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BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 16

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## AEROSPACE MEDICINE

### DEVELOPMENTS IN SPACE MEDICINE AND BIOLOGY

Moscow MEDITSINSKAYA GAZETA in Russian No 79, 5 Oct 77 p 4

[Article by V. Taratorkin]

[Text] "K. E. Tsiolkovskiy wrote: "Mankind will not remain on earth forever; in the chase for light and space, it will first timidly penetrate beyond the atmosphere and then conquer all of the space around the sun." At that time, in the early years of our century, it appeared that this prediction would come true hundreds of years later. But less than half a century has elapsed, and cosmonautics has gained a definite and firm foothold in our lives.

This year, the 60th anniversary of the Great October Revolution, is also another remarkable anniversary: 20 years ago, on 4 October 1957, a small metal sphere with protruding antennae disrupted the silence of the universe. Soviet men stepped into the unexplored, into space. Since then, Soviet space science and technology have consistently served man. This is fully stressed in the draft of the USSR Constitution, which states that "the State is implementing planned development of science, in accordance with the needs of society."

Today we shall tell about some of the stages of development of space medicine and biology.

In our times, when earth satellites are routinely "shot" into space almost daily, the launching of biological laboratories worries earth's inhabitants, as it did before. It is not only that these launches have always preceded manned flights. Biosatellites pave the way for great cosmonautics, revealing to mankind the horizons of long-term space flights.

In the early 1950's, space medicine did not seriously look this far ahead. In essence, it was faced with a single question: is life compatible with weightlessness?

There was testing to be done, carefully feeling our way to the goal. Vertical rockets have flown 100, 200 km and more into space carrying biological objects. The rockets returned, the animals were examined and the arguments of the pessimists gradually waned. But not completely. Weightlessness lasted only 8-10 minutes in these flights. But what if they are longer? Would adverse changes occur in the organism?

The flights made by the first four-legged cosmonauts, the dogs Layka, Strelka and Belka, Pchelka and Mushka, Chernushka and Zvezdochka were to answer this main question. Many people were involved in this work, including the pioneers of space medicine: V. I. Yazdovskiy, O. G. Gazenko, A. M. Genin, A. V. Pokrovskiy, A. D. Seryapin, V. I. Popov, Ye. M. Yuganov, N. N. Gurovskiy, A. R. Kotovskaya; engineers B. G. Buylov and B. V. Blinov, and others.

We should recall that animals have not always by far been the trailblazers for man. For example, with regard to the study of sea depths, they only began to participate in experiments after man discovered the sequelae of high barometric pressure. The same happened in aviation medicine. When man was faced with the intolerance of high loads [g forces], studies began of the mechanism of their effect on animals in ground-based laboratories. It was a different matter in outer space. Spacecraft were controlled automatically. For this reason, it was possible, for the first time, the test in advance the extent to which flights into the universe could be hazardous to human life. And this was done.

Adilya Ravgatovna Kotovskaya, doctor of medical sciences, tells us:

"A large group of animals was prepared for flight in history's first bio-satellite. They lived under crowded conditions, they wore gear that protected the sensors and a special device to remove products of vital functions, etc. In a word, they experienced everything that was in store for them during the space flight. We chose the dog Layka. She was calm, even-tempered and everyone who worked with her was fond of her. She behaved well during training sessions, she was smart and everything came easily to her. And Layka lived up to our expectations."

Indeed, the significance of this mission was great, in spite of the fact that it is many years removed from our times. Many of the principles involved in building life-support systems, which were developed in the days of the first animal flights, are used to this day. For example, the physico-chemical system of air regeneration used by Layka in orbit has been basically retained. The same applies to the recording equipment and biotelemetry, which had even then provided researchers with a wide set of physiological parameters: electrocardiogram, blood pressure, respiration rate, body temperature, etc.

The interval between the launches of the first satellite of earth and the first flight of Yuriy Alekseyevich Gagarin was only slightly over 3 years. This great stride was made possible not only by the achievements of Soviet science and technology. The selfless work of many people who redoubled

their efforts hastened the time of the first manned space flight. A small touch: The last examinations on the centrifuge were made on Sundays and even holidays. This team included some remarkable and enthusiastic people: S. I. Lobashkov, S. F. Simpura, I. S. Grishina, P. P. Balynin, L. G. Kamanina and many others.

The cosmonauts jokingly named the centrifuge a "driver" ["vyshibalo"]. Indeed, this stand made high demands of the organism and determined the extent of its reliability. Of course, everyone wants to get the rating of high or good resistance to accelerations. However, not all succeeded in these tests.

The three-man craft, Voskhod, was launched on 12 October 1964. For the first and only time, Boris Borisovich Yegorov participated in the space flight as a physician. Yuvenaliy Mikhailovich tells us about those days:

"Once, we began to talk with Sergy Pavlovich Korolev about the necessity of having a physician as part of the crew. I indicated that we now obtain medical information from cosmonaut engineers. It is obviously sparse. A professional outlook is needed. Moreover, a physician would help organize the crew's work better. Also, since medical men are responsible for preparing cosmonauts, they should experience themselves all of the factors involved in the flight. Finally Korolev agreed: 'Oh well, let's pick a bright physician and let's train him.' And he took charge of this project. Sergey Pavlovich had always displayed attention and interest in biomedical experiments. When physicians began to be considered, he talked with literally each one. And he decided on B. B. Yegorov. By the way, V. G. Lazarev was among the first physician candidates. A few years later he made a flight into space as a craft commander. Had we made a mistake in sending a research physician into space? No, of course not. As a physician, he directly observed the phenomenon of redistribution of blood, associated with reddening and edema of the face. Nowadays, to attenuate this deleterious factor in orbit, a 'vacuum tank' was used to increase the flow of blood to the lower limbs. On that craft, a system with removable sensors and electrodes had also been tested for the first time."

People were flying in space, but biological experiments continued. The mission of Kosmos-110 satellite lasted about 22 days. The dogs Veterok and Ugolek made 330 orbits around the earth and returned safely to the laboratory. In this experiment, they were exposed to special factors, to study reactivity of the cardiovascular system and distinctions of nervous regulation thereof under flight conditions. The orbit of Kosmos-110 crossed the inner radiation belt of earth. This made it possible to test the effectiveness of means of protecting living beings from radiation. This was 11 years ago. Interestingly enough, Veterok is still thriving. He is the only one of the four-legged cosmonauts. He is now 18 years old. His progeny numbers over 100."

The flights to other planets are a matter of great [major] cosmonautics. This is what S. P. Korolev dreamed of and mankind will eventually achieve this. Professor Abram Moiseyevich Genin tells about the strategy involved in making long-term flights."

"The attempt (made on the automatic research stations, Salyut and Skylab) to combine gradual extension of flights with certain model experiments on earth simulating, to some extent or other, the effects of weightlessness and other flight factors constituted an important stage in the development of space medicine and biology. In principle, such models were conceived already by K. E. Tsiolkovskiy. It was important to make sure that they produce conditions that are similar to weightlessness. Studies of these questions began in the early 1960's."

Model experiments make it possible to predict the direction and sometimes the severity of changes occurring in the human body in weightlessness. For example, we know that loss of calcium might be critical in extended space flights. If there is significant decalcification, the bones may not tolerate the loads that man would be exposed to after returning to earth. But the body also loses calcium in special ground-based experiments, when a man remains in horizontal position for a long time. And it was found that the rate of decalcification on earth is approximately the same as during a space flight. Ground-based experiments are also convenient for testing the efficacy of various methods of preventing the deleterious effects of weightlessness. Among others, there is a team headed by Academician O. G. Gazenko, director of the Institute of Biomedical Problems, USSR Ministry of Health, working on these problems. Certain demands with regard to providing the required microclimate must be met when people live in a sealed space for long periods of time. On the other hand, the presence of microflora and possible growth thereof make it necessary, in addition to everything else, to develop methods of decontamination and disinfection. The team of specialists headed by Prof Yu. G. Nefedov, recipient of the USSR State Prize, is working on these, as well as other problems pertaining to habitat.

Other questions that concern scientists are the loss of hemoglobin and erythrocytes, effects of weightlessness on functional systems of the body and the most intimate cellular processes. Experiments with animals on biosatellites are best of all for the study of these mechanisms.

Not too long ago such an earth satellite, Kosmos-936, was launched. Scientists from Bulgaria, Hungary, Poland, Romania, France and the United States also participated in this experiment. Analysis of the flight data indicates that the road to space is clear [open] to man, from the standpoint of molecular biological processes.

"... As we expand our activities pertaining to the study of space," stated L. I. Brezhnev, general secretary of the Central Committee CPSU, "we are not only laying the foundation for future huge conquests of mankind, the fruit of which will be reaped by future generations, but extracting immediate practical benefit at the present time for the inhabitants of earth, for our people, for the cause of our building of communism."

In the town of Zvezdnyy, at the entrance to the Cultural Palace, there is a sculpture of a cosmonaut, soaring in a peculiarly curved oval. This is the band of Mobius, the symbol of infinity.

The roads to space will have no end. No matter how grand the feats of the earthlings, we shall always say: "To be continued!". The daring scientific exploration, the most profound research and selfless work will be continued. They will be a continuation of the great beginnings dating back to 4 October 1957 and 12 April 1961.

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EDUCATIONAL PSYCHOLOGY

SUGGESTOLOGY AND NEW DIRECTIONS IN TEACHING

The University for Parents: Issue 22

Moscow SOVETSKAYA KULTURA in Russian 23 Sep 77 p 6

{Column with above title}

{Text} The socialist countries' cooperation in economic and cultural areas is an excellent basis for exchanging experiences and the latest achievements not only on the scientific-technical plane, but also on the artistic and pedagogic planes. The best of what our friends have developed enriches our country's specialists. In its turn, Soviet practice is picked up and widely disseminated in the fraternal countries.

In today's issue of "The University for Parents," we are discussing the interesting methods for teaching general education subjects in some Bulgarian schools. Music, theatrical arrangements and an appeal to the students' esthetic sense play a large role here.

Now, our Bulgarian friends have the floor.

Leont'yev's Views on New Directions in Teaching

Moscow SOVETSKAYA KULTURA in Russian 23 Sep 77 p 6

{Article by A. Leont'yev, doctor of psychology and chairman of the problem-oriented Council on the Psychology and Methods of Intensive Language Training of the USSR Academy of Pedagogical

Sciences: "The Teachers are Conducting Research: The Interesting Experience of Our Bulgarian Friends"]

{Text} The material published in today's issue of "The University for Parents" will arouse the readers' lively interest. And this interest is warranted: the experience of Dr. Georgiy Lozanov and his collaborators forces us to think about those unused psychological reserves of the personality which can be put to work in the cause of training and educating the young generation.

The student of the future, and of the near future, is not an encyclopedist burdened with a load of diverse knowledge. First of all, this is the person we are teaching to think independently and to make creative use of acquired knowledge, to orient himself easily in the flood of information and to develop an active life position. This is a valuable, all-round personality.

As V.I. Lenin said, methods for teaching, indoctrinating and educating the young generations which will build a communist society cannot be antiquated. Today, the content and organization of the student's educational activity still does not entirely correspond to the tasks of training him for future work nor to the tasks of developing his personality. We are not studying teaching's motivational aspect enough: as a rule, all first graders go to school with great pleasure, but where does their ardor disappear to by the fifth or sixth grade? We are not devoting enough thought to creating a favorable emotional climate in the classroom and we are not studying the social psychology of the school collective enough--precisely that collective as it was understood by A.S. Makarenko--the collective which unites both the students and the teachers.

The need for a solution to these problems is becoming more and more evident to every thinking teacher or psychologist. That is why successful attempts at such solutions are appearing more frequently. V. Sukhomlinskiy's "School of Joy" in Pavlysh; a most interesting system suggested by V. Shatalov in Donetsk; the experience working with students of junior classes which was accumulated by the Tbilisi psychologists Sh. Amonashvili and N. Imedadze; and finally, the experiments which have been conducted for about two decades now in Moscow School No 91 and

in a number of other schools by scientists of the Scientific Research Institute for General and Pedagogical Psychology of the USSR Academy of Pedagogical Sciences--all of these are links in a single chain, all of these are the beginnings of a new pedagogical system. I would like to believe that D. Kabalevskiy's work in music education and B. Nemenskiy's work in art instruction--which are well-known today--as well as the less well-known but no less valuable experience of the Khar'kov teacher V. Levin and the Novosibirsk teacher E. Goryukhina--who successfully developed a taste for literature in their students--will enter this system and foster creative thinking in it.

It seems to me that the studies of G. Lozanov and his collaborators are heading in the same direction. After carefully reading the conversation with him, one can see that he is troubled by the same problems--the "personalness" of social intercourse, the harmonious development of students, an orientation to their activity, the social psychological management of the classroom, developing and maintaining motivation for education and creating a favorable emotional climate in the school. It's true that terminologically we speak somewhat different languages--Soviet psychologists and teachers avoid the concepts "suggestopedics" or "suggestibility." We simply talk about pedagogical reciprocity, seeing the root of its effectiveness not in some sort of special psychological mechanism but in the optimal use of all aspects and all types of reciprocity for developing personality in continuous association with educational activity. But, one can unconditionally subscribe to Lozanov's main slogan "to discover the personality's physiological and psychological reserves."

Although the main direction and the basic principles of Lozanov's pedagogics are without a doubt progressive and modern and one cannot help but welcome them, the concrete procedures and methods used by him still require analysis.

Until recently, G. Lozanov was especially well-known as the creator of a new method for teaching adults a foreign language--so-called "intensive training." Having adopted the basic principles of this method, a number of Soviet teachers are successfully developing them; essentially, they are creating a new system which

combines Lozanov's principles with all the best from our methods for teaching foreign languages. "Intensive training" has convincingly demonstrated its effectiveness.

Now G. Lozanov has expanded the area of suggestopedics' application to other subjects, and most importantly, to the general education school. Time will tell whether the results of this experiment will be as effective. The USSR Academy of Pedagogical Sciences plans to repeat Lozanov's experiment in a Soviet school. Our Bulgarian friends are giving us a great deal of help with this.

#### Suggestopedics Studied by Academy of Pedagogical Sciences

Moscow SOVETSKAYA KULTURA in Russian 23 Sep 77 p 6

[Article by S. Pavlova: "In Moscow and Sofia"]

{Text} The USSR Academy of Pedagogical Sciences is beginning a joint study with Bulgarian scientists and teachers of the new method for teaching subjects which is called suggestopedics. At first a group of our specialists under the leadership of Anatoliy Mikhaylovich Pyshkalo, professor and doctor of pedagogical sciences from the Institute for Content and Teaching Methods of the USSR Academy of Pedagogical Sciences, will visit classes in Bulgarian schools. Then teachers from Sofia will come to Moscow to demonstrate their system in the beginning grades of Soviet schools. All of this will help explain the essence of the new method and the potential for its further dissemination.

Bulgarian teachers who have worked with tenth graders maintain that suggestopedics also has encouraging results in teaching subjects in the final phase of school training.

