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BIOLOGICAL ACTIVITY OF LUNAR SOIL FROM ISOBILIUM SEA OBSERVED UNDER
INTRATRACHEAL ADMINISTRATION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian
No 3, May-Jun 83 (manuscript received 19 Oct 81) pp 461-465

BELKIN, V. I., KUSTOV, V. V., KULAKOVA, M. K. and PANCHENKOVA, E. F.

[Abstract] Lunar soil from Isobilium Sea [brought to Earth by the automatic station Luna-16] was administered in 1% starch solution to male Wistar rats. One control group received silicon dioxide in same solution, and another group was exposed to just 1% starch solution. It was shown that intratracheal administration of lunar soil resulted in moderate fibrogenic reaction due to its specific action on morphological structures of the lung. Its effect was weaker than that of the SiO_2 , however. Maximum effect of lunar soil was observed at the 3rd month of the experiment; SiO_2 showed continuously increasing effect, even after six months. Figures 3; references 10 (Russian).
[663-7813]

BIOTECHNOLOGY

ALMA-ATA BIOLOGICAL COMBINE

Alma Ata KAZAKHSTANSKAYA PRAVDA in Russian 21 Jul 83 p 4

[Article by I. Khromov, special correspondent of "Kazakhstan Pravda", Enbekshi Village, Alma-Ata: "Subduers of the Invisible"]

[Text] The Alma-Ata Biological Combine is one of the largest modern enterprises of the Main Administration of Biological Industry of the USSR Ministry of Agriculture. It was founded in 1919 by a decree, signed by V. I. Lenin, of the Soviet of People's Commissars. Construction began on biological plants in various parts of the country. In 1931, within the facilities of the manufacturing section of the Veterinary Scientific-Research Institute in Alma-Ata a bacillary plant was organized which, ten years later, was redesignated a biological combine.

Three or four types of medical serums and vaccines were produced here in the laboratory for the first time. Over the last fifty years, seventy-five biological preparations of various types have been developed, the use of which has improved the sanitation and facilitated the development of animal husbandry. It is sufficient to note, that in 1980 alone, Alma-Ata microbiologists produced 800 thousand liquid and 400 million dry doses of biological preparations at a cost of more than 10 million rubles, to get an idea of the volume of their work.

Today the combine's collective produces more than thirty effective preparations and has a monopoly on a number of them. The combine has several times taken part in the Exhibition of Achievements of the National Economy [VDNKh] of the USSR and of the Kazakh SSR. Samples of its biological preparations were exhibited at the "Veterinary-79" international Exhibit. The Alma-Ata citizens' products do to many foreign countries, including Bulgaria and Yugoslavia, Vietnam and Cambodia, to Cuba and Mongolia, Afghanistan, Angola and Mozambique.

In the workshops, laboratories and departments of the enterprise and its branch located in the village of Enbekshi in Kaskelensk Rayon, approximately six hundred shock workers of communist labor work. Twenty-two of the collectives bear the high title of Communists. The labor dynasties of the Vlasovs, Korchenkos, Terent'evs, and Tsytzarevs are their pride, the leading workers, veterans and innovators of production. Local scientists and specialists perform valuable scientific research. There are noteworthy

achievements in the social development of the enterprise. By order of the Presidium of the Supreme Soviet of the USSR on May 25, 1967 the Alma-Ata Biological Combine collective was awarded the Order of the Labor Red Banner for great achievements in production. More than forty workers and specialists were awarded government citations.

The much-decorated collective is still at the top, as they say, today. Let's put on our white coveralls and go through the shops and laboratories of the Biological Combine, and meet the people who skillfully subdue and harness fearful invisible microorganisms.

Reportage

These dangerous invisible microorganisms are the microbes and viruses which are too small to be seen by the human eye. In comparison with one another microbes look like giants, while viruses are dwarfs. But actually the giants are a thousand times smaller than...a grain of sand, while the dwarfs are millions of times smaller!

Microorganisms are encountered everywhere in nature. Look at a drop of muddy water under a microscope. Even here there are numberless living beings of the most varied shapes. Along with the harmless ones many disease-causing microbes can get into the water, especially those that cause intestinal illnesses. The statistics of infectious diseases show that a fourth of the world's hospital beds are occupied by patients who were made ill by infected water. Microbes and viruses are guilty of terrible epidemics among both people and animals.

Louis Pasteur's brilliant idea--to turn deadly microbes into protective ones, that is, into vaccines--became one of the important approaches which science took in the struggle against infectious diseases. Pasteur produced vaccines against chicken pox, anthrax and rabies. He achieved the weakening of the disease-producing properties of these diseases, making them harmless to humans and animals. By creatively developing Pasteur's ideas, Soviet scientists have achieved great successes. They have obtained live vaccines for plague and brucellosis, a new vaccine for anthrax, and a dry vaccine for smallpox. A number of other biological preparations have been produced, and these methods which scientists have developed are used in their current industrial production.

Many microbes adapted themselves in the course of their evolution to a parasitical existence in an animal organism. Such microbes, especially viruses, do not grow in artificial nutritive mediums; they need conditions resembling natural ones, that is, living cells and tissues. The smallpox and rabies viruses, for example, are of this type. In order to protect tens of millions of animals from infection by these diseases, an enormous quantity of inoculation material--vaccines--is needed. Thus the need to sacrifice sheep. The smallpox virus, it turns out, multiplies well in the sheep's stomach, while the rabies virus grows well in its brain and spinal cord.

...We are walking through the workshops and laboratories with party organizer Ludmila Ivanovna Fedyanina and assistant branch director Ivan Grigoryevich Malinovsky. The branch produces medical and diagnostic serums, the raw material for various vaccines and diagnostic preparations.

The surroundings are especially orderly. It's easy to understand that being around microbes is not without danger. But the people, skillfully observing the necessary precautions, work here like people at any other work-place. In the rabies section, for example, where raw material for antirabies vaccine is produced, people work with the rabies virus.

"See how the assistants work", says shop head Aliya Aubakirovna Dzhunusova.

We can see through a window glass how skillfully and quickly they remove from the bones of the head and spinal column the diseased tissue of the sheep and pack it into glass beakers.

Wearing sterile coveralls, hats and gloves, with gauze masks on their faces, they work in a specially prepared isolation room. All manipulations of viruses are carried out under burner flames in order not to introduce foreign microbes from the air into the inoculations. Dzhumash Baratova, Zoya Nikolayevna Leshkova and other assistants are famous in the section for their skill.

In the serum section headed by Serik Baitelesovich Akzheltayev, the preparation of antitoxic serum for anaerobic dysentery in lambs and infectious enterotoxemia in sheep has become standard procedure. Workers of the Alma-Ata Biological Combine also participated in the development of the technology of its preparation. The Main Administration of Veterinary Medicine of the USSR Ministry of Agriculture has approved a special manual on this subject.

The dysentery serum is obtained from the blood of oxen to which antigen--live microbes--has previously been administered. Protective antigens form in the oxen's blood after a certain time, and these antigens kill the dysentery microbes. This blood is taken from the oxen. Each ox yields up to nine liters of blood at a time, which is then separated to produce the serum.

Zhamal Sagimbayev, Zhamshi Kozhamberdiyeva, Pavel Asaf'yevich Shmit, Tezekbay Chigibayev, Lyudmila Nikolayevna Dushkina, Natal'ya Ivanovna Novichikhina and other workers skillfully cope with the section's tasks.

In the blood serum of guinea pigs scientists have discovered the bactericide alexin, or complement. There is a special section at the branch where thousands of guinea pigs are kept.

"Our laboratory workers work with the precision of jewellers", says Lidiya Aleksandrovna Vaganova, the head of this section. The blood is usually taken from the left ventricle of the guinea pig's heart. The puncture must be made in such a way that the "operation" does not kill the guinea pig.

The workers here are also masters of their craft. Among them are Ol'ga Stepanovna D'yachenko and Raisa Vasil'yevna Mikhaylova.

The biological raw materials obtained at the branch are sent to the combine, where various biological preparations are produced--in dry and liquid form, live and killed vaccines, and others.

We visited some of the sections and laboratories of the main building with senior microbiologist of the production technology section Antonina Dmitriyevna Vanina. With the opening and subsequent reconstruction of this building the combine became a modern industrial enterprise. The transfer of materials, containers and loads of various kinds between sections is accomplished here using electrical vehicles. Nutritive mediums from the preparatory section are fed to the production sections through conduits directly to the reaction vessels in which various microcultures are growing, and from which the biological preparations are produced. A single section packages all liquid preparations. This permits the use of four continuous operational lines and the mechanization of the pouring and labeling of flasks.

In short, much has been done at the combine to make human labor easier. But, of course, no technology can replace the human being. Thus even today, when working conditions are fairly good, microbiologists' work is not easy,

We are in shop No. 5, anaerobic preparations. This section deals with microbes which prefer an oxygen-free environment. The temperature is over thirty degrees (86 degrees F), and even higher in the reaction vessels. After all, it is only at elevated temperatures that the microorganisms actively grow and multiply.

"The operators follow the process in the reaction vessels", says shop head Raisa Georgiyevna Kolomiytseva. "This is probably our most responsible job".

The people, however, have become accustomed to the difficulties, countering them with their persistence and skill. Shop No. 5 is a small but friendly collective. Microbiologist Yekaterina Timofeyevna Shishkina and operators Nina Il'inichna Rogozina, Tamara Mineyevna Slegina, Marina Vasil'yevna Fedotova and others have worked here for many years.

Pathogenic microbes are the enemies of humans, animals and plants. But microbiologists have subdued them--and now the microbes are harnessed. Transformed into various vaccines and serums, into many other biological preparations, they work--improving the sanitary conditions of our animals and the green world which surrounds us.

Village: Enbekshi

City: Alma-Ata

12344

CSO: 1840/625

BIOTECHNOLOGY IN WORLD OF THE FUTURE

Tallinn SOVETSKAYA ESTONIYA in Russian 5 Aug 83 p 2

[Article by A. Favorskaya: "Third Partner: We Present a Target Program in Biotechnology"]

[Text] Everything produced by world industry is made on the basis of a mechanical or a chemical method. Now, along with these two technologies a third potent partner has appeared--biotechnology, i.e., the industrial use of living cells. We are witnesses to its beginning rapid advancement which, in the opinion of scientists, is opening a new era in scientific and technical progress.

"...In 10 years probably 90 per cent of all pharmaceutical compounds will be produced for us by bacteria, and this is not counting other uses. A race is going on in the world; corporations from different countries are hurrying to be first to get results in biotechnology and capture the market," Mart Saarma told me.

This was "first-hand" information, since the main I was speaking with (chief of a sector at the ESSR Academy of Sciences Institute of Chemical and Biological Physics) is directly involved in work upon which depends the success in control of serious diseases, the solution of the food problem and the protection of the environment from contamination. Last year, Saarma conducted a portion of the research planned by the sector at a world-famous scientific center in Switzerland. We are now speaking with him about the projected comprehensive program, "Physicochemical Biology and Biotechnology" which we have adopted in our republic. Saarma, a molecular geneticist, is one of its responsible implementers.

The goal of the program is this: to work out the theoretical foundations and practical possibilities for putting living cells and microbes to work in our industry, agriculture and in medicine. One of the instruments of the new technology is:

The Transplanted Gene.

What is a living cell, from the "production" standpoint. It is a "factory" working according to a program assigned to it by its own genes, and yielding

a strictly specified "product", e. g., some kind of specific protein or enzyme. The amount of product accumulates the more, the farther the cell multiplies. Bacteria simply have no equal in this respect--a new generation is born every half hour. A 100-gram mass is obtained from one gram in several hours. Now, imagine that the bacteria production is for insulin, a hormone of vital importance to man, or interferon--a defensive protein, the newest and for the time being the strongest antiviral agent.

Now, it might be replied that insulin is manufactured only in the human body itself, or in animals. What are bacteria needed for?

As it turns out, a bacterium can also do this very well if a corresponding human gene is "transplanted" into the molecule where its hereditary information (DNA) is stored and is set to work there.

Just a couple of decades ago an idea such as this seemed like science fiction to these same researchers, and now just look: genetic engineering exists already and it can even be considered to be out of the infant stage--it is already 10 years old.

Of course, enormous effort has been expended in this direction all over the world, but the problem is worth it.

...Why does influenza sometimes leave of its own accord after several days? It is suggested that this is due to interferon, which is manufactured in human cells under the influence of viruses. This protective mechanism of the body is probably already millions of years old. It has not, however, been fully explained in all its details by scientists. It is known, however, that one interferon molecule protects several thousand cells in a row from virus infection. There is simply no other antiviral agent with such high activity at the present time. And if science has already but bacteria (let us remember their overwhelming productivity) to work synthesizing interferon, then the hope of dealing with viruses becomes more realistic, the more so since man is threatened by approximately 500 different viruses (and livestock and plants by just as many), and up until now, except for a few exceptions, there are no specific antibiotic agents against these viruses.

And these "converted" bacteria are still breeding insulin, hormones and other enzymes...

"The scale of genetic engineering application is just a question of time--we are simply short-handed in everything," said Saarma. "DNA research is already at the level where it is possible and purposeful to correct the genes of man himself, or of animals--to replace defective structures with healthy ones. And this means radical treatment for hereditary diseases."

"When our bacteria are finished," said Saarma during our conversation, and the complexity of what they are doing in their laboratory had full meaning for me. It was as though someone else had said: "When our new turbine is finished" or "production line" or "new computer". The scales of complexity obviously correspond fully. And at that same time Saarma told about...rennet,

the same rennet that is added to curdle milk in making cheese. The rennet is very much in demand everywhere; it is obtained from the stomachs of newborn calves.

Frankly speaking, there is not a large amount of raw materials. New sources must therefore be sought. It is true that bacteria synthesize their own enzyme that is similar to this (but not identical); cheese made this way, however, would undoubtedly have a piquant odor.

It is indeed possible, says Saarma, to take the gene directly from the calf and transplant it into a bacterium, making it synthesize the specific rennet that we need.

Well here, I think, this man speaks of "transplanting" and "making them work" as though there were no problems involved with this. Where did he get these words "when our bacteria are finished"--this evidence of long work and expectation?

And there is still more for me to learn. That laboratory bacteria will not work under industrial conditions, they quickly die from something--from unsuitable temperatures or from "wild" relatives. They must be technologically "suitable" in all respects, and must not only possess a high degree of "productivity" and do their work in the best manner, but they must be hardy and able to defend themselves. And in this regard, of course, they must be able to multiply in the cheapest nutrient medium. Each of these bacteria "derived" by scientists is a product of science in the full sense of the word. This is what the time and effort of many many specialists in different countries is being spent on. Work such as this is going on in the USA and in England [illegible portion, probably reads: to be the first to develop] the industrial strain that will "set the tune" for the world market. Mart Saarma has his own motto, which seems to me to be the only correct one: "Do not go 100% by the standard method." He is looking for and finding his own approaches.

Nevertheless, the various sectors of the institute are all on the same team for this game. In a neighboring sector (biochemistry) Rayvo Vilu's group has lost no time in developing (on analogs for the time being) optimal conditions for cultivating bacteria for future production. And, incidentally, on a very interesting enzyme--with a computer which is capable of modeling and checking the most varied conditions for cultivation. One goal is being set: the strain will be finished--new production can be immediately optimized.

Such a delicate undertaking and clearly technological tasks cannot be accomplished without the help of physicochemical biology and biotechnology.

For example, how is an enzyme, produced by bacteria, extracted from its containing complex, industrial mixture? In one case it was decided to use...an antibody for this. (This method was mastered by Saarma a year ago in Switzerland). It is known that antibodies begin to be manufactured by the lymphatic cells of an organism upon the entrance of a foreign substance. They combine with that substance and render it harmless. In Saarma's laboratory,

antibodies are produced in a test tube and "fastened" to a carrier--a glass globule--so as to then run the mixture through a column with this globule. The desired enzyme attaches to the antibodies and is precipitated onto the globule. It is then very easy to remove from there. Technology? Yes. But, it is also the most precise biology when one speaks of what occurs, albeit in a test tube. And in the test tube not just an antibody, but an extremely stable hybrid is obtained: chromosomes of two specifically matched "parents"--lymphoid and cancer cells--are combined so that the hybrid might inherit the specific antibody-synthesizing property of the first and the viability of the second.

"The Reader is Interested in Practicality". This is how my interviewee excuses himself for not spending much time strictly on science during our conversation on the target program. Indeed, I take pleasure in writing in my notebook that, with the help of these very antibodies, diagnosis and treatment will undergo incredible change, will become perfect. Of course: it is possible to tell how much of a virus is in a large organism by combination of the virus with antibodies. It is possible to obtain narrow-spectrum antibodies, capable of recognizing, let's say, only cancer cells (early diagnosis in oncology!). It is possible to "attach" a pharmaceutical product to an antibody, and it will go to strictly-defined large cells.

Early diagnosis of leukemia and foot and mouth disease in cattle (both viral diseases) is also fully possible. At the present time antibodies are generally used very extensively in agriculture--indeed there are viral diseases of the potato, carrot, etc. Rapid tests are necessary to make sure whether material is healthy or not. Saarma mentioned several projects being done at the Institute in this connection. And all this was the specific target program "Physicochemical Biology and Biotechnology." More precisely, all this is only part of it. The foundation of it all, says Saarma, is "our oldest subject, for which we are best known in this country and abroad. And that, actually, is our personal way of doing things." He is interested in the foundation of foundations--the biosynthesis of protein and those specific mechanisms by which genetic information is transmitted. His aim is to understand how protein synthesis occurs in nature and how it is regulated.

Many of these projects are done in cooperation with molecular biologists from TCU [Tartu State University]. Financing from two sources, generally unique equipment and many student assistants--all of these things help work for success.

...The answers to questions posed by scientists' research are not at all direct, and sometimes are not found at all. Take this same antiviral hope--interferon--which is no longer scarce thanks to bacteria and genetic engineering. Its structure has already been detected, and even the fact that there are 10 different types. However, the mechanism of action is not fully understood at this time. It appears that this interferon usually does not penetrate into the cell, but sits on its surface. It is a courier, that sends the message: go virus! And the cell constructs its defense. But what is it? How is it created?

(Saarma: "If only we could synthesize a small piece of nucleic acid. We are working on this...")

But we will discuss this separately, the next time.

[Translation of material appearing in boxes, lower left and upper right-hand corners] Biologization--This is the new level of technology that is chiefly determining the scientific and technical potential of governments. It deals with the solution to the food supply problem, control of serious diseases and protection of the environment.

Microbes already manufacture pharmaceutical products and biologically active substances for us; they make vitamins and enzymes and bacterial fertilizers--more than 100 types of products.

A living cell is a small chemical factory, wherein production is subject to a hereditary program inscribed in one of its nucleic acids (DNA).

We are entering upon a new phase in the cure of viral, tumor and autoimmune diseases.

In a microbe, simple and even worthless raw materials are turned into the most complex and high-value substances which are often impossible to obtain by another method.

Many inhabitants of the microworld are capable of building up a "concentrate" of proteins in their organism which are necessary for animals.

