSYCHOLOGY

HUMAN ADAPTATION TO EXTREME CONDITIONS AND NEUROMENTAL STRAIN

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA. EKONOMIKA, FILOSOFIYA, PRAVO
in Russian No 11, 1977 pp 95-100

[Article by T. A. Nemchin]

[Text] One of the main characteristics of the scientific-technical revolution is continual growth in the quantity of information modern man must perceive and process. Such factors as the growing dynamism of our life, intensification of communication among people, and the need for altering accustomed stereotypes of behavior and making decisions in the conditions of uncertainty and high responsibility for the consequences of one's actions serve as the sources of this information flow.¹

The problem of human adaptation to new conditions is acquiring continually greater significance in this connection. Works published in recent years devoted to human adaptation emphasize the importance of profound study of not only biological but also, chiefly, psychological adaptation.²

This article makes an attempt at providing one version of a conceptual flowchart of some mechanisms behind neuromental strain, interpreted as one of the principal components of "mental stress." This task corresponds to the need for deeper research on the problems of human adaptation to extreme conditions and provides answers to authors who argue against too broad an interpretation of the concept of "stress" and the fuzziness of the concept's bounds.³

The topic of the present study was the complex of changes occurring in an individual's neuromental sphere in response to an extreme situation. In this case we examined not emotional, or mental, stress as it is often defined in the literature,⁴ but rather those manifestations of neuromental strain or that state of the neuromental sphere as a whole which are defined as strain upon the physical, moral, spiritual, and other strengths of the individual. Following this definition, the word "napryazheniye" [stress, strain, tension] corresponds most closely to the English word "strain."⁵

Neuromental strain is an aggregate of characteristics developing within the individual while he acts in complex situations, and it can be interpreted

as an independent neuromental syndrome characterized by a moment of arisal, developmental dynamics, substitution of some symptoms by others, a particular rate in its course, different intensities of manifestation, regression, and termination. Neuromental stress is associated with specific features of the physiological and mental characteristics of the individual, and it depends on functions of those body systems which define the stability, reliability, and effectiveness of the individual's work.⁶ For this reason we must define more specifically the possible causes leading to arisal of the neuromental strain syndrome, its clinical and phenomenological features, and the mechanisms behind its development and regression, and we must develop the ways and means by which to control this state.

The following theoretical premises on some mechanisms of neuromental strain are suggested on the basis of literature on this issue we have studied and an analysis of the results of integrated research on representatives of mental work (design office workers, engineers, technicians, and workers at industrial enterprises, and teachers and students at institutions of higher education--750 persons in all) during performance of complex assignments and at rest, and neurotic patients exhibiting pronounced emotional disorders, anxiety, fear, and phobias (250 persons in all).

The neuromental strain syndrome is a complex of objective and subjective symptoms and signs developing within the individual in the conditions of an extreme situation in the presence of imperative motives for attaining a goal and high requirements upon the effectiveness of the activity. An extreme situation is defined as one which imposes requirements upon the subject exceeding his capabilities. A subjectively difficult situation, which under certain conditions can also be interpreted as extreme and which can serve as a cause leading to neuromental strain, is characterized by parameters which do not range beyond the extreme values of requirements corresponding to the individual's capabilities. In this case, however, we are dealing either with inadequate motivation or a negative attitude toward the activity in the presence of a high desire to achieve the goals.⁷

The phenomenological pattern of neuromental strain and its qualitative and quantitative features take shape with the participation of a complex multi-level hierarchically ordered system of adaptive activity regulation. All units of the body's adaptive system, the functional activity of which depends on the specific features of the external, situational and the internal, individual characteristics of the individual, take part in this process. The symptoms of the neuromental strain syndrome are defined both by the initial level of the somatic systems, the neurodynamic characteristics of the nervous system, and the mental properties of the individual, and by the specific features of the activity of these systems. While somatic systems give form to the somatic, autonomic symptoms, and while neurodynamic features, the strength and balance of nervous processes in particular, define the thresholds of arisal and the intensity and temporal characteristics of the syndrome, higher mental functions give form to the diverse subjective manifestations of this syndrome. The clinical pattern of neuromental strain depends in many ways on qualities of the subject of activity such

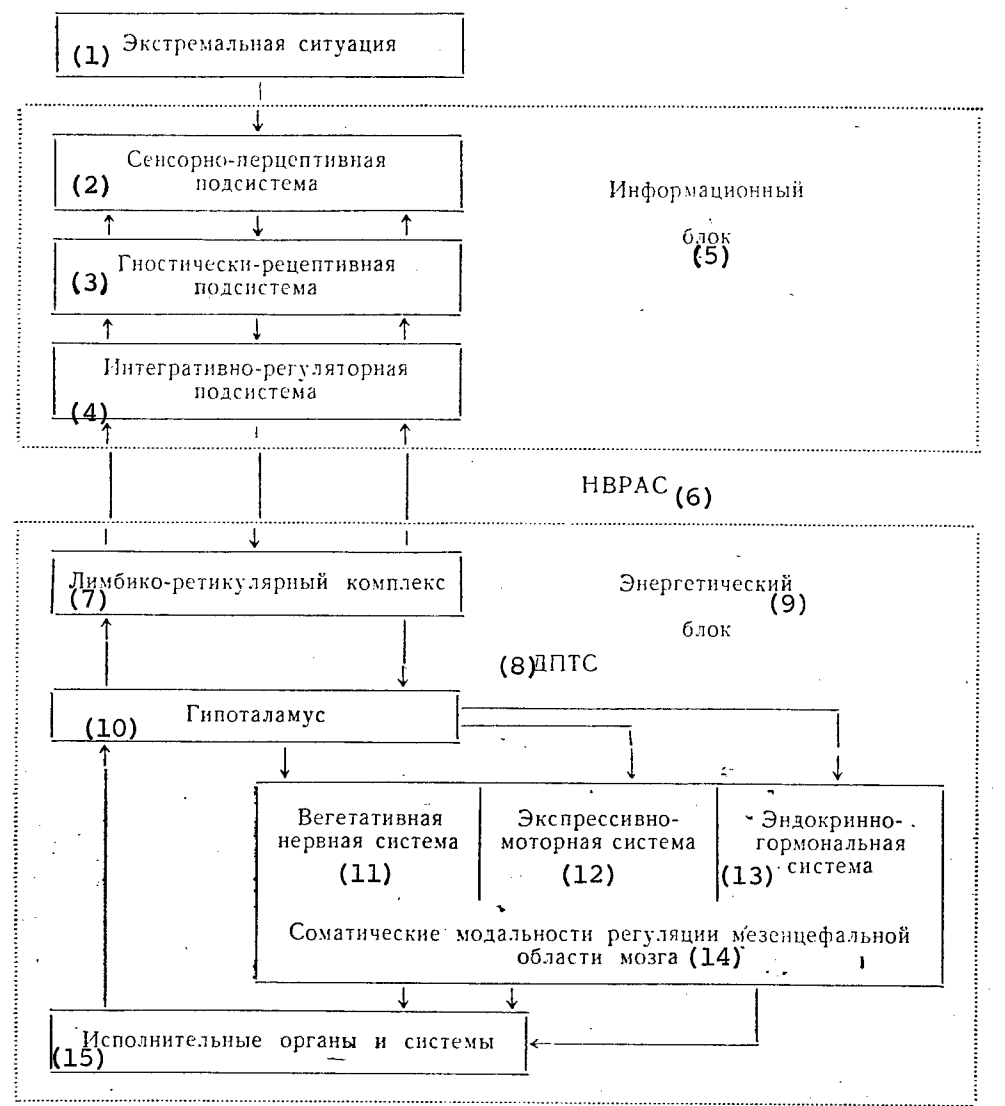
as the level of development of his habits, the extent of his training, his work experience, the specific features of the social environment surrounding the individual, and the psychological climate within the production collective.

The hypothetical scheme of mechanisms behind the arisal and development of the neuromental strain syndrome can be represented in the form of a flowchart (see below). Information on the situation in which the individual's activity proceeds passes through a system of analyzers at the level of the brain's sensory-perceptual structures into the gnostic-receptive zone of the cortex. Next the information flow reaches the integrative-regulatory regions of the antecentral divisions of the brain, which actively participate in formation of the initial assessment of the situation, taking account of past experience, motives, the difficulty of the task, and the possible consequences of success or failure. Thus as a result of afferent synthesis the individual's disposition and his attitude toward the activity and the goal are given shape, the expected result is programmed, and the initial, uncorrected strategy of activity is determined.

Information on the personality's disposition and the parameters of the programmed result stimulates deeper-lying structures of the brain, the paleocortex and the anterior divisions of the reticular formation, and then it divides into two branches. One of them, taking the form of nonspecific ascending reticular activating stimulation (NARAS), returns to the cerebral cortex, heightens its activity, and sensitizes the central neuromorphological substrates of the analyzers. The other branch, which has come to be called diffuse projective thalamic stimulation (DPTS), concentrates its activity upon a particular modality of lower-lying units of the adaptive system at the level of the medulla oblongata. DPTS defines the functional activity level of the three basic somatic modalities of the adaptive-trophic system. The first causes inclusion of central and peripheral structures of the autonomic nervous system, together with its ergotropic and trophotropic functions, in the adaptive process, the second activates the motor neuron system in support of expressive-motor acts, and the third places the endocrine-hormonal system into the adaptive process, activating the hypophysis and the adrenal glands. Interoceptive information from the working organs and somatic systems produces a reverse, afferent, or centripetal flow which, ascending, passes through zones of the midbrain and reaches the neocortex. This flow provides feedback in the adaptive system, transmitting information on the parameters of the actual result to the acceptor of action for their comparison with the parameters of the programmed result.⁸ Carrying differentiated impulses from different peripheral systems and organs, this information has a specific influence upon certain divisions of the cerebral cortex, stimulating some and inhibiting others.