#### Suggestology Principles and Applications

Moscow SOVETSKAYA KULTURA in Russian 23 Sep 77 p 6

{Article: "Not Just the Words, But the Smile, Too"}

{Text} How can a person's creative efficiency be increased? Pedagogics is looking for a way for students to master the continuously increasing volume and complexity of knowledge, efficiently and without extra tension. A search is underway for a unified system for education and indoctrination which will not only ensure but also stimulate accelerated mastery of an enormous amount of information without unfavorable consequences--a deterioration in health and work capacity.

In this respect, the suggestopedic method of accelerated training which was created by the Bulgarian doctor and psychotherapist, Dr Georgiy Lozanov, is of interest. The new direction in science developed by him on suggestibility--suggestology--is called suggestopedics. It is based on the personality's reserve potentialities and on the widespread use of the learner's psychological activity.

The first year's experiment with suggestopedic training was conducted five years ago in Sofia with a group of tenth grade students. The outstanding educational, indoctrinational and medical results have enabled the system to be introduced on an experimental basis in 17 secondary schools in 6 of Bulgaria's districts.

The essence of the suggestopedic training method and its effectiveness, the principles and means of its influence, the criteria for retention of knowledge and the rapidity of mastering material, the role of suggestibility in the pedagogical process and teacher training--all of these issues were the topic of a conversation between our correspondent and Dr Georgiy Lozanov, director of the Suggestology Scientific Research Institute in Sofia.

## Without Boredom and Fatigue

The suggestopedic educational system is in complete conformity with contemporary trends in psychology. It creates conditions which make education pleasurable. The mastery of new material on a truly creative level as well as the education of children takes place naturally, in a free and easy situation; the teacher's contact with students yields much better results than in a conventional school.

Suggestopedics is based on the observance of three principles: joy and the absence of tension, the unity of the conscious and unconscious and suggestive interdependence. The first principle proposes an organization of the educational process under which the children's external behavior cannot stimulate concentrated attention. Behavioral pseudopassivity--of course, without violations of proper conduct--does not interfere with a high degree of inner motivation and a positive attitude toward the material being studied.

The second principle is based on the fact that the conscious is just a part of total psychological perception. This principle excludes focusing attention on conscious memorization of details which do not bear significant information; it gives due regard to emotional stimuli and takes into account not just the students' conscious reactions but also their unconscious activity.

The principle of suggestive interdependence is called upon to uncover the personality's physiological and psychological reserves. Modern studies show that we probably use only 4 percent of our brain's potential; at the same time, the remaining 96 percent is an inactive reserve. Everything is important here: the teacher's behavior, the atmosphere he creates for lessons, the content of textbooks and his approach to children.

## How Can Remembering be Made Easier?

We are trying to avoid boring repetition and the gradual introduction of new educational subjects. Continual contact with

diverse art forms--music, theater and artistic readings--raises the students' esthetic and overall cultural level and humanizes interpersonal relations in the collective. And last but not least is the feeling of satisfaction which the children experience upon being convinced that they can master a large volume of educational material without being bored and overworked and without homework.

Suggestopedics is a complete system which liberates us from the preconceived, negative ideas about the difficulties of the educational process. Naturally, in order to master this system, teachers require thorough retraining and the educational process requires thorough reorganization. Each of us can recall a situation where all the students easily remembered new material and quickly mastered it in a situation of highly creative discipline for a favorite teacher. And there are those teachers whose lessons are hard to remember and are slowly understood and because of this the students' attention wanders. At the same time, it frequently turns out that both teachers have an identical mastery of their subject matter and know the basic requirements of pedagogics and methods. Then where do the differing results come from? Evidently, there are psychological nuances (which at times are not perceived by the teachers themselves) which help them command an audience. These nuances have not yet been sufficiently investigated in pedagogics. The teacher influences students not just by words, but also by his smile, clothes, movements, walk, voice intonation and attitude toward the child--by everything that is overlooked behind the logic of his speech which stands out in the forefront.

Suggestology teaches the teacher not only how one must talk with children but also with what sort of inner attitude one must approach them. His authority is the authority of an affectionate, knowledgeable person who is organizing and leading the children's collective, while striving to ensure that each separate individual finds his specific form of development in the common labor and realizes his development to the utmost.

## Our Motto--Nothing Superfluous

Along with mastery of the material, we are no less concerned with making it easier to remember and making the factual output automatic upon the first request. In childhood everything new is remembered a lot easier, without tension and effort. However, in the child's individual development, this process--under the influence of incorrect pedagogical goals--is sometimes changed from being spontaneous and natural to being tortuous and joyless. The formula--which is essentially correct--that everything must be achieved by work is sometimes discussed one-sidedly and students arrive at the conclusion that remembering demands an extremely large amount of effort. This is precisely why they unintentionally activate many actions which are not necessary for remembering and which lead them to become fatigued quickly. We believe that the act of perception should not be accompanied by muscular and psychological tension; it is stimulated only by a proper attitude toward the educational process.

Suggestopedics creates the conditions for creative pseudopassivity. What does this mean? In a general atmosphere of ease, spontaneity and the absence of a feeling of coercion, the education of children proceeds pleasantly, naturally and the material is mastered inconspicuously. The educational process becomes desirable. The feeling is created in children that they are surrounded by kindly disposed adults from whom they inconspicuously learn about important and complex things. In the new atmosphere, they do not feel obligated to display an imaginary behavioral hyperactivity.

We are frequently asked: "What sort of a system is this that teaches one to grasp necessary information in a lazy, passive manner?" Such a question is essentially incorrect. When a student is learning to play the piano and he makes superfluous movements, the teacher prompts him: "Not with those fingers. Not with the entire body. Don't bend low: you will waste energy and get tired and your performance will be uninspiring." Later, the time arrives when the pianist only makes the necessary movements. Is this really passivity? No, this is economical and productive education.

During studies one should not be tense or afraid of anything; one should not make supreme efforts to develop different kinds of associations; there is no need to repeat the same material hundreds of times. It can be grasped naturally and calmly. It is only necessary to rid oneself of superfluous movements--both in the somatic and psychological realms--and of the feeling of alarm that something will be overlooked. All stimuli which enter the domain of our sensory organs leave their traces in the brain. We are teaching people to grasp information entering from outside so that it can easily be activated later and creatively used in practice. What is passive here? We are teaching people to rid themselves of pseudoactivity and to work with pleasure so that this will not be a burdensome duty but a pleasure--joy from the painless mastery of knowledge.

99 Instead of 334

The ease of mastering an even greater volume of knowledge than in the conventional schools made it possible for students of the experimental school to go over to a five-day school week. We are consolidating material according to its significance and shifting second and third grade material to the first. The results we obtained are encouraging. The first grade students--without required homework for their 20 weekly lessons (24-26 lessons in conventional schools) and without boredom and tension--have mastered the entire first grade program well, almost all of the second grade program and a part of the third grade program in some disciplines. Their tests show that in 99 academic class hours in the Bulgarian language the students of the experimental schools mastered the program which is covered in 334 hours in the conventional schools and in 27 weeks they acquired mathematical knowledge encompassing first and second grade material. The research data confirm that in spite of the increased volume and rate of grasping information, there was no deterioration in the children's physical development.

The suggestopedic system of education and indoctrination should not be accepted and evaluated based only on the ease of mastering a large volume of material. It is also necessary to point out its great importance for character formation. We cannot imagine the construction of a new society without its members' awareness

and self-control. Pedagogics which rid the individual of tension and stimulate and develop him--this is new and this is what we are fighting for.

### Suggestology in the Classroom

Moscow SOVETSKAYA KULTURA in Russian 23 Sep 77 p 6

{Article by Nadezhda Marinova: "At the Lesson..."}  
{Text}

I found myself in Sofia Secondary School No 122 imeni Khristo Kyrpachev a few minutes before the next class began. The children were rushing to the Bulgarian language, mathematics and history laboratories. I dropped in on one of the first grade classes.

"Take your seats, children," said Yoanna Blakhcheva, the teacher. "We have a visitor today. Shall we show her what we can do?"

"Yes-s-s!" the chorus of first graders willingly answered.

The class blackboard--which the teacher had prepared ahead of time--is covered with numbers, equations and an innumerable amount of signs "greater than," "less than," "or," "sets"--mathematical concepts which are introduced in the first year of study according to the new program.

A game of the "1001st" astronaut begins.

"What must the astronauts know best of all?"

"Mathematics, mathematics!"

The development of sets and multiples of three and four sprang up; binary equations were solved. Questions follow with lightning-like rapidity but the children are keeping up. It's noisy in the room. Raising their hands, the children shout in eager rivalry:

"Me, ask me! I want to answer!"

Those called upon rush to the school blackboard; they recount the numbers quickly and skillfully and rush back.

The teacher says, "Let's find a total by adding a number that we all know to a number that even I don't know..."

The children point out the one who has not been to the blackboard yet and magnanimously give way to him, but at the same time they are trying to beat him using their notebooks. Immediately after the drills at the blackboard, they write a composition about the astronauts. I glance at the notebook of the girl sitting next to me: "I am flying through the air and I feel the stars twinkling over me..."

I am welcomed by songs, riddles and cheerful jokes in the second grade. For several minutes, everyone's attention is riveted on a twig from a birch tree--the children are learning to identify plants: trees, bushes and grains; they are learning their features. The lesson flies by imperceptibly--without the traditional appeals to sit still and listen attentively. There is no old and new material; there is no fixed questioning on the material covered.

The results of these methods are even more perceptible in the third grade. The lessons here also slip by with an external light-heartedness, but they appear a little more serious. The third graders already feel like knowledgeable and competent people. They also wait impatiently for the next task and they also compete eagerly, but now for their desk mates, groups and teams. And the assertive "I" of the first graders has quite naturally given way to the concept "we." For the rest, they--just like their younger brothers--begin and end the lesson with a song of their choice; they watch movies or slides and describe what they saw; and they solve complex fraction and decimal inequalities--accompanied by pleasant music. They also diligently jot down their minor duties--for a homework assignment, they have to measure and calculate their favorite book's area and volume. It is now necessary to gradually acclimate them to independent work at home. Next year, a conventional school awaits them with its traditional requirements for discipline and quiet, with tests and grades...

"Actually, only our first, second and third grades are being taught by the new method at present," explained Damyanka Lozanova, an observer from the Suggestology Institute. "For the time being, only one of the fourth grades is undergoing this so-called "advance experiment." There are many and diverse reasons for this: the need for specially trained teachers, new textbooks and auxiliary subjects. A stronger supply base is also needed."

I wanted to hear what the teachers had to say.

"I hesitated for a long time before I joined this course," says Anna Yordanova. "I was afraid the children couldn't assimilate this enormous volume of material which had to be taught each year. I was disturbed by the unusual manner of presenting it and the short time for teaching it. My alarm was in vain. The first graders are immediately learning to read and write whole words easily--without breaking them down into syllables and without these endless drills in drawing outlines, flourishes and separate letters. It's the same in mathematics: we are combining all the material in several general topics: addition and subtraction, linear and inverse operations, etc. Each topic is preceded by a performance--a play, opera or operetta. In the scripts, the children's favorite heroes get into trouble. The children react to this immediately and naturally. But, in order to help their heroes, they must learn a good deal of new, unknown material. It is precisely in this situation that it is grasped in an excellent manner."

The conversation became animated. The teachers were pioneers in their field and that is why they were talking about it with great enthusiasm.

#### Parents Reactions to Suggestology

Moscow SOVETSKAYA KULTURA in Russian 23 Sep 77 p 6

{Article: "But What Do the Fathers and Mothers Think?"}

{Text} Kirill Serafimov, Professor and Doctor of Physical Sciences

"Svetoslava, our youngest child, is a pleasant exception in our family. Our son, who is now in the ninth grade, sometimes gets low grades. Margarita, our older daughter, learns brilliantly, but she achieves this at the expense of a lot of effort. The younger one masters everything easily. And I think the issue here is not simply Dr. Lozanov's new method, but the fact that the teaching collective--enthusiastic about the experiment--began to improve teaching efficiency and are striving to remove everything superfluous from the educational process. This is why the fact that children are mastering the material of two conventional grades in one year is quite logical.

"Svetoslava is already solving fourth and fifth grade mathematics problems. When I saw the rate they are advancing at, I tried to explain negative quantities to her; they are studied in the fifth grade in conventional schools. She understood quickly and easily. I cautiously went further: I explained the addition of integrals and differentials to her; it turned out that she could also grasp this.

"An important advantage of the new system is the increase in free time. Once, we went to the Young Pioneer Palace with the children; a performance of sorts was organized for them by the school there. Everything was designed in extremely good taste. They had a good time; they sang and returned singing a new song which they had unwittingly learned. And, most important, they were in a wonderful mood the whole time.

"This is why I put Dr. Lozanov's method in second place; first place goes to the creative spirit in this school of joy which is striving to prepare conditions for brave searches for the new in life."

Latinka Gruyeva, Trade Employee

"I am at work almost all day and I don't have an opportunity to closely familiarize myself with my daughter's school work, but lately I have had the impression that she has begun to read a lot. She is in the second grade and exchanges books at the library every three-four days."

Nedyalko Vrazhalski, Engineer

"Desislava likes to go to school. At first she felt somewhat tense, but she overcame it very quickly and easily adapted. We haven't noticed anything disturbing in her behavior or in her psyche. She feels good and is not encountering any difficulties--in spite of the fact that there are such serious moments in the first grade program like the concept of set, for example. Evidently, the fact that the children aren't burdened with homework also has its effect."

Yekaterina Nikolova, Telephone Operator

"My daughter is in the first grade. In my opinion, she is coping with her studies better than my son did several years ago in another school. Nevertheless, I think their program is strenuous. They are studying fourth grade mathematics in the first grade and they are solving several problems from the fifth grade program."

"It is good that they have one Saturday off and another is taken up by trips to the theater or circus or they have a Labor Saturday. I would like to see the six hours set aside for physical training lessons devoted to different types of sports."

Yuriy Zlatev, Architect

"Perhaps Dr. Lozanov's method is not ideal, but when we compare our daughter's development with that of other children, we notice how much less tired she is. My colleagues, who have children the same age, are establishing a second school at home. We believe that the headstart in knowledge which the experimental school children achieve in comparison with their peers makes it possible to study foreign languages, music, the fine arts and to engage in sports in a more systematic way."

Nadezhda Dyankova, Seamstress

"Our family lives near Dr. Dimitrov. Our children are together everyday, and I see the difference in their development. My

sons--who study in another school--are overworked all the time, but Lyubomir, Dimitrov's son, comes home from school happy; he has time for play; he is growing well and is in excellent health. His parents say that as soon as they notice any deviations or overwork, they will immediately transfer him to another school."

Valentina Tyrkalanova, Secretary

"I am a supporter of the tried, old methods of teaching and I registered my son in this school only because it is quite close to our house. I only have one child and I can't compare his education to anybody else's. Up to now, he has coped with everything. We decided to leave him in this school for now, but we are watching his development carefully. He has some difficulty in writing; sometimes he leaves out letters; but when he is calm, he writes beautifully."

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## GENETICS

### GENETIC ENGINEERING, A STEP INTO THE FUTURE

Riga SOVETSKAYA LATVIA in Russian 8 Sep 77 p 3

[Article by Academician Aleksandr Bayev (APN--"Novosti" Press Agency)]

[Text] We molecular biologists are often asked how our discipline will help society in solving such acute problems as hereditary diseases, environmental pollution, shortage of food, increased intellectual loads and stress situations.