Escherichia coli containing working human genes is a new organism. Genetic engineering has embarked on a new path of practical application: the process of combining genes takes place in a test tube, at the choice and will of the experimenter.

One interferon molecule protects several thousand cells in a row from viral infection.

12262

CSO: 1840/615

MICROBIOLOGICAL PRODUCTION OF AMINO ACIDS

Yerevan KOMMUNIST in Russian 16 Jul 83 p 2

[Article by Candidate of Technical Sciences Ye. Arzumanoy, head of the Armenian SSR Academy of Sciences Institute of Microbiology Department of Production and Technology: "Amino Acids--Biotechnology of the Future"]

[Excerpts] In the early 70s, scientists first confirmed that cells of microorganisms incorporated in polymer materials preserve their useful properties for a long time (up to 1 year). For this period of time, the microorganisms' enzyme systems continue to function actively and can carry out certain chemical conversions.

Consequently, the task of using microbiological conversion methods to produce amino acids is resolved by choosing microorganisms, which have specific enzyme activity, and, also, the initial product. Coming into "contact" with the enzyme systems of microorganisms, this product changes as a result of the reaction, being transformed into an amino acid.

Technologically, this occurs as follows: the biomass of the microorganisms increases, gets incorporated into the polymer material, and is put into a temperature-controlled column through which a solution of the initial product is continuously passed. At the outlet is obtained the reaction mixture which contains the amino acid. The mixture's composition makes it possible to easily precipitate and purify the amino acid and get it in the form of crystallized powder containing 98 percent or more of the desired substance.

Based on this method, associates of the republic Academy of Sciences Institute of Microbiology Department of Production and Technology, with the assistance of specialists of the Groznyy Promavtomatika Scientific-Production Association, were the first in our country to create a highly-automated experimental facility for microbiological conversion, which is being used for developing new biotechnological processes to obtain amino acids.

Since the facility went into operation, the times needed to obtain amino acids have been reduced by the new method. Thus, in just one year, an experimental-industrial routine for producing aspartic acid has been developed. The technical and economic indicators exceeded all expectations--just one of

the facility's production lines can produce over a ton of aspartic acid in a year with an economic effect of approximately 100,000 rubles.

The facility is universal--that is its significant characteristic. Conversion to the production of other amino acids is accomplished simply by changing the initial product and the microorganism cells.

Our institute is currently developing processes for obtaining a number of amino acids which have economic importance.

Thus, microbiological conversion processes have a number of substantial advantages over the widely used industrial processes of microbiological synthesis. They are continuous and therefore worthwhile economically; they make it possible to get prolonged use of the properties of the microorganism cells; they are easily controlled, since they are similar to chemical processes, the only difference being that the catalysts are the microorganism cells; and they do not require creation of sterile production conditions, which is especially important for industrial adoption.

In conclusion, let us note that the small energy consumption of the technological processes for obtaining amino acids based on the method of microbiological conversion, their high technical and economic effectiveness, their ready availability and the relatively small amounts of raw materials needed, the negligible capital outlays required for construction, and the fact that they rapidly pay for themselves, are excellent reasons for industrial adoption of these processes in Armenia.

12255

CSO; 1840/642

BELORUSSIAN INDUSTRIAL MICROBIOLOGY

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 6, Jun 83, pp 38-39

KANUS, K.

[Abstract] A brief survey is presented of the current state of industrial microbiology in Belorussia and its contribution to the national economy. Currently, the plants in operation produce a wide variety of products for agricultural use which serve as feed additives for livestock and soil-improving preparations. More specialized products include various amino acids, antibiotics, single-cell proteins, and nitrogen-fixing bacterial preparations (rizotorfin) for addition to seeds to improve their nitrogen-fixation. In line with the USSR Food Program, plans have been made to establish additional high-volume plants to increase the production of lysine, furfural, and microbial agents for plant protection.

[714-12172]

UDC 616.98:579.841.93]-092:616.153.962.4-097.3

CIRCULATING IMMUNE COMPLEXES IN BRUCELLOSIS

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 83
(manuscript received 24 Dec 81) pp 77-79

MUKOVOZOVA, L. A., BELOZEROV, Ye. S. and SEKERBAYEV, A. Kh., Semipalatinsk
Medical Institute

[Abstract] Studies were conducted in the presence of immune complexes in 112 patients with acute, subacute, and chronic forms of brucellosis, which showed that such complexes were present in most of the patients in each category of illness. However, the highest incidence of positive findings (89.2%) was found in the acute category. The complexes consisted of the specific brucella antigen and IgG in 67.6-80.0% of the patients, IgM in 5.88-14.2% of the patients, and IgA in 2.94-6.66% of the cases. Presence of the circulating complexes was not affected by therapy and persisted after recovery. It appears that the circulating complexes are an important factor in the pathogenesis of brucellosis. References 6: 4 Russian, 2 Western.

[001-12172]

ENDEMIC FOCUS OF TULAREMIA IN SEMIARID ZONE OF EASTERN KAZAKHSTAN OBLAST

Alma Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 8, Aug 83 pp 10-12

KOZLITINA, R. K., DANILOVA, E. V. and ROMASHOVA, T. D., Eastern Kazakhstan
Oblast Sanitary and Epidemiologic Station

[Abstract] Until 1968 the semiarid zone of the Eastern Kazakhstan Oblast was considered to be tularemia-free; in that year epidemiologic studies revealed positive serologies in ticks. Subsequently, serologic studies on 1566 residents of 23 settlements revealed 55 positives, and since then tularemia has been regularly identified in water rats, muskrats, field voles, and other small rodents, as well as in ticks and the Aedes cinereus mosquito. The epidemiologic studies on the distribution and frequency of identification of the tularemia bacillus are being continued, natural foci of infectivity in that region are being identified, and the appropriate preventive measures are in force to protect the human population.

[005-12172]

CLINICAL COURSE OF SALMONELLOSES IN OLDER AND VERY OLD PEOPLE

Alma Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 8, Aug 83 pp 33-35

SRYMBETOV, M. S., LYUBASHEVSKIY, A. B., UL'YANOV, A. F. and
ZHUMANBAYEV, K. A., Chair of Infectious Diseases, Karaganda Medical
Institute; City Infectious Diseases Clinical Hospital, Karaganda

[Abstract] The clinical course of salmonellosis was followed in 441 male and female patients ranging in age from 16 to 80 years. Comparison of the subjective and objective clinical findings demonstrated that the course of salmonellosis was much more difficult in the older patients due to underlying pathology as well as to more severe effects on the gastrointestinal and cardiovascular systems. This was partly illustrated by the differences in hospitalization, with 19.9 days for the older group and 16.7 days for the younger population. An important aspect of the treatment of the older group of patients was the incorporation into the therapeutic regimen of general supportive measures consisting of the administration of panganin, ATP, and cocarboxylase. References 4 (Russian).

UDC 664.0+577.1

ROLE OF INDUSTRIAL BIOCHEMISTRY IN USSR FOOD PROGRAM

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 3,
May-Jun 83 (manuscript received 1 Aug 82) pp 307-313

ORESHKIN, N. V., USSR Ministry of Food Industry, Moscow

[Abstract] A discussion is presented of the importance of industrial biochemistry in the USSR Food Program which was approved in the May (1982) Plenum of the CC of the CPSU. The most important aspect of applied biochemistry pertains to the various enzyme preparations which are used in the processing of raw materials and preparation of foodstuffs, are highly cost-effective, and render the different technological processes more efficient. The use of the special enzyme preparations has been especially intensive in bakeries, breweries, vine production, distilleries, and tea manufacturing industries. Measures are currently being employed to tighten the relationships between academic biochemistry and applied biochemistry and to ensure more rapid implementation of new developments in biochemistry in the actual manufacturing process. References 8 (Russian).

[002-12172]

UDC 577.156

UREASE IMMOBILIZATION ON MACROPOROUS SILICAS

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 3,
May-Jun 83 (manuscript received 4 Jan 82) pp 378-382

KHOKHLOVA, T. D., YANINA, M. M., DIKHTYAREV, S. I., NIKITIN, Yu. S.,
KURGANOV, B. I., KISELEV, A. V. and CHERNOBAY, V. T., All-Union Scientific
Research Vitamin Institute, Moscow; Moscow State University; Kharkov
Chemics-Pharmaceutical Institute

[Abstract] Studies were conducted on the correlation between the physical characteristics of silochrome and silicagel and the immobilization of urease (EC 3.5.1.5) via γ -aminopropyl triethoxysilane and glutaraldehyde coupling. Maximum degree of immobilization was observed with silicas having a pore

diameter of 70 to 90 nm (silochrome Skh-2,5; silicagel MSA-750) with specific surface areas of ca. 70-74 m²/g. The use of highly purified urease preparations yielded immobilized preparations with activities exceeding those previously reported for this enzyme (ca. 17,000 U/g). These immobilized preparations tolerate lyophilization without loss of enzymatic activity. Figures 4; references 16: 1 Ukrainian, 6 Russian, 9 Western.
[002-12172]

UDC 537.150.2

RUSSULIN IMMOBILIZATION ON FIBROUS CARRIERS

Moscow PRIKLADNAYA BIOKHIIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 3, May-Jun 83 (manuscript received 21 Jan 82) pp 383-387

STEPANOVA, L. S., FEDOROVA, L. N., SHAMOLINA, T. I. and GAVRILOVA, V. P., Botanical Institute, USSR Academy of Sciences, Leningrad; Leningrad Institute of Textile and Light Industry

[Abstract] Studies with russulin, a newly discovered milk clotting enzyme with low proteolytic activity from the basidiomycete *Russula decolorans*, showed that maximum adsorption from the culture filtrate to alginate fibers occurred at pH 9.0. However, for maximum milk clotting activity adsorption had to be conducted at pH 4.5-5.0, the pH optimum for milk clotting, for 50-70 min. In addition, polyacrylic acid-modified polyvinyl alcohol fibers were found to remove a nonprotein russulin inhibitor from the culture filtrate which resulted in a two-fold increase in russulin activity in the native filtrate. Figures 1; references 7: 6 Russian, 1 Western.
[002-12172]

UDC 615.007:[664:339]:008(47+57)

ACTIVE PARTICIPATION OF SOVIET PHARMACOLOGISTS IN USSR FOOD PROGRAM

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 46, No 5, Sep-Oct 83 pp 5-10

MOZGOV, I. Ye., Academician, All-Union Agricultural Academy imeni Lenin

[Abstract] A review is provided of the USSR Food Program with emphasis on the contributions that are being made and will continue to be made by Soviet biomedical scientists toward its successful conclusion in 1990. Particular attention is devoted to the role and responsibilities of Soviet pharmacologists and toxicologists in this endeavor. They have the task of vigilant research and search for novel pharmaceuticals that can be assimilated in veterinary practice to maintain and improve the health of livestock, and prevent and cure infectious and other diseases. It is also their responsibility

to manipulate the pharmacologic agents in such a manner as to direct the physiological processes toward more and better quality meat production, faster weight gain, and improved production of attendant products, e.g., milk, eggs, biologicals, etc.
[006-12172]

UDC 576.311.342:576.857.5

EXPERIMENTS WITH BACILLUS THURINGIENSIS PROTOPLASTS. COMMUNICATION 2.
INVESTIGATION OF POSSIBLE INTERSPECIES FUSION OF BACTERIAL PROTOPLASTS:
BACILLUS THURINGIENSIS AND BACILLUS MEGATERIUM

Moscow GENETIKA in Russian Vol 19, No 4, Apr 83
(manuscript received 16 Nov 81, after final revision 11 May 82) pp 525-531

TSENIN, A. N., KARAMYAN, N. A., RYBCHIN, V. N. and POTOKIN, I. L.,
Leningrad Polytechnic Institute imeni M. I. Kalinin; All Union Scientific
Research Institute of Especially Pure Biopreparations, Leningrad

[Abstract] This work was aimed at studying the potential of interspecies fusion of genetically remote bacterial protoplasts using the industrial strain *Bac. thuringiensis* as one of the partners and *Bac. megaterium* as the other-- after their treatment with polyethyleneglycol (PEG). Genetic and electron-microscopic data indicated with great probability that such a fusion of these protoplasts did occur indeed, since it would appear improbable that under the influence of PEG the protoplast of each species separately and selectively would adhere to each other and only then would undergo the fusion. As a result of this fusion, prototropic colonies appeared on selective media; however, no stable recombinant clones could be identified among them. This is probably because of the lack of recombination or the death of recombinants resulting from the defense mechanisms of the cells. Figures 4; references 20: 7 Russian (1 by Western authors).
[684-7813]

TRANSPOSONE Tn9 INCLUSION INTO SHUTTLE PLASMIDS (ESCHERICHIA COLI-SACCHAROMYCES CEREVISIAE) AND EXPRESSION OF PROKARYOTIC GENE CONTROLLING RESISTANCE TO CHLORAMPHENICOL IN YEAST CELLS

Moscow GENETIKA in Russian Vol 19, No 4, Apr 83
(manuscript received 15 Mar 82) pp 541-547

FEDOROVA, I. V., KOZHINA, T. N., PESHEKHONOV, V. T., CHEPURNAYA, O. V., and ZAKHAROV, I. A., Leningrad Institute of Nuclear Physics imeni B. P. Konstantinov USSR Academy of Sciences

[Abstract] The goal of this study was to construct new in vivo chimeric plasmids by insertion of transposon Tn9 carrying chloramphenicol resistance gene; further, it was intended to transform yeast cells with such plasmids and to verify their ability to express cam^r gene and to study the behavioral characteristics of chimeric plasmid containing Tn9 in bacteria and yeast cells. It was shown to be possible to express the prokaryotic gene cam^r in yeast cells; evidence was obtained for introduction of Tn9 transposon into chimeric shuttle plasmids pYF91 and YEpl3 which consist of parts of E. coli plasmid pBR322, yeast plasmid 2mkm and its structural gene LEU2. To study the expression of prokaryotic gene in eukaryotic cells, a recipient yeast strain carrying cam^r and Leu 2 markers was constructed. Chimeric plasmids pYF91::Tn9 and YEpl3::Tn9 were inserted into yeasts and bacterial recipients by transformation. The isolated cam^rLEU2 transformants were genetically unstable losing simultaneously cam^r and LEU2 markers when grown on non-selective media. Transformation of the cells from E. coli strain sensitive to chloramphenicol with DNA plasmid isolated from chloramphenicol-resistant transformants yielded new transformants of the cam^rLeu^+ genotype. Figure 1; references 28: 3 Russian, (1 by Western author), 25 Western.
[684-7813]

UDC 575.11:576.851.5:576.858.9

INSERTION AND PHENOTYPIC EXPRESSION OF PLASMID GENES IN BACILLUS SUBTILIS CHROMOSOME RESULTING FROM BACTERIA TRANSFORMATION WITH DNA PREPARATION OBTAINED AFTER LIGATION OF DNA PLASMID pBD 12 AND PHAGE ϕ 105

Moscow GENETIKA in Russian Vol 19, No 4, Apr 83
(manuscript received 23 Apr 82, after final revision 26 Jul 82) pp 552-558

SAVCHENKO, G. V., LAKOMOVA, N. M., POLUEKTOVA, Ye. U. and PROZOROV, A. A., Institute of General Genetics, USSR Academy of Sciences, Moscow

[Abstract] Experiments are described of insertion of DNA plasmid pBD13 into chromosome Bac. subtilis; some properties of the strain with inserted plasmid are reported. This insertion was achieved in a few cases after transformation of Bac. subtilis cells with restricted and ligated DNA's from

pBD12 plasmid and the temperate phage ϕ 105. This was supported by several observations: disappearance of visible band of plasmid DNA in lysates of respective clones which nevertheless carried plasmid markers of stability towards antibiotics; appearance of a genetic coupling of a plasmid marker with a chromosome marker of the phage integration into chromosome range with the prophage ϕ 105 immunity range; a sharp increase of the transformation frequency of the plasmid marker inserted into the chromosome; loss of the ability of such marker to transform protoplasts; lowered frequency of the transformation of *recE4* mutant cells with respect to this marker and lower resistance to antibiotics of the cells with plasmid genes inserted into the chromosome. Figure 1; references 16: 2 Russian, 14 Western.
[684-7813]

UDC 575.24:576.851.48

RESISTANCE MUTATIONS TOWARDS RIFAMPICINE LEADING TO INCREASED ACTIVITY OF URIDINE PHOSPHORYLASE GENE OF *ESCHERICHIA COLI*

Moscow GENETIKA in Russian Vol 19, No 7, Jul 83
(manuscript received 19 Jul 82, after revision 2 Nov 82) pp 1070-1074

ASTVATSATORYAN, M. Z., MIRONOV, A. S., SUKHODOLETS, V. V., All Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] Gene *upd* of *E. coli* codes for synthesis of uridine phosphorylase enzyme which catalyses the reversible phosphorylation of uridine. Synthesis of uridine phosphorylase is negatively regulated by a protein repressor forming under control of the gene *cytR* which prevents activation of the promoter gene *upd* with a protein complex. In the present study, RNA polymerase mutants were obtained which lowered the sensitivity of the synthesis of uridine phosphorylase towards catabolic repression. These mutants were obtained by combination selection of the forms with increased constitutional synthesis of uridine phosphorylase and at the same time being resistant to rifampicine. It was also shown that many spontaneous mutations of resistance to rifampicine involving the structure of β -subunit of RNA polymerase lead to increased synthesis of uridine phosphorylase in mutants of the regulatory gene *cytR*. Overall, the data obtained showed that phenotypic manifestation of mutations *rif^r* is connected with lower sensitivity to catabolic repression of uridine phosphorylase; possibly this is under control of gene *cytR* of transport proteins. References 20: 7 Russian (1 by Western author), 13 Western (1 by Russian authors).
[664-7813]

STUDY OF AMBER-MUTANT TRANSMISSION OF T4 BACTERIOPHAGE. COMMUNICATION 2.
THERMAL SENSITIVITY OF AMBER-MUTANT MULTIPLICATION OF GENE 26 IN
ESCHERICHIA COLI B CELLS AND IN ITS LACK IN CASE OF GENE 33

Moscow GENETIKA in Russian Vol 19, No 7, Jul 83

(manuscript received 22 Mar 82, after final revision 16 Sep 82) pp 1075-1080

NIVINSKAS, R. G., KLAUSA, V. Y., SHALNENE, V. Yu. and SHAKALENE, O. M.,
Institute of Biochemistry, LiSSR Academy of Sciences, Vil'nyus

[Abstract] It was earlier reported that gene 26 amber-mutant amN131 showed mutants with strongly-expressed thermal sensitivity during their multiplication in nonpermissive host cells. In the present paper, the site or gene-specificity of the thermal sensitivity of the multiplication of genes 26 and 33 T4 amber-mutants was studied in temperature range 25°-41°C. It was shown that while multiplication of gene 26 amber-mutants amS105x5, amN131 and amNc114x1 depends substantially on the incubation temperature: the phage yield dropped three-fold when the temperature was raised from 25° to 41°C, the multiplication of gene 33 amber-mutant with exception of the mutant amC18 was practically independent of the temperature. Maximum yields of the phage were obtained at 37°C. All of these mutants were obtained by crossing starting amber-mutants with T4D wild type phage and shown not to have any additional TS-mutants. The thermal sensitivity observed in all gene 26 mutants and its absence in gene 33 mutants showed that it is gene specific. References 14: 3 Russian, 11 Western (1 by Lithuanian authors).
[664-7813]