The emotional component of neuromental strain takes the form of both primary (cortical) and secondary (afferent) stimulation of the limbic region. Thus a single circular system of regulation of the adaptive process is created, in which practically all units and levels of the body's activity are included. This system is open, since admission of new information, from

Flowchart of Neuromental Strain Mechanisms



Key:

- | | |
|-------------------------------------|--|
| 1. Extreme situation | 9. Energetic block |
| 2. Sensory-perceptual subsystem | 10. Hypothalamus |
| 3. Gnostic-receptive subsystem | 11. Autonomic nervous system |
| 4. Integrative-regulatory subsystem | 12. Expressive-motor system |
| 5. Information unit | 13. Endocrine-hormonal system |
| 6. NARAS | 14. Somatic modalities of mesencephalic regulation |
| 7. Limbicoreticular complex | 15. Acutating organs and systems |
| 8. DPTS | |

without, on changes in the situation continues throughout the entire period of the system's activity, and the activity of the system's units undergoes continual correction in correspondence with this. The circular nature of the system insures circulation of the flows of information, it creates the conditions for making its work independent to a certain extent, and it affords a possibility for maintaining the system at a given level of activity for a long period of time.

The dynamicness of the functional limits of the system's individual units is what provides it the capability for working in different conditions. When the environmental requirements and the conditions of activity do not exceed the system's functional limits--that is, when the situation is not extreme, the energetic balance of the body is not disturbed, and in this case we can say that the working conditions are normal, that the level of psychoneural strain is normal, a level which does not produce persistent residual phenomena taking the form of significant changes in body functions. However, when the adaptive system works in extreme conditions for a long period of time, overstrain may arise, as a consequence of which the body's energy resources become exhausted, decompensation occurs and, in the end, a pathological state develops. The level of neuromental strain and the limits of its normal range are defined not so much by the absolute value of the requirements imposed as by the relationship between these requirements and the capabilities of the adaptive system, chiefly of its mental components.

The structure of the system regulating adaptation is extremely complex, though we can distinguish two basic regulatory units within it--information and energetic. The first unit contains the morphofunctional formations of the sensory-perceptual system, the antecentral cortex, and the paleo-cortex, which are responsible for analytical-synthetic activity and general regulation over adaptation. The second unit contains morphofunctional formations within the vertical regulatory loop--the reticular formation, the hypothalamus, and central formations of the autonomic nervous system, as well as the expressive-motor system. The information unit plays the dominant role in organizing human adaptation, since it is precisely the unit which first turns on and then modifies adaptive reactions and processes and defines the succession and differentiation of the intensities of the work of individual units within the system--that is, it controls the adaptive process. The information unit also takes the initiative in giving form to the complex of subjective experiences of neuromental strain, at the basis of which the general assessment of the situation lies.

The degree to which the syndrome is expressed and its subjective characteristics are defined by the individual features of general nervous system properties, which have the regulatory-integrative zone of the cortex as their neuromorphological substrate.⁹ In this connection the characteristics of human activity in extreme conditions may not be consistent with the characteristics of the activity of individual systems; moreover they may not correlate with the characteristics of particular nervous system properties and characteristics of the activity of somatic systems. For this

reason we should not expect some particular relationship or dependence between the degree to which neuromental strain is expressed and the characteristics of activity effectiveness.

We can say in conclusion that the effectiveness and reliability of the activity in the presence of neuromental strain depend not on some particular factor or on several factors, but rather on the relationships between them which assume individualistic form in each specific case. The mobility of the limits of the normal range of neuromental strain permits not only a fundamental possibility but also, in a number of cases, the necessity for making use of individualized systems of special measures by which to broaden this range.

Sensible combinations of hygienic, preventive, educational, correctional, training, medical-therapeutic, psychological-regulatory, and other influences taking account of the individual features of neuromental strain, are the prerequisites for creating systems of ways to control these states.

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PUBLIC HEALTH

RESPONSIBILITY FOR ILLEGAL PRODUCTION OF ABORTION

Moscow SOTSIALISTICHESKAYA ZAKONNOST' in Russian No 7, 1977 pp 46-47

[Article by S. Ulitskiy, candidate of juridical sciences]

[Text] Criminal responsibility for an illegal abortion is stipulated in article 116 of the RSFSR Criminal Code. By abortion is meant artificial termination of pregnancy at any of its stages. An abortion is considered illegal when it is performed in violation of special conditions. In accordance with the ukase of the Presidium of the USSR Supreme Soviet of 23 November 1955 "On Revocation of Prohibition of Abortions," the artificial termination of pregnancy is permissible only in hospitals and other medical institutions in conformity with the instruction of the USSR Ministry of Health of 29 November 1955 "On the Manner of Performing the Operation of Artificial Termination of Pregnancy (Abortion)." An abortion is considered illegal if it is not performed in a hospital medical institution, or if a person operates who does not have a higher medical education, or if medical contraindications for such an operation exist in regard to the pregnant woman.

Three factors determine these contraindications: certain ailments of the pregnant woman; lapse of time after a preceding abortion (less than six months); period of pregnancy: it cannot exceed 12 weeks. But this does not mean that after 12 weeks of pregnancy an abortion is inadmissible. Pregnancy may be terminated even in such a case, but only with medical indications. For example, a reason for this may be severe organic affections of the heart, an open form of tuberculosis, a narrow pelvis excluding natural birth and creating the necessity for caesarean section and the like. An abortion after 12 weeks is permitted only where the pregnant woman or father of the future child suffers from certain severe diseases which may be transmitted through heredity. A woman is not obliged to have an abortion for genetic reasons even where there is a risk of the child being born defective. It is impossible to go against the wishes of the woman in such cases.

A woman who has performed an abortion on herself carries no criminal responsibility.

It sometimes happens that a woman asks to have her pregnancy terminated, assuming the role of original instigator. The people's court of Kavalerovskiy Rayon in Primorskiy Kray convicted M. in accordance with article 116, part 2 of the RSFSR Criminal Code for performing an abortion on V. under the influence of a demanding entreaty. But V. was not held criminally responsible for having incited someone to a crime. Such a decision is quite correct. Since the legislator does not consider the performance of an abortion by a pregnant woman herself to be criminally liable, then it does not make sense for the law to hold a woman criminally responsible for the fact that she asked another person to perform the abortion.

An abortion even under hospital conditions and in the absence of contraindications is far from safe, especially for women who have not given birth.

If an abortion is made necessary by a condition of extreme need (for example, it is impossible to take the woman to a hospital, but the pregnancy must be terminated immediately), then in accordance with article 14 of the RSFSR Criminal Code there is no criminal responsibility.

According to article 116 of the RSFSR Criminal Code, an illegal abortion has to be considered completed when it is already impossible to preserve the pregnancy. Consequently, an action having abortion directly as its aim (for example, the introduction of a powerful agent into the cavity of the uterus), but not resulting in termination of pregnancy, has to be qualified as an attempt at one.

Article 116 of the RSFSR Criminal Code proposes the direct intention for termination of pregnancy. But pregnancy may be interrupted intentionally. For example, a physician through carelessness prescribes for a sick pregnant woman a treatment resulting in miscarriage. In such a case the physician's actions are qualified under other articles of the Criminal Code.

More often an illegal abortion is performed for remuneration, but occasionally without any desire for profit (for example, out of a feeling of compassion). The motives here do not affect the qualification, but in setting a sentence, the court must take into consideration that profit incentives of the guilty person aggravate the criminal responsibility.

Physicians may be the subjects of illegal abortion (article 116, parts 1 and 3, RSFSR Criminal Code) and persons without higher medical education (article 116, parts 2 and 3, RSFSR Criminal Code). An abortion performed by a person without higher medical education increases the social danger of the committed act. Comparison of part 1 and part 2 of the analyzed norm shows that only a person with a higher medical education may be considered a physician. Therefore, if an abortion, for example, is performed by a person who has completed a secondary medical institution, then he must answer not according to part 1, but according to part 2 of the aforesaid article. At the same time the law does not speak of a higher specialized medical education. In other words, it does not connect the qualification of what has been performed with a physician's specialization. This means that according to article 116, part 1, RSFSR Criminal Code a physician with a higher medical education of any type

(surgeon, internist, gynecologist and so forth). This is explained by the fact that everyone who receives a higher medical education has occasion to go into possible and permissible ways and means of terminating pregnancy.

The law (article 116, part 3 of the RSFSR Criminal Code) includes under extremely aggravating circumstances of criminal abortion: repetition, death of the person undergoing it; onset of other severe consequences.

Repetition of an illegal abortion means its commission no less than two times. The law does not indicate that in repeated abortion the victim must necessarily be several persons. Therefore, repetition could refer to actions where two or more abortions could be had by a single woman. But if an illegal abortion of a pregnant woman is performed in several sessions united by the same intention, then such an act should be considered as a continuing crime and qualified according to article 116, part 1 or part 2, RSFSR Criminal Code. In recognition of repetition, it is not important whether the guilty party has been convicted for a preceding illegal abortion. Repetition does not enter the case if the conviction of a previous abortion has been remitted or rescinded, the prescription has lapsed, or in view of an amnesty.

An abortion is considered to have caused the death of the person undergoing it where the death is judged to be causally related to this operation.

Under other grave consequences is to be understood the causing of serious damage to the health of the person undergoing it: a grave incurable or acutely painful disease, considerable and persistent loss of working capacity, sterility and so on.

The consequences stipulated in article 116, part 3 of the RSFSR Criminal Code may be named only where they stem from a criminally punishable abortion. If, however, death or other serious consequences have occurred as the result of a legal abortion performed at a hospital, the physician performing the abortion must answer not according to article 116 of the RSFSR Criminal Code but according to other articles of the Criminal Code (article 106 or article 114, part 1, or others). But it is necessary to establish for this the fact that the physician violated the rules established for the performance of the operation and that the permitted violations resulted in such an outcome.