I do not presume to maintain that molecular biology is capable of solving all problems of this sort, but its practical applications are becoming more and more distinct. I would say that genetic engineering has come the closest to a breakthrough with regard to practical implications.

In recent times, this concept has broadened somewhat. It refers to bacterial, cellular and even embryological engineering. For this reason, it should be stipulated at the start that we shall be referring hereafter primarily to genetic "hybrids," i.e., recombinant molecules of DNA. They are obtained in the laboratory by connecting fragments of DNA isolated from viruses, bacteria, plants or animals, which are organisms that are far apart with regard to evolution and that never cross with one another naturally.

Such synthetic genetic structures can be introduced in the cells of bacteria or higher organisms and multiply there to the required extent. And the cells that are carriers of "hybrid" molecules acquire unusual hereditary traits and, so to speak, new organisms are formed.

For a long time man has been transforming living nature. Breeds of domestic animals and cultivated varieties of plants have been obtained by means of hybridization and selection, which man used empirically. Genetic engineering deals with something else: the problem is to obtain an artificial hereditary substance, a carrier of genetic information, and then only proceed to create organisms from it.

In the late 1960's, the gene responsible for assimilation of lactose was isolated for the first time from colibacilli. Last year, chemical synthesis of this gene was completed, and this event became a triumph of synthetic

chemistry, although its biological significance is being evaluated with restraint. Since then, new advances have been made in isolation and synthesis of genes. It was learned that expressly they perform all genetic conversions of nucleic acids which contain hereditary information: synthesis and breakdown thereof, repair of injuries, progressive course of reactions, leading to the end effect of expression of hereditary traits. By isolating these enzymes from the cells of organisms, scientists have acquired the very tools that nature uses for hereditary processes.

Many institutes of the USSR Academy of Sciences are working in this direction. Research deals with a wide area, ranging from the study of enzymes to development of recombinant molecules of DNA.

Thus far, we did not set tasks that were too complicated, and we avoided the use of systems, the safety of which is questionable; at the first stages it is better to work with objects that are reliable in this respect. We are satisfied with the fact that we are succeeding in obtaining genetic hybrids and reproducing them in bacterial cells. Incidentally, there is some originality to the research, for example, that led to the discovery of a new enzyme, restrictase, which is capable of dissociating the DNA of phage T-4, by virtue of chemical specificity, which had previously been inaccessible with regard to any of the known enzymes of this type.

Have useful results been obtained with recombinant DNA? Of course they have, with respect to gaining knowledge about hereditary processes, but there are no practical applications in medicine, agriculture and industry as yet, although this is probably understandable: genetic engineering is not yet 10 years old, it is still in its infancy.

Skeptics state that the procedures used to create genetic "hybrids" are not effective enough and could not ever compete with natural processes, that the expense involved in the search for new avenues is too great and, for this reason, unjustified.

Researchers directly involved in this work are confident that, in the near future, it will be possible to use the new molecular genetic techniques for practical purposes. The most important element in these operations is that the recombinant molecules are being developed in the laboratory, in a test tube, and these are the first synthetic genetic structures. The optimistic expectations are related to the fact that any genetic material could be obtained and reproduced in this manner, even though nature is incapable of doing so under natural conditions.

What then are the possibilities of practical applications of such research? Probably, the first practical application of genetic engineering techniques in the field of medicine will refer to hereditary diseases, and the genes developed in the laboratory will be used for treatment that could be named genotherapy.

One can foresee practical applications in agriculture, in the form of faster methods of developing useful hybrids, using cell cultures for genetic and other purposes and even in the form of such (fantastic at first glance) an operation as transfer of the gene for nitrogen fixation.

Man created chemical methods of fixing nitrogen and spends an enormous amount of energy, effort and funds for this purpose. An enormous amount of petroleum is used daily to obtain nitrogen, which is added in the form of fertilizer to plowed fields all over the world.

Our scientists have long since tried to simulate biological fixation of nitrogen, and in this respect they have made definite strides. In recent years, there has been intensive development of research in the field of biological fixation of nitrogen, and it promises to cause a genuine revolution in agriculture: plants will no longer require the nitrogen that man puts in the soil in the form of fertilizer.

The most immediate possibilities of practical application of genetic engineering are related to development of highly productive strains of bacteria in the microbiological industry.

The latest advances in the field of recombinant molecules will make it possible to obtain biologically active proteins and other compounds in bacterial cultures, for example, insulin, growth hormone and others.

In principle, the problem of species formation in the laboratory has been solved, and hereafter it is merely a matter of building up the possibilities. And we cannot fail to take into consideration the advances made in related directions of experimental biology. This discipline was enriched by a new procedure slightly over 10 years ago: uniting cells under the influence of inactivated Sendai virus.

Concurrent development of research in several directions will, sooner or later, lead to the joining of forces, significant expansion of possibilities in genetic building of life [living things].

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## HIGHER NERVOUS ACTIVITY

### MAN-MACHINE INTERACTION STUDIES

Moscow VECHERNYAYA MOSKVA in Russian 9 Sep 77 p 2

[Article by L. Voronin, corresponding member of the USSR Academy of Science, head of the Department of Higher Nervous Activity at Moscow State University]

[Text] 1. As before, the fundamental problems of our field of expertise concern the main direction of investigation. In the past 5 years, scientists in the department have substantially broadened the range of study and concurrent with the development of theories, have implemented them according to the needs of the collective industrial enterprise.

In particular, the central attention of our research is directed at the problem of the interconnection between "men and machines." The growing level of automation and mechanization of modern production makes it all the more acute. As you know, in difficult situations, the burdens on the nervous system of people in such professions as, for example, operators reaches at times large proportions.



Together with engineers, we are striving to find the means for the best interaction between "men and machines." Thus, a search is being conducted for effective methods of codification and transmission of information. For example, the created methods allow operators to grasp information with maximum productivity while expending a minimum of nervous energy.

2. Experimental collaboration puts us in contact with Moscow enterprises. In a compressed period of time, we do our utmost to apply the results of our research which is directed at the improvement of conditions

and the increased productivity of labor. Concrete recommendations, worked out on the basis of investigations of the collaborating departments also helped to improve the working conditions of operators in various enterprises in the city and also of controllers in the metropolitan airports.

Good communication was established between us and specialists of practical workers' welfare. Scientists of the department consult doctors in hospitals and polyclinics, give lectures about recent progress in brain physiology and conduct joint research. For example, in nervous diseases clinic of the Primary Medical Institute, as a result of collaborative research, we are striving to find a way to improve memory. It has been shown that for short periods, one can improve memory by the introduction of ribonucleic acid. This work is being continued at this time.

Together with specialists of the Institute of Defects, the Academy of Pedagogical Science, SSSR and the Institute of Psychology, the Academy of Science, SSSR, an effective method for eliminating speech defects has been worked out. The "method" was approved in the main polyclinic of the Ministry, SSSR and by reporting it, we hope to find application for it in other therapeutic city institutions.

While preparing to appropriately meet the 60th anniversary of Great October, the collective departments will apply all efforts in order to hasten the fulfillment of the socialist commitments undertaken in honor of the national celebration.

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## INDUSTRIAL MICROBIOLOGY

### ENZYMES ARE 'PERFORMING SURGERY'

Vil'nyus SOVETSKAYA LITVA in Russian 30 Oct 77 p 4

[Article by M. Sheynbergas]

[Text] A few days ago, A. Yanulaytis, candidate of biological sciences and head of the department of genetics at the Vil'nyus Scientific Research Institute of Applied Enzymology, visited the city on the Neva River where an agreement was signed with the Leningrad Scientific Research Institute of Extrapure biological preparations concerning the delivery of enzymes.

The first batch of these biological catalysts, which are needed for conducting experiments in the field of genetics, was produced by the Vil'nyus Plant of Enzyme Products. Specialists at the Institute of Applied Enzymology developed the techniques for commercial production thereof for the first time in our country, under the guidance of A. Yanulaytis. This achievement will relieve virologists, microbiologists, breeders and scientists in other fields of the complicated process of obtaining such enzymes in the laboratory; it will expedite work in a new direction of research that has been named genetic engineering.

The specialists in this field, using enzymes as a tool, "operate" on molecules of deoxyribonucleic acid (DNA), a component of the nuclear substance of animal and plant cells, which play a leading role in the transmission of genetic traits. With the help of the enzymes, experimenters "cut" DNA molecules in specific sites and the fragments obtained are then "sutured" together, thus forming new combinations that had not existed before in nature. These so-called hybrid molecules are introduced into a cell, where their activity is submitted to comprehensive investigation. The ultimate goal of such experiments is to create organisms with new, specified traits.

The present level of genetic engineering provides broad opportunities for successful use thereof in research and practical areas. Thus, the experimenters working with higher living organisms are often faced with the problem of shortage of specific fractions of DNA molecules. It is purposeful to use the methods of genetic engineering to transfer this molecule to the cells of

microorganisms, in which could reproduce the required DNA fractions in an unlimited quantity.

A. Yanulaytis tells us: "Scientists will perhaps be able to obtain in the future the required quantity and at minimal expense such products as insulin, human growth hormones and some antibiotics by means of genetic engineering. Genetic engineering will help make the fondest dream of plant growers come true: to give agricultural plants such properties as resistance to frost and drought, and the capacity to assimilate nitrogen from air.

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## INDUSTRIAL MICROBIOLOGY

### ENZYME PRODUCTS FOR THE SWINE INDUSTRY

Tallin SOVETSKAYA ESTONIYA in Russian No 218, 17 Sep 77 p 4

[Telepresstorg advertisement]

[Text] The use of amylosubtilin (0.05% mixed feed weight) or protosubtilin (0.03%) increases mean daily weight gain by 8-15% and, at the same time, lowers feed outlay by 5-9%.

Every 1000 rubles spent on enzyme products yields up to 6000 rubles additional income.

One kg of enzyme products means an additional 6-8 kg of pork. The best way to use enzyme products is to add them to mixed feed.

The price is 8.50 rubles per kg for amylosubtilin and 4.50 rubles for protosubtilin.

Advice on the use of these products can be obtained at the All-Union Scientific Research Institute of Applied Enzymology (232028, Vil'nyus, 8 Fermentu Street).

Orders for these enzyme products and comments on the results obtained with the use thereof should be addressed to UMTS [Administration for Material and Technical Supply] of the Microbiological Industry, 113809, Moscow, M-162, 18 Lesteva Street.

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## INDUSTRIAL MICROBIOLOGY

### ENZYME PRODUCTS FOR THE ANIMAL INDUSTRY

Tallin SOVETSKAYA ESTONIYA in Russian No 218, 17 Sep 77 p 4

[Advertisement]

[Text] Income of Eight Rubles per Ruble Spent

Amylosubtilin G3x (0.5 g/feed unit), protosubtilin G3x (0.3 g), pectawamorin P10x or pectofeotidin P10x (0.1 g each per feed unit, with activity of 9 units per gram) increase the mean daily weight gain of young cattle by up to 20%.

The feed outlay and digestibility of protein drop to 16% per kg weight gain.

One kg of enzyme products means an additional 20-30 kg beef.

Each ruble spent on enzymes yields up to 8 rubles income.

The best way to use enzymes is to add them to mixed feed.

The price is 8.50 rubles per kg amylosubtilin, 4.50 rubles for protosubtilin and 30 rubles each for pectawamorin and pectofeotidin.

Advice on the use of these products can be obtained at the All-Union Scientific Research Institute of Applied Enzymology (232028, Vil'nyus, 8 Fermentu Street).

Orders for these enzyme products and comments on the results obtained with the use thereof should be addressed to UMTS [Administration for Material and Technical Supply] of the Microbiological Industry, 113809, Moscow, M-162, 18 Lesteva Street.

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UDC: 614.7:54(049.3)

COMMENTARY ON ARTICLE ENTITLED 'CRITERIA FOR HYGIENIC EVALUATION OF THE COMBINED EFFECT OF CHEMICAL ENVIRONMENTAL POLLUTANTS' BY G. I. SIDORENKO, ACADEMICIAN OF THE USSR ACADEMY OF MEDICAL SCIENCES AND M. A. PINIGIN

Moscow GIGIYENA I SANITARIYA in Russian No 5, 1977 pp 76-78

[Article by Prof N. I. Smetanin, Ryazan' Medical Institute imeni Academician I. P. Pavlov, submitted 29 Jun 76]

[Text] The data submitted in the above-mentioned article\* are of great interest with regard to settling the problem of setting health standards for chemicals that pollute the environment. The proposed method is helpful in continued development of health-related legislation. The approach indicated by the authors to evaluation of the hazard to man of chemical pollutants originating from all environmental objects merits much attention. The use of "dose-time" function and concept of "maximum permissible load" (MPL), as well as isoeffective concentrations, in hygienic research is one of the most rational means of setting sanitary [health] standards, and it is a new step toward development of hygienic standard-setting.

One special question arises: To substantiate the formula for calculation of MPL, the authors tested the effects on the organism of continuous inhalation of a toxic agent. But it is known that most of the public works in industry and spends one-third of the time under different hygienic conditions, where the atmospheric influences are altered and industrial factors affect the organism.

Thus, for this group of people, the effect of atmospheric chemical pollutants is intermittent and the effects of chemicals of a different nature and in a different combination are added to it. And while this effect did not exceed the MPC [maximum permissible concentration] for industrial conditions, in atmospheric air it could be significantly above the threshold, and it served as a background state.

The proposed method involves standard setting for chemicals only; however, in the natural environment these factors are combined with physical ones. In

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\*GIG. I SAN. [Hygiene and Sanitation], No 6, 1976, p 77.

our opinion, the most marked and hazardous factors are those, in particular, to which man is exposed throughout his life with ever increasing intensity. These factors include, for example, superhigh-frequency fields. Moreover, it is also important to take into consideration the climatic and geographic factor, to which the specifics of adaptational reactions of the organism to chemicals is closely related (particularly in the Far East, Extreme North and Central Asia). At the present time, intensive research is in progress on adaptation of the organism to environmental factors prevailing in these areas (V. M. Shubik).

There is no doubt that hygienists must include, in their evaluation of deleterious environmental effects on the organism, as complete as possible estimation of the combined effect of different factors. For example, modern man is exposed to such continuously increasing environmental loads as superhigh-frequency fields and allergens. As the effect of these factors increases, the immunobiological reactivity of the organism decreases.

Among the physical factors, corpuscular and electromagnetic radiation, which reaches earth in the form of 3 mm to 30 m radiowaves and has a particularly deleterious effect on human health during periods of magnetic solar storms, merits special attention. What is particularly important is that electromagnetic radiation is constantly increasing, especially in the vicinity of radio and television stations, and at the present times it constitutes tenths of  $W/m^2$  and  $10 \mu W/cm^2$ .

It is known that superhigh-frequency and static electric fields, which have a cumulative effect on the organism, result in a different course of allergic reactions. It has been established that many allergic reactions present distinctive ecological specifics and ecological specialization of regulatory systems develops. The meteorological factor is an additional irritant to the organism. Under specific conditions, it weakens developing adaptational reactions of the organism and makes it difficult to maintain homeostasis. The climatic and geographic factor also affects immunity.