UDC 576:616.981.452:576.8

DETECTION AND CHARACTERIZATION OF YERSINIA PESTIS PLASMIDS DETERMINING
SYNTHESES OF PESTICIN I, FRACTION I ANTIGEN AND "MOUSE" TOXIN

Moscow GENETIKA in Russian Vol 19, No 7, Jul 83

(manuscript received 1 Oct 81, final version received 26 Apr 82) pp 1081-1090

PROTSENKO, O. A., ANISIMOV, P. I., MOZHAROV, O. T., KONNOV, N. P., POPOV, Yu. A.
and KOKUSHKIN, A. M., All Union Scientific Research Antiplague Institute
"MIKROB", Saratov

[Abstract] The goal of the present study was to show presence of internal plasmids in plague microbe Yersinia pestis responsible for the synthesis of pesticide I, fraction I antigen and "mouse" toxin. Synthesis of pesticide I by Y. pestis is determined by the plasmid pPstI with molecular weight 7.0-7.8 MD belonging to the class of nonconjugative plasmids. This plasmid carries genes responsible for production of fibrinolysin and plasmocoagulase. Plasmid DNA was isolated from plague microbe strains Fra⁺Tox⁺ as follows: after

ultracentrifugation of lysates from the strain *Y. pestis* A579 and *Y. pestis* Congo belgia, which lost the determinant for the synthesis of pesticin I but retained the determinant for synthesis of fraction I antigen and "mouse" toxin in density gradient cesium chloride-ethidium bromide, satellite DNA fractions were identified in positions below the chromosome zone. Electrophoretic analysis of the strains which lost the phenotypic expression of Fra and Tox determinants led to conclusion that the regulation of plasmid pFra 1/tox functions is very complicated. Figures 3; references 26: 12 Russian, 14 Western.
[664-7813]

UDC 576.8 + 575

LOCALIZATION OF KpnI RESTRICTION SITES IN r-DETERMINANT OF NRI PLASMID

Moscow GENETIKA in Russian Vol 19, No 7, Jul 83
(manuscript received 18 Jun 82, after final revision 29 Nov 82) pp 1210-1212

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[Abstract] It was shown that the product of restriction by endonuclease KpnI of DNA molecule NRI is an almost complete linear plasmid genome and a fragment with molecular weight 1.0 MD localized in r-determinant. The DNA NRI plasmid and spontaneously formed RTF were isolated from *E. coli* J53 (NRI). Restriction endonucleases EcoRI (*E. coli* RY13), Sall (*Streptomyces albus* G) and KpnI (*Klebsiella pneumoniae* OK8) were isolated by the usual methods. Analysis of the experimental results showed localization of KpnB to be on the EcoRI J fragment of the NRI map. Hence endonuclease KpnI generated two fragments with molecular weight 58.0 MD (KpnA) and one with 1.0 MD (KpnB) on the physical map of NRI molecule. Figure 1; references 6 (Western).
[664-7813]

CLONING OF BACILLUS SUBTILIS 168 GENES COMPENSATING FOR MUTATION DEFECTS IN THYMIDINE PHOSPHORYLASE AND URIDINE PHOSPHORYLASE IN ESCHERICHIA COLI CELLS

Moscow GENETIKA in Russian Vol 19, No 6, Jun 83
(manuscript received 16 Sep 82) pp 881-887

MAZNITSA, I. I., SUKHODOLETS, V. V. and UKHABOTINA, L. S., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow 113545

[Abstract] In order to study the function of the Bacillus subtilis 168 gene which codes for pyrimidine nucleoside phosphorylase (the pdp gene), the cloning of this gene in E. coli was investigated. E. coli mutant in the two genes which code for the pdp gene function, thymidine phosphorylase (deoA) and uridine phosphorylase (udp) were obtained. Plasmids pBR325 and pBR322 were used as vectors. Twenty seven clones capable of transforming the mutant E. coli to Deo⁺Udp⁺ were produced, but only five out of eighteen of these were found to also transform Bac. subtilis PC315 to Pdp⁺. Various restriction endonucleases were employed. This indicates the presence of nonexpressed, cryptic genes in Bac. subtilis. The plasmids obtained could be divided into at least two groups, according to their thymidine phosphorylase to uridine phosphorylase activity ratios. Several plasmids also restored methionine prototrophy. When Bac. subtilis PC313(pdp) was used as the donor and CM810IdoeAudp) as the recipient, 47 clones capable of transforming the recipient to deoA⁺udp⁺ were obtained, most of which possessed uridine phosphorylase activity only 40-50% of its true level. This may indicate that the deoA gene controls pdp enzyme formation, while confirming the presence of a cryptic pdp gene in Bac. subtilis 168. References 23: 6 Russian, 17 Western.
[687-12126]

UDC 546/582.23

CHIMERIC PLASMID LOCALIZATION IN YEAST CELL TRANSFORMATION BY CYTODUCTION METHOD

Moscow GENETIKA in Russian Vol 19, No 6, Jun 83
(manuscript received 6 Apr 82) pp 927-932

YURCHENKO, L. V., KOZHINA, T. N. and ZAKHAROV, I. A., Leningrad Institute of Nuclear Physics imeni B. P. Konstantinov, USSR Academy of Sciences, Gatchina

[Abstract] The cytoduction method was used to study episomal plasmid localization in Saccharomyces cerevisiae yeast. Strain 6D-3005 transformants, carrying plasmid pYF91 with the LEU2 gene, plasmid pFL2 with the URA3 gene

or plasmid pYG0001 served as cytoplasm donors. Cycloheximide-resistant rho⁻ strains were recipients. Plasmid transfer was indicated by the development of uracil or leucine prototrophy. Cytoeductants were selected via respiratory competence and cycloheximide resistance. They were obtained by direct crossing on selective media or by protoplast fusion using polyethylene glycol. Cytoeductants, while bearing recipient genotypes, contained normal mitochondria; this demonstrated their hybrid origin. Plasmids entered cytoeductant cells extremely rarely; this was seen in only 1.5% of the pFL2 or pYF91 plasmids and 0.7% for pYG0001. Donor cells conserved their plasmids at a rate of 55-87%. Plasmid loss did not affect cytoeduction probability, which was $1-2 \times 10^{-6}$ in all cases. Using cycloheximide-resistant transformants bearing a pYF21 plasmid, the concentration of cycloheximide used was shown not to influence plasmid replication. The data indicate that in the majority of cases plasmids were not transferred during cytoeduction. This may mean that the plasmids are usually associated with the cell nucleus. Loss of crossing ability was seen in the genotype of 30% of the cytoeductants bearing pYF91 or pFL2, indicating nuclear fusion or other transfer of nuclear material, and not true cytoeduction. Definitive confirmation of the concept of chimeric plasmid nuclear localization will be obtained by studying stable heterokaryons. References 17: 5 Russian, 12 Western.

[687-12126]

UDC 575.24;576.851.48

INDUCTION OF Tn1 TRANSPOSON TRANSLOCATION CAUSED BY DIFFERENT MUTAGENS

Moscow GENETIKA in Russian Vol 19, No 6, Jun 83
(manuscript received 15 Jul 80, final version 14 Sep 82) pp 903-911

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[Abstract] In a study of translocation regulation and induction, various *E. coli* strains were exposed to mitomycin C, nitrosoguanidine or UV light. Frequency of transposition was determined as the relative amount of carbenicillin-resistant thermorevertants, since these are due to loss of the pEG1 plasmid in Tn1 transposon translocation. Spontaneous transduction was seen in 0.001% of the cells. All three mutagens used induced translocation; mitomycin C and UV were more effective than nitrosoguanidine. This suggests involvement of the *E. coli* SOS function. In *E. coli* strain JC1553, mutant in the *recA* gene, UV light did not change the frequency of transposition, indicating that this mutation completely blocks Tn1 translocation. On crossing strain EC1000(F'lac)(pEG1) and IZ10Ap^Rlac⁺Rif^R, transconjugants were found, indicating that Tn1 was transposed into the F'lac plasmid at a rate of 2.6×10^{-3} per cell. This rate was increased by UV light, with no change in transconjugant nature. The activity of UV light in inducing this translocation was less than in inducing translocation into the bacterial chromosome. UV light is ten times more effective in inducing transposition

in *E. coli* B/rWP2(pEG1) than in *E. coli* K-12JC411(pEG1). The data indicate that transposition can be regarded as one of the *E. coli* SOS functions. Figures 3; references 17: 4 Russian, 13 Western.
[687-12126]

UDC 575.24;576.851.48

ESCHERICHIA COLI K-12 MUTANTS WITH INCREASED EFFICIENCY OF PLASMID TRANSFORMATION

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
(manuscript received 29 Jan 82) pp 375-380

MOLCHANOVA, Ye. S., LIKHACHEVA, N. A., KIM, A. A. and IL'YASHENKO, B. N.,
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Academy of Medical Sciences, Moscow

[Abstract] Studies were conducted on *E. coli* K-12 mutants showing increased efficiency of plasmid pMB9 transformation, to correlate the change in the efficiency of plasmid pMB9 transformation with transfection of phage λ vir DNA. The results showed that there was no correlation and transfection was either unaffected, enhanced, or diminished. Polyacrylamide gel electrophoresis of the mutant cell membranes showed variable changes usually affecting proteins with molecular weight of ca. 60,000 daltons. Presumably, the changes involved specific sites for DNA. More detailed studies will have to be performed with transformation and transfection conducted with DNA preparations having identical molecular weights for correlation of the changes in the cell membrane protein patterns with efficiency of transformation and transfection. Figures 1; references 15: 2 Russian, 13 Western.
[686-12172]

AUTONOMOUS REPLICATION OF PLASMID pBR322 CONTAINING A FRAGMENT OF ANIMAL MITOCHONDRIAL DNA IN BACTERIA WITH MUTANT DNA-POLYMERASE I

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
(manuscript received 24 Apr 81; in revised form 9 Feb 82) pp 381-387

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[Abstract] Studies were conducted to determine whether animal mitochondrial-DNA-origin region was capable of autonomous activity in bacterial cells, using *E. coli* K-12 strains with mutant DNA-polymerase I that had been transformed with a recombinant plasmid carrying the mitochondrial DNA fragment. The recombinant plasmid (pBR-mtB-A) consisted of plasmid pBR322 with the BamHI-A fragment of rat hepatocyte mitochondrial DNA (mtDNA) which carried

the origin. All of the K-12 strains carrying the recombinant plasmid were capable of growth under selective conditions wherein pBR322 was not, since its replicon requires native DNA-polymerase I. This represents the first report of a recombinant vector undergoing replication utilizing plasmid replicon and mitochondrial origin segments under conditions nonpermissive for the parent plasmid. Figures 5; references 13: 3 Russian, 10 Western. [686-12172]

UDC 576.858.9:576.851.48

INDEPENDENCE OF TRANSPOSITION AND TRANSPOSON-INDUCED ALTERATIONS IN GENOME

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83

(manuscript received 12 Oct 81, final version received 30 Mar 82) pp 388-396

NECHAYEVA, Ye. V., IL'INA, T. S. and SMIRNOV, G. B., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] An *E. coli* system was employed in studies on the effects of mutations affecting transposition (*tmm*) on the induction of deletions by insertion sequences (IS-1) and transposons (Tn9-). The genetic studies demonstrated that deletions induced by IS-1 (inserted within the *gal* operon) were not affected by *tmm*. Studies on *tmm*⁻ mutants also revealed a phenotype that was due to two independent mutations identified as *tmm*-2 and *gerA2*. Mutation *gerA2* had no effect on the frequency of Tn element (located within a recombinant lambda phage) transposition, but sharply reduced the frequency of Tn9-induced deletions, as well as deletions due to Tn10 and Tn601. Mutation *tmm*-2 did not affect the frequencies of Tn9- or IS-1-induced deletions. Since the 'del' mutation specifically affects IS-1-induced deletions, and because Tn9 contains IS-1, the frequency of Tn9 transposition was also determined in *del*⁺ and *del*⁻ strains. In view of the fact that the *del* mutation has no bearing on the frequency of Tn transposition, the indication is that either different genes control transpositions and deletions induced by IS-1 and Tn9, or that the processes of transposition and deletion involve separate, unique steps. References 22: 4 Russian, 18 Western. [686-12172]

MAPPING MUTATIONS IN E. COLI K-12 GENES CODING FOR ENZYME I AND Hpr
 PROTEIN OF PHOSPHOENOLPYRUVATE:SUGAR PHOSPHOTRANSFERASE SYSTEM, PART 2.
 MAPPING MUTATIONS WITHIN GENE ptsH

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
 (manuscript received 29 Jan 82; in revised form 30 Apr 82) pp 397-405

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 Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Fine mapping was conducted on eight spontaneous and one deletion mutant within the ptsH gene of E. coli using P1KS transducing phage and recombinant analyses. The gene ptsH codes for the Hpr protein which is responsible for phosphate transfer to substrates in the phosphoenolpyruvate:sugar phosphotransferase system in E. coli. A map is presented which indicates the location of the ptsI gene (coding for enzyme I) in relation to gene ptsH, and within the ptsH gene the location of the following mutations: pts5, pts10, pts12, pts20, pts30, pts31, pts29, pts1101, and deletion $\Delta 5$. Figures 1; references 16: 4 Russian, 12 Western.
 [686-12172]

UDC 575.1:576.851.5

SIMULTANEOUS REVERSIONS IN GENES thy, dra AND drm IN VACILLUS THURINGIENSIS

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
 (manuscript received 31 Jul 81; in revised form 22 Jun 82) pp 406-415

GRIGOR'YEVA, T. M. and AZIZBEKYAN, R. R., All-Union Scientific Research
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[Abstract] Bacillus thuringiensis var. galleriae 351 was employed in studies on simultaneous reversions affecting thy, dra (deoxyriboaldolase), and drm (phosphodeoxyribomutase) genes in cells that are thymine dependent (thy^-) and thymidine sensitive (td^S). The phenotype of thy^- B. thuringiensis 351 cells that carry dra^- and drm^- mutations is $thy^- td^+$. Analysis of numerous reversions demonstrated that in addition to reversions affecting thy or td separately, colonies were also isolated that were independent of exogenous thymine and thymidine resistant (thy^+td^R) with a frequency of 10^{-4} to 10^{-8} , depending on the selection methods and previous culture history. The thy^+td^R revertants formed only R (rough) colonies, although the parental strains formed S (smooth) colonies, and in addition to selection on the basis of colonial morphology, could also be selected and identified on the basis of resistance to Tg4 phage and, in some cases, tetracycline resistance. Reversion to the parental thy^-td^S phenotype with a frequency of 10^{-8} to 10^{-9} was accompanied by S colony formation and streptomycin susceptibility. References 18: 9 Russian, 9 Western.
 [686-12172]

INVOLVEMENT OF THE F FACTOR IN CHROMOSOMAL REPLICATION OF Hfr ESCHERICHIA COLI K-12

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
(manuscript received 5 Jan 82) pp 416-424

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[Abstract] The Hfr E. coli K-12 system was investigated to delineate the role of the F episome in chromosomal replication of dna^+ -type chromosome. The F factor gene identified as responsible for chromosomal replication (chr = chromosome replication) has been localized to the 52,2-55,8 kbase region of the F DNA, outside of the ger1 and ger2 regions controlling replication of the autonomous plasmid. Studies on F', F^o, and Hfr thermotolerant and thermo-sensitive strains of E. coli demonstrated that at 43°C chromosomal replication is under episomal control, while at 30°C chromosomal replicative mechanisms assume control. Evaluation of the effects of membrane-active agents indicated that the chr gene codes for membrane proteins that are involved in DNA replication and can correct membrane defects when in the episomal state, thereby leading to recovery of chromosomal replication. Figures 3; references 32: 4 Russian, 28 Western.
[686-12172]

ESCHERICHIA COLI MUTANT THERMOSENSITIVE FOR B SUBUNIT OF DNA GYRASE, EFFECTS ON REPLICATION AND TRANSCRIPTION

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
(manuscript received 26 Jan 82) pp 425-434

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[Abstract] A temperature-sensitive mutant of E. coli K-12 has been isolated in which the B subunit of DNA gyrase is thermolabile under in vitro conditions and plasmid pMB9 DNA shows relaxation in vivo. Under nonpermissive conditions the mutant culture ceases growth and DNA synthesis shows a three-fold decrease. Concomitantly, transcription shows a two- to three-fold decrease but at a faster rate than the reduction in replication. These observations indicate that changes in the superhelical structure of the DNA primarily affect transcription, and that the proper superhelical structure of the DNA must be maintained for optimum gene transcription. This view is also supported by studies with rifampicin (an inhibitor of bacterial RNA-polymerase) which in low concentrations increases the viability of the thermosensitive mutant E. coli K-12 cells under nonpermissive conditions. Figures 6; references 26: 2 Russian, 24 Western.
[686-12172]

TRANSCRIPTION AND TRANSLATION COUPLING CONTROLS TRANSCRIPTION OF rpoBC GENES
IN ESCHERICHIA COLI

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
(manuscript received 16 Feb 82) pp 435-439

LIDEMAN, L. F., PONOMARENKO, O. I. and SHAKULOV, R. S., All-Union
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[Abstract] Studies were conducted on the E. coli K-12 CP79 system to identify those regions of the rplJL-rpoBC operon which undergo transcription only when transcription and translation remain coupled, and not when uncoupling is mediated by chloramphenicol. Using normal E. coli K-12 system and recombinant pMB9 plasmid technology, data were obtained which showed that inhibition of translation is accompanied by an increase in polarity of transcription of proximal and distal genes of the rplJL-rpoBC operon. A comparative analysis of transcription frequencies of the different operon segments obtained by restrictase cleavage showed that termination of transcription is due to uncoupling of transcription and translation of the operon within the segment obtained by EcoRI-2,6 treatment. The EcoRI-2,6 segment of the operon contains the end of the rplL gene, the intercistron region rplL-rpoB which includes the attenuator of transcription, and the beginning of the rpoB gene. The attenuator appears to coordinate transcription of the rpoBC genes with the overall translational activity of the cell, and its formation may be prevented by complex formation between the ribosome and the translated segment of the mRNA. Figures 3; references 14: 4 Russian, 10 Western.