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PUBLIC HEALTH

RESULTS AND MAIN DIRECTIONS OF HYGIENIC STUDIES IN THE RUSSIAN FEDERATION

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 7, 1977 pp 3-9

[Article by Professor A. P. Shitskova, Corresponding Member of the USSR Academy of Medical Sciences]

[Text] The Communist Party and the Soviet Government, always being concerned about the development of science in our country, have afforded every possibility for our scientists to show their initiative and to engage in active research. As a result of this, sciences, including medicine and hygiene, reached a qualitatively new stage during the years of the Ninth Five-Year Plan. During these years, work continued on strengthening material and technical resources of institutes and departments of hygiene, as well as sanitary and epidemiological stations (SES). Construction of the following scientific research institutes (NII) was completed: Novosibirsk Sanitary NII, Ufa and Gor'kiy NII of Labor Hygiene and Occupational Diseases, as well as a new building for work on experimental animals of the Moscow NII of Hygiene imeni F. F. Erisman. Improvements were made in the structure of institutes, and departments of sanitation and hygiene at the Gor'kiy, Vladivostok, and other medical institutes were either created anew or strengthened. The cadres continue to grow due to influx of young specialists. The total number of scientists in the hygienic institutions of the Russian Federation (in 10 NII and 85 departments of hygiene and programs of medical institutes) is 1417 people, 94 of them being doctors, 682 candidates, and 641 people with a higher education.

All this made it possible to complete the plans of scientific investigations during the Ninth Five-Year Plan and in the first year of the Tenth Five-Year Plan successfully at a high methodological level ahead of time. As a result of the acceleration of the rate of scientific studies, 2020 projects were completed. The attention was focused on the development of the most urgent directions. The number of the national economic subjects in a number of the institutes was over 50 percent. These were complex hygienic studies in the developing industrial regions of the Extreme North, Western and Eastern Siberia, and the Far East, including the BAM [Baykal-Amur Trunk Line], where a number of institutes are working intensively. They include the Moscow NII of Hygiene imeni F. F. Erisman, Novosibirskiy Sanitary NII, Angarskiy NII of Labor Hygiene and Occupational Diseases, and the

departments of hygiene of the Novosibirsk and Irkutsk Medical Institutes, and the Irkutskaya Oblast SES. At the present time, the programs and methods of studies, as well as the forms of cooperation in research work and the generalization of the results have been unified.

The Resolutions made by the CPSU Central Committee and the USSR Council of Ministers on the protection of nature and rational utilization of natural resources contributed to the development of extensive sociohygienic studies on the protection of the environment. These works are of important state-wide significance.

For example, in the area of the water hygiene and sanitary protection of water reservoirs, a vast amount of material has been generalized on the hygienic characteristics of the main water reservoirs of the country in the last 10 years in connection with their contamination by industrial waste waters almost in all large river basins -- the Volga, Ural, Don, Kuban, Severnaya Dvina, Ob', Angara, and others. This included the studies on the hygienic effectiveness of the water protection measures by enterprises of the petroleum-processing, petrochemical, chemical, cellulose-paper, metallurgical, and coal industries. Materials of these studies became a basis of the "Rules for Protection of Surface Waters Against Contamination by Sewage Waters" which were approved jointly for the first time (in 1975) by the USSR Ministry of Water Management, USSR Ministry of Fisheries, and USSR Ministry of Health. Generalized results of this research were also used in the draft of the General Scheme of Complex Utilization and Protection of Water Resources of the USSR and a number of local systems of the Don, Kuban', and Tobol river basins for the period up to the year 2000. During the years of the Ninth Five-Year Plan, studies were started on the problems of hygiene in diverting some of the run-off of northern rivers into the Volga basin.

Hygienic studies on the protection of the Volga, Ural, and Tom' river basins, Ivan'kovo water reservoir, and Lake Baykal are completed. These studies revealed favorable tendencies in the sanitary state in individual sections of a number of basins (Volga, Ural, Oka, and other rivers).

A nation-wide forecast has been compiled for noise control in the cities. It received positive evaluation by the CEMA member countries.

About 100 projects dealt with studies on the hygienic significance of atmospheric pollution, its influence on health, and sanitary living conditions of the population. The largest percentage of these studies were those in the pollution of the atmosphere by the enterprises of nonferrous metallurgy, organic synthesis, and petroleum and gas processing.

For the first time studies were done on the hygienic evaluation of the exhausts into the atmosphere of a large industrial complex -- the Volga Chemical Combine.

On a new methodological basis, studies have been made on the evaluation of remote aftereffects such as genetic, cancerogenic, embryotoxic, and

allergenic, of the maximum permissible concentrations for fluorine salts, propyl and amyl alcohols, metallurgical nickel, nickel oxide, diamethyldioxane, selenium dioxide, propanide dioxide, and other compounds.

Studies were made on the combined effect of a number of substances when combinations of them were present, and the development of calculation methods for establishing their maximum permissible concentrations, as well as the maximum permissible concentrations of substances entering the organism simultaneously with water and air.

When studies important for the national economy are conducted, experience is accumulated for wide cooperation in the work of hygienic institutes and departments with sanitary and epidemiological stations, as well as with the institutes in the system of the USSR Academy of Medical Sciences and Academy of Sciences, NII, and the designing institutes of a number of ministries and departments.

The fulfillment of extensive complex studies, undoubtedly, facilitated further development of the modern hygienic science as broad prophylactic and social discipline.

The characteristic peculiarity of the studies of the last few years was further development of clinical and experimental studies which made it possible to study thoroughly the mechanism of the effects of various factors of industrial environment and environment in general on the organism and the health of the population more objectively, and to develop scientifically substantiated preventive measures, hygienic norms, and requirements.

Methodological methods of modern biology, genetics, physics, chemistry, and electronics have started to be used more widely in research.

The studies of recent years have been characterized by high scientific significance and results. For example, complex hygienic studies of the sanitary conditions of large RSFSR cities on the problem of "scientific principles of the hygiene of populated areas" has made it possible to reveal new tendencies in urban development, generalize accumulated experience, and map out the main direction for the improvement and transformation of the environment of cities, as Moscow, Leningrad, Murmansk, Gor'kiy, Sverdlovsk, Novosibirsk, and others until 1980-2000, which was transmitted to the USSR Gosstroy.

In five years, a thorough hygienic evaluation was given to over 80 new polymer materials. They include low-combustibility, constructional, heat and sound isolating, and corrosion-resisting plastics, and the sphere of their utilization was established in civil and industrial construction, as well as in the production of furniture. Materials which received a positive evaluation have been included in the "List of Permitted Polymer Materials" approved by the USSR Ministry of Health.

The results of complex studies on noise and vibration under the conditions of populated areas made it possible to develop in cooperation with technical

organizations a unified method for measuring noise, as well as methods for compiling a noise chart of street and road network of cities which was used in determining the noise characteristics of cities differing in their planning structure: Moscow, Novosibirsk, Barnaul, Tol'yatti, Kuybyshev, and Naberezhnyye Chelny.

The hygienic significance of vibration and noise created by railway transport has been studied. The influence of air transport on the noise condition of cities has been investigated.

For the first time, the GOST "Aviation Noise. Permissible Levels of Noise within Housing Areas and Methods for Its Measuring" were developed in cooperation with the NII of Civil Aviation and other institutes and approved.

Traditional studies conducted for many years on the hygienic problems at created water reservoirs in connection with the development of hydraulic power engineering made it possible to develop "Sanitary Rules for the Designing and Operation of Water Reservoirs and Irrigation Channels," as well as a number of instructions and methodological suggestions under the conditions of water reservoir cascades, discharge of thermal waters, development of fisheries, etc, in cooperation with the designing organizations of the USSR Ministry of Power Engineering and the Ministry of Water Management.

The projects in the area of the hygiene of drinking water and water supply were conducted in the direction of studying various methods of conditioning and purification of drinking water, studies on the influence of the microelement and salt composition of water (boron, copper, zinc, iron, cobalt, nickel, chromium, iodine, etc) on the health of the population, individual sources of water supply to the population (underground and surface), including rural ones. Studies were made on the hygienic effectiveness of fluorination, desalting, magnetization, and carbonization of drinking water.

During the last five-year plan, studies on the hygienic significance of harmful chemicals in the soil expanded. More than 20 studies on the effectiveness of new methods for treating industrial and household wastes discharged into the soil were completed.

Studies connected with the scientific and technical reequipment of modern production progressed successfully. Modernization and the introduction of new technological methods were the subject of studies in terms of improving working conditions and the prevention of occupational diseases. This included such branches of industry as the coal, mining, oil, petrochemical, and chemical industries, heat and power engineering, machine building, etc. Considerable attention was given to the studies on the labor hygiene of women, working and studying juveniles, students, and medical workers.

More than 1100 scientific studies in this area were completed in the Ninth Five-Year Plan. It should be stressed that these studies were done at important industrial enterprises, at new petroleum processing plants of Omsk,

Komsomol'sk-on-the-Amur, Angarsk, at new oil and gas fields being developed in Tyumenskaya Oblast, at ore-mining and smelting enterprises of the Urals, Siberia, the Far East, and Extreme North, at the Volga Automobile Plant, and many other locations. It should be stressed that special attention in these studies was given to the evaluation of the hygienic and economic effectiveness of health measures being implemented.

During the last five-year plan, complex interinstitute hygienic studies on the working and living conditions at new oil and gas extraction enterprises under the conditions of the severe climate of Tyumenskaya Oblast developed successfully.

During the Ninth Five-Year Plan, the problems of women's labor hygiene started developing successfully. This work was done jointly with scientific research institutes and departments of obstetrics and gynecology.

Toxicologic characteristics of a number of new toxic substances and their compositions were given.

The extensive complex research conducted by a group of scientific research institutes for critical evaluation of the effects of poisons entering through the skin deserves attention. This made it possible to develop methods for determining permissible doses of poisons entering through the skin.

Much attention was given to the study of working conditions and health of workers engaged in the ore-mining and coal industries in connection with the extensive mechanization and intensification of the mining processes.

These studies were generalized in the "Hygienic Requirements for Mining Machines and Devices for Coal Mines" and "Sanitary Rules for the Organization and Maintenance of Coal Mining Enterprises."

A considerable part of studies dealt with labor hygiene in machine and instrument building, radio electronic industry, and in the production of non-ferrous metals. The main directions in this research were connected with solving theoretical problems of the physiology of labor, physiological characteristics of professions, and the development of physiological principles of the rationalization of working and relaxation conditions of workers engaged in various sectors of the national economy.