At the present time, studies are in progress of immunological reactivity of the organism when it is exposed to toxic agents. More and more consideration is also being given to climate and geographic conditions in setting sanitary standards. For example, SN-245-71, which pertains to air temperature standards in work areas, states: "The permissible air temperature should not be more than  $5^\circ$  higher than the mean outdoor temperature at 1300 hours in the hottest month of the year" in a given locality. As for setting sanitary standards for chemicals that pollute the air in work places, many authors have long since proposed that the MPC be lowered for toxic agents in regions with a hot climate. Thus, M. A. Adylov proposed a MPC of  $0.1 \text{ mg}/m^3$  in the air for sevin, which is used in agriculture in regions with a hot climate, instead of the officially approved  $1 \text{ mg}/m^3$ . In his research, T. I. Iskandarov established that, at an atmospheric air temperature of  $35^\circ$ , the toxic properties of 8 pesticides are 1.5-2-fold increased, as compared to  $20^\circ$ .

The foregoing leads us to suggest that a coefficient of reduction be added to the formula proposed by the authors in question for calculation of MPL. It is determined by the additional loads on the organism referable to physical environmental factors. According to the data in the literature, this reduction should constitute at least 50%.

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## PSYCHOTHERAPY

### EXTENSIVE RESEARCH IN HYPNOSIS, USES IN THERAPY, REVEALED

Budapest ORSZAG-VILAG in Hungarian No 41, 12 Oct 77 pp 12-13

[Article by Tibor Lukacs:"Healing With Hypnosis, Not 'Sorcery'"]

[Text] A pretty housewife polished the chandelier; all of a sudden there is a noise of an explosion and of shattered glass. The woman raises her hand to her eyes, starts screaming. The members of her family who rush to her aid listen in horror: the woman, who was singing happily just a few seconds ago, became blind.

One would think the following: "As she polished the bulb, it shattered, and the fragments injured her eye."

However, the incandescent bulbs are intact.

"What about the noise of an explosion and of shattered glass?"

A bottle of beer was dropped next door.

"But then, how did the eyes of the woman became injured?"

The most surprising fact is that no injuries are evident in the eyes. A very thorough examination was carried out at the Ophthalmological Clinic in Moscow; no evidence of any damage was found. Accordingly, the patient was transferred to the head of the Department of Psychotherapy of the Central Institute of Advanced Medical Education, Professor V. E. Rozhnov. After a thorough examination, the professor established the following: The young woman has recently heard that a lightbulb exploded in someone's hand, and the fragments blinded him. This story impressed her to such a degree that she was convinced as someone dropped a beer bottle next door that the bulb she was just handling exploded and made her blind.

This surprising story was told us by Professor Rozhnov himself when, during his visit to Hungary, he honored us with a visit in our editorial bureau.

We asked him: "What has ultimately happened to the young woman?"

"We established that she developed a so-called hysterical blindness as a result of this experience. The ophthalmologists are helpless in such a case since the eyes are intact. However, we healed the blindness with a few sessions of hypnosis therapy; it was caused by emotional stress."

A miracle has happened: this is what some people would have said, and what has indeed been said in earlier times when they experienced such "miracle" cures of patients of this kind. Modern psychotherapy, however, knows more and more about the complex processes of the nervous system and is now able to use hypnosis for healing.

One might think the following: "Whoever can react in this manner must have a nervous disorder."

But it is indeed a serious matter whether someone remains blind — irrespective whether as a result of real injury or nervous disorder — and will have to be cared for by his relatives or whether he regains his vision and can return to his work.

According to the professor, "this can happen to perfectly healthy individuals also; people may lose one of their faculties in an instant after a nerve-shattering shock. It has happened that a pedestrian stepped off the sidewalk and the driver of an approaching car barely missed him, while his brakes screamed. The witnesses were relieved to see that all the pedestrian suffered was a fright. But the pedestrian, who was not even touched by the car, fell down and remained on the ground. An examination in the hospital confirmed that there were no injuries whatsoever. Yet the victim lost his hearing. He did not dare to go to the street again. His wife had to escort the burly man, who started to shake whenever an automobile came toward him. The close call shattered his nerves to such a degree that even conventional psychotherapy was ineffective. Eventually he obtained hypnosis therapy: this restored his health. No longer is he afraid of automobiles, he even qualified for a driver's licence."

The professor continued: "Let us discuss another example. Friends of a young woman scared her in the dark - a practical joke. The effect was unexpected.

The unfortunate woman developed hysterical paralysis; she lost her ability to stand and to walk. No orthopedic treatment could help her. After lengthy, unsuccessful attempts to help her, she was transferred to the Psychotherapy Clinic; even there it took several months until she recovered. First, she was able to stand in an unsteady manner, and later she started to walk. Now, four years later, she is recovered. But it is difficult to believe that this mobile young woman was a paralyzed cripple for about one year.

Hypnosis was not taken seriously for a long time; it was classified as pseudoscience. There is still resistance in many places against its medical use, even in "official" circles.

We asked Professor Rozhnov "How did the therapeutical use of hypnosis develop in the Soviet Union?" (Editor's note: The professor described the role of hypnosis in science in an article published in KOMMUNIST, the theoretical journal of the Communist Party of the Soviet Union, in No 2 of the 1972 volume and No 14 of the 1974 volume; he also discussed this subject in an article published in PRAVDA on 8 October 1977.)

"In earlier times, hypnosis was regarded as a miracle by ignorant individuals; it had an aura of mysteriousness and "super-natural" character. But hypnosis was also studied by serious scientists and physicians. I should like to stress that in the Soviet Union there has never been a so-called adverse reputation for hypnosis as in many western countries. The main reason for this is that during the first decades of the present century, the tenets of Freud repressed hypnosis, placed it in the background. As a result, it took 65 years after the first experiments, carried out at the turn of the century, that the practitioners of this discipline met on the international level. Now, the hypnotherapists of the world meet every two or three years, but the fact remains that outstanding personalities of Soviet science have expressed great interest in hypnosis as a science ever since the beginning of Soviet society. This interest increased further as our scientists started to pay increased attention to the teachings of Pavlov, who was the first to approach the phenomenon of hypnosis from an objective, materialist point of view. He interpreted the hypnotized state as partial sleep, in which a "guard post" in the brain maintains the relationship with the physician. Regarding hypnosis as partial sleep was an important step toward the understanding of the phenomenon; however, it is not sufficient for explaining many experimental and clinical observations. In recent studies, N. A. Aladzhava, professor, S. L. Kamenetski, Dr, and myself obtained experimental data at the Psychotherapy Clinic of the Central Institute of Advanced Medical Education in Moscow which indicate that hypnosis is neither sleep nor awakesness; it is a third, qualitatively different state. We based our

studies on the evaluation of those electro-physiological processes which take place in the brain of the hypnotized individual in the course of the hypnosis. We were also able to record these processes by using the method developed of Professor Aladzhava."

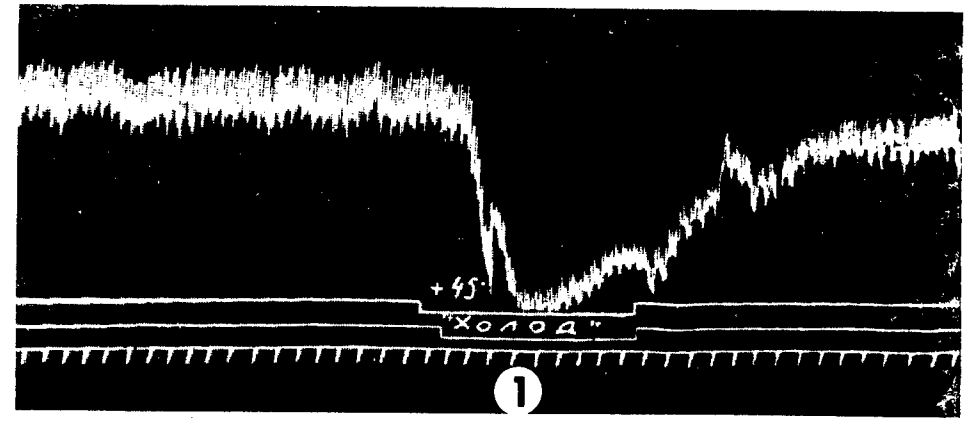
We asked: "What is the definition of hypnosis?"

"Hypnosis is a unique psycho-physiological state which develops upon the effect of mainly verbal factors in an individual. As a result, the hypnotized individual reacts actively to the suggestions of the hypnotist."

According to most researchers, hypnosis has three phases. The first phase is characterized by light slumber and the general slackening of the muscles. In the second phase, the muscles may be bent like wax, and they remain in any position into which they have been set, without fatigue, for a long period of time. In the third phase, which is the deepest phase and which is the hypnosis proper, there is a psychic activity which differs from both sleep and wakefulness. Then, the world of the experiences and feelings of the hypnotized individual is determined solely by the information which is imparted verbally to the patient. For example, if we suggest to someone that an incandescent-hot coin touches his fingers, he may develop a burn wound there. This stage presents us with the most surprising psychic phenomena. By studying these phenomena and learning about them, we can not only develop methods of therapy but can also obtain invaluable information about the sub-conscious sphere of cerebral activities in an experimental manner.



In the second stage of the hypnotic state, the muscles may be bent like wax, and they will remain in the set position without fatigue over a relatively long period of time



In deep hypnosis, the physiological characteristics of the hand change if the sensation of cold is suggested



Professor V. E. Rozhnov, head of the Department of Psychotherapy at the Central Institute of Advanced Medical Education in Moscow

Indeed, we had a very interesting case in Hungary. A child who turned up in Hungary during wartime remembered neither his parents nor his homeland when he became an adult. Of course, he did not speak his mother tongue. In a hypnotized state, however, he described in fluent Russian his childhood experiences. When awakened, he was highly surprised in hearing himself in the magnetic tape recorder as he described his childhood in the Russian language. In any event, through this means he discovered his native village and his relatives in the Soviet Union..

The professor stressed the following: "Soviet medical science regards the therapeutical use of hypnosis important. At the present time, two departments of psychotherapy train various medical specialists, primarily neuropathologists and psychiatrists, in the Soviet Union about hypnosis. They are located in Moscow and Kharkov, respectively. The presently most intensively studied subject at the Department of Psychotherapy of the Central Institute for Advanced Medical Education in Moscow is hypnosis and its problems.

In September 1975, the Ministry of Health of the Soviet Union decreed that 150 special psychotherapy clinics will be established with the aim of providing psychotherapeutical help. The primary task of these workshops is to use psychotherapy, including hypnosis, as a complex method for treating certain diseases of the heart, the stomach, the intestines, and other parts of the body. Hypnotherapy has an increasingly important role in the fight against various unwholesome habits such as alcohol consumption or smoking. In the 150 new specialist clinics the specialist physicians use hypnosis in all appropriate cases in the course of the psychotherapeutic treatment.

Hypnosis starts to play an important role in complex surgical procedures also. The suggestion of my Hungarian colleague, Dr. Gyorgy Danis, that hypnosis may be used as a relaxing treatment in patients afflicted with kidney disease, is worthy of serious consideration. Hypnosis may make people able to get used to the idea that they have to use a complex device as an artificial kidney. Hypnosis might alleviate some of the conditions which make the affliction more serious. Hypnosis is being used today in surgical procedures, such as kidney transplantations also. In our clinic we developed more than ten years ago a complex pain-relieving procedure in cooperation among surgeons and anesthesiologists, using drugs and hypnosis together. We published the results of our studies in the Soviet Union and abroad.

Hypnosis also plays an important role in cases of so-called phobia, for example in fighting the fear of cancer, tuberculosis, heart disease and other diseases. Such fear, which is accompanied with a constant concern,

can in itself harm the patient. Psychotherapy, using hypnosis, may help here. Sometimes a carelessly uttered word from the physician can cause such disease. There was a case where the physician remarked that "this young man has a droplet-shaped heart" when fluoroscoping a sportsman. This is a case often encountered in adolescence; it is not a disease. However, the young man became concerned about this term, of which the significance he could not comprehend, and believed himself to be seriously ill. He gave up sport, hardly dared to move, and went from one clinic to the other, trying to convince the physicians that he is indeed a sick man. Since, however, there was nothing wrong with his heart, he ended up at the psychotherapy clinic. There, after 12 hypnotic sessions, his fear ceased and he now continues with his sport training without difficulty.

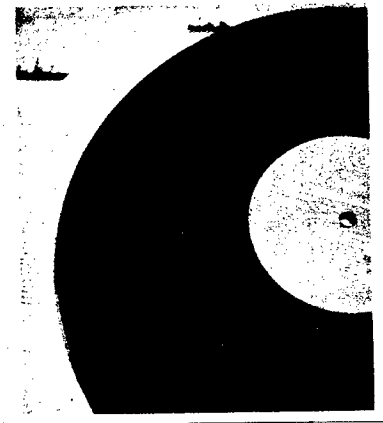
What may we expect from the further development of this scientific discipline?

Our dynamic era imposes increased stresses on the nervous system of the people. Modern men usually cope with these stresses. But it does happen that excessive stress creates so-called sub-clinical diseases. One is not sick yet but becomes sick if the stress becomes more pronounced. One is just at the borderline. One more step and one needs a physician. Since socialist medical science aims primarily to prevent diseases from developing, we think that it is an important task to prevent the development of this overstressed condition, where one tiny increment makes the person really sick. For this reason, Soviet psychotherapy, including our clinic, developed a number of methods for reducing such tensions.

Not quite a year ago, I participated in a scientific experiment over the Atlantic Ocean as the head of a medical expedition. I spent 90 days on a fishing vessel to study the psychological state of the fishermen. Much stress is imposed on these hardy and brave individuals during the fishing season on the high sea. Sometimes they must work 24 hours without pause, away from their homeland and their families, always having to cope with the vicissitudes of seafaring life. In order to fight the irritability caused by this life, and to permit optimum utilization of the time available for sleep and relaxation, we developed a special method of autogenous training for fishing ships, a special form of hypnotherapy.

We recorded on a gramophone record a text, accompanied by music, which relaxes the listener fully, and eventually causes him to fall asleep and sleep deeply. One side of the gramophone record creates a 15-20 minute rest and refreshment before returning to work; the other side helps falling asleep and utilize the available sleep period to maximum advantage. The soft, soothing music suggests the homeland far away, and the sounds of singing birds, rustling trees, and the like, help relaxation of the nervous tensions. There is an instruction on the cover of the gramophone record

which enables anyone to reach the state of full relaxation, to control his own vegetative nervous system, to relax his musculature, and to achieve the dilatation of his blood vessels, all of which are needed for full relaxation. These physical training procedures are first performed under the supervision of a neurologist. Later, the exercises may be performed in groups, or in cabins from the sound through the loudspeakers. Eventually, each individual becomes competent to do them alone, and make a habit of them.