[686-12172]

UDC 576.31:576.851

PHENOTYPIC EXPRESSION OF AUTONOMOUS AND INTEGRATED pPL7065 PLASMID IN BACILLUS
PUMILUS

Moscow GENETIKA in Russian Vol 19, No 3, Mar 83
(manuscript received 28 Apr 81; in revised form 19 May 82) pp 440-446

LUKIN, A. A., KOZ'MINA, L. M., LYSENKO, A. M., DROBYSHEV, V. I.,
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[Abstract] Studies were conducted on the effects of autonomous and episomal pPL7065 plasmids on the physiological characteristics of Bacillus pumilus (ATCC7065). The bacillus normally carries 20 autonomous copies of pPL7065, shows a very low level of sporogenesis, and can be characterized by a defined pattern of antibiotic production in terms of inhibition of other organisms

(zones of inhibition on Petri dishes). A spontaneous purine-requiring mutant (pur^-), designated LK1, showed a high-level of spore formation, an altered antibiotic-producing pattern, and absence of autonomous pPL7065. Hybridization of the bacterial LK1 DNA with pIG1 plasmid DNA (created by integrating pPL7065 DNA into pBR322 and amplification in *E. coli* C600) showed the presence of pPL7065 DNA integrated into the bacterial chromosome. A pur^+ revertant from LK1 was shown to contain autonomous pPL7065 and the antibiotic pattern of the parental *B. pumilus* and was characterized by low frequency of spore formation. An LK3 strain that had spontaneously lost pPL7065 also showed all the phenotypic characteristics of the parental *B. pumilus*, plus the formation of an antibiotic that inhibits the original ATCC7065 strain. Figures 1; references 26: 8 Russian, 18 Western.
[686-12172]

HUMAN FACTORS

'HUMAN FACTOR' AND INDUSTRIAL ORGANIZATION

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 2, Mar-Apr 83
(manuscript received 24 Jul 81) pp 34-44

KIZIMENKO, L. D.

[Abstract] Industrial organization as a complex system including "living" and technical equipment components with the human component performing both operator functions and organizational functions was examined from a systems approach and a procedure for directional regulation of human activity to increase the efficiency of industrial organization as a whole was discussed. It was assumed that analysis of the effectiveness of industrial organization must proceed from a systems approach considering industrial organization as a "sociotechnical" system of interacting human and technical components. The elementary component of this "sociotechnical system" should be represented by a two-component structure to promote analysis and synthesis of an optimal system showing the role of the human component at various levels of the procedure. The method of regulation proposed promotes an understanding of the process of maneuverability by the human component with consideration of both physical and social effects in developing methods of control of the human factor, human subjectivity and its possible effect in synthesis of a metaphorical model of the "sociotechnical" system. Experimental checking of these proposals at various Soviet plants showed the validity of the approach suggested. Figures 2; references 31:(Russian).
[656-2791]

AUTOMATION OF PROCESSES OF EVALUATING EFFECTIVENESS OF A 'MAN-MACHINE' SYSTEM

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 2, Mar-Apr 83, pp 45-50

BEZBOGOV, A. A.

[Abstract] A study of the processes of functioning of systems for evaluating the effectiveness of man-machine systems and the activity of a man-operator in ergic systems indicated that the ideal method of evaluation should be functionally similar to that of a man monitoring operation of the man-machine

system but an automatic system of evaluating operational efficiency (ASOE) will be free of human subjectivity. It was assumed that the great complexity of current automatic control systems and the creative nature of the work of a man-operator working in such a system calls for a systems approach to describing and constructing an ASOE making it possible to consider it independently of the specific practical nature of the man-machine system evaluated. The ASOE was depicted as a complex, hierarchically-organized, five-level structure which can be formulated without constraints on the composition, interconnections or regimes of operation characterizing specific man-machine systems. This basic structure may be used to construct any ASOE which can be changed to other ASOE's and expanded. Figures 3; references 25 (Russian). [656-2791]

METHOD OF EXPERT VISUAL DETERMINATION OF EMOTIONAL STATES OF INDUSTRIAL WORKERS

Moscow PSIKHOLOGICHESKIY ZHURNAL Vol 4, No 2, Mar-Apr 83
(manuscript received 6 Oct 81) pp 59-63

ZINCHENKO, Ye. A.

[Abstract] A method of assessing the emotional state of a worker was developed by selecting external signs of emotional states, selecting experts to evaluate these signs and constructing tables and instructions for expert visual determination of emotional states based on evaluations by these experts. Use of this procedure revealed negative emotional states in workmen and helped to eliminate them. Inclusion of production workers in the evaluation process helped them to understand emotional states of workers. The method can be used by shop experts to locate job assignments which can produce potent and dangerous emotional states in workers. Production managers can use results obtained by use of this method to increase their own understanding of workers and to improve their skill as managers thereby promoting a healthy social and psychological atmosphere for workers. References 5 (Russian). [656-2791]

PSYCHOLOGICAL PROBLEMS OF MUTUAL ADAPTATION OF A MAN AND MACHINE IN CONTROL SYSTEMS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 2, Mar-Apr 83,
pp 59-63

ZARAKOVSKIY, G. M.

[Abstract] This is a review of a book (title above) written by B. F. Lomov, editor, V. F. Venda and Yu. M. Zabrodin. Published by Nauka, Moscow, in 1980, it discusses the theory and methodology of optimization of information between a man and a machine. It presents generalized material on the dynamic adaptation to one another of a man as a subject of labor and a machine as a

means of labor. Emphasis is placed on methods of organizing and modelling processes of multilevel adaptation of "man-machine" systems. It presents methods of analysis and adaptation of "man-machine" systems and describes methods of analysis and adaptation of "man-machine" systems. The authors presented a detailed consideration of methods of optimizing the structure of informational interaction in "man-machine" systems and describes four methods to be used in this process. It contains a description of adaptive informational interaction in training operators and suggestions concerning criteria for assessing the level of training of pilots. The book will interest all specialists in engineering psychology, labor psychology, ergonomics, industrial education and systems engineering.

[656-2791]

APPROACHES TO REGULATING MAXIMUM PERMISSIBLE LEVELS OF SCATTERED CONTINUOUS-WAVE LASER RADIATION

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 6, Jun 83 (manuscript received 10 Dec 82) pp 48-49

[Article by I. N. Ushkova and E. A. Dvorkin, Institute of Industrial Hygiene and Occupational Diseases, Leningrad]

[Text] Hygienic studies of working conditions for those operating laser units revealed that exposure to low-intensity laser radiation leads to functional disorders of the eyes (T. I. Selitskaya and N. L. Teplyakova); for this reason, when selecting models for experimental studies to regulate laser radiation, authors searched for the most sensitive parameter characterizing changes in functional state of the visual analyzer. Change in blood content of the vascular tract of the visual analyzer (I. N. Ushkova et al.) is the earliest effect of low-intensity laser radiation. The most significant effect of lasers, according to the literature, is a vascular reaction, primarily referable to eye and skin vessels. Consequently, in our approach to regulating scattered laser radiation, we selected blood flow in the uveal tract of the rabbit eye. Preliminary data concerning the effect of a helium-neon laser at a wavelength of 0.6328 μm revealed that the threshold of the effect, according to blood filling of the vascular tract of the rabbit eye constitutes $2 \times 10^{-5} \text{ W} \cdot \text{cm}^{-2}$ ($1.8 \times 10^{-2} \text{ J} \cdot \text{cm}^{-2}$), while mean effective time is 13.3 (7.6-23.2) min (I. N. Ushkova et al.). It was found that the coefficient of accumulation on the threshold level was 1.8. All this could serve as grounds to raise the question of regulating scattered laser radiation. In setting the maximum permissible level (MPL), it is necessary to take into consideration the radiation wavelength, overall exposure time, linear size of the spot on exposed tissue, pulse duration, pulse recurrence frequency and duration of the pulse arc.

For a continuous action helium-neon laser at a wavelength of 0.6328 μm , one can disregard pulse duration, its recurrence frequency and duration of pulse arc, since these parameters are determined by overall exposure time.

The question of linear size of the spot on irradiated tissue was answered in accordance with existing health norms. In rabbit experiments, the size of the spot on the retina constituted 700 (600-800) μm , i.e., it was 6 times larger than the sanitary [health] norm of 1. This justifies our use of an additional coefficient (K_p) for the linear size of irradiated tissue of 0.16.

Evidently, the MPL of scattered laser radiation for man should be determined by the following: 1) threshold effect of radiation on an animal, according to the parameter that is the most sensitive to this factor (ED_{50}); 2) biological difference between the effect of this factor on animals and man--coefficient of species sensitivity (K_B); 3) degree of sexual difference (K_{II}); 4) individual differences in sensitivity of each individual to the factor (K_H); 5) biological distinctions of the effect of this factor--coefficient of accumulation (K_K); 6) exposure time.

The threshold effect of scattered helium-neon laser radiation, according to functional state of circulation in the vascular tract of the rabbit eye, as the system that is most sensitive to this factor, in comparison to others (peripheral blood, systemic circulation, hypothalamo-hypophyseal-adrenal system, retina of the eye, etc.) was found to constitute $2 \times 10^{-5} \text{ W} \cdot \text{cm}^{-2}$ (I. N. Ushkova et al.). However, with expansion of technical capabilities for determination of local blood flow in the animal eye, the threshold dosage could be reduced. We determined threshold dosage under specially aggravated conditions, with room illumination of 3-5 lux. Evidently, the threshold would have been considerably higher with more illumination.

There are data in the literature concerning the correlation between the effects of this factor on man and animals for direct laser radiation. This ratio is 1:4 for the effect of direct radiation, i.e., man is one-fourth as sensitive to laser radiation as the rabbit (Hughes). This justifies disregarding, in this case, the coefficient of species-specific sensitivity. Judging from the change in a mobile indicator--state of rabbit eye vascular system--we determined individual differences in the experiment from the scatter of the data.

We consider it possible to take 1 as the coefficient of sexual difference, and it may apparently be determined more precisely in future studies.

The biological distinctions of effects of scattered laser radiation on the threshold level were studied from its cumulative properties after 5-fold exposure of rabbits to threshold doses. The coefficient of accumulation was 1.8. This is indicative of the high cumulative properties of scattered helium-neon laser radiation. On the basis of the theses used to regulate levels of chemical compounds, with a high level of cumulative properties in the factor under study, the reserve coefficient (K_3) should be 10. Preliminary experiments conducted in our laboratory revealed that the effect of laser radiation in the case of overall exposure during the work day differed insignificantly from the effect of single exposure. This enabled us to calculate the MPL for an 8-h work day:

$$MPL = \frac{\text{threshold}(ED_{50}) \cdot K_P}{K_B \cdot K_{II} \cdot K_H \cdot K_3} = \frac{1.8 \times 10^{-2} \cdot 0.16}{1 \cdot 1 \cdot 2 \cdot 10} = 1.4 \cdot 10^{-4} \text{ J} \cdot \text{cm}^{-2}$$

However, this value must be subsequently defined more accurately, depending on the results of chronic experiments. The value we found is close to the one proposed in the "Sanitary Norms and Rules for Setting Up and Operating Lasers."

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CSO: 1840/616

INNERVATION OF THE MOUTH CAVITY IN BLACK-SEA DOLPHINS

Kiev VESTNIK ZOOLOGII in Russian No 3, May-Jun 83
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[Article by S. A. Gilevich and A. P. Manager, Institute of Zoology
imeni I. I. Shmal'gauzen UkrSSR Academy of Sciences: "Innervation of the
Mouth Cavity in Black-Sea Dolphins"]

[Text] The neural apparatus of the mouth cavity is the primary link in the functional system of feeding, and the study of its structure in toothed cetaceans facilitates an understanding of the morpho-functional specialization of these animals.

This work presents the results of studies on the innervation of the mouth cavity in representatives of the dolphin family -- the bottle-nosed dolphin (*Tursiops truncatus* M.), the common dolphin (*Delphinus delphis* L.) and the porpoise (*Phocoena phocoena* L.) living in the Black Sea. Material taken from eight dead animals is used. The methodologies of macro-microscopic preparation per V. P. Vorobyev and impregnation with silver nitrate per Bil'shovskiy-Gros are used.

The literature on cetaceans describes the intracranial sections of the V, VII, IX, and XII paired craniocerebral nerves innervating the organs of the mouth cavity, the exit points of these nerves from the cranial cavity, and the topography of the main branches (Kleynenberg et al., 1964; Hosokava, Kamiya, 1965; Jansen, Jansen, 1969, and others). However, these works do not give specific information on the innervation of structures within the mouth cavity. These questions are only partially illuminated in the works by Qiacometti (1967), B. G. Khomenko (1970), V. F. Kulikov (1972), G. B. Agarkova et al. (1973, 1974, 1975).

Innervation of the mouth cavity floor, the lower lip skin and the gingivae mucosas in dolphins is supplied by branches of the mandibular nerve from the V pair of craniocerebral nerves. Also, the hypoglossal nerve participates in the innervation of the mouth floor musculature.

The mandibular nerve (n. mandibularis) exits from the cranial cavity through an oval opening and gives off a series of motor and sensory branches to the organs of the head. Innervation of the mouth cavity is provided by the following

branches: the mylohyoid nerve, the buccal nerve, the lower alveolar nerve and the lingual nerve (Figure 2).

The mylohyoid nerve (n. mylohyolaeus) branches directly off the mandibular. It proceeds out from under the edge of the lower jaw downward and forward and innervates the muscle of the same name and the oral belly of the digastric muscle. The nerve penetrates into the digastric muscle from the medial surface with one or two branches (Figure 1). Its main trunk, following along the ventral surface of the mylohyoid muscle, gives off four or five large branches, each of which after secondary division splits into six to eight small trunks penetrating into the body of the muscle (Figure 1). Numerous connecting branches having the form of arches and loops may be observed between the small trunklets. The anterior of the large branches is the longest. It runs parallel to the edge of the lower jaw and in its course gives off a series of thin branches which innervate the anterior portion of the infrahyoid muscle and reach the tip of the snout. These trunklets, branching, form a micro-alveolar network oriented in different planes. The division of the mylohyoid nerve is of mixed form: the branches of the 2nd order diverge generally along the main trunk type, while the smaller branches diverge along the disperse type. The anterior branch is divided along the main trunk type down to branches of the 3rd-4th order.

The buccal nerve (n. buccalis) passes between the pterygoid muscles, proceeds slightly upward and forward, then splits into several branches which perforate the buccal muscle and enter the buccal skin. Some of these innervate the lip skin and areas of the mouth angles.

The lower alveolar nerve (n. alveolar inferior) is one of the strongest in the mandibular portion of the trigeminal nerve. Being a continuation of the main trunk (n. mandibularis), it enters the mandibular canal, where it splits into a series of large and small branches which form the lower dental plexus (plexus dentalis inf.) (Figure 3). Diverging from this plexus are branches which innervate the dental organs (r.r. dentales inf.) and the gingivae (r. r. gingivales inf.).

Branches of the mental nerve (n. mentalis), which innervate the lip skin, exit through the openings in the lower jaw. Before its entry into the mandibular canal, the alveolar nerve gives off a large connecting branch to the lingual nerve. This branch is directed downward and forward, intersecting several trunks coming off the lingual nerve at a sharp angle, and then diverges, surrounding one of the branches of the lingual nerve. Thin connective trunklets, discernible only under a magnifying glass, are observed at the point of contact between the lingual and alveolar nerves. After exchanging fibers with the lingual nerve, one of the branches of the lower alveolar nerve proceeds medially and innervates the gingivae mucosa. The other proceeds forward, penetrates the genio glossal muscle in the region of its lateral edge, and branches in the mucous membrane of the anterior portion of the mouth cavity.

The lingual nerve (n. lingualis), having diverged from the mandibular nerve

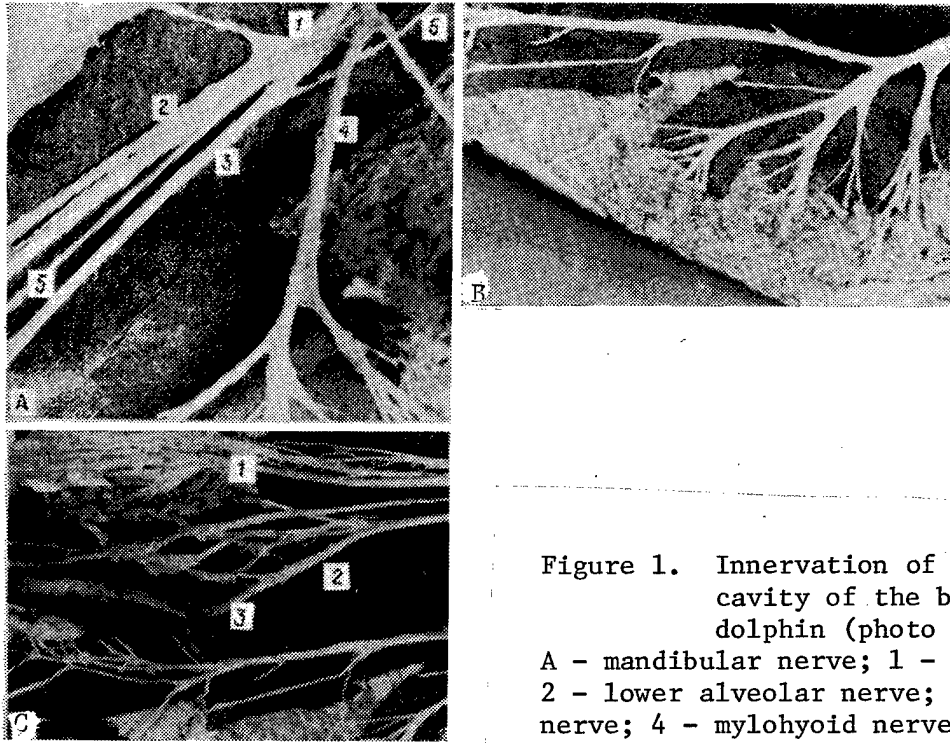


Figure 1. Innervation of the mouth cavity of the bottle-nosed dolphin (photo from specimen):

A - mandibular nerve; 1 - main trunk; 2 - lower alveolar nerve; 3 - lingual nerve; 4 - mylohyoid nerve; 5 - connecting branch between alveolar and lingual nerves; 6 - tympanum cord; B - mylohyoid nerve; C - lingual nerve; upper; 2 - medial; 3 - lower branches.