Intensive introduction of new technological processes in modern production and scientific and technical reequipment contributed to further development of studies in the area of the hygiene of physical factors in the industrial environment and their effects on the organism and occupational pathology.

On the basis of hygienic, physiological, and clinical studies, permissible levels were established for local and general vibration, stable and pulsed noise, ultrasound, electromagnetic and laser radiation, and industrial lighting.

The results of theoretical studies and practical evaluations were used in compiling the Regulations Concerning Labor Conditions in Professions with Vibration Hazards approved by the RSFSR Council of Ministers on August 3, 1972, No 408.

In the area of rural hygiene, considerable attention was given in the last few years to the problems of environmental protection and improvement of working conditions in connection with the development of animal husbandry on an industrial basis.

In 1971-1975, 200 studies were completed on the problem "Diets of Healthy and Sick People." Studies on actual diets and health conditions of individual groups of the population in various climatic and geographical zones included industrial workers, individual groups of rural population, elderly people, juveniles and children, GPTU [expansion unknown] students, boarding school students, etc.

The diet of the builders of the central and western sections of the BAM was studied.

The problems of preventive diet of workers in specific working conditions continued to occupy an important place. Corrections were made in the therapeutic and preventive diets of workers: at enterprises of synthetic polymer materials, oil refineries, petrochemical enterprises, and some other sectors of industry.

In connection with further introduction of new toxic chemicals, there was an increase in the number of studies on hygienic evaluation of vegetable foodstuffs grown with the use of new pesticides for the purpose of their hygienic normalization. Toxicity parameters were established for the first time for new domestic pesticides: tsikos, nitrochlor, calcium salt of dimethyldithiocarbamic acid, as well as the mixture of chlorophos and tsineb for their combined effect. Studies were done on the nature of the toxic effect of prometrin, ipazin, and semeron in experiments with various routes of entry.

Due to the stability of certain pesticides and their wide circulation in the environment, and the resulting danger to the health of the population, new methods of studies have been constantly developed and introduced in hygienic standardization. During these years, studies were done on the effects of pesticides on the generative functions of the organism, cancerogenic danger was studied by means of the transplacental method and oncogenic viruses, new methods were approved for studying the functional state of the cardiovascular system, as well as new methods for determining the activity of enzymes in the mitochondria of the liver and the kidneys.

In the determination of pesticides, the luminescence-microscopic method was used for evaluating cell cultures, a method was suggested for quantitative evaluation of changes in the DNA [deoxyribonucleic acid] and RNA [ribonucleic acid], as well as a method for studying the bioelectric activity of the cardiovascular system in adult animals and embryos.

During the last five-year plan, studies continued to develop on hygienic evaluation of articles made from polymer materials for use in the food industry and households.

The Moscow NII of Hygiene imeni F. F. Erisman, which is a large methodological center in the country, conducted studies on new brands of such materials as fluoroplastic-4 and 4D, modified brands of polyethylene and polypropylene, organosilicone compounds, domestic copolymer -- ethylene-butylene, and others. Long-term studies on polystyrene plastics were summarized. These were first studies on animals for determining remote aftereffects. This made it possible to give recommendations for the conditions and possibilities of using some plastics in the food industry and households. Highly sensitive methods were developed for detecting styrene, organic compounds of fluorine, phenol, diphenyl propane, chromium, and others.

Studies on the evaluation of the toxicity of grain affected by the fungus were completed, and hygienic recommendations were proposed for selling such grain (Orenburg Medical Institute).

During the years of the Ninth Five-Year Plan, a number of important resolutions were passed for improving the level of education and upbringing in schools of general education, boarding schools, vocational technical schools, as well as for the development of physical culture and sports. Therefore, in the area of the hygiene of children and juveniles, considerable attention was given to the problem of the hygiene of studying and working juveniles. Studies were focused on working conditions, development of hygienic norms of industrial environment and medical indications and contraindications in industrial training and work of juveniles in the construction, chemical, petrochemical, and radio engineering industries, as well as in agriculture.

Good results were achieved by the studies which were started during the years of the Ninth Five-Year Plan on the hygiene of education and the health of students. Studies were done on the conditions and mode of education of students in various fields, problems of their health services, as well as the physiological and hygienic evaluation of the work of students in the students' construction teams (SSO). These studies made it possible to develop hygienic recommendations for the optimization of conditions and modes of the intellectual work of students and their work in SSO, as well as a complex of measures for improving health services in vuzes.

Attention was also given to the problems of construction and equipment of educational institutions of various types. These studies made it possible to develop hygienic recommendations for improving the designs of buildings for preschool institutions, schools, vocational technical schools, children's polyclinics, etc.

Studies were done on the state of health, physical development, as well as the disease rate among children and juveniles.

As a result of these studies, standards were developed for the physical development of children and juveniles, school children, students of vocational technical schools of various cities and oblasts of the RSFSR, and a complex of therapeutic and preventive measures was developed for improving the health of children and juvenile groups.

Unfortunately, studies on the hygienic principles of physical education for children and juveniles were not sufficiently developed.

Not all institutes, departments, and sanitary and epidemiological stations participated actively in the development of the hygienic problems in the specific natural and climatic conditions of the BAM. For example, the following did not participate in these studies: Vladivostok Medical Institute and the SES of the Primorskiy Kray in the eastern zone of the BAM; Khabarovsk Medical Institute and the SES of the Khabarovskiy Kray in the western zone.

The material submitted by the large army of hygienists of Russia show the many-sided work done by them during the last five-year plan and the beginning of the Tenth Five-Year Plan. The accumulated scientific experience and the significance of these studies for the theory and practice of health protection are quite evident.

The Ninth Five-Year Plan was not only a five-year plan of high-quality methodological level of studies, but also of high effectiveness. For example, these studies became a basis for 14 GOST and sanitary rules, 70 standards, 64 instructions for new detection methods, 106 methodological instructions and recommendations, 1020 hygienic, therapeutic, and preventive recommendations pertaining to the improvement of health conditions of the environment, improvement of working conditions, prevention of occupational diseases in individual industries and regions. These studies yielded 42 patents, certificates for 59 inventions, and 492 proposals for efficiency improvement.

The Moscow NII of Hygiene imeni F. F. Erisman, according to the results of socialist competition in 1975, the decisive year of the Ninth Five-Year Plan, was awarded the challenge Red Banner of the Ministry of Health of the USSR and Central Committee of the Trade Union of Medical Workers. It was also awarded the title of the collective of communist labor. The Certificate of Honors of the USSR Ministry of Health and the Central Committee of the Trade Union of Medical Workers was awarded to the Gor'kiy NII of Labor Hygiene and Occupational Diseases.

A number of institutes were awarded the VDNKh certificates: Moscow NII of Hygiene imeni F. F. Erisman, Gor'kiy NII of Labor Hygiene and Occupational Diseases, and their members were awarded gold, silver, and bronze medals; one bronze medal was awarded in the competition of young scientists of socialist countries in 1976.

During these years, 40 monographs, 78 collections and scientific works, and over 3711 articles in scholarly journals were published. During the same period, 184 candidate's dissertations and 48 doctoral dissertations were completed.

Much help was given to health agencies through seminars and 10-day campaigns. In five years, more than 3500 SES workers were trained at 513 seminars, 1025 people -- at work places.

On the instructions of the Ministries of Health of the USSR and RSFSR, Gosstroy, and Gosplan, more than 2000 projects, general plans of cities and large industrial centers were examined.

The achievements of the hygienists of the Russian Federation during the Ninth Five-Year Plan constitute a good basis for the fulfillment of those responsible tasks which are set for the medical science by the 25th CPSU Congress.

During the period of the preparations for the glorious 60th Anniversary of our state, the leading hygienists and health officers of the Russian Federation will do their best, using their knowledge and experience, for the realization of the "Health Program" -- an important part of the broad social program of the Tenth Five-Year Plan mapped out by the 25th CPSU Congress.

Received 10/VIII 1976

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

ALL-UNION CONFERENCE ON THE MICROBIOLOGICAL PROTECTION OF PLANTS

Kiev MIKROBIOLOHICHNYY ZHURNAL in Ukrainian Vol 39, No 3, 1977 pp 385-386
SYNYTS'KYY, V. M.

[Text] The first All-Union Scientific Conference on the Microbiological Protection of Plants was held 18-21 October 1976 in Kishinev. It was organized by the Ministry of Agriculture of the USSR, Ministry of Agriculture of the Moldavian SSR, All-Union Scientific Research Institute of Biological Methods for the Protection of Plants [VNIIBMZR] and Scientific Technological Society of Agriculture of the Moldavian SSR.

Close to 200 specialists from 40 scientific and industrial organizations of the USSR took part in it. The participants of the conference presented 153 reports on topics assigned by the organizing committee.

The conference activity was conducted at three plenary sessions and four sections entitled "Bacteria for Plant Protection," "Fungi for Plant Protection," "Viruses for Plant Protection," and "Biological Compounds Against Plant Diseases."

The Minister of Agriculture of the Moldavian SSR I. N. Berezhnyy opened the conference and welcomed the participants in his speech to the session plenary. He emphasized the importance of research on the microbiological protection of plants and the use of the research results for practical agricultural purposes.

Scientific Secretary of the Department of Plant Protection of the VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin] Yu. S. Chekmen'ov reviewed the state of microbiological plant protection in USSR agriculture. He stated that despite many advantages of microbiological plant protection, as opposed to chemical methods, the contribution of microbiological methods to total measures used for plant protection is very small.

Head of the Laboratory of Biological Methods of VNIIBMZR A. I. Sikura reviewed the main achievements and future tasks of the microbiological protection of plants against harmful insects. M. V. Kandybina (All-Union Scientific Research Institute of Agricultural Microbiology [VNIISKhM]) reported on the current state and prospects for microbiological rodent

control methods. The research results on this subject indicate that microbiological methods are very promising for reliable protection of many agricultural crops. M. T. Petrukhina (VNII "Bakpreparat") presented a lengthy description of preparations made by microbiological synthesis which have been used in agriculture against many plant diseases. On the other hand, she could name only a limited number of preparations which passed preliminary production tests and are in use. Head of the laboratory of the All-Union Scientific Research Institute of Toxicology Ye. A. Mel'nykova devoted her report to methods and criteria for the hygienic evaluation of microbiological preparations, which are subjected to toxicology tests before being put into industrial production. The role of pathogens of harmful insects in the integrated protection systems of plants was emphasized in the report of N. S. Fedorynchik (All-Union Institute of Plant Protection [VIZR]).