This is the gramophone record which makes it easier for the seamen to cope with the stresses of their profession

It was demonstrated that the method is eminently suitable for creating a sense of well-being and for eliminating the problems caused by the absence of sexual activities, and for becoming less irritable. As a result, the working performance improved. The Soviet gramophone record manufacturers have since produced 10,000 copies of this recording, and it is available to all deep sea fishermen. It can be used on all Soviet ships during long voyages. Bulgarian mariners expressed an interest in the gramophone record. Hungarian seamen could also use it, of course in a modified form.

At the present time we carry out studies in our department on helping sportsmen in their training; musicians, chess-players or students to increase their concentrating ability. Study of hypnosis and related phenomena opens up new potentialities for practical application. Soviet scientists, according to Professor Rozhnov, do all they can to ensure the growth of this important discipline on the basis of domestic and foreign findings.

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INFLUENCE OF AN ALTERNATING MAGNETIC FIELD ON HEALING OF ULCERS OF THE LOWER EXTREMITIES

Leningrad VESTNIK KHIRURGII in Russian Vol 119, No 8, 1977 pp 84-85

[Article by A. A. Tyuryayeva, V. M. Ponizovskiy and G. L. Akimov of the Railroad Hospital No 2 of the Perm-II Station]

[Text] Ulcers of the lower extremities are, to this day, serious complications of wounds and thrombophlebitis. Patients with such ulcers must undergo prolonged treatment in polyclinics and hospitals.

An insignificant number of physiotherapeutic methods of treatment are described in the literature for these indicated illnesses. We have not encountered information on therapy for ulcers of the lower extremities by an alternating magnetic field.

We have used medical electromagnets [1], made in the Department of Experimental Physics of Perm University, for treatment of 302 patients suffering from ulcers of the lower extremities. Local action of an alternating magnetic field (AMF) was applied daily on the ulcer, using a frequency of 50 Hertz and a tension of 400 oersted (H-maximal), in combination with bandages spread with a synthomycine emulsion and Vishnevskiy ointment.

The present report analyzes 67 observations studied in detail. The control group consisted of 30 patients treated conservatively without application of AMF. Beforehand, in an experiment on 40 mice, the hastening effect of AMF on the healing of fresh wounds had been confirmed.

Forty-three of the 67 patients were over 50 years of age. The ulcer had appeared less than a year before in 37 of the patients; it had appeared in 12 of the patients 1-3 years before, and in 18, more than 3 years before. The ulcers were varicose in 48 people, neurotrophic in 4, and cicatrotrophic in 15. The damage was localized mainly in the lower third of the shin. The dimensions of the ulcers, determined prior to treatment by the methodology of N. I. Krauze [2], varied from 1 to 115 square centimeters.

In most of the patients (51 people), after 2-3 sessions of AMF, the ulcers already were cleansed of the film of pus, and, after 3-5 sessions, the discharge became serous and the putrid odor disappeared. Limp and cyanotic until the beginning of treatment, the granulations became fine-grained, moist and rosy after 5-6 sessions. We did not observe the formation of excessive granulations even once. The epithelial rim appeared usually at the 7th to 9th session. In 63 of the patients, further healing of the ulcers occurred under the scab. The forming scar tissue was distinguished by its elasticity and was not connected to underlying tissues.

Complete healing of the ulcers occurred in 57 of the 67 patients treated with AMF. The best effect was that with varicose ulcers. Study of subsequent results in 51 of the patients in periods of from 1 to 7 years has shown that true healing of ulcers was attained in 42 of them, and that ulcers recurred in 9 of them.

The control group consisted of 30 people (17 men and 13 women). Their age ranged from 30 to 60 years. The length of illness was up to 1 year for 5 people; 1 to 3 years for 9; and over 3 for 16. The classifications of the ulcers were: varicose, 14; cicatrotrophic, 12, and neurotrophic, 4. The localizations of the ulcers were: the lower third of the left and right shins, 8 people each; the middle third of the left shin in 5, and the right shin, 4; and the left foot, 5. The dimensions of the ulcers: from 3 to 70 square centimeters.

Treatment used: epidermatoplasty in two patients; dissection of scars, also in two patients. Twenty-six patients received conservative treatment: rest, raised position of the legs, generally strengthening and anti-inflammatory treatment; some of them received antibiotics and sulfanilamides. Applied locally were synthomycine emulsion, to 23 patients, and bandages with Vishnevskiy ointment, to 7.

As a result of the treatment, scarring of ulcers occurred in 4 people, reduction of the sizes of the ulcers in 15, and 11 were discharged without improvement.

Statistical processing of information and comparison of treatment with the control group of patients confirmed better the results of conservative treatment of ulcers of the lower extremities with the inclusion of AMF in the treatment measures. In the process of treatment using AMF, we observed, as well, more rapid disappearance of the pain syndrome, a tendency to normalization of arterial pressure and pulse. Fifty-eight persons had come to the hospital with complaints of pain. After 4-5 sessions under the influence of AMF, the pain left 46 and was reduced in 12 of these patients.

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BACTERIOLOGICAL PURITY OF PHARMACEUTICAL AEROSOLS

Moscow FARMATSIYA in Russian Vol 26, No 5, 1977 pp 66-68

[Article by G. S. Bashura, A. A. Aslan'yants and Ye. M. Savinova, Khar'kov Scientific Research Chemical and Pharmaceutical Institute, submitted 31 5 76]

[Text] There has been a significant increase in production of pharmaceutical aerosols all over the world.

The specifics of drugs in aerosol form do not permit sterilization thereof by the popular thermal methods for two reasons: 1) the packaging is explosive, since it contains liquified gas as propellant in most cases; 2) the valve system of aerosol containers consists of polymers which can soften at a temperature of 80-100°C, lose their shape and fail to assure airtightness and preservation of the container as a whole.

There are various methods of sterilizing aerosol containers: exposure to ultraviolet rays of the valve and spraying system separately, the container as a whole and the environment, which lowers bacterial content by 70-80% [3]; microfiltration of drugs and propellents before dispensing into the containers using Millipore [1] and other filters (Berkefeld filters, Seitz asbestos disks, Schott filters, membrane filters and others) [2]; use of agents with sterilizing properties (ethylene oxide) [3]; radiation sterilization [4]; addition of bactericidal agents to the product (self-sterilizing packaging) [5-7]. Parisse [8] believes that sterility is mandatory for aerosols used to treat burns and open wounds, aerosols used to treat the respiratory tract and in the body cavities or on the skin should be free of pathogenic microorganisms.

Fillers (propellents, surfactants, corrective agents, etc.), which are widely used in the production of pharmaceutical aerosols, as well as the packaging material, with the use of which there could be bacterial contamination of the prepared product [9] may be the sources of contamination.

L. K. Rubtsova and S. I. Eydel'shteyn investigated the effects of propellants (freon 11, 12, 114 and mixtures thereof), which are used the most in the production of pharmaceutical aerosols, on various microorganisms. It was

established that when these freons come in brief contact with various test microorganisms they diminish their viability, retard reproduction and growth, alter morphology and, in the case of prolonged contact (up to 30 days), they elicit death of microorganisms [10, 11].

Stohz [12] has reported on the preservative effect of nitrogen in aerosol products.

We tested the bacteriological purity of pharmaceutical aerosol products (see Table).

Aerosol products, applications, composition and quality thereof

Name of product	Applications	Propellant	Composition	Storage time, mo
Inhalypt	Treatment of chronic diseases of the oral mucosa	Nitrogen	Soluble norsulfazole and streptocid, peppermint and eucalyptus oil, thymol alcohol, 95% ethyl alcohol, etc.	18
Cameton	Treatment of acute and chronic diseases of upper respiratory tract	Freon 12	Chlorbutanolhydrate, camphor, menthol, eucalyptus oil, etc.	14
Camphomen	Treatment of chronic and exacerbated catarrh of upper resp. tract, oral cavity, inflammatory processes of a hypertrophic nature	Freon 12	Menthol, camphor, furacillin, 95% ethyl alcohol, eucalyptus oil, etc.	20
Livian	Treatment of burns	Mixture of freon 11 and 12	Linethol, tocopherol acetate, ciminal, 95% ethyl alcohol, etc.	14
Streptourazole	Treatment of acute inflammatory pathology of the oral mucosa	Nitrogen	Soluble streptocid, methyluracil, trimecaine, 95% ethyl alcohol, etc.	18
Ephatin	Treatment of bronchial asthma	Freon 12	Atropine, ephedrine, novocain, 95% ethyl alcohol, etc.	13

The aerosol products studied contain antimicrobial, bactericidal, antiseptic and preservative agents, as well as propellants with antimicrobial properties. Although these products could be classified as self-sterilizing, we tested

them for microbial contamination, which could occur in the process of preparation and storage.

We analyzed two samples of each of three series of specimens.

The method of demonstration of contamination is described in the instructions for bacteriological inspection of chemico-pharmaceutical products used for injections (1973).

We used the following nutrient media to check sterility of the aerosol products: meat-peptone sugar broth (0.5% glucose), pH 7.2-7.4 for demonstration of aerobes; semiliquid meat-peptone agar with pieces of meat (0.1% agar), pH 7.4, for demonstration of anaerobes and liquid Sabouraud medium for molds.

The nutrient media were first checked for sterility.

The atomizers and valve stems of the aerosol vials were swabbed with a sponge saturated in 3% chloramine, washed in three batches of distilled water, treated with 95% ethanol and dried.

The last batch of wash water was inspected for residues of disinfectant. Two series of control experiments were conducted. Petri dishes with 1% sugar agar were sprayed in a day-old broth culture of the following: 1) pathogenic staphylococcus (collection ["museum"] strain No 19) in 16 tests and 2) mucus from the mouths of patients and healthy individuals, 63 tests. The contents of the dishes were dried and drops of wash water were applied to the surface. The cultures were incubated at 37°C for 20 h. We failed to observe retarded growth of microflora in any of the tests, which is indicative of absence of disinfectant on the valve stems and atomizers after three-fold washing in water. We did not take the effect of alcohol into consideration, since it evaporated rapidly.

Before culturing, the oil-based aerosols were emulsified by shaking them with glass beads in sterile isotonic sodium chloride solution. To 3 mℓ isotonic solution we added 1 mℓ of the tested product, which we took from the aerosol container using the atomizer; we shook this for 3-4 min and made cultures of the obtained emulsion at the rate of 1 mℓ per 200 mℓ nutrient medium. Products consisting of alcohol solutions of drugs and having bacteriostatic action were also cultured on analogous nutrient media, but without preliminary external treatment. The cultures were kept in an incubator on sugar meat-peptone broth and semiliquid meat-peptone agar with pieces of meat at 37°C, and on liquid Sabouraud medium at 22°C for 10 days in the case of oil and water-based aerosols and for 7 days for alcohol-based ones, and we examined them daily.

There was no growth on the nutrient medium throughout the incubation time in any of the cultures of aerosol products listed in the Table after storage for the indicated time. All of the aerosols were found to be sterile (see Table). Inhalant, streptozazole, cameton, camphomen, livian and ephatin aerosols, which contain antimicrobial, bactericidal, antiseptic

and preservative agents, with nitrogen, freons 11, 12, 114 and mixtures thereof as propellants, were sterile after more than 1 year of storage.

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GAS CHROMATOGRAPHY USED TO ASSAY METAPHOS, METHYL NITROPHOS AND METHYL ETHYL THIOPHOS IN BLOOD

Moscow FARMATSIYA in Russian Vol 26, No 5, 1977 pp 44-51

[Article by Zh. A. Lisovik and N. A. Gorbacheva, Republic Center for the Treatment of Acute Poisoning, Institute of First Aid imeni Sklifosovskiy; Scientific Research Institute of Forensic Medicine, USSR Ministry of Health, Moscow, submitted 29 Apr 76]

[Text] Blood tests on patients with acute poisoning by organophosphorus pesticides (OPP) are important in differential diagnostics of poisoning and for development of methods of eliminating OPP from the organism in cases of acute poisoning. In spite of a significant number of publications dealing with gas chromatography as a method of analyzing blood for demonstration of metaphos, methyl nitrophos, methyl ethyl thiophos and analogues thereof [1-5], this technique has not been adequately developed. The techniques have not been adequately described, either qualitatively or quantitatively.

Our objectives included development of a method for quantitative assay of metaphos, methyl nitrophos and methyl ethyl thiophos in patients' blood and fluid obtained in peritoneal dialysis.

Experimental Section

We pursued our studies with a Tsvet-106 gas chromatograph with a thermoionic detector. We investigated the following chemically pure OPP: 0,0-dimethyl-0-4-nitrophenylthiophosphate (metaphos), 0-methyl-0-ethyl-0-4-nitrophenylthiophosphate (methyl ethyl thiophos), 0,0-dimethyl-0-4-nitro-3-methylphenylthiophosphate (methyl nitrophos, 4-MNP), 0, 0-dimethyl-0-6-nitro-3-methylphenylthiophosphate (6-MNP, isomer with low toxicity constituting 20-30% of commercial methyl nitrophos), 0,0-diethyl-0-4-nitrophenylthiophosphate (parathion), some commercial preparations thereof and others. We used glass columns (2 m x 3.5 mm for stationary liquid phases SE-30 and OV-17, 1 m x 3.5 mm for the XE-60 phase) filled with 5% SE-30 on N-AW-DMCS chromatone (0.16-0.20 mm), 2, 3 and 5% OV-17 on N-AW-HMDS chromatone (0.16-0.20 mm); 5% XE-60 on N-AW-DMCS chromatone (0.16-0.20 mm). The analysis involved the use of

23 ml/min helium as gas carrier, 14-15 ml/min hydrogen and 24 l/h air. The diagram tape was fed at 240 mm/h. The scale of the electrometer multiplier was  $1 \cdot 10^{-10}$  A. The columns were packed tightly. On the side of the detector they were filled with 0.2 cm fiber glass and on the side of the evaporator, 1 cm fiber glass. The fiber glass was changed every 7 days. In a freshly prepared and conditioned column we placed 3 samples of OPP, at the rate of 1  $\mu$ l solution in a concentration of 100  $\mu$ g/ml .

Table 1 illustrates retention time for metaphos, 4-MNP, 6-MNP, methyl ethyl thiophos and parathion on columns with stationary phases SE-30, OV-17 and XE-60. We observed complete separation of the mixtures in the following instances: Mixtures of metaphos--methyl ethyl thiophos--parathion, metaphos--4-MNP--parathion, 4-MNP--6-MNP--methyl ethyl thiophos--parathion and 4-MNP--parathion separate, whatever the proportions of each, on a column with the nonpolar phase of 5% SE-30 ( $T_{col} = 190^{\circ}C$ ,  $T_{evap} = 220^{\circ}C$ ). Mixtures of 6-MNP--metaphos and 4-MNP--methyl ethyl thiophos do not separate. Use of columns with more polar phases (2, 3 and 5% OV-17 and 5% XE-60,  $T_{col} = 190, 195, 200^{\circ}C$ ;  $T_{evap} = 220^{\circ}C$ ) also failed to separate the mixtures of 6-MNP--metaphos and 4-MNP--methyl ethyl thiophos. The partial separation observed on a column with 5% XE-60 ( $T_{col} = 190^{\circ}C$ ) could be used for qualitative analysis of these OPP in a limited number of cases with optimum proportions of components. Thus, the mixtures of metaphos--methyl nitrophos (industrial and commercial products) and methyl ethyl thiophos--methyl nitrophos (industrial and commercial products) do not separate under the tested conditions, and no conclusion can be derived as to demonstration of an individual compound or compounds in most such cases. A conclusion can be derived as to demonstration of a compound or compounds in the OPP group of metaphos, methyl nitrophos or methyl ethyl thiophos if the tests are made on columns with stationary phases of 5% SE-30, 2% OV-17 and 5% XE-60 ( $T_{col} = 190^{\circ}C$ ,  $T_{evap} = 220^{\circ}C$ ).