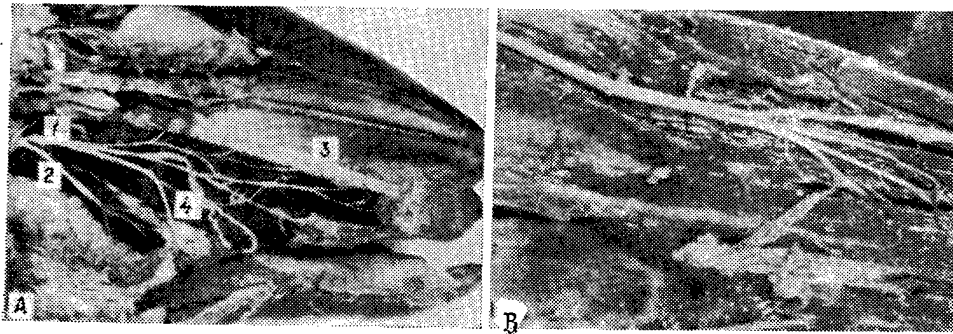


Figure 2. Innervation of the porpoise mouth cavity (photo from specimen): A - lower alveolar nerve; 2 - mylohyoid nerve; 3, 4 - branches of the lingual nerve; B - innervation of the geniohyoid muscle by the hypoglossal nerve.

somewhat anterior of the n. mylohyoideus, runs along the medial surface of the pterygoid muscle. At a distance of 1-1.5 cm from the point of divergence

to the lingual nerve is the juncture of the tympanum cord, which approaches obliquely underneath from the rear. Coming out onto the dorsal surface of the mylohyoid muscle, the lingual nerve splits into three branches -- the upper, medial and lower (Figure 1). The upper, and thinnest, branch is directed medially and upward, passes under the mucous membrane of the mouth floor and in the area of the 18th-20th lower teeth splits into small trunklets innervating the gingivae mucous membrane. The medial branch (n. sublingualis) innervates the mucous membrane of the anterior portion of the mouth floor, the gingivae and the top of the tongue. Diverging from it are connective branches to the hypoglossal nerve (n. hypoglossus) and the lower branch of the lingual nerve, while the above-described thin trunklets go to the lower alveolar nerve. Joining with each other, the branches of the lingual nerve form a large-looped plexus between the mylohyoid muscle and the skeletal muscles of the tongue. Along the course of n. sublingualis there is an intumescence, which is evidently the sublingual vegetative ganglion (ganglion sublingualis). The lower branch of the lingual nerve is the largest. Proceeding downward and forward along the lateral surface of the genioglossal muscle, it arches and enters the tongue between the right and left genioglossal muscles. It should be noted that in the porpoise the lower branch of the lingual nerve splits dichotomously before the flexure and the indicated nerve enters the tongue as two branches. In the bottle-nosed and common dolphin, however, the lingual nerve enters the skeletal muscles in the form of a single trunk.

The hypoglossal nerve (n. hypoglossus) innervates the geniohyoid muscle, giving off to it a branch which first goes to the dorsal surface of the indicated muscle and then splits in the bottle-nosed and common dolphin into five or six and in the porpoise into three or four trunklets. Splitting repeatedly, these trunklets are submerged into the muscle tissue in the area of the posterior third of the muscle (Figure 2).

The intra-organ neural apparatus in the mouth cavity of dolphins is represented by neural plexes and by a large number of different terminal structures. There are two neural plexes -- profound and superficial -- in the lip skin, gingivae mucosa and hard palate. The profound [deep] neural plexus is located in the dermal layer of the lips or in the mucosa proper. It is formed by nerve fascicles of different calibre, containing different numbers of fibers. Most of the nerve trunks in this plexus consist of pulpous fibers. From the profound plexus, numerous nerve trunks of a smaller diameter are directed to the epithelium and form a superficial plexus in the subepithelial region. It is more sensitive, small-looped, and has a prevalence of non-pulpous nerve fibers. A triple-layer placement of nerve tissue may be observed in the mucous membrane of the soft palate and mouth floor, since in these regions there is yet another plexus which is localized at the boundary of the submucous and muscular layers. Being at different levels, the plexes are joined together by numerous nerve trunks.

According to the classification by B. I. Lavrentyev (1943), the mouth cavity receptors of dolphins may be divided into free and non-free. In the derma proper of the lips and in the connective tissue layer of the gingivae mucosa,

palate and mouth floor, the non-free receptors are represented by encapsulated bodies which differ in their form, size, capsule structure, and branching of their terminal fibers. Most of the terminal nerve structures of this type may be identified as Krause's bulbs (Figure 4). They have a circular or oval form and a double-layer connective tissue capsule. Receptors with a multi-layer capsule reminiscent of Vater-Pacini lamellar bodies are less widespread. They are found primarily in the lip skin. One other type of non-free sensitive ending is represented by encapsulated glomeruli (Figure 4). Such afferent devices are encountered quite frequently, surrounded by a thin single-layer capsule, with one or several pulpous fibers taking part in their formation. The receptor fibers branch out inside the capsule, forming glomeruli whose loops adjoin each other more or less closely and have the most varied form. Part of the encapsulated receptors are supplied with Timofeev's apparatus. It should be noted that the terminal bulbs are often located at an angle to the epithelial layer. This fact was also pointed out by other authors (Khomenko, 1970; Khadzinskiy, 1974). The encapsulated glomeruli are found in the subepithelial layer and in the base of the dermal papillae. We found encapsulated receptors on the soft palate near the ducts of the mucous glands and amid the lymph follicles.

Free receptors in the deep layer of the mucous membrane have the appearance of clusters with more or less dense arborization of the terminal branches. Such nerve structures are quite often localized near vessels. Sometimes they form vascular-tissue receptors. In the epithelial covering of the lips and walls of the mouth cavity are thin nerve trunklets and individual fibers penetrating into the epithelium from the superficial plexus through the base of the epidermal cristae and the apices of the dermal papillae. Proceeding upward, they become thinner and are lost among the epithelial cells (Figure 4). Nerve structures are not found in the upper rows of the prickle-cell layer and in the keratotic layer. The receptor apparatus in the epithelium is represented by free nerve endings having the appearance of whiskers, rings, loops, and button-like intumescences.

The results of analysis of the quantitative distribution of receptors in the mouth cavity of dolphins testify to an increased concentration of free and non-free sensory nerve endings in the lip skin, which correlates with the literary data (Agarkov et al., 1974) on the presence of a para-oral reflexogenic zone in dolphins, as well as in the mucous membrane of the soft palate oral surface. The mucous membrane of the mouth floor is most weakly innervated.

We know that the mouth cavity of toothed cetaceans has a number of morphological peculiarities which bear an adaptive character and are generally associated with the feeding specifics of these animals and which are not characteristic for land mammals (Yablokov, 1958; Gilevich, 1980). Nevertheless, the present study has shown that adaptation to a marine environment has been reflected to a significantly lesser degree in the structure of the innervation apparatus of the mouth cavity in dolphins. Innervation of the mouth organs in these animals occurs from the same sources as for land mammals, with the same diagram of branching of the main nerve trunks and

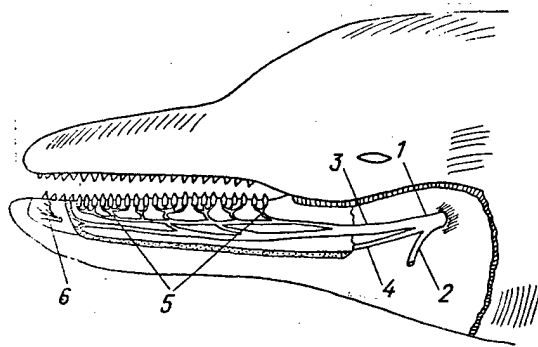


Figure 3. Diagram of the branching of the lower alveolar nerve in dolphins:
 1 - mandibular; 2 - mylohyoid; 3 - lower alveolar;
 4 - lingual; 5 - dental branches of the lower alveolar; 6 - mental.

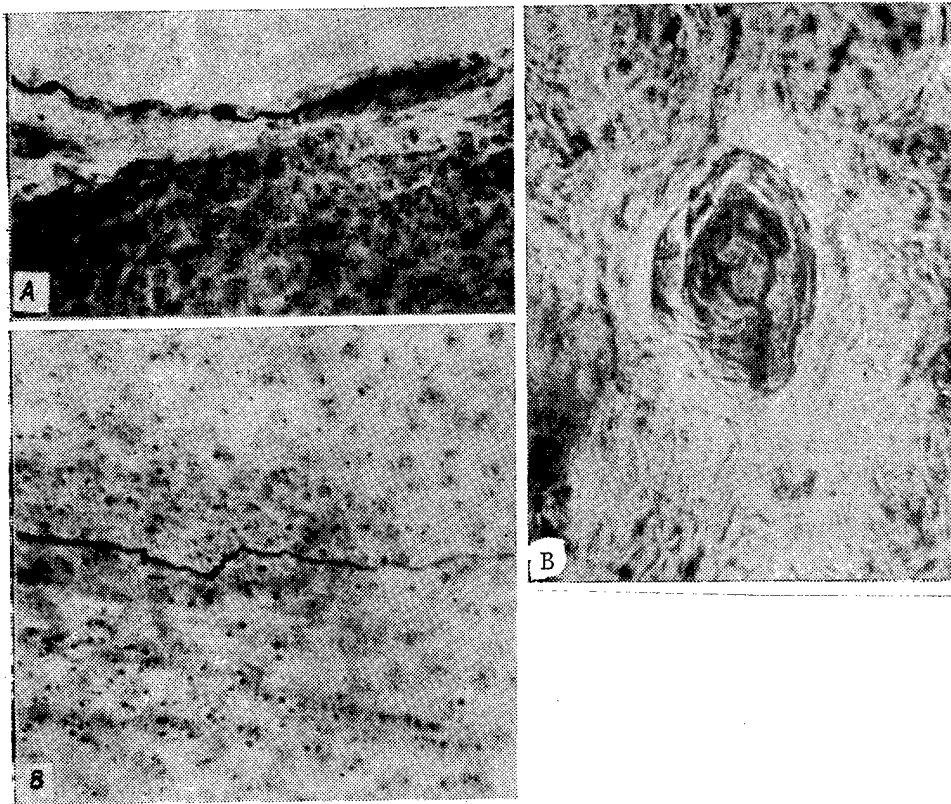


Figure 4. Types of nerve endings in the mouth cavity of the porpoise (impregnation per Bielschowsky Gros, ob. 20, oc. 10):
 A - ending of bulb of Krause type in floor mucous membrane; B - encapsulated glomerulus in mucous membrane of hard palate; C - nerve fiber among cells of rough epithelial layer of hard palate.

their primary branches being preserved. Certain differences are manifested in the number and topography of the small intra-organ branches. However, these deviations are generally within the boundaries of individual and species polymorphism of the given morphological indicators indicated by various authors.

The performed study showed that the mouth cavity walls in dolphins are saturated with various nerve structures, whose totality forms a major intra-organ neural apparatus. The sharp polymorphism of the mouth receptors is conditioned by the fact that the sensitive mouth nerve apparatus is subjected to the action of a complex of exogenic stimuli -- mechanical, temperature-related, chemical, proprioceptive. It is clear from the obtained data that mechanical stimulation is one of the most adequate for the sensory nerve endings in the mouth of dolphins, since the prevalent form of receptors are encapsulated nerve endings, and the capsule has, modern neurophysiologists believe (Ilyinskiy, 1967) a great influence on mechanical stimulus, changing its various parameters en route to the axon's superficial membrane.

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INTESTINAL TRACT OF BLACK SEA DOLPHIN STUDIED

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[Article by V. Ya. Lukhanin, Institute of Zoology imeni I. I. Shmal'gauzen, UkrSSR Academy of Sciences: "The Anatomy of the Intestinal Tract in the Bottle-Nosed Black Sea Dolphin"]

[Text] All the researchers who have studied the intestinal tract of Cetacea (Jackson, 1845; Watson, Young, 1880; Jungklaus, 1898; Yablokov, 1958; Kamiya, 1962; Kleynenberg et al., 1964; Betesheva, Sergiyenko, 1964; Betesheva, 1965; Takahaschi, Jamasaki, 1972 and others) have noted the presence of a formation which they called the duodenal ampulla. Some authors (Watson, Young, 1880; Betesheva, Sergiyenko, 1964 and others) also indicated that the large intestine is weakly expressed in toothed cetaceans or is inseparable from the small intestine, while the caecum is absent. However, the fresh-water Ganges dolphin has a discernible small as well as large intestine, as well as a clearly expressed caecum (Takahaschi, Jamasaki, 1972).

Our anatomical and topographical study of the intestinal tract of the Black Sea bottle-nosed dolphin (*Tursiops truncatus ponticus* B.) introduces certain corrections into the existing notions regarding the structure of the intestinal tract in toothed cetaceans. The material was taken from 12 animals. The methodologies of macro-micropreparation were those of V. P. Vorobyev, with section preparation per N. I. Pirogov.

The duodenum (*intestinum duodenum*) is reminiscent by its form of a horseshoe which is open dorsally. It is located between the pyloric region of the stomach and the ampulla of the intestine (Figure 1).

The initial section is represented by the bulb (*bulbus duodeni*). This weakly expressed formation is located in a caudo-cranial direction almost horizontally between the pylorus and the superior flexure (*flexura superior duodeni*) and bears the name of the superior horizontal portion of the duodenum (*pars horizontalis superior*). On the left this section adjoins the right wall of the pylorus and the second portion of the stomach, on the right and dorsally

it adjoins the pancreas, on top -- the accessory spleen, and anteriorly -- the posterior surface of the left portion of the liver.

The descending portion (pars descendens) goes from the superior flexure almost vertically downward to the anterior inferior flexure (flexura inferior anterior duodeni), directed to the right and dorsally. On the left this segment lies next to the second portion of the stomach, anteriorly and on the right -- to the posterior surface of the liver, and dorsally -- to the head of the pancreas.

The inferior horizontal portion (pars horizontalis inferior) is located between the anterior and posterior inferior flexures, is directed from front to back and from left to right. The anterior right and lower surface of this segment adjoins the dorsal surface of the right lobe of the liver, the upper and posterior -- the head of the pancreas.

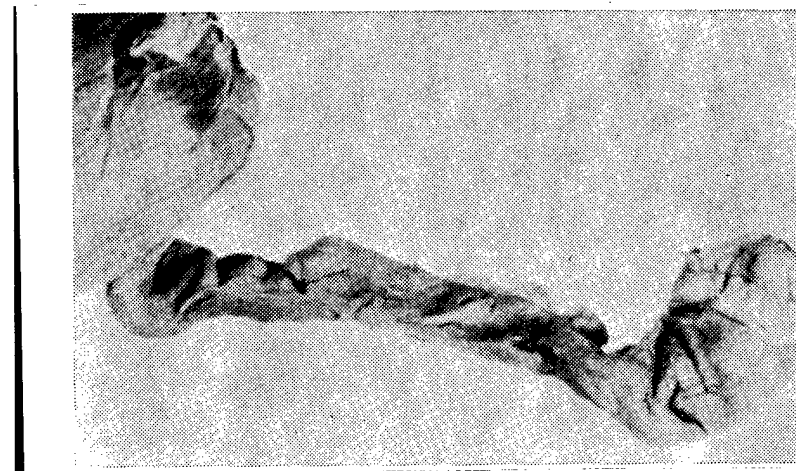


Figure 1. The duodenum, located between the stomach (left) and ampulla of the intestine (right). (Photo from specimen).

The ascending portion (pars ascendens), located between the posterior inferior flexure (flexura inferior posterior duodeni) and the ampulla of the intestine, is directed almost vertically upward. To the right and anteriorly this segment adjoins the liver, anteriorly and to the left -- the pancreas, dorsally -- the loops of the small intestine. The latter three segments of the duodenum are of approximately equal length and encompass the head of the pancreas.

Along its entire extent, the duodenum is a thin-walled formation with a rather large cavity and weakly expressed plication of the mucous membrane

(Figure 4,5). It differs in this respect from contiguous portions of the digestive tract. In its unfilled state, the duodenum is usually compressed by the adjoining organs to a certain plane, depending on the portion of the intestine. The ducts of the major digestive glands do not open into the duodenal cavity.

The duodenum is connected at its entry opening with the pyloric portion of the stomach (Figures 2,5), and at its exit opening -- with the ampulla of the intestine (Figure 4). The entry opening is small and located on the left lateral wall of the bulb. The exit opening is located on the transverse septum separating the terminal portion of the duodenum from the ampulla. The terminal portion of the duodenum is expanded in the shape of a funnel, since the transverse septum of the ampulla exceeds that of the duodenum. The boundary between the duodenum and the ampulla is marked by a sulcus (sulcus ampullo-duodenalis), corresponding to the ampullo-duodenal septum between them.

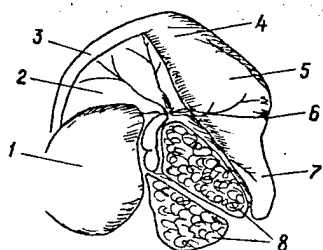


Figure 2.

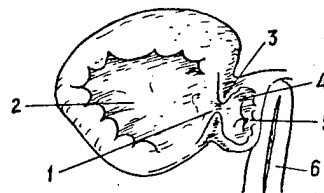


Figure 3.

Figure 2. Initial portion of the duodenum (posterior view, diagram from specimen):
 1 - pyloro-fundal opening; 2 - second segment; 3 - pyloro-fundal sphincter; 4 - pyloric segment; 5 - pylorus; 6 - duodenum.

Figure 3. Ampulla of the intestine (posterior view, diagram from specimen):
 1 - spleen; 2 - mesentery of small intestine; 3 - small intestine; 4 - ampullo-tenual flexure; 5 - ampulla of the intestine; 6 - ampullo-duodenal sulcus; 7 - ascending portion of the duodenum; 8 - pancreas.

The ampulla of the intestine (ampulla intestinalis) (Figures 3,4), which is another enlargement of the digestive tract, is located between the duodenum and the small intestine. The ampulla is oriented in a ventro-dorsal direction. The septum between the duodenum and the ampulla contains a strong sphincter (m. sphincter ampullo-duodenalis). The ampulla is separated from the small intestine by the ampullo-tenual flexure.

The ampulla of the intestine differs sharply in both its internal and external indicators from the duodenum as well as the small intestine. Its shape is

piriform, and its walls are of considerable thickness. The mucous membrane forms deep longitudinal and transverse folds and is thereby reminiscent of the second portion of the stomach.



Figure 4. Exposed terminal portion of the duodenum (right), ampulla of the intestine (center) and initial portion of the small intestine. (Photo from specimen).

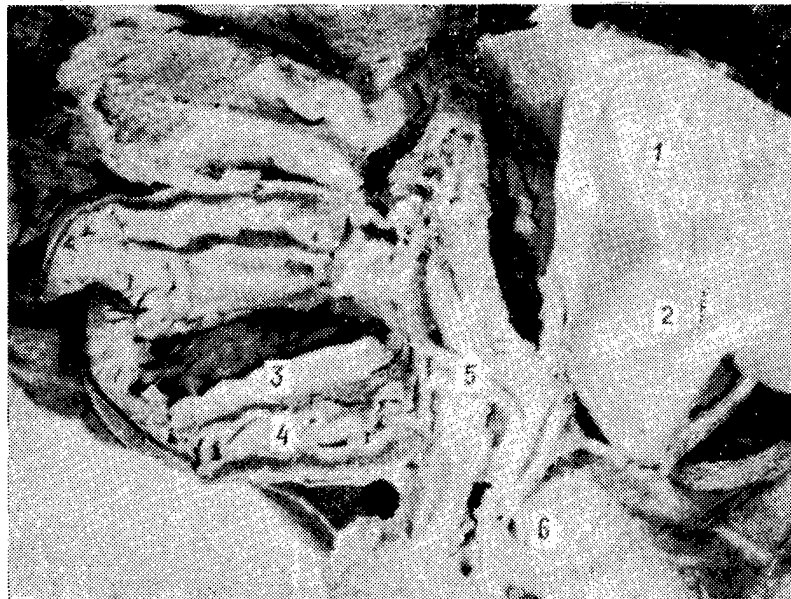


Figure 5. Duodenum (right) and ampulla of the intestine in section. (Photo from specimen):

1 - pylorus; 2 - mucous membrane of duodenum; 3 - cavity of ampulla of the intestine; 4 - "cistern"; 5 - common hepatopancreatic duct; 6 - pancreas.