After presentation of the reports and communications, the conference participants discussed the scientific institutions which are engaged in research on promising microorganisms, their role in the dynamics of development of harmful insect species and ways for using them for plant protection. The research conducted in recent years in the USSR on plant protection was evaluated and summarized. The following topics were discussed:

1. Development of the prognosis method for forecasting epizootic properties of different groups of microorganisms in populations of harmful insects (granulosis virus of the wheat moth, entomophthorosis of pea aphids, etc.) which would make it possible to exclude the cereals from treatment with chemical insecticides.
2. Soviet-made biological compounds and ways for using them effectively (entobakterin, dendrobacillin, boverin, Virin-YeNSh, Virin-YeKS, Virin-ABB, bitoksibacillin, insektin, trikhotecin, phyto bacteriomycin, trichodermin).
3. Development of the mass production technology of biological compounds based on *Bacillus thuringiensis*.

At the same time it was noted that the level of research on the microbiological protection of plants does not satisfy the existing requirements. Not enough attention is paid to research topics dealing with the microbiological protection of plants at institutes within the VASKhNIL system, as well as at institutes under the Academy of Sciences of the USSR and of academies of individual republics. Many researchers do not concentrate their effort on solving the most urgent problems, the research is poorly organized and coordinated, and the information is lacking on completed research topics in many instances. The quality and quantity of microbiological compounds produced by the Soviet industry does not satisfy Soviet agriculture requirements and the cost of these compounds is too high.

The conference concluded that the main urgent tasks on the microbiological protection of plants are:

1. Broadening the research activities on microorganisms that could be used successfully against harmful insects;
2. Developing better identification methods for entomopathogenic microorganisms, microbial antagonists, producers of antibiotics, and hyperparasites which could find a practical use;
3. Developing the new approaches which would increase the natural epizootic characteristics in populations of harmful insects;
4. Developing and in some cases improving the test standards and biological evaluation approaches for methods of the microbiological protection of plants;
5. Developing new and improving the existing methods for mass cultivation of microorganisms suitable for the protection of plants against insects and plant diseases; preparation of effective treatment compounds on the basis of these microorganisms;
6. Expanding the studies on action mechanisms of microbiological preparations and their long-time effect on plants;
7. Organizing studies on the technological and economic effectiveness of microbiological methods for plant protection and developing technology for the use of these methods in integrated protection systems;
8. Studying the effect of microbiological protection methods on useful biocenosis organisms, warm-blooded animals, and man; researching the new hygienic approaches for a broad utilization of these methods.

For a successful solution of these problems, the conference decided to undertake the following steps:

1. To ask the State Plan of the USSR, State Committee on Science and Technology of the Council of Ministers of the USSR and the Ministry of Agriculture of the USSR to provide funds and material for scientific institutions of the Academy of Sciences of the USSR and academies of the Union republics, and for institutions of the VASKhNIL for the study of microbiological methods.
2. To ask the Ministry of Agriculture of the USSR and the State Committee on Science and Technology of the Council of Ministers to assign a part of allocations of the VASKhNIL to organize supporting research stations of the VNIIBMZR to study epizootic parasites, entomopathogenic microorganisms and to test biological preparations.
3. To ask the Council of Ministers of the USSR to put the responsibility for the production of high quality microbiological preparations and supplying them to agricultural organizations in adequate quantity on the Main Administration of the Microbiological Industry of the Council of Ministers.

4. To ask the Ministry of Agriculture and the Ministries of Higher and Specialized Educational Institutions of the USSR to

--introduce courses on the biological protection of plants at agricultural higher educational institutes and at biology departments of universities, as well as to offer specialization in this subject to students at departments of plant protection;

--prepare textbooks and supplementary reading material on the microbiological protection of plants;

--improve the educational level of scientific personnel at specialized graduate schools of leading Soviet scientific research institutions and to provide possibilities for young scientists to acquire needed experience at scientific centers of the USSR and abroad.

5. To ask the Council of Ministers of the USSR to allow the VNIIBMZR to publish annually the collection of works entitled "Biological Methods for Plant Protection," in order to coordinate research on this subject and to provide information on progress in this field; and to organize symposia on individual groups of entomopathogenic organisms and biological protection of plants on a regular basis.

6. To make the scientific institutions of the VASKhNIL, the Academy of Sciences of the USSR and academies of the Union republics, at which the principal studies on the microbiological protection of plants are conducted, to be responsible for the popularization of microbiological preparations and their effective use for the protection of plants against diseases and harmful insects.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

UDC 612.12+616.152/.153](092) Derviz

GEORGIY VALERIANOVICH DERVIZ--80TH BIRTHDAY

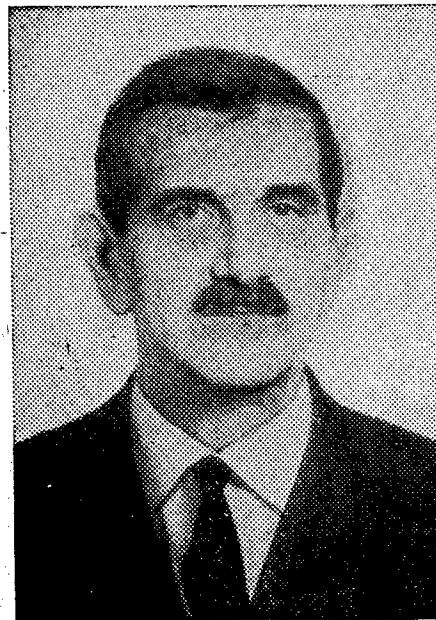
Moscow KLINICHESKAYA MEDITSINA in Russian No 2, 1977, p 3

[Text] Our country's prominent scientist-biochemist, Doctor of Medical Sciences, Professor Georgiy Valerianovich Derviz, will be 80 years old on 18 February 1977.

Completing in 1921 the medical faculty of Moscow University and then graduate study, G.V. Derviz performed for almost 15 years teaching and scientific-research work at various educational and scientific-research institute in Moscow as an assistant, professor of a department and head of a biochemical laboratory. He served as a consultant at the 1st Moscow Medical Institute from 1936 to 1948.

Since 1938, G.V. Derviz's scientific work has been inseparably connected with the blood service and its chief institution--the Central Scientific-Research Institute of Hematology and Blood Transfusion of the USSR Ministry of Health. He worked at the institute from 1938 to 1966 as head of the biochemical laboratory and from 1966 to 1966 to 1973 as a scientific consultant.

In recent years, Georgiy Valerianovich has been continuing his scientific work at the institute on a voluntary basis.



During his work at the institute, Professor G.V. Derviz made a major contribution to the organization of research on the biochemistry of the blood and to the development of Soviet hematology and /transfusiology/. It is necessary to point out the extremely wide range of G.V. Derviz's scientific interests: oxygen deprivation, hypoxia, blood gases, gaseous metabolism of the organism and respiratory function of the blood at a time of acute blood loss,

occupational poisoning, biochemical changes in certain occupational diseases, biochemistry of blood storage and hemopoiesis, hereditary hemoglobino- and enzymopathy of erythrocytes and so forth, in the solution of which Professor G.V. Derviz made a definite personal contribution. Among the laboratory-service workers of our country, Georgiy Valerianovich is known as an excellent methodologist and the author of a number of widely used laboratory methods. For a long time he has headed the Commission on New Laboratory Equipment under the USSR Ministry of Health and has served as a member of the editorial council of the journal KLINICHESKAYA MEDITSINA and so on.

Professor G.V. Derviz is the author of about 100 scientific works; several candidatorial dissertations have been prepared under his supervision. He has given much attention to public work--from 1953 to 1957 he was a deputy of the Oktyabr'skiy Rayon Soviet of Moscow. The many-sided scientific work of Professor G.V. Derviz has been highly valued by the Soviet government. He has been awarded the Order of Lenin and several medals.

The editorial board of the journal KLINICHESKAYA MEDITSINA, the scientists-medics of our country, his colleagues in hematology and /transfusiology/ cordially congratulate dear Georgiy Valerianovich on his 80th birthday and wish him long years of life and further creative achievements.

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SCIENTIST AND SCIENTIFIC ORGANIZATIONS

STATUS, DEVELOPMENT OF MOLECULAR BIOLOGY IN KAZAKHSTAN

Alma Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 7, 1977 pp 22-26

[Report by M.A. Ayt Khozhin, doctor of biological sciences]

[Text] Toward the end of the fifties a new development had its inception in biology and bore the name of "molecular biology." The basic aim of this science is the elucidation of the mechanisms of the life activity of living organisms on the basis of a study of physical-chemical processes occurring on the macromolecular level of the cell.

In the past twenty years, there have been major achievements in this field: the DNA structure and the basic mechanisms of heredity have been decoded, the role of nucleic acids was disclosed in implementation of genetic information, which has led to the complete decoding of the mechanisms of protein biosynthesis; synthesis of protein and nucleic acids was attained in noncellular systems.

The fundamental discoveries in this field of science are of great theoretical and practical importance for future agricultural development and of a number of sectors of industry and medicine. In recent years, there have been major successes in elucidation of mechanisms of viral infections, and definite prospects for the solution of the problem of cancer have been indicated.

In May 1974, a decree was adopted of the CC CPSU and the USSR Council of Ministers "On Measures for Accelerating the Development of Molecular Biology and Molecular Genetics and Utilizing Their Achievements in the national Economy." This decree directed: "To consider as one of the most important tasks of Soviet science at the present stage the achievement in the shortest possible time of an advanced level of development for molecular biology and molecular genetics and other fields of science directly connected with the study of the physical-chemical bases of life phenomena.

"In consideration of the great importance of the indicated work, to require ministries and branches--performers of this work--to take all necessary measures for its unconditional fulfillment.

Report read on 6 January of this year at a meeting of the Presidium.