Work dealing with quantitative assay of metaphos, 4-MNP and methyl ethyl thiophos was conducted on columns with 5% SE-30 ( $T_{col} = 190^{\circ}C$ ,  $T_{evap} = 220^{\circ}C$ ). The quantitative assay was made by the method of comparison of tested and standard solutions of OPP\* and miscalculation, according to height of peaks; for the quantitative estimate, we used a signal constituting at least 4% of the working scale. Metaphos was used as the standard for quantitative assay of methyl ethyl thiophos.

It was established with hexane solutions that there is linearity in proportions of concentrations and heights of peaks in the presence of 0.1 to 10 ng metaphos, 4-MNP and methyl ethyl thiophos in the sample.

We tested the accuracy and reproducibility of the technique as follows: We decanted a specific amount of a known OPP solution in a 5 ml pycnometer and added hexane to the mark. Samples of 5  $\mu$ l were submitted to gas chromatography. The results (Table 2) are indicative of satisfactory accuracy and reproducibility of the readings.

\*Standard solutions were prepared in hexane with 0.1, 1.0 and 10.0  $\mu$ g/ml OPP.

Table 1. OPP retention time (in relation to metaphos), column temperature 190°C, evaporator 220°C

OPP*	Stationary liquid phase		
	5% SE-30	2% OV-17	5% XE-60
Metaphos	1,00	1,00	1,00
4-MNP	1,21	1,22	1,09
6-MNP	1,01	1,07	0,91
Methyl ethyl thiophos	1,20	1,15	1,07
Parathion	1,43	1,29	1,14
Anthio	0,91	0,43	0,54
Butyphos	2,63	2,35	0,99
Gardon	2,13	2,07	1,89
DDVF	**	**	**
Diazinone	0,80	0,49	0,23
Dibrom	**	**	**
Carbophos	1,36	1,31	0,87
Koral	***	***	***
Methyl mercaptophos	same	same	same
Octamethyl	0,80	0,42	0,68
Rogor	0,76	0,40	0,68
Sayphos	***	***	***
Trichlorometaphos	1,14	0,86	0,46
Trichlorometaphos-3	1,36	0,98	0,48
Fozalon	***	***	***
Phthalophos	***	***	***
Chlorophos [trichlorfon]	**	**	**
Tsideal	1,82	1,95	1,12
Tsiodrin	***	***	***

\*OPP of chemically pure grade were tested.

\*\*Peaks emerge at the solvent signal.

\*\*\*Peaks emerge at a higher temperature.

Bearing in mind the data in the literature, we used hexane (chemically pure) extraction without additional purification to isolate OPP from the liquid obtained from peritoneal dialysis. In order to select optimum isolation conditions, we first tested the effect of the volume of extractant and frequency of extractions on buffer solutions\* on completeness of extraction of added OPP, as well as the conditions of concentration of hexane solutions of OPP. We selected 2 ml as the amount of tested buffer solution, which was the same as for the tests of patients' blood.

It was demonstrated that extraction with two portions of hexane, 6 ml each, was the most effective for extraction of OPP under study from the buffer solution. It is desirable to concentrate the hexane solutions at 20°C (rotor evaporator, vacuum ~0.80 kgf/cm<sup>2</sup>).

\*In modeling experiments to develop the method of analysis of dialysis fluid, we used a buffer solution with pH 7.46 (5.6 g sodium chloride, 0.4 g potassium chloride, 0.4 g calcium chloride, 0.17 g magnesium chloride, 0.5 g sodium bicarbonate, 50.0 g glucose and water to bring volume up to 1 l), with which the operation of peritoneal dialysis is performed.

Table 2. Demonstration of metaphos and 4-MNP in hexane solutions

added, μg	Metaphos		metrological characteristics	add. μg	4-MNP		metrological characteristics
	found μg	%			found μg	%	
1,01	1,00	99,0	$\bar{x} = 99,8\%$ $\sigma = 0,57$ $\sigma_{\bar{x}} = 0,20$ $\epsilon_{0,95} = 0,47$  $a = 99,8 \pm 0,47\%$	1,01	1,01	100,0	$\bar{x} = 99,3\%$ $\sigma = 1,04$ $\sigma_{\bar{x}} = 0,37$ $\epsilon_{0,95} = 0,87$  $a = 99,3 \pm 0,87\%$
	1,01	100,0			1,01	100,0	
	1,00	99,0			0,99	98,0	
	1,01	100,0			1,01	100,0	
	1,01	100,0			1,01	100,0	
	1,01	100,0			0,99	98,0	
	1,01	100,0			0,99	98,0	
	1,01	100,0			1,01	100,0	
0,51	0,51	100,0	$\bar{x} = 100,8\%$ $\sigma = 1,04$  $\sigma_{\bar{x}} = 0,37$ $\epsilon_{0,95} = 0,87$  $a = 100,8 \pm 0,87\%$	0,50	0,50	100,0	$\bar{x} = 102,0\%$ $\sigma = 2,14$ $\sigma_{\bar{x}} = 0,76$ $\epsilon_{0,95} = 1,79$  $a = 102,0 \pm 1,79\%$
	0,52	102,0			0,52	104,0	
	0,52	102,0			0,50	100,0	
	0,51	100,0			0,52	104,0	
	0,51	100,0			0,50	100,0	
	0,51	100,0			0,52	104,0	
	0,52	102,0			0,52	104,0	
	0,51	100,0			0,50	100,0	
0,20	0,20	100,0	$\bar{x} = 101,9\%$ $\sigma = 2,59$ $\sigma_{\bar{x}} = 0,91$ $\epsilon_{0,95} = 2,16$  $a = 101,9 \pm 2,16\%$	0,20	0,20	100,0	$\bar{x} = 103,8\%$ $\sigma = 5,18$ $\sigma_{\bar{x}} = 1,83$ $\epsilon_{0,95} = 4,33$  $a = 103,8 \pm 4,33\%$
	0,21	105,0			0,22	110,0	
	0,21	105,0			0,22	110,0	
	0,20	100,0			0,20	100,0	
	0,20	100,0			0,20	100,0	
	0,20	100,0			0,20	100,0	
	0,21	105,0			0,22	110,0	
	0,20	100,0			0,20	100,0	

Method: 2 ml buffer solution with a specific amount of OPP\* was shaken in test tubes with ground glass stoppers, successively with two portions of hexane, 6 ml each, for 3 min. The hexane extracts were separated by decantation after centrifugation for 10 min at 3000 r/min. The combined hexane extracts were dried in 2 g anhydrous sodium sulfate for 5 min; the solution was decanted in a flask to drive off the solvent; the precipitate was washed in 2 and 1 ml hexane and put with the main solution. The solvent was driven off in a rotor evaporator at 20°C (vacuum 0.80 kgf/cm<sup>2</sup>) to a volume of 0.5 ml. The precipitate was transferred into a 6 ml pycnometer using hexane (2, 1 and 1 ml) and filled with solvent to the mark. We submitted specimens of 5 μl to gas chromatography. Concurrently, we examined control samples containing no OPP under the same conditions.

As can be seen in Table 3, depending on the added amounts, a mean of 94.6-98.7% metaphos, 94.0-96.1% 4-MNP and 96.0-98.8% methyl ethyl thiophos are demonstrable, and this is indicative of satisfactory extraction of these OPP from buffer solutions.

\*We added OPP to the buffer solution in the form of solution in acetone in a volume of no more than 100 μl.

Table 3. Assay of metaphos, 4-MNP and methyl ethyl thiophos in buffer solution, pH 7.46

Metaphos				4-MNP				Methyl ethyl thiophos			
added µg	found		metrological characteristics	add. µg	found		metrological character.	added, µg	found		metrological character.
	µg	%			µg	%			µg	%	
1,12	1,10	98,2	$\bar{x} = 98,2\%$ $\sigma = 1,27$ $\sigma_x = 0,57$ $e_{0,95} = 1,58$ $a = 98,2 \pm 1,58\%$	1,03	0,99	96,1	$\bar{x} = 96,1\%$ $\sigma = 1,38$ $\sigma_x = 0,62$ $e_{0,95} = 1,71$ $a = 96,1 \pm 1,71\%$	1,02	1,01	99,0	$\bar{x} = 98,8\%$ $\sigma = 0,84$ $\sigma_x = 0,37$ $e_{0,95} = 1,04$ $a = 98,8 \pm 1,04\%$
	1,10	98,2			0,99	96,1			1,01	99,0	
	1,12	100,0			1,01	98,1			1,02	100,0	
	1,08	96,4			0,99	96,1			1,00	98,0	
0,46	0,46	100,0	$\bar{x} = 98,7\%$ $\sigma = 2,90$ $\sigma_x = 1,30$ $e_{0,95} = 3,60$ $a = 98,7 \pm 3,60\%$	0,10	0,97	94,2	$\bar{x} = 94,0\%$ $\sigma = 5,48$ $\sigma_x = 2,45$ $e_{0,95} = 6,80$ $a = 94,0 \pm 6,80\%$	0,10	0,10	100,0	$\bar{x} = 96,0\%$ $\sigma = 5,48$ $\sigma_x = 2,45$ $e_{0,95} = 6,80$ $a = 96,0 \pm 6,80\%$
	0,44	95,7			0,09	90,0			0,10	100,0	
	0,47	102,2			0,09	90,0			0,10	100,0	
	0,44	95,7			0,09	90,0			0,10	100,0	
0,11	0,46	100,0	$\bar{x} = 94,6\%$ $\sigma = 4,30$ $\sigma_x = 2,20$ $e_{0,95} = 6,12$ $a = 94,6 \pm 6,12$	0,10	0,10	100,0	$\bar{x} = 94,0 \pm 6,80\%$ $\sigma = 5,48$ $\sigma_x = 2,45$ $e_{0,95} = 6,80$ $a = 94,0 \pm 6,80\%$	0,10	0,09	90,0	$\bar{x} = 96,0 \pm 6,80\%$ $\sigma = 5,48$ $\sigma_x = 2,45$ $e_{0,95} = 6,80$ $a = 96,0 \pm 6,80\%$
	0,10	91,0			0,10	100,0			0,10	100,0	
	0,10	91,0			0,10	100,0			0,10	100,0	
	0,11	100,0			0,10	100,0			0,09	90,0	
	0,11	100,0			0,10	100,0			0,09	90,0	

Table 4. Assay of metaphos, 4-MNP and methyl ethyl thiophos in blood

Metaphos		4-MNP			Methyl ethyl thiophos					
added, $\mu\text{g}$	found		added, $\mu\text{g}$	found		added, $\mu\text{g}$	found		metrolog. character.	
	$\mu\text{g}$	%		$\mu\text{g}$	%		$\mu\text{g}$	%		
1,12*	1,00	89,3	1,03*	0,91	88,4	1,01*	0,90	89,1	$\bar{x} = 86,9\%$ $\sigma = 1,64$ $\sigma_{\bar{x}} = 0,73$ $\epsilon_{0,95} = 2,05$ $a = 86,9 \pm 2,05\%$	
	0,94	83,9		0,87	84,5		0,89	88,1		$\sigma = 2,62$
	0,90	80,4		0,87	84,5		0,87	86,1		$\sigma_{\bar{x}} = 1,17$
	0,92	82,1		0,84	81,6		0,87	86,1		$\epsilon_{0,95} = 3,25$
1,12**	0,84	75,0	1,02**	0,75	73,5	1,02**	0,90	88,2	$\bar{x} = 86,0\%$ $\sigma = 1,66$ $\sigma_{\bar{x}} = 0,83$ $\epsilon_{0,95} = 2,65$ $a = 86,0 \pm 2,65\%$	
	0,81	72,3		0,73	71,6		0,88	86,3		$\bar{x} = 84,3 \pm 3,25\%$
	0,86	76,8		0,79	77,5		0,87	85,3		$\bar{x} = 74,7\%$
	0,83	74,1		0,75	73,5		0,86	84,3		$\sigma = 2,65$
	0,87	77,7		0,79	77,5		—	—		$\sigma_{\bar{x}} = 1,19$

\*End volume of hexane extraction 5 ml.

\*\*End volume of hexane extraction 1 ml.

We failed to observe any interference to reading (in the form of production of gas chromatography peaks, elevation of background current, as compared to the initial level) on samples of fluid obtained from peritoneal dialysis on a patient known to have had no contact with OPP, i.e., the extracted substances passing into the dialyzed fluid do not hinder demonstration of metaphos, 4-MNP and methyl ethyl thiophos.

More tests were made to assay metaphos, 4-MNP and methyl ethyl thiophos added to fresh, warm donor blood containing heparin. OPP were added to 2 mL blood in the form of acetone solution, the amount of which did not exceed 100 µL. Analysis was made 2 h after addition of OPP, as described above. In one series of tests, the volume of end extraction was brought up to the mark in a 5 mL pycnometer, and in another, up to 1 mL.\* The volume of the sample examined constituted 5 µL. In all instances, we made a concurrent examination of control blood specimens to which OPP was not added.

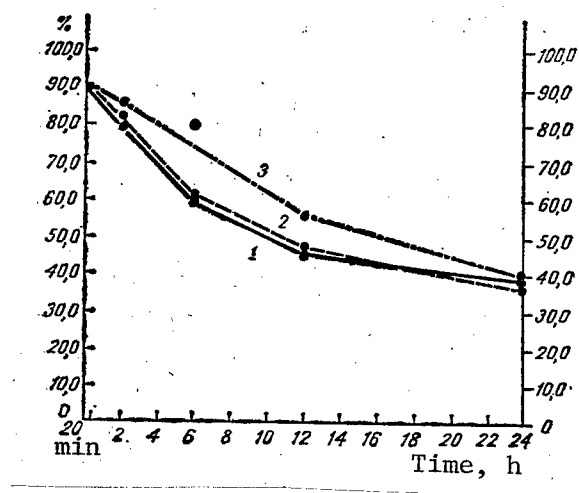
As can be seen in Table 4, under the above conditions, with a level of 1 µg in an end volume of 5 mL, we demonstrated a mean of 83.9% metaphos, 84.3% 4-MNP and 86.9% methyl ethyl thiophos; the figures were 75.2, 74.7 and 86.0%, respectively, in the case of a level of 1 µg in an end volume of 1 mL. In this case, the lower yield of added OPP, as compared to the preceding series, is apparently related to the difficulty involved in complete transfer of the OPP residue in the small amount of hexane, from the flask to the small pycnometer.

The range of assay with the use of this method constitutes 0.002 mg%. In view of the fact that the concentrations of OPP under study in patients suffering from acute poisoning constituted 0.005-1 mg%, according to our findings, the obtained results are indicative of suitability of the method for testing the blood of such patients. It should be noted that, in conducting the tests, we failed to observe gas chromatography signals or significant increase in background current in control samples, as compared to the initial level, that could have been indicative of marked interference of extractive blood substances of the individuals tested.