The anterior, right and posterior walls of the ampulla are free. The upper portion of the left wall is free and adjoins the lymphoid crest. The remaining portion adjoins the accessory spleen, accreting to it, and slightly touching the pancreas from below and in front.

The ampullo-tenual flexure found at the dorsal wall of the abdominal cavity is directed to the posterior and downward. The latter is separated from the dorsally located hypaxial musculature by a diaphragm layer. Anteriorly and partially to the right the ampulla adjoins the posterior surface of the right lobe of the liver; to the right and dorsally -- it adjoins the loops of the small intestine, and from underneath it borders the duodenum.

The peritoneum covers the ampulla from the front, right and back, without touching the portions accreted to the accessory spleen. The dorsal portion of the ampulla is covered by the peritoneum on all sides. The free mesentery (mesenterium) of the small intestine begins from the ampullo-duodenal sulcus. At first it is short, then gradually increases and, beginning with ampullo-tenual flexure takes on the usual dimensions for free mesentery.

The common hepatopancreatic duct, which enters the ampulla anteriorly at the boundary sulcus with the duodenum, penetrates into the muscle layer of the ampulla. Here it is transformed into the cistern and passes within the intestinal wall along its anterior margin in the direction of the ampullo-tenual flexure, where it opens into the ampulla cavity at its point of transition to the small intestine through an unnoticeable opening in the papilla which does not stand out in the mucous membrane folds. The mucous membrane of the cistern is gathered into deep folds (Figure 5).

The small intestine (intestinum tenue) in the dolphin starts at the ampullo-tenual flexure and ends at the anal opening. The wall of the small intestine has a characteristic appearance, with the opening of the intestine filled with longitudinal folds along almost its entire extent. The number of longitudinal folds is not uniform in all sections. Almost the entire small intestine is suspended on mesentery.

The mesentery covering encompasses the small intestine on all sides. The intestinal portion of the mesentery spreads out in a fan, encircling the small intestine which is folded into loops. The radical portion of the mesenterium (radix mesenterium) merges at the lymphoid crest, which passes in the dorsal portion of the abdominal cavity along the spine. The small intestine fills up the medial and posterior section of the abdominal cavity with its loops. Only the caudal portion of the intestine, in the form of sigmoid and straight sections, is located somewhat by itself. Anteriorly the loops of the small intestine adjoin the posterior surface of the first portion of the stomach, the spleen, the ascending portion of the duodenum, the posterior margins of the left and right lobes of the liver, and the posterior surface of the pancreas. On the sides and bottom the small intestine adjoins the internal surface of the abdominal wall, and at the posterior -- the kidneys and adrenal glands. The sigmoid portion of the intestine lies in the space between the kidneys. The straight portion is located more caudally, in the

hollow between the left and right hypaxial muscles.

The material presented in this report testifies to the fact that the duodenum in the bottle-nosed dolphin possesses all the basic anatomical and topographical indicators of the duodenum in mammals, although the excretory ducts of the liver and pancreas do not flow into it. For reasons which we can only surmise, the point of connection of the major digestive glands with the intestinal tract has been shifted somewhat distally. Having first joined together, these ducts penetrate into the intestinal wall at the boundary of the duodenum and the ampulla. The mucous membrane of the duct -- cistern -- is gathered into deep folds. When the duct becomes over-filled with secretions from the digestive glands, the plication of the mucous membrane undoubtedly facilitates the extension of the cistern wall. However, with contraction of the ampulla wall musculature, the mucous membrane plication must lead to the creation of an impenetrable barrier to the intestinal content, preventing the latter from being thrown into the ducts of the liver and the pancreas with increased intra-abdominal pressure while the animal is submerged at great depths. The intestinal contents being thrown into the duodenum and stomach is evidently prevented by the strong sphincter of the ampullo-duodenal septum. Possibly, the need for such protection is one of the reasons for the very emergence of such a septum between the duodenum and the intestinal ampulla, as well as for the formation of the ampulla.

The ampulla of the intestine, which arose in the process of adaptation of cetaceans to a deutomarine form of life as a result of the change in the boundary section between the duodenum and the small intestine, is an original formation which is not characteristic to land mammals. It is a separate subsection of the intestinal tract since, possessing peculiarities of structure and evidently function which are characteristic to it, it not only differs from the duodenum and the small intestine, but is also quite clearly delineated from them. The small intestine has all the basic indicators of the small intestine in mammals. The data available to us is insufficient to subdivide it into a "jejunum" and an "ileum". Since the characteristic indicators of the large intestine have not been defined, in our opinion it is fully justifiable to call the portion of the intestinal tract located between the ampullo-tenual flexure and the anal opening a "small intestine."

Thus, in the bottle-nosed dolphin the intestinal tract is subdivided into the duodenum, the ampulla, and the small intestine. The sigmoid and straight portions, corresponding to the sigmoid colon and the rectum in land mammals, may also be conditionally defined in the latter.

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EFFECT OF NORMO- AND HYPOXIC HELIUM-OXYGEN GAS MIXTURES ON TISSUE RESPIRATION OF LUNGS AND LIVER IN WHITE RATS

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 29, No 3, May-Jun 83

[Article by T. N. Govorukha, Department of Physiology of Respiration, Institute of Physiology imeni A. A. Biomogolets, UkSSR Academy of Sciences, Kiev]

[Text] Recently, interest in the problem of the effect of helium-oxygen mixtures on the body has grown considerably.

We analyzed the intensity of tissue respiration of the lungs and liver of white rats under the influence of helium-oxygen gas mixtures with a normal and reduced content of oxygen at atmospheric pressure. Two series of experiments were conducted on 120 mature male rats weighing 170-200 g. We analyzed the chymes and homogenates of lung and liver tissues. The first series was conducted on isolated tissues placed in solutions saturated with helium-oxygen gas mixtures. This series included three variations of effect: due to a hypoxic helium-oxygen mixture with an oxygen content of 7.2% (the effect of the latter was compared to the effect of a nitrogen-oxygen mixture containing 6.3% O₂); due to a hypoxic helium-oxygen mixture (11.2% O₂), the effect of which was compared to the effect of a nitrogen-oxygen mixture (11.2% O₂) and due to a normoxic helium-oxygen gas mixture. The atmosphere served as the control in all of the experiments. In tissue chymes of the animals, the expenditure of oxygen was determined by the manometric Warburg method. In the second series, we analyzed tissues of animals which were preliminarily held in a compartment ventilated with a normoxic helium-oxygen mixture for 45-60 minutes. The animals were killed in the compartment; in lung and liver chymes, we determined the expenditure of oxygen with and without the effect of the mixture on isolated tissues. In homogenates of these tissues, the activity of a Krebs cycle enzyme--succinate dehydrogenase (SDH)--was determined according to the modified Nordman method.

In the first series of experiments, it was shown that lung and liver tissues of rats in a normoxic helium-oxygen environment require more oxygen than in the atmosphere, which corresponds to data in literature. It was noted that in a hypoxic nitrogen-oxygen environment (6.3% O₂), the O₂ demand by lung tissue was reduced in comparison to the control, while in a helium-oxygen environment

(7.2% O₂), the reduction of oxygen expenditure was less expressed. For liver tissue, the decrease of O₂ expenditure was the same in both environments. During the effect of a helium-oxygen mixture (11.2% O₂), it did not change in comparison to the control. The oxygen demand by liver tissue in both environments hardly differed from that in the control. In the second series of experiments, it was shown that the O₂ demand by liver and lung tissue of rats placed in a helium-oxygen environment (21% O₂) is higher than in the control both during the effect of the mixture on isolated tissues, and without the effect. SDH activity in homogenates of these same tissues was higher than in the control. Results we received agree with data of several researchers who have noted the rise in general gas exchange in a helium-oxygen environment in comparison to the atmosphere.

Thus, the conducted experiments demonstrated that the requirement of oxygen by lung tissue in helium-oxygen environments is higher than in nitrogen-oxygen environments with a similar O₂ content in them. It is possible that helium renders a direct effect upon tissue metabolism. Mechanisms of such an effect require further research.

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CURRENT PROBLEMS OF ANTIBACTERIAL CHEMOTHERAPY

Moscow ANTIBIOTIKI in Russian Vol 28, No 6, Jun 83 pp 471-474

[Article by I. I. Kolker and B. M. Kostyuchenok, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow]

[Text] An All-Union conference dealing with pathogenesis, symptomatology and management of surgical sepsis convened at the Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, on 9-10 December 1982. On behalf of the USSR Ministry of Health and USSR Academy of Medical Sciences, the opening remarks at this conference were delivered by Academician M. I. KUZIN of the USSR Academy of Medical Sciences, member of the Presidium of the Academy of Medical Sciences and director of the Institute of Surgery imeni A. V. Vishnevskiy.

In their keynote report, M. I. KUZIN et al. dwelled on the current status of problems of surgical sepsis. In spite of the advances in modern surgery and control of surgical infection, even now sepsis is one of the most difficult and inadequately studied general clinical and surgical problems. Many basic questions of pathogenesis of sepsis are still essentially on the level of hypothetical interpretation. Data based on vast clinical material were submitted in this report concerning the incidence of surgical sepsis (from 0.07 to 0.1% of all treated patients), and it was stressed that the rise in recent decades was attributable to "iatrogenic" forms of intramural sepsis. The death rate is extremely high, from 40 to 80%, depending on the form of sepsis and type of pathogen, and this is indicative of inadequate efficacy of modern methods of treating this disease. It was stressed that a suppurative wound is the primary septic focus and entry portal of infection, and underestimation of this fact is often the cause of insufficiently active and radical surgical management of abscesses in septic patients. On the basis of their clinical experience, the authors believe that modern treatment of sepsis should consist of two interrelated parts: active surgical management of primary and metastatic suppurative foci and general intensive therapy of septic patients. This approach lowers significantly mortality due to sepsis.

In the paper of V. I. STRUCHKOV et al., it was noted that maximum mortality is referable to sepsis that develops following abdominal operations (89%), which is indicative of the extremely serious course of this type of sepsis. In the opinion of these authors, there has been a trend in the last 5 years

toward decline of incidence of surgical sepsis and mortality attributable to it thanks to refinement of methods of surgical treatment of the primary focus, appearance of new, highly effective antibacterial and immune agents and rational combinations thereof. The authors mention the great practical importance of refinement of bacteriological high-speed diagnostic methods for early detection of the pathogen of sepsis and determination of its sensitivity to antibacterial agents. In their opinion, herein lies the success of antibacterial therapy of surgical sepsis.

V. S. SAVEL'YEV discussed the main aspects of the problem of septic shock. Onset of this terrible complication is related not only to marked systemic intoxication, but impairment of mechanisms of protection against infections. The pathogenesis of systemic disturbances in the presence of septic shock is based on marked microcirculatory and metabolic disorders. The speaker noted the great difficulty of early diagnostication of septic shock, which is related to the complexity of pathogenesis of this condition and polymorphism of symptoms. The significant increase in number of strains of microorganisms with multiple resistance limits drastically the arsenal of really effective antibacterial agents in the treatment of septic shock.

According to current conceptions, a methodologically correct approach to comprehension of the infectious process (sepsis in particular) should be based on one of the basic tenets of dialectical materialism, namely the principle of causation. Any infectious process is based on the principle of interaction, which determines the clinically different forms of manifestation of the process. An exogenous causative factor (microbe) and endogenous causative factor (reactivity) are involved in the infectious process, and the outcome of this process depends on the result of their interaction.

The paper of I. I. KOLKER et al. discussed in detail the bacteriological aspects of surgical sepsis and demonstrated that there are appreciable differences in the etiological structure of pathogens of various forms of sepsis. Staphylococci, particularly *Staphylococcus aureus*, are in first place among the pathogens of surgical sepsis developing against a background of serious and acute suppurative disease and extensive posttraumatic and postoperative wounds. The contribution of different representatives of Gram-negative microflora is relatively small, although it is apparently correct to refer to sepsis caused by a polymicrobial flora in a number of cases.

Various representatives of Gram-negative microflora (*P. pyocyanea*, different types of pathogens of the *E. coli* group), which have moved staphylococci to second place, are presently in first place among the pathogens of the iatrogenic form of surgical sepsis developing against a background of suppurative complications following clean cardiosurgical operations (replacement of valves).

The data obtained by these authors concerning the difference in etiological structure of pathogens in forms of surgical sepsis differing in origin are of definite clinical interest, since, according to the modern etiopathogenetic conception of sepsis treatment, appropriate antibacterial therapy should be designed in accordance with the type of pathogen, its sensitivity and pharmacokinetic data in relation to MPK [maximum permissible concentrations?].

S. M. BELOTSKIY et al. dealt with immunological problems of sepsis. These authors demonstrated that expressly impairment of mechanisms of defense against infection creates favorable conditions for local infection to turn to a generalized form, sepsis. With a local infectious process there is little change in parameters of function of phagocytes, T and B systems of immunity. At the early stage of generalized infection the recovery process corresponds to activation of both chemotaxis and immune phagocytosis, along with stimulation of T system and specific immunity. Sepsis is characterized by functional impairment of phagocytes, although there is no impairment of processes of lymphocyte activation. More marked functional disturbances of phagocytes and absence of stimulation of T lymphocytes, as well as low level of lymphocytes with receptors for specific microbial antigen, are inherent in an adverse outcome of generalized infection.

The paper of D. S. SARKISOV et al. elicited much interest in participants at the conference; it dealt with correlations between the microorganism and macroorganism (on the model of phagocytosis) in the presence of a septic process. These authors demonstrated convincingly the vast opportunities afforded by use of new investigative techniques, in particular electro-autoradiography, for the study of the basic mechanism of defense against infection--phagocytosis.

At this stage, special attention is given to rational antibacterial therapy, which is viewed as a most important component of intensive treatment of sepsis.

The paper of S. M. NAVASHIN showed that the use of new aminoglycosides, semi-synthetic penicillins and cephalosporins offers new prospects for etiotropic therapy of sepsis. The broad spectrum of antibacterial activity and rapid bactericidal effect are the advantages of these groups of agents over other antibiotics. In the opinion of the author, among the aminoglycosides, in addition to the most popular agent--gentamicin--sisomicin [extramycin], amikacin and netilmycin merit attention. Among the semisynthetic penicillins and third-generation cephalosporins, the most promising are azlocillin and cephotaxim (claphoran). The conference participants expressed their wish to expedite release of these agents for broad clinical use, since the practical possibilities of antibacterial therapy of sepsis in surgical departments of municipal hospitals are very limited at the present time.

The paper of V. P. FOMINA et al. gave a comparative assessment of new aminoglycosides that are being introduced to medical practice: new drug forms of kanamycin sulfate in form of solution in vials for intravenous injections, gentamicin sulfate and sisomicin sulfate (in vials for intravenous and intramuscular injection).

The authors established that all three aminoglycosides are highly effective, provided they are used properly. Clinical efficacy was noted in 81-85% of the cases. At the same time, when prescribing kanamycin, poor results have been observed in cases of diffuse suppurative peritonitis and isolation from exudate of a microbial association of *P. pyocyanea*, *E. coli* and enterococci. In a number of cases, poor results were observed when aminoglycosides were prescribed following prolonged and unsuccessful therapy with other antibacterial agents. Side-effects in the form of rash, cutaneous pruritis were observed in isolated cases. However, appearance of protein in urine was

noted in 33% of the children given gentamicin for serious bronchopulmonary pathology. These data are indicative of a need for comprehensive evaluation of possible side-effects of antibiotics, particularly those in the aminoglycoside group.

The principles of modern antibacterial therapy of surgical sepsis were discussed in the paper delivered by A. M. SVETUKHIN et al. (Institute of Surgery imeni A. V. Vishnevskiy). When administering antibacterial therapy it is necessary to take into consideration the sensitivity of the pathogen isolated from blood and local sites of infection, localization of infection and form of septic process, accessibility of the pathological focus to penetration of antibacterial agents, their toxicity to organs and tissues of the patient.

Modern antibacterial therapy must be based primarily on the etiotropic principle, i.e., as accurate as possible selection of agents for the isolated or suspected pathogen of the infectious process. For this reason, the following principle is followed in prescribing antibacterial therapy at the Institute of Surgery imeni A. V. Vishnevskiy. When a patient is admitted with suspected sepsis in the department of wounds and wound infection, broad spectrum antibiotics are prescribed and secretions from the wound are immediately sent for analysis to the laboratory. The first correction of prescribed antibacterial therapy is made 16-18 h later, on the basis of high-speed determination of sensitivity of the wound microflora to antibacterial agents. After 2-3 days, depending on the results of quantitative determination of bacterial contamination per gram biopsy material from the wound or 1 cm² wound surface, as well as depending on the species composition of isolated microflora and its sensitivity to 20-25 antibacterial agents, a second correction is made, if necessary, of the ordered antibacterial therapy. The agents are prescribed in courses of 2-3 weeks in average or maximum doses, generally using 2-3 agents given via different routes (by mouth, intravenously, intraarterially, etc.). The experience gained at the institute indicates that one can obtain a synergistic effect with different combinations of semisynthetic penicillins or cephalosporins, thereby making it possible to lower significantly the dosage of aminoglycosides used and prevent their possible toxic effect on parenchymatous organs.

In addition to systemic antibacterial therapy of sepsis, it is imperative to institute active surgical management of primary and metastatic suppurative foci, as well as to constantly wash them out with antiseptics. In the department, furacillin, furazidin, 0.1% dioxidine and other antiseptics are used for this purpose. In recent years, compound ointments on a hydrophilic (water-soluble) base have been used for local treatment of suppurative wounds.

One of the main prerequisites for effective antibacterial therapy is to provide high enough concentrations of agents, not only and not so much in blood as in the suppurative foci, the septic foci of infection. The present level of our knowledge makes it imperative to constantly implement pharmacological monitoring of antibacterial therapy according to various pharmacokinetic parameters, which will make it possible to work out scientifically validated, optimum schemes for use of antibiotics and to effect purposeful corrections to reach the required concentrations exceeding the MPK for the principal pathogens of sepsis, not only in blood, but mainly in primary and metastatic suppurative sites.

In view of the foregoing, it is particularly important to make the correct choice of route of administration of antibacterials. For septic patients, virtually the main route is intravenous, which involves catheterization of a great (most often subclavian) vein. The agents are injected intra-arterially, through the inferior epigastric vein, when there is a suppurative site on the lower extremities. One can produce a high concentration of antibacterial agents in the suppurative site by means of local needling of the site and electrophoresis.

In the treatment of sepsis, antibacterial therapy should be administered for a long time (at least 6-8 weeks) until there is persistent stabilization of the patient's general condition and results of laboratory tests. Premature discontinuation of therapy is dangerous due to the possibility of recurrent infection and formation of chronic sites of inflammation which do not respond or respond poorly to treatment. Total and definitive destruction of the pathogen of a septic process is possible only when there is active involvement of the body's defenses. For this reason, it is necessary to search for optimum programs for administration of antibiotic and immunotherapy.