"USSR ministries and branches, Councils of Ministers of union republics, AS USSR and the State Committee for Science and Technology to provide in projects of annual and five-year plans for the development of the national economy of the USSR necessary allocations for ensuring fulfillment of the work in the field of molecular biology and molecular genetics."

In a short time after the adoption of the decree the training of specialists in this field in the country improved sharply, a number of new research centers were created, the material-technical base of many institutes was strengthened.

In Kazakhstan, research in the field of molecular biology was started in the sixties. In 1967, a special laboratory of biochemistry of protein and nucleic acids was set up at the Institute of Botany of the Kazakh SSR Academy of Sciences for the purpose of conducting molecular-biological researches on protein biosynthesis in higher plants. This laboratory is working on the problem "Biosynthesis of Protein and Nucleic Acids in Higher Plants." As a result of the work done on the comparative study of the physical-chemical characteristics of the ribosome of plants and animals, it was possible to obtain functionally active hybrid ribosomes built from subparticles of plant and animal origin. A most interesting feature was that the hybrid particles possessed a functional activeness in a noncellular system. Protein synthesis with hybrid ribosomes takes place at the same rate as with particles not subjected to "molecular surgery." In the course of study of information RNA and their distribution in subcellular structures in plant cells, /informosomes/ of different intracellular localization were isolated and described for the first time: free cytoplasmic, nuclear and polysome-bound. It was determined that /informosomes/ constitute the reserve form of iRNA in plants.

Researches on the functional role of polyadenylation of iRNA in plant cells are conducted jointly with the Institute of Atomic Energy imeni I.V. Kurchatov. Work is being planned in the field of gene engineering.

The work of the laboratory has been reported at international congresses, symposiums and biochemical congresses. More than 500 requests from 52 of the world's countries have been received for publications of this laboratory. A new subject of the laboratory for 1976-1980 has been included in the coordinating plan of the State Committee for Science and Technology of the USSR Council of Ministers and the USSR Academy of Sciences dealing with the solution of the basic scientific-technical problem of the field of molecular biology and molecular genetics. The 1976 Lenin Prize in the field of science and technology was awarded to a group of scientists of the USSR Academy of Sciences, including M.A. Aytkhozhin, doctor of biological sciences and head of the laboratory of biochemistry of protein and nucleic acids of the Institute of Botany of the Kazakh SSR Academy of Sciences, for a cycle of works on the discovery and study of /informosome/--a new class of intracellular particles.

At the same institute, work is being done at the laboratory of plant biochemistry involving the ideas and methods of molecular biology. As a result of research conducted on plants, highly active enzymatic complexes have been

discovered capable of hydrolyzing and oxidizing many phenol compounds. Some interesting molecular mechanisms for regulating these enzymes have been elucidated. Research has been started on the molecular structure of the key enzyme of nitrogen metabolism--glutamatedehydrogenase.

At the Institute of Microbiology and Virusology of the Kazakh SSR Academy of Sciences, three laboratories have been organized on the base of the laboratory of virusology--general virusology, genetics of viruses and biochemistry of viruses. Immunobiological and molecular-cytological processes of the interaction of RNA- and DNA-containing viruses with the cell are being studied in connection with the evolution of their function. A study has been carried out of the immunobiological properties and nature of specific and nonspecific factors of resistance to influenza. The existence has been disclosed of three types of inhibitors, distinguished by resistance to temperature influences.

At the laboratory of genetics, the molecular-genetic bases are being studied of myxoviruses in the aspect of elucidation of intracellular localization of virus-specific RNA and the dynamics of their biosynthesis, as well as the influence of /mutagens/ of the alkylating type on the reproduction of viruses under conditions of nonpermissive temperatures.

Work is conducted on the molecular structure and immunogenic properties of supercapsidal antigens, including neuraminidase and hemagglutinin of influenza viruses in man, animals and birds. For their researches in the field of virusology, staff workers of the institute Kh.Zh. Zhumatov, N.B. Akhmatulina, Ye.S. Isayeva and D.S. Arkhangel'skiy have been awarded the Kazakh SSR State Prize. At the laboratory of genetics and selection of the same institute and at the Department of Microbiology of the Order of the Labor Red Banner Kazakh State University imeni S.M. Kirov, study is going on of the mutagenesis of microorganisms. With the aid of recombination analysis of biochemical and morphological mutants preliminary data were obtained on differentiation in microorganisms and its genetic determination. Study of the lysogeny of the bacterial genus *Pseudomonas* made it possible to isolate moderate phages capable of performing transduction.

At the Institute of Physiology of the Kazakh SSR Academy of Sciences, a new laboratory of the physiology of membranes has been created. At this laboratory problems are being intensively studied connected with the activity of transport systems built into membranes. This work makes it possible to approach an understanding of the mechanisms of contraction of muscular tissue and their regulation. The laboratory has concluded an agreement on cooperation with the Department of Biochemistry of the Moscow State University. The purpose of this work is identification of the acetylcholine receptor in the membranes of sarcoplasmic reticulum and the investigation of the mechanism of its operation. In 1976, the Institute of Physiology organized an All-Union Conference on Transport ATPases. At this conference, the work of the laboratory of the physiology of membranes was rated highly.

At the laboratory of radiobiology of the Institute of Zoology of the Kazakh SSR Academy of Sciences work is going on on the study of the permeability of cells and the action of different physiologically active substances on the transfer of ions through a membrane. There was described a new variant of the enzyme ATPase, the so-called anion-stimulating ATPase.

Problems of the molecular bases of the genetics of agricultural animals are being studied at the Institute of Experimental Biology of the Kazakh SSR. In the cytogenetic plan, there are studied aneuploidy, polyploidy, and spontaneous chromosome variability in cells of the bone marrow of sheep. The necessity was shown for cytogenetic testing for the purpose of elimination of animals with anomalous chromosomes. Investigation is going on of the biochemical polymorphism of a number of enzymes of the oxidation cycle and haptoglobine of serum. The physical-chemical constant of haptoglobin is being studied. It has been established that their molecules consist of two types of subunits connected with disulfide bonds, while these dimers are united into a whole molecule of noncovalent interaction.

At the Order of the Labor Red Banner Institute of Chemical Sciences of the Kazakh SSR Academy of Sciences work is going on in the field of molecular biology on enzyme engineering. The problem is synthesis of heterogenous enzyme systems, ensuring "pumping up" of active centers of oxidative-restorative enzymes by electrochemical means. These biocatalyzers may be used in enzyme fuel elements and batteries.

Thus definite work is going on at institutes of the Kazakh SSR Academy of Sciences in the field of molecular biology. In certain aspects of molecular biology, particularly the study of biosynthesis of protein in plant cells, the Kazakh SSR Academy of Sciences occupies a leading place in the country. Work in the field of virusology, molecular biology of membranes and enzymology is extremely promising.

It should be noted, however, that the level and volume of molecular-biology research at the Kazakh SSR Academy of Sciences are small so far. Many topics are being studied by small groups and the material-technical base is not adequate. The subjects worked on at institutes of the Kazakh SSR Academy of Sciences are not coordinated as a rule by the Scientific Council for Molecular Biology AS USSR. A large percentage of its publications appear in local scientific editions and do not become available to specialists working in the field of molecular biology. This in turn results in the fact that many specialists are not invited to scientific conferences, symposiums and congresses. At best, display communications are presented.

The absence of coordination and bringing together of works in the field of molecular biology at the Kazakh SSR Academy of Sciences results in the fact that there is no requisite control over the quality of performed work. Frequently staff workers are sent to central institute of the USSR Academy of Sciences to master some method of research, which method has already been mastered and used successfully at another institution.

Contemporary molecular biology is a high costing science. The cost of research is determined first of all by the use of special apparatus, reagents of high purity and isotopes. At the same time the actual system of acquiring and distributing instruments has been imperfect up to now. At some institutes, extremely necessary, valuable apparatus have a low rate of use.

At the present time, it is already perfectly clear that the ideas and methods of molecular biology in the near future will be used increasingly widely for the solution of the most diverse problems of biology.

Analysis discloses that even the previously called purely descriptive sciences, such as zoology and botany, have begun to make wide use of the ideas and methods of molecular biology. The extent of the interest in the methods and approaches of molecular biology may be demonstrated with concrete facts. Methodical help from the laboratory of biochemistry of protein and nucleic acids of the Institute of Botany has been requested by colleagues of the biological, medical and agricultural institutions of Kazakhstan: institutes of microbiology and virusology, zoology, experimental biology, oncology and radiology, nutrition, farming, clinical and experimental surgery, regional pathology, protection of plants, Kazakh State University, Agricultural Institute, Kazakh Pedagogic Institute, Zootechnical and Veterinary Institute and others.

At the present time, almost all the central biological institutions of the USSR Academy of Sciences and many union republics have new research subdivisions for molecular-biology research; they have trained cadres and created a powerful apparatus base, including isotope blocks, ultracentrifuges, spectrophotometric rooms and computer centers.

Future lag of molecular biology in Kazakhstan may be braked by the development of many sectors of biological, agricultural and medical science in the republic. Consequently as a first step to a course of intensification of work in the field of molecular biology at the Kazakh SSR Academy of Sciences, it would be useful to create on the base of one of the institutes a central laboratory, providing it with necessary apparatus and engineering and technical personnel. In the initial period, this laboratory should ensure the performance of basic work in the system of the Kazakh SSR Academy of Sciences with the use of the latest methods of molecular biology.

For the coordination of conducted research, creation of comprehensive programs and development of a project for the organization of a special Institute of Biochemistry and Molecular Biology, it would be necessary to create a commission on molecular biology under the Presidium of the Kazakh SSR AS.

The resolution of these questions will be abetted by fulfillment of the decree of the CC CPSU and the USSR Council of Ministers "On Measures for Accelerating the Development of Molecular Biology and Molecular Genetics and Using Their Achievements in the National Economy."

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

UDC 616.21(092) Fetisov-

PROFESSOR ALEKSANDR GEORGIYEVICH FETISOV

Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 3, 1977 pp 105-106

[Text] On 25 August 1976 the otorhinolaryngologists marked the 80th birthday and 55 years of medical, scientific-pedagogic and public activity of Doctor of Medical Sciences Professor Aleksandr Georgiyevich Fetisov.