Of interest is the study of in vitro dynamics of metaphos, 4-MNP and methyl ethyl thiophos in donor blood as related to storage time at room temperature. Experiments were conducted as described above in three repetitions, and the examination began 20 min, 2, 6, 12 and 24 h after adding OPP. Concurrently, we examined control blood samples (in which no OPP were demonstrated at any time). The results of these studies are illustrated in the Figure. As we see in this Figure, the curves of dynamics of metaphos, 4-MNP and methyl ethyl thiophos in blood are rather similar, but with addition of equal amounts the concentration of methyl ethyl thiophos in blood drops somewhat more slowly. The obtained data indicate that, when testing the blood of patients

\*In the case of poison ingested by mouth, relatively higher concentrations of OPP are observed, and for this reason we used an end dilution of up to 5 mL; if poison intake was via the lungs or skin, we analyzed solutions concentrated down to 1 mL.

with poisoning by the OPP under study, the analysis must be made as soon as possible, for example, within 2 h after taking blood; in evaluating the results, one must take into consideration the drop in OPP concentration in blood when it is stored.



In vitro dynamics of metaphos, 4-MNP and methyl ethyl thiophos in donor blood

- 1) metaphos (10.5 µg/2 mL)
- 2) 4-MNP (9.7 µg/2 mL)
- 3) methyl ethyl thiophos (10.8 µg/2 mL)

Data on the specificity of the examination method must be available in order to evaluate the results of quantitative assay correctly.

Effects of admixtures and components of pesticide forms of metaphos, 4-MNP and methyl ethyl thiophos: Examination of industrial preparations of these pesticides in concentrations of 10-15 µg/mL revealed the formation of additional (unidentified at this stage of our study) gas chromatography signals (see Table 5). The additional peaks can be satisfactorily distinguished from the peaks of unadulterated compounds. When testing blood of individuals poisoned by this group of OPP, we also observed formation of peaks in a number of cases, with retention time of industrial products (see Table 5).

Under the conditions described, the components of pesticide forms of OPP (solvents, emulsifiers, etc.) do not hinder gas chromatographic demonstration (xylene, dichloroethane, acetone, cyclohexanone; spindle, castor, vaseline and mineral oils; petroleum and coal solvents, white spirit, OP-7 and OP-10 emulsifiers). We shook 1 drop of the tested substance with 2 mL water, performed extraction with hexane as described in the method and submitted it to gas chromatography. Under these conditions, no additional peaks were noted on the chromatograms.

Effects of other OPP: As can be seen in Table 1, provided columns differing in polarity are used, the OPP in question can be differentiated from carbophos, trichlorometaphos-3 and trichlorometaphos, chlorophos, DDVF [expansion unknown], butyphos, anthio, gardon, diazinone, dibrom, koral, methylmercaptophos, sayphos, fozalone, phthalophos, tsideal and tsiodrin.

Table 5. Retention time of OPP (as compared to metaphos) in studies of solutions of industrial products in hexane (10-15 µg/ml)

OPP	Stationary liquid phase	
	5% SE-30	5% XE-60
Metaphos	1,00 0,71	1,00 0,66 0,25
4-MNP	1,21* 1,01** 0,81 0,32	1,11* 0,91** 0,64
Methyl ethyl thiophos	1,20 1,00 0,84 0,71	1,08 1,00 0,66

\*Peak of 4-MNP.

\*\*Peak of 6-MNP.

Drugs used to treat OPP poisoning: Reactivating agents (diprioxime and other oximes), atropine, vitamins B<sub>1</sub>, B<sub>6</sub> and B<sub>12</sub>, nicotinic acid, as well as metacin, morphine, promedol, aminazine, tiserzin, diprazin, luminal, barbanyl, sodium ethaminal, hexenal used in therapeutic doses, do not hinder gas chromatographic assay of metaphos, 4-MNP and methyl ethyl thiophos.

#### Conclusions

1. A method has been developed for quantitative assay of metaphos, methyl nitrophos and methyl ethyl thiophos in human blood and fluid obtained from peritoneal dialysis in cases of acute OPP poisoning. The range of demonstration of metaphos, methyl nitrophos and methyl ethyl thiophos is 0.002 mg%.
2. A study was made of selectivity of assaying metaphos, methyl nitrophos and methyl ethyl thiophos with regard to admixtures and components of the pesticide forms of these products, a number of organophosphorus pesticides used in the USSR and drugs used to treat OPP poisoning. The presence of such substances does not hinder demonstration of the OPP under study.

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SOCIAL PSYCHOLOGY

SOCIOLOGICAL STUDY REVEALS WORKER COLLECTIVE CHARACTERISTICS

Moscow ZNANIYE-SILA in Russian No 10, 1977 pp 57-59

[Article by I. Minayeva: "On the Road: A Psychosocial Portrait of the Worker Collective (Based on Materials From One Concrete Sociological Study)"]

[Text] "The draft Constitution includes...a statute on the role of laborer collectives. This is consistent with the basic line of our party, with the significance it attaches to development of democratic principles in production control."

From a Report by Comrade L. I. Brezhnev at the May (1977) Plenum of the CPSU Central Committee.

The countenance of our cities and villages, our production, and our homes is not the only thing that has changed in the last 60 years; we ourselves and our awareness have changed as well. The ideals declared in the Great Revolution have in many ways become the rule of day-to-day life, an inseparable part of the world outlook of millions of Soviet people.

The conditions under which Soviet collectives are laboring today are entirely different from what they were a few decades ago. The significance of these conditions to the most diverse areas of our lives has grown immeasurably. As Article 16 of the draft of the new USSR Constitution states, "Laborer collectives and social organizations participate in management of enterprises and associations, and in solving the problems of organizing labor and personal life and utilizing resources intended for development of production as well as to satisfy social and cultural needs and provide material incentive."

What is the worker collective like today? What do workers think about themselves, about their work, and about their collective? What is typical of the mass consciousness of workers in the 1970's?

Leningrad sociologists, candidates of philosophical sciences A. N. Alekseyev, G. G. Karpov, and A. V. Tikhonov have attempted to answer these questions. They presented some results of a concrete sociological study conducted at one of the Leningrad plants in the anthology "Rol' trudovykh kollektivov v kommunisticheskom vospitanii trudyashchikhsya" (The Role of Labor Collectives in Communist Education of Laborers) (Leningrad, 1975). This research has been conducted by the Department of Pedagogics and Psychology of the Higher Trade Union School of Culture since 1970 with the active support of the plant's administration and its party and trade union organizations. The study itself is also typical of our times: Production and social activity cannot develop successfully today without scientific knowledge, without a scientific foundation.

Journalists often report on the best worker collectives. The best today embody traits which tomorrow will be typical of most collectives, and dissemination of their experience promotes this progress. But sociologists do not select the best for their research: Their objective lies elsewhere--using scientific methods to find the typical social traits of today's worker collective, and using the same methods to establish the principal trends in the collective's development and to study this process in all of its complexity and contradiction.

The plant the Leningrad sociologists selected was not among the best. The work pace regularly reached a fever pitch toward the end of a quarter, and it is only through this price, the price of shturmovshchina [crash program], that the plant has managed to complete its plan. Violations of labor discipline have occurred here. The work of the enterprise's social organizations has elicited serious and deserved reproaches.

Naturally this concrete situation at this concrete plant has made its impression on the consciousness of its workers, on their attitude toward labor, toward production, and toward social life. But the main traits of a worker collective and its consciousness are shaped not by the microclimate and macroclimate but rather by the entire structure of our life. Research has confirmed this with full obviousness.

- 1.

As is the case everywhere, highly qualified workers made up the core of the collective. These were people of middle and old age, natives of

Leningrad for the most part (66 percent): The sociologists treated as natives both those who were born here and those who had lived in the city for more than 15 years. There are many more "migrants" among the very young workers (18-22 years old): Almost two-thirds of them have been living in Leningrad for less than 5 years, with only one out of every five born in the city. Thus the latter are precisely the ones who will quite soon define the countenance of the collective and make up its core. If we consider that their education is higher on the average than that of the native Leningrad workers, it is they who, in the words of sociologists, are promoting "growth in the cultural and educational potential of the worker collective." (Data cited by the sociologists pertain only to the 10 percent of the plant workers interviewed, but the sample was selected in such a way that these data could fully describe the collective as a whole.)

In the early 1970's, when the study was just beginning, almost half of the workers had completed seven to nine grades in secondary school; 27.4 percent had a complete secondary education; 4.6 percent had a secondary special education or an uncompleted higher education. Today, 7 years later, half of the workers of the same plant have a secondary, a secondary special, and an uncompleted higher education, while in the country's industry as a whole workers with such education make up an even greater proportion--66 percent.

Modern machine building (the study was conducted at a machine building plant) requires rather high qualifications: Half of the workers are Class IV and higher.

One out of every 10 workers at the plant is a communist or a party candidate; 14 percent are Komsomol members.

Two-thirds of the workers interviewed have families; the wives (husbands) of almost half of them are office workers, half of these office workers being employed in work requiring a secondary special or a higher education. This is a graphic example of how intensively different social strata in our society "mix."

Such is the purely external description of the worker collective studied by the sociologists, but it does tell a great deal. It bears the impression of the scientific-technical revolution, which has dramatically heightened the requirements on worker education and qualifications. It also reflects a complex, contradictory process of modern times--urbanization, the attraction of former peasants and residents of small villages and small cities to the large cities. Today, however, this is an influx of educated people internally prepared to abide by the laws of urban life and a worker's life to a much greater degree than was the case with semiliterate peasants that had taken their places at the machine tools during the period of industrialization. School, motion pictures, radio, television, and frequent visits to large cities have played a tremendous role in such preparation: The isolation of rural life has long been broken.

Naturally, we must not overstate the degree of such preparedness: Urbanization continues to create highly specific problems today. The same study showed that many young people with a completed secondary education and low qualifications are entirely unsatisfied with their work (a total of 11.6 percent); the sociologists interpreted this as a "contradiction between the higher general education of the young people and the lack of production experience (lower qualifications and wages, less-interesting work), refracted through the consciousness as a conflict between aspirations and needs stimulated by education and their satisfaction."

2.

The study conducted by the sociologists showed that educated young people demand not only higher wages but also interesting work. The scientists distinguished three degrees of work satisfaction--fully satisfied, basically satisfied, and entirely unsatisfied. The fewest "fully satisfied" workers were found among those doing mechanical and rigidly regulated work.

The problem of such work, which is unavoidable at the present stage of scientific-technical progress, has been discussed many times. It is the problem of thorough development of the personality, for which it is more difficult to find the possibilities for self-improvement, growth, and self-confirmation in such work. It is an economic problem: Such jobs are occupied by persons having a continually lesser desire to do these jobs; this is one of the factors in greater personnel turnover. It is the contradiction, noted not only by the authors of the study but also by many, many sociologists, between the continually growing level of education and the content of labor in such areas of work. It is an entire complex of problems, ones that are not yet solved but which persistently demand solution.

The Soviet worker has always associated the principal values of his life with labor; it is precisely in labor that he has sought an expression of his spiritual strengths and capabilities. And now that his strengths and capabilities have matured, now that they are adequate to tasks of a new class, he wants work commensurate with these strengths and capabilities.

According to the study's data this problem is not as acute in machine building as would appear on the surface. Of the persons interviewed, 83.6 percent declared that they themselves (or "generally they themselves") choose the rate and rhythm of the work, and only 6 percent responded: "I have no choice in it at all." Half of the responses to the question "At your workplace can you decide what to do at what time, or are you given precise instructions and orders?" were "I decide myself" and "I usually decide myself."

We should recognize that the problem of poor labor content is not yet too acute to the workers themselves (at least at this plant). On comparing the degree of general satisfaction with work and the scores the workers assigned to different aspects of their life at work, the sociologists obtained the following results: The degree of work satisfaction is

correlated most closely with the degree of satisfaction with pay; next follow (in order of diminishing correlation): The possibilities for upgrading qualifications and the perspective for growth; organization of labor, sensible use of working time; relationships with the administration; the condition of the equipment; the content of the work.

In so to speak pure form "work content" took last place in this list; however, the desire to upgrade qualifications is associated in all probability with a desire not only to increase wages but also move on to work of greater content. Besides everything else, highly qualified labor defines the status of the working man in the collective, earning him the respect of comrades. This item of the list is the most "complex," and it is very difficult to determine exactly what plays the main role in the desire to upgrade qualifications.

As numerous studies have shown, the content itself of work becomes more important to the worker as his education level increases. And inasmuch as the education level of workers is rising swiftly, their demands on the content of labor are rising as well. This trend elicits no doubts. What is important to know is when and under what sorts of conditions this need arises, becomes conscious, and achieves real acuity.

It is precisely labor of this content that shapes the best qualities in the working man. The more complex the labor is, as a rule the greater is the creative activity. Sociological studies conducted at different enterprises in the country have shown, for example, that among machine tool operators involved in monotonous, mechanical work, not more than 2.5 percent are inventors and efficiency experts, while among trouble-shooters--people in one of the occupations requiring the highest qualifications--from 19 to 50 percent are inventors and efficiency experts. The study conducted by the Leningrad sociologists revealed yet another interesting law: The maximum number of obvious collectivists was found among workers employed in complex operations.

Processes occurring in production and in the consciousness and associated with the work of people are irreversible. Education and labor of good content create a worker of a new type, for whom the need for labor of good content becomes natural.

### 3.

Improvement of the society's economic mechanism necessarily brings on improvement of social relationships and the psychosocial atmosphere. On the other hand every economic error in the wage system inevitably has its social and psychosocial consequences. All of this can be seen in the data gathered by this study.

Many have already realized the need for making wages directly dependent on the end results of the work--the "output" and the quality of the end product. Many experiments based on this principle have been made, and

they have justified themselves fully--the team contract in construction, the self-managing units in agriculture, and the wage system at L'vov enterprises. But these are only experiments at the moment; the Leningrad plant under discussion here has not been a participant of them, and the sociologists were dealing with the "production consciousness" of the workers shaped in the conditions of a more or less traditional economy.

The workers were asked: "Upon whom and upon what does your pay depend?" Eleven factors affecting the pay one way or another were presented, and the workers were asked to rank them in relation to their influence. Practically all workers placed their labor first ("Upon the way I work"): The main economic principle of socialism had entrenched itself firmly in their consciousness. On the other hand, in the opinion of the workers their pay depends least on fulfillment of the plan by the plant: They placed this factor last, in 11th place. This might be a very serious argument in favor of paying on the basis of the end results of the work; this might create the economic grounds for complete fusion of the personal interests of the workers and the interests of the enterprise as a whole.