Having heard and discussed the papers dealing with the problem of "Surgical Sepsis," the All-Union Conference noted the following:

In spite of the significant incidence of suppurative infection, the frequency of surgical sepsis has shown a tendency toward decline in the last 10 years, which is due to improvement of methods of treating suppurative infection (development of new, active and rational methods of treating the suppurative site, new antibacterial and immune agents, etc.).

Mortality due to sepsis is still high in institutions where therapy is not rational enough, and it has declined significantly where the methods of treatment conform to the current level of science.

The chief cause of high mortality is improper understanding of the purpose and organization of therapy.

At the present time, intramural infection (staphylococci and Gram-negative flora) has started to play a substantial role in the etiology of surgical sepsis.

The course of surgical sepsis is usually directly related to the condition of the primary and secondary foci. The conception of sepsis as a disease that is unrelated to the focus of infection does not conform to the clinical signs of the process, and it leads to underestimation of the importance of surgical management.

Treatment of sepsis should be combined, and it should consist of active surgical management of local suppurative sites and systemic intensive therapy. Both elements are interrelated.

Active surgical management of suppurative foci is aimed at their speedy eradication by means of surgical treatment, drainage,

prolonged flushing and early closure of wounds. Eradication of a local suppurative focus improves significantly the course of sepsis, and it creates conditions for its speedy cure.

Intensive therapy of patients with severe forms of suppurative surgical infection and sepsis must be administered for a long time, until there is persistent stabilization of homeostasis, in specialized intensive care wards (or departments). Systemic intensive therapy must include antibacterial and immunotherapy, infusion and transfusion therapy aimed at correction of metabolic and circulatory disorders, as well as prevention of pulmonary complications.

Combined treatment of patients with sepsis, with severe forms of suppurative infection, aimed at the principal pathogenetic factors, lowers drastically the mortality due to surgical sepsis.

The All-Union Conference on Surgical Sepsis deems it expedient to recommend that research be expanded to find new methods of early detection of surgical sepsis and to refine methods of treating it (hemisorption, lymphosorption, etc.), as well as develop immunological diagnostic and therapeutic methods for surgical sepsis, and find new antibiotics and chemotherapeutic agents.

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COMPARATIVE ANALYSIS OF STRUCTURE AND PERMEABILITY OF SKIN OF VARIOUS MAMMALS

Moscow GIGIYENA I SANITARIYA in Russian No 3, Mar 83

[Article by V. D. Gostinskiy; Novosibirsk Oblast Sanitary and Epidemiology Station]

[Text] The skin as a path of entry for chemical substances into the body can play a major role not only under production conditions, but also in everyday life (G. N. Krasovskiy and coauthors). In connection with this, there is an increasing need to select adequate models for study--animals whose skin is close to human skin in terms of permeability. Usually one species of mammal is studied. For example, Massman recommends skin on a rat's tail as a convenient model. In our opinion, it is advisable to approach this question from a general biological position, viewing skin as one of the types of macro-membranes that have adaptive significance in the evolution of mammals. It is important to take into consideration specific features in the structure and permeability of the skin on various parts of the body.

It was established in experiments on immature pigs (Tregear) that an increase in the number of hair follicles in a standard section of skin does not increase significantly the rate at which tri-n-butylphosphate penetrates the skin. This study, however, also leaves some doubts about the relative role of the epidermis, hair, and glands in the skin's permeability to chemical substances.

We attempted to perform a statistical analysis of the data on the thickness of the epidermis, and the number of hairs and sebaceous glands associated with the hairs. All this was compared to the mammals' body mass. As a starting point, we borrowed data from V. Ye. Sokolov (1973) on 18 of the 20 existing orders of mammals (V. Ye. Sokolov, 1979). We used K. A. Kalantayevskaya's data on the thickness of human epidermis. We also used results from our own research (V. D. Gostinskiy and T. Ye. Mayeva; V. D. Gostinskiy and G. B. Krasnopevtseva, 1979), as well as previously unpublished material. We studied the permeability of abdominal skin in mammals of over 50 species and 9 orders to lithium salts, aniline, trichlorethylene, ethylchlorohydrin, and ammonium chloride. We obtained data on the body mass of various species of mammals from reference books and monographs, or by actual weighing. The majority of the skin samples were obtained from animals that had died or were slaughtered in zoos, meat combines, etc. All the animals that were delivered to the laboratory live were killed instantaneously by means of a specially designed guillotine.

The relationship between the thickness of the epidermis on the nape and body mass can be described by the equation:

$$\lg L_n = 0.118 + (0.136 \pm 0.0148) \lg P,$$

where L_n is the epidermal thickness (in micrometers) and P is body mass (in grams).ⁿ The number of mammal species is (n); 148 is the coefficient of the conjugate direct linear correlation 0.624.

An analogous equation can be given for the chest:

$$\lg L_c = 0.806 + (0.0267 \pm 0.231) \lg P,$$

where $n=99$; the correlation coefficient is 0.759.

The same can be done for the abdomen:

$$\lg L_a = 0.694 + (0.238 \pm 0.118) \lg P,$$

where $n=12$; the correlation coefficient is 0.503.

The formulas presented below describe the connection between the total number of hairs per 1 cm^2 of skin on the nape and the chest, and the body mass:

$$\lg B_n = 4.61 - (0.233 \pm 0.0368) \lg P,$$

where B_n is the total number of hairs and $n=111$; the correlation coefficient is 0.691;ⁿ

$$\lg B_c = 4.799 - (0.344 \pm 0.0404) \lg P,$$

with $n=52$; the correlation coefficient is 0.763.

The relationship between the number of sebaceous glands per 1 cm^2 of skin from the nape and the mammals' body mass in grams is described by the following equation: $\lg G_n = 4.743 - (0.422 \pm 0.065) \lg P$, where G_n is the total number of sebaceous glands and $n=43$; the correlation coefficient is 0.764.

Thus we established a highly reliable correlation between epidermal thickness and body mass. The larger the mammal, the thicker the stratum corneum, and the fewer hairs and sebaceous glands found per unit of skin surface. For individual mammal species corresponding indicators deviated from the norm by a factor of more than 10; this is tied to the specific characteristics of these species and the peculiar functions of different parts of the skin in animals of several species. For example, the thickness of the epidermis from the nape of a hedgehog is 7 times thicker than would be estimated, since there are needles on the back of the neck that require a thick support. The thickness of the epidermis from the chest, where there are no needles, does not differ significantly from what one would estimate for an animal with the corresponding body mass. The thickness of human epidermis on the chest and abdomen is close to what one would estimate (with a body mass of 70 kg).

The data obtained do not permit us to answer the question of the why there was decreased skin permeability with increased body mass. There are two possible explanations: an increase in epidermal thickness or a decrease in the number of hair and sebaceous glands.

In order to answer this question we studied skin permeability in reptiles, which do not have any hairs or sebaceous glands (N. P. Naumov and N. N. Kardashov). The permeability of skin from the abdomen and back of two species of reptiles (the Amur grass snake and the sand constrictor) to trichlorethylene was studied *in vitro*¹.

On the whole the permeability of reptiles' skin does not differ substantially from that of mammals with the corresponding body mass. This provides evidence (although indirectly) of the fact that the epidermis is the primary path through which chemical substances pass through the skin of mammals. A clear relationship has not been established between epidermal thickness or the skin's permeability and any particular order of mammal.

A comparison has been made of the permeability of various sections of human skin to lithium chloride and aniline (V. D. Gostinskiy and G. V. Krasnopevtseva, 1980) and the average indicators for epidermal thickness in these sections (K. A. Kalantayevskaya). A correlation analysis revealed a statistically reliable inverse relationship. Thus, we can consider skin permeability to be directly dependent on its thickness. At the same time there are significant deviations in epidermal thickness as well as permeability in various sections of skin or throughout the entire skin surface of different species of mammals.

Abdominal skin was used as a model section of skin for mammals and humans when inter-species differences were studied. This area, unlike skin from the extremities, for example, is functionally the same among practically all mammals, including the pangolin, hedgehog, porcupine, and armadillo. In mammals the abdomen is the usual area for taking a section of skin because samples can be taken for study without any noticeable decline in the skin quality. This is the site for removing a section of skin when human cadavers are dissected. Abdominal skin is often used to study the skin-resorptive action of chemical substances *in vivo* (Yu. I. Kundiyev). Human abdominal skin does not differ significantly from what would be calculated for a mammal of the corresponding body mass (70 kg) both in terms of permeability and morphometrical characteristics (V. D. Gostinskiy and T. Ye. Mayeva). Therefore, in order to extrapolate from the experimental data on the skin permeability in animals to human values, those species must be selected whose abdominal skin permeability deviates only minimally from the mean correlations for the entire series of mammals (and for humans). The model species should be

¹The chemical assay of trichlorethylene was produced by T. V. Medvedeva.

easily obtainable and inexpensive. Skin from white mice and rats, rabbits, pigs, cows, and horses corresponds to these conditions for in vitro experiments. Skin from guinea pigs does not meet these requirements quite as well, and skin from sheep is more permeable than would be calculated for a mammal with the corresponding body mass. Human skin should also be studied (using material obtained during autopsies and operations). It is necessary to study the permeability of skin from mammals of no fewer than 4 species, which differ to the greatest extent in terms of body mass, even if human skin is studied, since isolated skin is less permeable than skin in vivo. At the same time, the regression coefficients describing the relationship between skin permeability in vitro and in vivo, according to data obtained using lithium chloride (V. D. Gostinskiy and G. B. Krasnopevtseva, 1979) practically did not differ. Also of fundamental importance is the selection of mammals with the most diverse body mass. According to actual data from the study of skin permeability to lithium chloride in 4 species of mammals, differing in body mass by a factor of only 2, an error in extrapolating from animals to humans could reach an order of 6 (that is, a factor of 1 million). When mammals of 4 different species differed in body mass by an order of 2, an error in extrapolating from animals to humans using the results of an in vitro experiment did not exceed the limits of error in the direct determination of human skin permeability (by a factor of 2). For in vivo experiments it is sufficient to study skin permeability in white mice and rats, hamsters, guinea pigs, or rabbits. The relative permeability of the entire skin surface of animals requires a special discussion: taking this factor into account, for example, in the hygienic regulation of chemical substances in reservoir water.

Conclusions. 1. The results of comparing the skin permeability of mammals and reptiles allow us to assume that the primary skin pathway for chemical substances entering the body is through the epidermis, and not through hair follicles or sebaceous glands.

2. Morphometrical characteristics of the skin (epidermal thickness, number of hairs and sebaceous glands) are tied closely to the mammal's body mass. In logarithmic coordinates the relationship is described by a direct linear correlation. The larger the mammal, the thicker its epidermis and the fewer hairs and sebaceous glands it has.

3. Skin permeability and its morphometrical characteristics (epidermal thickness, number of hairs and sebaceous glands) do not have a noticeable correlation with any order of mammal.

4. The specific functions of various areas of skin are reflected clearly in the skin's permeability and morphometrical characteristics.

5. In order to extrapolate from animal experimental data to human values on skin permeability to chemical substances, it is necessary to use abdominal skin from mammals of no fewer than four species. The smallest and largest mammals in these species should differ from each other in terms of body mass by no less than an order of 2. White mice and rats, hamsters, guinea pigs, and rabbits are suitable for these experiments. White mice and rabbits differ the most in terms of body mass, and white rats are the most frequently used laboratory animals.

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UDC 616.644-07

BIOLOGICAL EFFECT OF IDENTICAL LEVEL NOISES WITH VARIOUS SPECTRAL CHARACTERISTICS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 8, Aug 83 (manuscript received 28 Mar 83) pp 31-34

ARAKELYAN, A. G., Armenian Institute of General Hygiene and Occupational Diseases, Yerevan

[Abstract] Fifty healthy subjects, aged 25-35, were exposed to 45 minutes of constant noise in a continuous spectrum of 50-10,000 Hz. Sound level was held constant at 55, 65, 75, 85 or 95 dB A. Ascending and descending spectral envelopes, slope 5 dB/octave, were compared. Continuous recording of subject EEG revealed that alpha-wave period uniformity coefficient decreased with increasing noise level. Above 65 dB the greatest insensitivity to sound was seen at low frequencies. Time of simple motor reaction to light varied depending on the sound load, while that to sound decreased with increasing noise level. The cochlear-pupillary reflex was also more pronounced with low frequency than with high frequency. Time shifts in the threshold of air conduction were greater in low frequency noise, with a maximum at 500-2000 Hz. The data indicate that at the same sound level, low frequency noise causes greater changes in CNS functional state than high frequency noise. Figures 5; references 10: 8 Russian, 2 Western.
[648-12126]

UDC 621.591

PHYSIOLOGICAL TOLERANCE OF MAN TO ERGOTHERMIC EFFECTS

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 29, No 4, Jul-Aug 83 (manuscript received 19 Aug 81) pp 444-449

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[Abstract] Heat resistance was studied in 150 unadapted males, aged 20-30, subjected to 40°C and 85% humidity. Substantial variation among the subjects

was seen in rate of increase in rectal temperature under ergothermic load and limit of endurable hyperthermia. The time for which the subjects could endure the experimental conditions varied from 35 to 100 minutes. Thermo-stasis is influenced by tissue thermal resistance and stability of regulatory processes, while thermal homeostasis depends on heat formation in the organism and heat transfer to the surroundings. Hyperthermic limit of the subject was correlated with erythrocyte thermal resistance. Time for doubling of the mismatch between signal and response and changes in heart and respiratory rates correlated with hyperthermic limit. Internal heat formation played a more important role in compensation with greater work load, while heat transfer was more significant with increasing external temperature. Energy consumption was correlated with the arrhythmic nature of the respiratory reaction and the respiratory coefficient. Minute blood volume was connected with heat accumulation. Minute volume, body fat content and skin moisture were only weakly correlated with rate of heat transfer in the organism. A combination of physiological and mathematical methods is needed to analyze the hierarchical functional characteristics of human stability to ergothermic effects. Figures 1; references 10 (Russian).
[651-12126]

UDC 612.82+612.822,3+615.78

ANALYSIS OF INTERHEMISPHERIC ASYMMETRY IN SPATIOTEMPORAL ORGANIZATION OF HUMAN CORTICAL BIOPOTENTIALS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 33, No 3, May-Jun 83 (manuscript received 26 Mar 82) pp 464-471

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[Abstract] Studies were continued on interhemispheric interaction in the face of various functional states of the brain, based on an analysis of spatial synchronization of cortical potentials. Using multichannel recording from 48 sites, the analysis demonstrated that different functional states of the brain (restful wakefulness, caffeine-induced inhibition) can be correlated with specific changes in synchronization in the left and right hemisphere. Quite similar changes may be evoked both by similar functional states (e.g., intellectual or caffeine-induced stimulation) or be seen in diametrically opposed neurophysiological states (e.g., emotional excitation and neuroleptic-induced tranquility). Although difficult to explain, the facts point to the complexity of interhemispheric interrelationships under various conditions and underscore the importance of spatial synchronization of cortical activity in the evaluation of cerebral laterality in humans. Figures 3; references 14 (Russian).
[003-12172]

ELECTROPHYSIOLOGICAL RESPONSES OF HUMAN BRAIN TO REAL AND OMITTED ACOUSTIC STIMULI

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 33, No 3,
May-Jun 82 (manuscript received 16 Mar 82) pp 522-528

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[Abstract] Investigations were conducted on eight human subjects, 20 to 30 years old, to correlate brain potentials with attentiveness to stimulus with presentation of real and omitted stimuli. The subjects were presented with a series of 23 acoustic stimuli (1000 Hz, 30 dB) at 3 sec intervals with 2-3 min intervals between series, including omission of signals 7, 19 and 20. In one experimental setting the subjects were distracted from the signals by reading a book, in the other the subjects' attention was drawn to the signal by having them count the signals and identify omitted stimuli. Evaluation of the electrophysiological response in the vertex with transcranial recordings showed a negative/positive (N_1/P_2) complex in response to missed stimuli in the inattentive subjects, with a latent period of 144.0 ± 21.5 msec for N_1 and 206.6 ± 29.8 msec for P_2 ; this was observed in 100% of the cases when stimulus No. 7 was omitted and in 63 and 75% of the cases when Nos. 19 and 20 were omitted. In the situation with increased attentiveness the latent period for N_1 was 125.0 ± 9.0 msec and 208.5 ± 19.4 for P_2 . This pattern was observed in, respectively, 60, 60, and 40% of the cases when stimuli Nos. 7, 19 and 20 were omitted. In addition, in the latter situation a late positive wave with a latent period of 560.0 ± 19.0 msec was observed in 80% of the cases in which No. 7 stimulus was omitted, in 80% with No. 19 omitted, and in 60% with omission of No. 20. The fact that the number of recorded N_1/P_2 complexes decreased in the situation in which attention was distracted may indicate that extraneous sensory stimulation diminishes the significance of specific sensory stimulation which constitutes an excess of sensory input in light of the already established more efficient information processing. Figures 2; references 19: 10 Russian, 9 Western.
[003-12172]

UDC 579.841,11-252.5

THERMOSENSITIVITY OF NAPHTHALENE-DEGRADING PLASMIDS

Moscow MIKROBIOLOGIYA in Russian Vol 52, No 1, Jan-Feb 83
(manuscript received 21 Jan 82) pp 27-32

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[Abstract] Studies were conducted on the correlation of naphthalene and salicylic biodegradation and plasmid thermosensitivity in *Pseudomonas aeruginosa* PAO. The plasmids responsible for naphthalene degradation were transferred to *Ps. aeruginosa* PAO strains from *Ps. putida* by conjugation. The catalytic enzyme systems were found to be thermolabile and could be correlated with the loss of plasmids NPL-41 and pBS3 at 41°C, and of plasmids NAH and pBS2 at 42°C. In addition, NPL-41 and pBS3 were found to be strongly inhibitory of *Ps. aeruginosa* growth at 42°C, while NAH and pBS2 were weakly inhibitory at this temperature; this resulted in the appearance of a large number of anomalous, filamentous cells and lysis. However, since plasmid-free *Ps. aeruginosa* PAO cultures grew well at 42°C in meat-peptone broth, this phenomenon provides a convenient method for the selection of plasmid-free clones. In addition, the ability of the naphthalene-degrading plasmids to inhibit pseudomonad growth at elevated temperatures can serve as an additional taxonomic criterion in the classification of *Pseudomonas* sp. Figures 3; references 15: 6 Russian, 9 Western.
[008-12172]

UDC 576.851.095.4

SULFATE REDUCING BACTERIA IN PETROLEUM LAYERS OF ROMASHKIN DEPOSITS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian,
No 3, May-Jun 83 (manuscript received 18 Nov 80) pp 454-458

STUDENIKINA, F. G., RYAZANTSEVA, I. N., MUKHITOVA, F. K. and LAVRENYUK, T. I.,
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[Abstract] The goal of this study was to isolate pure sulphate-reducing bacteria cultures from Romashkin oil deposits and to determine their strains.

Three pure strains of *Desulfovibrio desulfuricans* bacteria were isolated: V, R11 and 3N. They were widely distributed throughout the Romashkin deposits, probably brought there by river flow. The morphology, physiological and biochemical properties of these cultures were described along with their content of fluorescent pigments and G + C base pairs composition of DNA.