Aleksandr Georgiyevich on completing secondary school enrolled in the medical faculty of Kazan' University; in 1918 he transferred to Tomsk University, which he completed in 1920 and stayed on to work as a prosector with the Department of Normal Anatomy. Subsequently he was transferred to the Clinic of Diseases of Ear, Nose and Throat headed at that time by Prof. A.M. Nikol'skiy. In 1933, after the death of his teacher, A.G. Fetisov was selected head of the Department of Diseases of Ear, Nose and Throat, which he headed until 1967. In 1934 Aleksandr Georgiyevich was conferred the title of professor; in 1938, after defending his doctoral dissertation, he received the title of doctor of medical sciences. A.G. Fetisov has published 57 scientific works. His first works dealt with problems of regional LOR-pathology of Siberia. He was the first to point out that Siberia had a focus of rhinoscleroma.

A number of A.G. Fetisov's works dealt with the histogenesis, clinic and treatment of osteomas of accessory sinuses of the noses, while his later works deal with the histogenesis, clinics and methods of surgical treatment of juvenile fibromas of the nasopharynx.

Aleksandr Georgiyevich is endowed with great teaching talent. Among the physicians and professor-instruction collective of the institute, A.G. Fetisov enjoys well-deserved respect. Aleksandr Georgiyevich has trained tens of otorhinolaryngologists, including 8 candidates of medical sciences.

A.G. Fetisov has combined his scientific-teaching and medical activity with a great deal of public work. Over the course of 9 years, he was the dean of the medical faculty, for 10 years he was prorector for teaching work and showed himself to be a good organizer of the teaching process.

Aleksandr Georgiyevich has been elected twice deputy to the Tomsk City Soviet of Workers Deputies. He is a member of the CPSU for almost 30 years. For many years A.G. Fetisov was a member of the board of the All-Union and

All-Russian LOR Society and chairman of the Tomsk branch of this society (up to 1967). Since 1956 he has been a member of the editorial council of the journal VESTNIK OTORINOLARINGOLOGII.

The collective of the Department of Diseases of Ear, Nose and Throat, the physicians of Tomsk and the board of the Tomsk branch of the All-Russian Scientific-Medical Society cordially congratulates its own dear teacher on his 80th birthday and wishes him long years of life, health and creative achievements.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

UDC 617(092) Kolesnikov

IVAN STEPANOVICH KOLESNIKOV

Moscow GRUDNAYA KHIRURGIYA in Russian No 2, 1977 pp 121-122

[Article by editorial board]

[Text] The date of 15 December 1976 marked the 75th birthday and 45 years of medical, scientific and teaching activity of Academician AMS USSR, Winner of the Lenin Prize, Honored Worker in Science RSFSR Major General of the Medical Service Ivan Stepanovich Kolesnikov.

I.S. Kolesnikov learned early of deprivations falling to the lot of the peasants in prerevolutionary Russia. During the civil war, he worked as a medical orderly and, on completing a feldsher school, as a feldsher with military units.

In 1931, I.S. Kolesnikov completed the Military Medical Academy and after two years of work with the military units he took the position of junior scientific assistant with the Hospital Surgical Clinic headed by S.P. Fedorov. Here I.S. Kolesnikov began his development as a surgeon and scientist.

After defending in 1936 his candidatorial dissertation on the topic of "Transfusion of Conserved Blood," he was appointed instructor and deputy chief of the Department of General and Military Field Surgery headed by N.N. Yelanskiy.

In 1937-39 I.S. Kolesnikov took part in the war in Spain, working as a surgeon and making a significant contribution to the organization of the blood service in the Spanish army. He participated in the fighting at Khalkhin-Gol River



and in the Soviet-Finnish War. At the time of the Great Patriotic War, Ivan Stepanovich worked as a surgeon at army and front medical institutions and then as chief surgeon of the front hospital of besieged Leningrad.

In 1945, I.S. Kolesnikov was appointed deputy chief of the Department of Faculty Surgery headed by P.A. Kupriyanov; from 1953 to 1976 he headed the academy's hospital surgery clinic. In September 1976, I.S. Kolesnikov became a professor-consultant to the Military Medical Academy imeni S.M. Kirov.

The main directions of I.S. Kolesnikov's scientific activity have been /transfusiology/, military field and thoracic surgery. At the time of the war, I.S. Kolesnikov acquired tremendous experience in surgical treatment of blind gunshot wounds of the chest (1,200 operations), generalized in 1946 in his doctoral dissertation, published in the form of a monograph.

Problems of treatment of diseases of the lungs, to whose solution I.S. Kolesnikov devoted almost 30 years of his life, found their reflection in numerous articles, reports and monographs: "Economic Resections of the Lungs in Tuberculosis," "Prevention and Treatment of Empyema of the Pleura," "Abscesses of the Lungs," "Handbook on Pulmonary Surgery," "Surgical Intervention in Lung Cancer," "Resection of the Lungs."

I.S. Kolesnikov broadened considerably the investigation of the problem of thermal affections started by S.S. Girgolav and T.Ya. Ar'yev.

The intensive work of the surgeon called for an improvement in the methods of postoperative treatment of patients, and a specialized division of intensive therapy and reanimation, one of the first of its kind in the country, was created in the clinic headed by I.S. Kolesnikov.

The tremendous varied activity of Prof. I.S. Kolesnikov is appreciated highly. He is a member of the World Association of Surgeons, a member of the governing board of the All-Russian Society of Surgeons, as well as of the All-Russian Society of Phthisiologists and Phthisio-Surgeons, honored chairman of the Pirogov Surgical Society, honorary member of the Society of Surgeons of Georgian SSR, member of the governing board of the Cardiological Society of Leningrad.

I.S. Kolesnikov has created a surgical school. He supervised the work of 22 doctoral and 40 candidatorial dissertations; under his guidance 16 professors were trained. I.S. Kolesnikov has written 23 monographs.

A man of great culture and principles, exacting in regard to himself and his coworkers, I.S. Kolesnikov gives all his energies and talent to the development of medical science.

I.S. Kolesnikov celebrates his splendid jubilee with full energies, creative ideas and bold plans. On the occasion of this date, Ivan Stepanovich has been awarded the high title of Hero of Socialist Labor. The editorial board of the journal GRUDNAYA KHIRURGIYA cordially congratulates Ivan Stepanovich Kolesnikov on his 75th birthday and wishes him sound health and further achievements in his creative work for the benefit of Soviet health care.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

UDC 617(092) Gerusov

TO THE MEMORY OF YURIY MIKHAYLOVICH GERUSOV

Moscow GRUDNAYA KHIRURGIYA in Russian No 2, 1977 p 123

[Article by the editorial board of the journal GRUDNAYA KHIRURGIYA]

[Text] Yu. M. Gerusov was born on 23 February 1920 in the village of Tundutovo in Volgogradskaya Oblast. In 1942, he completed the Volgograd Medical Institute and was called up into the active army of the Western and then the Voronezh Front. After the end of the Great Patriotic War, Yu. M. Gerusov worked as an assistant at the Department of Topographic Anatomy and Operative Surgery at the Volgograd Medical Institute, an assistant at the Clinic of General Surgery, a docent at the Department of Hospital Surgery and was the chief surgeon for Volgograd. In 1963, he defended his doctoral dissertation on the topic "Buried Suture of a Bronchus Stump in Resection of the Lungs in Prevention and Treatment of Postoperative Complications." Subsequently, Yu.M. Gerusov worked as the rector and head of the Department of Faculty Surgery of the Chita Medical Institute and beginning in 1967 as the head of the Department of Hospital Surgery and prorector of Ivanovo Medical Institute. In 1973, Yu.M. Gerusov was chosen for the position of head of the Department of Hospital Surgery of the Volgograd Medical Institute, where he worked to the end of his life.



A versatile surgeon, Yu.M. Gerusov was one of the first in Volgograd to start performing operations on the heart, lungs and esophagus.

The main directions of Yuriy Mikhaylovich's scientific activity included the problem of suppurative processes of the lungs and pleura, surgical treatment of the cardiac section of the stomach and the esophagus, the mediastinum. He developed an original method of esophagomyotomy after resection of the cardiac section of the stomach and esophagus.

Yu.M. Gerusov was the author of the first monographic handbook in the USSR and the world on ultrasonic diagnosis for physicians (1964). He wrote 75 journal articles and published two collections of scientific works.

Yuriy Mikhaylovich devoted much attention to the training of scientific-pedagogic cadres. There were completed under his guidance 19 dissertations, including three doctoral.

For his contributions to the Motherland, Yu.M. Gerusov was awarded the Order of the Red Star, the Order of the Badge of Honor, and medals.

The bright memory of Yuriy Mikhaylovich Gerusov will always remain in the hearts of all who knew him.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

VLADIMIR ANATOL'YEVICH GERMANOV

Moscow LABORATORNOYE DELO in Russian No 5, 1977 p 318

[Text] Honored Worker in Science RSFSR, Doctor of Medical Sciences, Professor Vladimir Anatol'yevich Germanov heads the Department of Hospital Therapy of the Kuybyshev Medical Institute where he has organized docent courses in clinical hematology and laboratory diagnosis. The scientific researches of V.A. Germanov are related to hematology. He has studied blood changes in exanthematous and typhoid fever, pneumonias, rheumatism, subacute bacterial endocarditis and various types of hypoxia. Many of his works are concerned with the analysis of hematological changes in patients with cancer of various localizations. V.A. Germanov has studied the special features of the blood system and the hemostasis system in elderly people; he has developed a thrombocytogram for healthy people in age groups from one to 108 years, an immunothrombocytogram which in a complex containing clinical data makes it possible to diagnose autoimmune thrombocytopathies, modified the leucoconcentrate method, developed age norms for the cytogram and norms for cytochemical indexes of leucocytes, determined cytolysis indexes for leucograms, a cytogram for leucocyte concentrate, a myelogram, which have found practical application.