Three forms of labor organization have evolved at the plant--individual (outside a team), a team of persons working on individual orders, and a team of persons working on a common order. The last form of labor organization is the most progressive from an economic standpoint. It has also been found to be more favorable from a psychosocial point of view. Persons in teams working on a common order are most fully satisfied with their work; the desire to change one's specialty is much rarer in such teams. Workers in these teams assess their possibilities for influencing resolution of various problems in production and outside of production much higher than all others. The assessment made by those in teams of persons working on individual orders are closer to assessments made by persons working individually, such that what is important here is not membership in a team by itself but rather the economic basis upon which the workers are united--the type of order. Teams of persons working on a common order score development of social life at the plant higher, and they participate in it more than others. Finally, the most clearly pronounced collectivists, who do not draw a line between their affairs and concerns and the affairs and concerns of comrades at work, are found precisely in such teams. Incidentally a study conducted at the Uralmash Plant confirmed that work in a team responsible for a common order favors development of qualities such as comradeship and conscientiousness in work.

Such are the social consequences of some economic innovations.

#### 4.

It turns out that there are a "mysterious 5 years" in the life of the workers, which revealed itself perpetually in the study.

Of course, a young worker who enters the plant for the first time needs time to work himself into the collective, to acquire his qualifications, to assimilate the plant traditions, and to recognize the plant's problems to be his own--in short, as social psychologists say, he needs time for "adaptation." Therefore it is entirely natural that when sociologists ask them how they relate to the collective, they respond with uncertainty more often than workers with a long time of service: "I do not know what to say; after all, no one has really encouraged me into the collective" (naturally, this also indicates inadequate attention to the new worker at the plant; such responses are almost never heard at many of the country's enterprises in which Komsomol work is well organized, young workers councils are active, and a good sponsorship system exists). We can also understand why work satisfaction displayed by young workers is close to the study's "statistical averages": Although their qualifications and, correspondingly, their wages are still relatively low, they have bold hopes for the future.

It would seem that 5 years are quite enough for adaptation. And, in fact, the situation changes noticeably after 5 years of service (after 23 years of life, after 5 years of residence in Leningrad). What is most interesting is the way the situation changes: According to the study's data a 5-year period (on the average of course) of "readaptation" begins at this point.

The number of persons "fully satisfied" with their work drops dramatically. Satisfaction with the work of the plant's social organization drops. An uncertain attitude toward the collective (this is precisely the way the sociologists described the responses of young workers) is supplanted basically by one which the scientists defined as moderate but not strong collectivism ("It is important to be part of the collective, but I have my own affairs and concerns").

Later, after 10 years of service and 27 years of life, work satisfaction begins to grow, reaching its maximum among workers 40-49 years old. The moderate attitude toward the collective is often supplanted by a strong attitude. The person becomes adapted to the work and to the collective, assuming he remains at the plant.

What happens to people in the "fatal" 5 years? The sociologists do not venture an explanation, simply noting: "Obviously a general change affecting all aspects and components of the consciousness occurs at this time."

We can only guess at the causes of such change. Could it be that 5 years is the time after which the individual begins to make his preliminary assessment of the beginning of his career, comparing his initial hopes with the first results, and that the results of this comparison do not always satisfy him? Could it be that the individual himself believes 5 years to be sufficient to learn everything and finally achieve an honorable place in the collective or in life in general, though in actual fact he later learns that 5 years is not enough to "exceed all expectations"? Only special studies could provide an answer to these questions.

Obviously the specific conditions of the plant, which do not favor satisfaction of the individual's profound need for self-expression and self-confirmation, have aggravated this as yet incomprehensible psychological phenomenon. Sociologists have studied work satisfaction among the workers of many of the country's enterprises, but this was the first time the "critical 5 years" were revealed. It might be very interesting (and important) to compare data from these studies and unravel the nature of this phenomenon.

5.

The fact that the consciousness of the Soviet individual is shaped chiefly under the influence of the general atmosphere within the country, the entire structure of social relations as a whole, and the entire ideology of the socialist society, was very clearly revealed in the attitude of the plant's workers to participation in management of production and to the collective's affairs off the job.

When we say that a new type of worker is evolving--a qualified, responsible, and creative person--we do not delineate these qualities from something else--a proprietary interest in production, which naturally presupposes participation in the plant's management and in the entire life of the collective. This new type cannot evolve in other conditions, in another atmosphere.

The sociologists asked the workers to choose one of several responses to a question pertaining to participation in production administration: "Shop or enterprise administration is the responsibility of the administration. Workers must not interfere with its work; they have their own responsibilities"; "Participation of workers in enterprise administration can help the enterprise, but high hopes should not be placed on this"; "It is incorrect to think that administration is the business of only the administration: The more actively the workers participate in administration, the better." More than two-thirds of the workers preferred the last response.

This attitude toward participation in enterprise administration was found to be independent of age, education, qualifications, and time of residence in Leningrad. No matter what the biography of each of the workers was, and no matter what stage the worker was in at the moment, he firmly knew that he must be a true boss, he and his comrades.

Such "recognition of participation" and the need for it are typical of a working person nurtured in our conditions. The "compulsory" style of management, so widespread several decades ago, gave the common worker some psychological advantages: It relieved him of responsibility. Today's worker does not want this "advantage." Sociologists asked workers at 18 industrial enterprises to state their preference for one of the styles of management--directive, comradely (which is most favorable for practical

participation of workers in administration), and conniving. Of those interviewed, 68 percent favored the comradely style of administration, 22.7 percent favored the directive style, and 8.7 percent favored the conniving style. Moreover the comradely style was especially popular among workers with high qualifications, while the directive style was most popular among workers with low qualifications and a low level of general education.

The higher the qualifications are, the greater is the need to participate in administration: This trend was also revealed in the Leningrad study. As I had mentioned earlier, the attitude itself toward such participation did not depend on qualifications (or on other "parameters"). But as qualifications and time of service grew, the demand for practical realization of this need increased. This is why permanent workers score their influence on resolution of the most diverse problems of plant life lower than do young workers. These scores are fundamental: For example, the possibility for influencing the distribution of housing was scored extremely low both by people on the waiting list and those who had already received housing from the plant.

There is an especially great gap between the scores of young workers in classes I and II and those of permanent workers in classes V and VI in relation to their influence on the appointment of direct supervisors, the relationship of the supervisors to their responsibilities, payment of bonuses to the best workers, the distribution of "profitable" and "unprofitable" jobs, the leave priorities, and the distribution of bonuses. Obviously these plant problems are especially important to the core of highly qualified workers, as is the problem of the workers' participation in production administration.

I repeat that workers participate actively in resolution of the issues at most enterprises. Therefore the situation at this plant could not be viewed as normal by the workers.

Collectivism is the most typical trait of consciousness the workers have developed in 60 years of Soviet rule.

Among those interviewed, there turned out to be so few individualists (2.5 percent) declaring to the sociologists "I do not see any sense in participating in the collective; there is nothing so bad about a person outside the collective" that they had to be excluded from further analysis: The sample was too small to make any sort of conclusions. As I had noted earlier, an uncertain attitude toward the collective ("I do not know what to say; after all, no one has really encouraged me into the collective") is typical of only a small proportion of the young workers--14 percent of those interviewed.

The overwhelming majority of them (62.3 percent) believe that collectivism, the need to participate within the collective, to help comrades, and to

sympathize with their concerns is something entirely natural. Moreover were we to exclude the "5 years of major change," neither age, nor time of service, nor qualifications, nor education noticeably influence the degree of collectivism. Only two circumstances intensified this feeling-- complex labor of good content, and a collective form of work in a team of persons working on a common order.

Numerous studies produce the impression that collectivism is that foundation, that soil in which the best qualities of the working man develops; this property is uppermost in relation to many other qualities. It is precisely the desire to be within a collective, to be in the thick of things and events at the enterprise that encourages people to engage in social activity: It is not until later that they find such activity appealing on its own and begin to envision longer-range goals.

Today, a traditional mechanized (not yet fully mechanized) production operation employs 30 to 68 percent qualified workers, 4 to 8 percent technicians, and 1 to 2 percent engineers with a higher education. Sociologists suggest that a fully automated enterprise would not need any unqualified workers at all, while 40 percent of all workers would be qualified, 20-60 percent would be technicians, and 20-40 percent would be specialists with a higher education.

Our plant is only at the beginning of this road, which all of the country's industry will travel. But we can already make conclusions on the sort of changes the scientific-technical revolution will make in the worker collective, hand and hand with social progress.

High qualifications which are impossible today without a high level of general education and general culture, and labor characterized by good content and stimulating creativity are to be the typical traits of the worker collective in the near future. As research shows, all of this will bring on high exactingness toward one's work and toward management, it will make participation in administration not simply desirable but a necessary rule of the day-to-day life of every worker, and it will develop and strengthen collectivism.

These traits are taking shape before our eyes. The road into the future began 60 years ago; the road will continue on in the future!

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## SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

### BIOLOGY TO SERVE INDUSTRY

Moscow LENINSKOYE ZNAMYA in Russian 26 Oct 77 p 2

[Interview with G. R. Ivanitskiy in Pushchino, by A. Narimanov]

[Text] A new town appeared on the map of the suburbs of Moscow 11 years ago. In a brief period of time it acquired worldwide renown. Its name is Pushchino. At the present time, this young town is one of the world's largest scientific center, it is the "capital" of biological science. Genrikh Romanovich Ivanitskiy, chairman of the council of the Scientific Center for Biological Research, USSR Academy of Sciences, corresponding member of the USSR Academy of Science told the LENINSKOYE ZNAMYA correspondent, A. Narimanov, about the problems on which the scientists of Pushchino are working and their relationship to industry.

[Question] Please tell us about the main tasks confronting biological sciences at the present time.

[Answer] The main task for our center is research in molecular and cellular biology. The intensive development of this new branch of natural science in the second half of our century has led to radical changes in the science of life, so that we are able to come right up to the problem of controlling cellular processes, which is very important in the scientific respect and extremely promising with regard to applications. Knowledge of the mysteries of the living cell opens up tempting prospects in man's practical endeavors: medicine will be supplied with an exact estimate in the treatment of cardiovascular diseases, cancer, hereditary and viral diseases, and there will be very specific synthesis of drugs.

Power over the living cell will have a revolutionary effect on the control of heredity, breeding productive species of microorganisms, agricultural plants and livestock.

The research team at the center is working on the solution to these very complex problems, which is urgently needed by the national economy.

[Question] Tell us, Genrikh Romanovich, how do they manage to combine two directions of work at the scientific center, basic research that discloses the laws of nature and applied investigations.

[Answer] Of course, solving the basic problems of modern biology is the most important task for the center. But, we also conduct many applied investigations and projects on the basis of the advances in theoretical research. In science, as in nature, there is a continuous cycle, the former emerged from practice and returns to it. The differences between "basic" and "applied" science disappear, and today it is impossible to draw a clearcut line between the two. For this reason, there should also be no division into the "caste of high priests" who worship the flawless beauty of "pure" science and heed only their own inclinations and workers who service the needs of the national economy.

[Question] One of the criteria of effectiveness of the work of scientists and research teams is the utilization of scientific achievements for practical purposes. In this regard, what contribution have the biologists of Pushchino made to development of our country's national economy?

[Answer] I should like to observe that large teams of talented scientists are at work here. And I do not refer only to highly qualified biologists, but also mathematicians, physicists, chemists and specialists in some branches of engineering sciences, who have united, for the first time in the world, to work on a common problem and goal. Such broad alliance of specialists in the most diverse fields has now become a most important prerequisite for the advancement of science.

At the present time, the scientists at the Center for Biological Research, USSR AS [Academy of Sciences], are implementing scientific and technical collaboration with numerous enterprises of ministries and agencies of our country. The major scientific results handed over to practice are being used with success in agriculture, medicine and industry. For example, the method of ultraviolet irradiation of farm and fur-bearing animals, to increase their productivity and upgrade the obtained product, is now being effectively used at the poultry plants and State fur farms in Moscow Oblast. The practical applications introduced by the Institute of Biological Physics, USSR AS, at the Chekhov Poultry Farm, for example, yielded an additional production amounting to over 300,000 rubles in 1 year.

In several parts of our country, a method of presowing irradiation of cereal and vegetable crop seeds and potatoes has been adopted, and it increases the harvests by 10-27%. The economic effect constitutes 1 million rubles per year.

Agrochemists and soil scientists have developed proposals for development of new irrigation systems, the use of which has resulted in a 2-4-fold increase in harvest.

The Institute of Biochemistry and Physiology of Microorganisms, USSR AS, in collaboration with the Main Administration for the Microbiological Industry of the USSR Council of Ministers, introduced to the national economy a technological process for producing protein and vitamin concentrates from the biomass of microorganisms that grow on petroleum. New methods of producing drugs with broad therapeutic action are being used in many of our country's plants....

I should like to stress once more that much attention is devoted at the center to problems of introducing scientific achievements to the practice of the national economy.

[Question] What forms of ties are there between science and industry? What helps expedite the process of introducing the results of scientific research to the national economy?

[Answer] In my opinion, a qualitatively new stage of development of ties between science and industry begins when the supervisor of each department and each scientist poses the question: "Have I done everything so that my results can be used in the nation's economy?" The ideas generated in the laboratory should not only undergo theoretical and experimental development there, but be advanced by the laboratory staff to the stage of assimilation by industry. We often do not lose the hope of relegating the work dealing with practical implementation of our ideas to others, either the department for introduction of results or intermediary firms.... It can be stated, on the basis of the experience of the institutes of the USSR Academy of Sciences, that such a route results in many years' delay in introduction of achievements. In my opinion, such an approach is psychologically wrong as well. It is mandatory for the researcher to be personally involved in the practical implementation of his ideas to develop a "psychological orientation" toward a high quality of work; for he is the one who will have to correct all miscalculations and incomplete work. In this instance, the researcher joins the ranks of one scientific and industrial cycle, interconnected by the need to perform a complete set of works, ranging from basic research and technical projects directly to industry. Participation in the work of inter-departmental commissions, which is practiced extensively in Academy institutes, is an example of the successful and creative collaboration of scientists and industry.

One of the main effective forms of contact between the scientists of the Scientific Center for Biological Research, USSR AS, and industry is the preparation of complex long-term programs of scientific research and introduction of the results thereof to practice, which is done together with specialized ministries. At the present time, the scientists of Pushchino are working on bilateral programs with several ministries.

The central design office of biological instrument building with experimental production, created at the center, is the connecting link between academic science and industrial ministries.

Several projects are being worked on to render scientific assistance to specialized scientific research institutes and practical institutions, and others are implemented on the basis of contractual commitments.

In recent years there has been an increase in work done on the basis of scientific research topics in accordance with the coordinated plan of CEMA member nations. This new form of collaboration, the organization of joint international teams with equal rights, rules out duplication of research and has justified itself in practice. Each year, there are such international teams working at the center, consisting of scientists from Academy institutions, specialists from scientific research institutes specializing in different sectors of the industry and industrial enterprises, on all projects, ranging from laboratory experiments to introduction to industry.

The joint efforts of the Scientific Center for Biological Research, USSR AS, and different industrial sectors, the establishment of direct contacts with enterprises and institutions that are ready to utilize the projects and are often co-executors thereof, accelerate research and shorten the road toward practical application thereof.

These forms of ties between science and industry make it possible to introduce the results of research not only to some enterprises, but to many enterprises in a sector. Applications in a sector becomes the guiding principle in the work of the scientific teams at the Center for Biological Research, USSR AS.

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