In the last ten years, V.A. Germanov and his colleagues have spared no efforts in the establishment and development of a scientific branch of medicine--clinical /hemostasiology/: monographs and monograph collections have been published, 40 candidates and doctors of sciences have been trained. Questions of purpose-assuming analysis of shifts in the blood and hemostatic systems of

patients have been worked out by V.A. Germanov jointly with philosophers. More than 60 works of his pupils are devoted to problems of differential diagnosis in the light of Marxist-Leninist theory of cognition and to topical questions of medical deontology in hematology and laboratory diagnosis.

V.A. Germanov gives a great deal of attention to the making of the young physician and to training in laboratory diagnosis and hematology at the medical higher educational institution.

V.A. Germanov has represented Soviet science more than once at international congresses, symposiums; for 20 years he has headed a society of physicians-laboratory workers in the city of Kuybyshev. To assist the practicing physician, he has written more than 10 methodic aids and practicums on laboratory diagnosis and hematology. V.A. Germanov is a member of the boards of all-union scientific societies of physicians-laboratory worker, hematologists and transfusiologists, a member of the editorial council of the journal LABORATORNOYE DELO, an editor of of the Hematology Department of the Great Medical Encyclopedia. He is actively participating in organizing seminars, ten-day sessions for improving the skills of physicians-laboratory workers, hematologists, therapists and has taken part in the preparation and holding of a number of all-union conferences and the 1st All-Union Congress of Physicians-Laboratory Workers. It would be difficult to overestimate the contributions of Professor V.A. Germanov to Soviet health care, and we would like to wish him continued achievements in his fruitful activity.

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UDC 577.1(092) Derviz

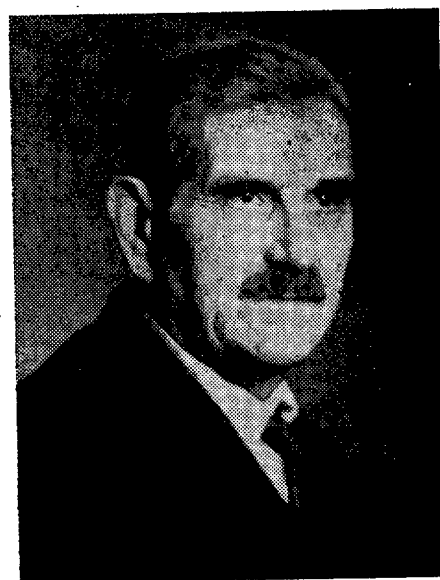
GEORGII VALERIANOVICH DERVIZ

Moscow PROBLEMY GEMATOLOGII I PERELIVANIYA KROVI in Russian No 5, 1977
pp 60-61

[Biographic sketch of Soviet biochemist G. V. Derviz on the occasion
of his eightieth birthday]

[Text] Professor Georgii Valerianovich Derviz
has marked his eightieth birthday and fifty-
fifth year of scientific activity.

Upon graduating in 1921 from the Moscow
University Medical Department he remained
there within the Department of Medical Chemis-
try which was headed at that time by academi-
cian V. S. Gulevich. Beginning in 1925
G. V. Derviz consistently headed a number of
laboratories and departments. He supervised
the biochemistry laboratories at the Institute
of Occupational Diseases, and later headed the
biochemistry department at the Belorussian
Medical Institute, and later organized and
headed the biochemistry department at the
Moscow Oblast Clinical Institute (Medvuz).



From 1938 to 1966 Professor G. V. Derviz headed a biochemical labora-
tory, and later (and until the present day) has been working as a con-
sultant at the Central Institute for Hematology and Blood Transfusion
where he has been fruitfully and creatively developing questions with
respect to hematology and blood transfusion from biochemical aspects.

One of the characteristic features of G. V. Derviz's scientific activity
has been the close combination of theoretical research and practical
questions in clinical medicine. The investigations of G. V. Derviz at
the Institute of Hematology and Blood Transfusion have been concerned
with working out the following important problems: gas exchange and gas

composition of blood in shocks of various etiology and in the transfusion of blood substitutes, oxygen starvation, disturbance of enzyme activity in blood cells of leucosis patients and in other hematological diseases, hemoglobinopathy and particularly hereditary methemoglobinemia. G. V. Derviz has formulated a new concept on the respiratory function of blood which combines biochemical and physiological data, and at the same time has obtained important data on the effectiveness of blood substitutes; he has established a new clinical indicator for oxygen insufficiency in an organism--the coefficient of urinary under oxidation; he has differentiated cases of congenital heart defects from methemoglobinemia. G. V. Derviz has undertaken the initiative and later the practical implementation (the development of his own hemometer) for the rational computation of blood hemoglobin concentration in grams per one hundred milliliters of blood instead of the antiquated Sali units.

For a number of years G. V. Derviz was a member of the editorial board of the journals VOPROSY MEDITSINSKOY KHIMII and LABORATORNOYE DELO.

For many years G. V. Derviz has been actively working in the commission for laboratory equipment in the USSR Ministry of Health Administration for the introduction of new medical technology.

His selfless loyalty to science, his humanity and sense of duty and his high level of erudition are the basic features of G. V. Derviz, the scientist and man.

The editorial board of the journal PROBLEMY GEMATOLOGII I PERELIVANIYA KROVI heartily congratulate Georgii Valerianovich on his glorious celebration and wishes him sound health and further creative successes in his scientific work.

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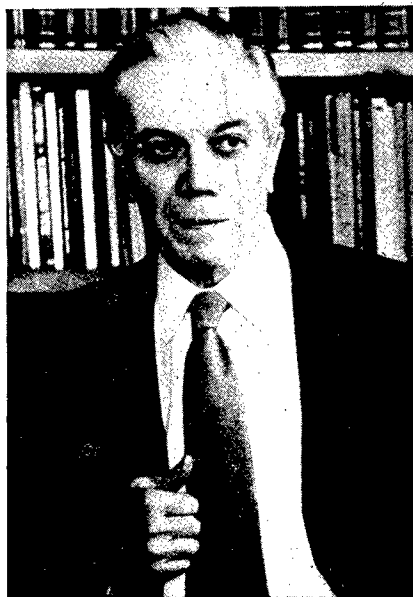
UDC 616-091(092) Voyno-Yasenetskiy

MIKHAIL VALENTINOVICH VOYNO-YASENETSKIY

Moscow ARKHIV PATOLOGII in Russian No 2, 1977 p 95

[Biographic sketch of Soviet pathologist M. V. Voyno-Yasenetskiy on the occasion of his seventieth birthday]

[Text] February 1977 marked the seventieth birthday of Professor Mikhail Valentinovich Voyno-Yasenetskiy. After graduating in 1931 from the Tashkent Medical Institute, he was assigned to the Tadzhik SSR. While working for almost fifteen years as a dissector at the Republic Hospital in Dushanbe and as a scientific associate at the Tropic Institute, Mikhail Valentinovich devoted considerable attention to questions dealing with the administration and development of pathological-anatomical services in the republic and to the study of regional pathology. Here he carried out a number of scientific projects including his candidate and doctoral dissertations. For his work in Tadzhikistan M. V. Voyno-Yasenetskiy was awarded the honorary title of Honored Physician of the Tadzhik SSR.



From 1945 to 1952 Mikhail Valentinovich headed the Department of Pathological Anatomy at the L'vov Medical Institute. In 1952 he was elected as head of the Laboratory for Infectious Pathology at the USSR Academy of Medical Sciences Institute for Experimental Medicine, and following the death of academician N. N. Anichkov, he became head of that section.

From the first periods of his medical activity in Tadzhikistan M. V. Voyno-Yasenetskiy encountered such complex problems of infectious pathology as malaria, intestinal infections and invasions. This also determined his scientific interests. In thoroughly analyzing clinical manifestations of the disease on the basis of a very large amount of

material and the results of post-mortem morphological research, he obtained the possibility of completing to a significant degree and modifying information on pathological anatomy and on the pathogenesis of tropical malaria. Of considerable practical significance was the establishment, along with microbiologists (M. K. Voyno-Yasenetskiy) of the dysentery nature of the so-called malarial colitis.

The study of malaria indicated the importance of compiling the clinical-anatomical data and the characteristics of the etiological agents' reliability. Thus, a rational methodology was developed for the study of infectious diseases on the basis of which a complex analysis was proposed, taking into consideration the clinical aspects, the biological properties of the microorganism and the determination of the latter's role in the genesis of morphological changes. Such an approach made it possible in a new way to examine the pathogenesis of scleroma and recurrent fever, as well as a large group of microbial, protozoan, rickettsial and chlamydial infections which were studied by himself as well as his associates with the assistance of experimental models.

A series of projects and articles written by M. V. Voyno-Yasenetskiy deals with methods in modeling infectious processes and the models themselves which disclose various aspects of the system parasite-host. The compilation of experimental data and results with respect to the study of naturally occurring human and simian dysentery allowed him to substantiate a now broadly recognized concept about the role of the intra-epithelial parasitic nature of *Shigella* in the pathogenesis of that infection.

M. V. Voyno-Yasenetskiy has devoted considerable attention to the technique of research as well as to sources of errors in morphological analysis as well as other practical important problems. At his initiative there was created within the system of the USSR Academy of Medical Sciences a special service for the study of laboratory animals and the maintenance of their health.

Mikhail Valentinovich is the author of eighty-one works including two monographs and eleven works of a methodological character. His book, concerned with the pathology of malaria, was awarded an I. I. Mechnikov Prize.

Under the supervision of Mikhail Valentinovich sixteen candidate and seven doctoral dissertations have been completed. There will be published in the near future a monograph which will include the work which has been undertaken over many years by M. V. Voyno-Yasenetskiy and the staff supervised by him on the study of intestinal infections.

Mikhail Valentinovich has been actively participating in public life and has been actively cooperating in the editorial counsel of ARKHIV PATOLOGII. He greets his seventieth birthday in full possession of his accumulated experience and with plans for new interesting research.

The editorial board of the Journal ARKHIV PATOLOGII and the board of the All-Union and Leningrad Scientific Societies of Patho-anatomists heartily congratulate our deeply respected Mikhail Valentinovich on his celebration and wish him sound health, many long years of life and great creative successes.

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