References 12: 10 Russian, 2 Western.

[663-7813]

UDC 576.809.33

MIXED CULTURES OF PRODUCERS OF BIOLOGICALLY ACTIVE SUBSTANCES WITH OTHER MICROORGANISMS: A REVIEW

Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 3, May-Jun 83 (manuscript received 5 Oct 82) pp 330-346

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[Abstract] Soviet and Western literature is reviewed on the advantages and disadvantages of mixed cultures of microbial producers of biologically-active substances with other microorganisms. The obvious disadvantages pertain to inhibition or destruction of the valuable culture by the other culture or its metabolites, or contamination of the desired product(s) by undesirable and/or difficult to eliminate products. However, in nature mixed cultures are the rule and such an approach can be utilized to enhance growth of the desired bacterial or fungal culture and/or increase its production of valuable metabolites. The latter phenomena are observed when the other culture inactivates inhibitors of the primary culture or provides necessary metabolites for it in a symbiotic relationship. This aspect of mixed cultures has recently received more attention and has become an active area of research that complements the vogue for pure culture studies. Figures 2;

references 157: 2 Czech, 73 Russian, 82 Western.

[002-12172]

UDC 547.912

PSEUDOMONAS AERUGINOSA STRAIN GROWING ON PETROLEUM HYDROCARBONS

Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 3, May-Jun 83 (manuscript received 7 Apr 82) pp 347-352

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[Abstract] Cultivation of *Pseudomonas aeruginosa* BS313 on media containing 4 mM octane eventually resulted in the isolation of a clone (designated BS316)

with a frequency of 10^{-8} capable of catabolizing this hydrocarbon. Agarose-gel electrophoresis led to the detection of a 100 MD plasmid DNA responsible for the oct+ trait, with designation of the plasmid as pBS250. This plasmid was found to be nontransmissible. However, *Ps. aeruginosa* BS316 served as a recipient for plasmids in conjugation experiments and ultimately gave rise to *Ps. aeruginosa* BS315 capable of growth on media with octane, decane, camphor, naphthalene, or salicylic acid. Gel electrophoresis revealed BS315 to contain plasmids pBS250, pBS2 (naphthalene oxidation), and CAM (camphor utilization). These findings indicate that *Ps. aeruginosa* can support a combination of plasmids that can impart to it the ability to degrade a variety of petroleum hydrocarbons and may in that capacity serve as an important adjunct in the management of oil pollution. Figures 2; references 13: 3 Russian, 10 Western.
[002-12172]

UDC 576.8.095.19

PREDICTING VIABILITY OF MICROORGANISMS IMMOBILIZED IN POLYACRYLAMIDE GEL

Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 3, May-Jun 83 (manuscript received 11 Dec 81) pp 369-371

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[Abstract] Several genera of bacteria (*E. coli*, *Ps. fluorescens*, *Ps. putida*, *B. subtilis*, *Erwinia carotovora*) were exposed to the acrylamide monomer under conditions similar to those under which immobilization in polyacrylamide gel is conducted in order to determine the suitability of such exposure as a predictor of viability of the immobilized cells. Comparison of the viability data for exposure to 6% acrylamide and immobilization in 5% polyacrylamide gel yielded results that were within 10-15% of agreement or better. These observations indicate that exposure of bacterial cells to the acrylamide monomer can serve as an excellent measure of the viability figures to be expected following immobilization in polyacrylamide gel. References 11: 7 Russian, 4 Western,
[002-12172]

DISTINCTIONS OF SEAMEN'S ADAPTATION TO WORKING CONDITIONS AS RELATED TO SETTING STANDARDS FOR MICROCLIMATE IN SHIP LIVING QUARTERS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 6, Jun 83 (manuscript received 20 May 82) pp 15-18

[Article by A. A. Vorob'yev, Institute of Maritime Transport Hygiene, Moscow]

[Text] Aboard modern vessels, 10 to 40% of the crew work in the heated microclimate of engine rooms (ER). For this reason, it can be assumed that adaptation to these conditions of seamen working in ER would lead to a change in their demands for a comfortable microclimate in their leisure hours in the living quarters of the ship. Checking this working hypothesis, which we undertook in this study, is an important factor for determination of the strategy of setting microclimate standards for ship living quarters, in order to validate the need to set differentiated microclimate SN [sanitation norms] for individuals working under different conditions or to confirm the physiological desirability of previously set microclimate SN, differentiated only according to climate zones and seasons (Yu. M. Sten'ko; SN 1184-79).

We solved this scientific and practical problem by separate determination of the comfort zones (CZ) for ER group seamen and "plant" group seamen working in fish-processing shops, where there are no sources of intensive heat emission. The methods used in these studies were the same as we used for validation of existing SN 1184-74.

We determined in both groups of seamen the thermal and general functional state of the organism under naturally formed and experimentally created cabin microclimate conditions after they had spent 30 min in specifically assessed microclimates.

Field study conditions. These studies were conducted at a fishing base in the southern subtropical zone of the Indian Ocean, in the summertime. For 2 weeks preceding the studies and during the study period, the meteorological conditions were close to nominal according to OST [All-Union Standard] 5.5056-71 (t_{dry} 26-27°C, f 68-78%). Cabin microclimate was in the comfort range established for this region (Ye. P. Sergeyev et al.) [t_{dry} 23.0-24.6°C, f 40-60%, y 0.15-0.25 m/s, mean temperature of partitions (Rt) 26.0-25.0°C, resultant temperature ($^{\circ}RT$) 22.2-23.0°]. The microclimate SN for the region of our studies, 23.2° RT was determined from the top of the comfort range in order to stimulate the seamen's adaptation to the hot subtropical region.

During the same period, t_{dry} was 38-42°C and f 48-56% in the ER, t_{dry} was 26-30°C and f 68-78% in the "plant." Noise level was 82-98 dB A in the ER and 68-78 dB A in the "plant," which is typical of ships in general (L. S. Godin and S. S. Markaryan).

Time of exposure was twice 4 h at an 8-h interval for the ER group of seamen and 10 h, with a 1-h interval, for the "plant" group. During the observation period both groups of seamen wore standard clothing (shorts, T-shirts, socks and shirt all made of cotton) with $clo \approx 0.8$. The seamen's diet on No 2 rations was identical and constituted about 3375 kcal.

Methods. Hygienic methods: determination of microclimate parameters according to t , f of air, t of spherical thermometer followed by calculation of R_t and $^{\circ}RT$ according to SN 1184-74.

Physiological methods: taking temperature t of the skin of the forehead, chest, thigh, hand and lower leg followed by calculation of mean weighted skin t (MWST), gradient of chest-leg t (Δt of chest-leg), sublingual t (body t), heat perception (HP) on the 5-point scale of N. K. Vitte (HP for the group was characterized by the mean HP score--MSHP), perspiration (P) "visually," "to the touch" on the adopted 5-point scale (for the group, P was assessed by the mean P score--MSP); pulse (HR/min), blood pressure (maximum and minimum in mm Hg), blood flow time in the lung-ear segment (BF, s), parameters of well-being (W), activity (A), mood (M) according to the SAN test (V. A. Doskin), time parameters of the Platonov-Shul'te test (P-Sh in s), latency period of simple visual-motor reaction (SVMR, in ms).

Statistical methods: reliability of differences between mean physiological parameters was determined by the t criterion of Student, CZ elements were determined by solving regression equations: $Y = a + bX$, where Y is the adopted HP score corresponding to the following: 3.5--top of CZ (TCZ), 3.0--comfort line (CL), 2.5--bottom of CZ (BCZ), X is the sought $^{\circ}RT$ corresponding to CZ elements, a and b are determined from a regression table with values of $^{\circ}RT$ and corresponding MSHP by solving the following system of equations (N. A. Plokhinskiy):

$$\begin{cases} n \cdot a + b \sum_{i=1}^n X_i = \sum_{i=1}^n Y_i, \\ a \cdot \sum_{i=1}^n X_i + b \sum_{i=1}^n X_i^2 = \sum_{i=1}^n X_i \cdot Y_i. \end{cases}$$

where n is the number of pairs (RT--MSHP) in the regression series. The volume of tests for determination of MSHP under concretely assessed microclimate conditions constituted 17-30 interrogations, and 11-17 seamen in each group were screened by other methods under concrete microclimate conditions.

Considering HP as the main indicator of man's thermal state under close to comfortable conditions, we then determine CZ elements on the basis of the data listed in the regression table, by means of the above-mentioned

regression equation, where n is 6 for the ER group and 9 for the "plant" group. After finding the values of a and b from the data listed in the Table and

MSHP for ER and "plant" group seamen under different °RT conditions

ER group		"Plant" group	
°RT (X)	MSHP (Y)	°RT (X)	MSHP (Y)
19,2	2,3	19,0	2,5
21,4	2,0	19,6	2,1
22,2	3,0	20,4	2,6
23,0	3,2	21,8	2,4
24,0	4,2	22,0	3,0
26,4	4,0	23,6	4,0
		24,2	4,0
		24,2	4,6
		26,6	4,0

solving the regression equation, we find the following values for CZ elements: BCZ 20.7°RT, CL 22.3°RT, TCZ 24°RT for the ER group; BCZ 20.2°RT, CL 21.9°RT and TCZ 23.4°RT for the "plant" group.

Under close to established CL conditions (21.9-22.3°RT)--22-22.9°RT, in spite of thermal comfort we found lower forehead temperature in the ER group than "plant," which is attributable to more intensive perspiration and subsequent evaporation of sweat. Intensification of perspiration could be due to increased lability of heat regulation or weakening of resistance of autonomically determined functions, in particular, perspiration (Ya. Kuno) in the ER group and in

both instances under the effect of the heating conditions in the ER. The fact that heart rate (71.5 ± 0.7), well-being (6.1 ± 0.2) and activity (6.3 ± 0.1) indicators were better in the ER group of seamen than in the "plant" group (heart rate 78.5 ± 0.3 , well-being 5.4 ± 0.4 , activity 4.4 ± 0.3), means that the first assumption is preferable.

The longer SVMR time (334 ± 10) and P-Sh test (75.4 ± 6.0) in the ER group than in the "plant" group (SVMR 227 ± 13 , P-Sh 52.5 ± 4.0) may be viewed as the consequence of more intensive effect on them of the noise and vibration factor.

All of the foregoing warrants the belief that a microclimate of 22.0-22.9°RT, which is close to the established CL (21.9-22.3°RT) and previously established CL (21.9°RT) is comfortable for both groups of seamen, while the demonstrated differences in several parameters are due to the distinctions of their adaptation to different working conditions.

In the case of cold discomfort (RT 19.0-19.9°C), a higher body temperature and heart rate (77.5 ± 2.0 /min), lower MSHP and MSP are noted in the ER group than the "plant" group (heart rate 69.8 ± 3.3 /min), which could be attributed to intense heat regulation in response to their more marked perception of cold discomfort and lower heat transfer due to perspiration.

At 21.0-21.9°RT, the ER group of seamen presented a drop of body temperature with increase in MSP and slowing of heart rate to 65.0 ± 0.2 /min, which was indicative of triggering of physical mechanisms of heat regulation. In the "plant" group of subjects, the changes in all parameters were insignificant, in comparison to 19-20.9°RT. As compared to the ER group, at 21.0-21.9°RT the "plant" group presented higher values for MWST and body temperature, which was indicative of blocking of heat-transfer mechanisms against a background of intense heat regulation. The absence of significant differences between physiological parameters at 19.0-20.9 and 21.0-21.9°RT, with concurrent

increase of well-being and mood indicators, indicates that the intense heat regulation does not affect the general condition of the "plant" group of seamen.

In the case of heat discomfort (23.0-23.9°RT) skin temperature, MSHP and MSP increased in both groups. The value of MSHP was closer to the comfort level in the ER group than the "plant" group, probably due to their better adaptation to a hot microclimate. Increase in heart rate to 87.4±1.8/min in the ER group (73±1.8/min in the "plant" group), with insignificant differences in blood pressure (110.7±4.0, 73.5±3.5-123.5±7.0, 74.2±1.0 mm Hg), blood flow time (6.9±0.7-7.7±0.9) and body temperature, is not the result of overheating (MSHP 3.2±0.1), but a manifestation of a more labile stereotype of cardiovascular reactions.

Under RT conditions beyond TCZ (24.0-24.9°RT), both groups presented the expected elevation of skin temperature, MSHP and MSP, with no change in the more stable body temperature. We observed more intensive perspiration in the ER group than the "plant" group, higher forehead temperature and lower chest-leg Δt . Considering the better heat sensation and indicators of well-being and activity (4.5±0.2 and 4.0±0.2, respectively, in the "plant" group, 5.8±0.1 and 4.5±0.5 in the ER group), this was indicative of a more labile heat-regulating reaction in the ER group of seamen to heat discomfort. The effect of more marked adaptation of ER group seamen to high ambient temperatures was also manifested by change in parameter of the P-Sh test, which reflects the ability to concentrate attention.

In the case of cold discomfort and comfort (19.0-22.9°RT), the capacity for concentrating attention was lower in the ER group (P-Sh time 79.6±13.74±4.5 and 75.4±6.0 s) than in the "plant" group (59.3±8.47±0.4 and 52±4.0 s), probably due to the effects of the noise-vibration factor. In the case, however, of heat discomfort (23.0-24.9°RT), the reverse was observed: while P-Sh time was unchanged in ER group seamen (61.8-60.0 s), this indicator rose appreciably in the "plant" group (P-Sh time 72.0±0.5 and 71.0±6.0 s), which could be interpreted as a more unfavorable effect of heat discomfort on the "plant" group of seamen who are less adapted to a hot microclimate (all of the changes in parameters that we analyzed were reliable with $P < 0.05$ and $P < 0.01$).

Conclusions

1. Regular exposure of ER group seamen and, perhaps, seamen in other occupational groups, to a hot working microclimate causes higher values for TCZ in the ER group of seamen (24.0°RT) than the "plant" group (23.4°RT), greater lability of their heat regulation in the presence of both cold and heat discomfort. In the case of heat discomfort, adaptation to a hot microclimate during work results in a better psychoemotional state in seamen who are accustomed to this factor than in those who work in a more favorable microclimate.

2. In spite of the presence of some differences in heat regulation reactions and other systems in seamen referable to different occupational groups

as determined by differences in working conditions, adaptation to such conditions does not have an appreciable effect on formation of differentiated requirements as to a comfortable microclimate. This confirms the physiological validity of the same standards of comfortable microclimate for the entire crew.

The similarity of the established TCZ (23.4-24°RT) to the norm of 23.3°RT (t_{dry} 24-26°C, f 40-60%; V 0.15-0.25 m/s) adopted as the health standard for microclimate (SN 1184-74) for a subtropical region (summertime) confirms the accuracy of this norm.

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CLONING AND STUDY OF THE PRIMARY STRUCTURE OF DNA COPIES OF TICK ENCEPHALITIS VIRUS GENOME FRAGMENTS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 2, Feb 83
(manuscript received 25 Sep 82) pp 276-279

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[Abstract] Cloning and determination of the primary structure of DNA copies of tick-borne encephalitis virus genome fragments (Far East, type 1, strain Sofin) are described. Virion RNA was used to construct recombinant clones containing the DNA copy of the tick-borne encephalitis virus genome fragments. The DNA copy was transformed into double-stranded DNA with the use of *E. coli* DNA-polymerase without adding primer. Hairpin structures on the ends of the double-stranded cDNA were decomposed by S1 nuclease. Oligo-dC-sequences were attached to the ends of the ds-cDNA with the aid of terminal desoxynucleotidyl-transferase from calf liver. A linear form of DNA plasmid pBR322 produced by Pst I with oligo(dG) segments at the ends of the plasmid DNA were used as a cloning vector. The recombinant molecules were transformed by *E. coli* HB101. Clones (360) with phenotype Tc^rAp^s were obtained. Positive clones (187) were selected by hybridization and DNA recombinant plasmids were isolated. Nucleotide sequences of some DNA-inserts hybridizing with ³²P-labelled tickborne encephalitis virus were determined by the Maxim-Gilber method. The diagram of the nucleotide sequence of the DNA-insert of clone No. 131 was presented. This sequence is translatable into an amino acid sequence without interruption. It was noted that, at the 3'-terminus of the insert, there is the sequence ACACACG which is homologous to that observed near the 3'-termini in the replicative form of RNA of the virus Western Nile. References 11: 1 Russian, 10 Western, [655-2791]

PLANT CHARACTERISTICS FROM LUMINESCENCE SPECTRA

Minsk SOVETSKAYA BELORUSSIYA in Russian 17 Jul 83 p 3

[Article by D. Patyko]

[Text] The luminescence spectrum of a plant carries genetic information. This unexpected conclusion, which fundamentally alters the basic principles of selection procedures, has been drawn by Crimean biologists and Belorussian physicists. The entire lifetime of a scientist is not long enough to raise a new plant strain. The experimental plots where each newly-obtained hybrid demonstrates from year to year its right to continue the race occupy enormous areas. There is no other way to do it. It is not possible, having achieved the first progeny after cross-breeding, to say for sure which of the plants has the interesting characteristics. Its prospects are determined by indirect methods--exterior form, number of grains in the spike, the character of its photosynthesis and other indicators. But no one can be sure that it will be resistant, for example, to viruses. This requires special experiments, which means many years before the results are in.

The method of selection proposed by scientists at the Nikitsk Botanical Garden, the M. V. Frunze Simferopol State University and the Physics Institute of the Belorussian Academy of Sciences simplifies the search and shortens it by tens of times. While researchers are bringing the method to completion the selector does not even have to wait for the harvest. It is sufficient to tear off the first green leaf and investigate its luminescence spectrum and all of the interesting properties of the plant will be reflected in it as in a mirror. "The genetic properties are coded by a strictly-defined set of substances, each of which, as has been shown, makes its splash on the graph", says one of the developers of the method, scientific collaborator at the Nikitsk Botanical Garden A. Osipov. "Our main difficulty therefore was to establish a link between the individual lines of the spectrum and the properties of plants. We were able to do this with the aid of a spectral-luminescence device specially developed and constructed for us at the Physics Institute of the Academy of Sciences of the Belorussian SSR. The Belorussian scientists not only taught our specialists to work with this unique apparatus, but also took an active part in the research themselves. Thousands of experiments with known plant strains were carried out by the biologists and physicists before they had developed a means of diagnosing certain selection characteristics. But, having done that, they need only a few minutes to determine the resistance,

let's say, of a new strain of peach tree to viruses. Fruit harvests are occasionally lost as a result of virus diseases. Criteria for the determination of frost resistance, drought resistance, yield and early ripening in the apricot tree and rose bush have also been found, and other investigations are being conducted. With the aid of spectrometry, a scientifically-based light requirement scale has been constructed for forty basic agricultural and decorative cultures. Using these data it is possible, for example, to determine the best planting density for cotton plants or corn, and correctly select plants for the greening of cities. The proposed method is also interesting in that the leaf torn from the plant can...be frozen for any length of time, without any diminution in the quality of the information it carries. This is convenient when the work is being done on rural experimental plots where you can't take a large laboratory instrument. Also interesting is the fact that the investigators have not limited themselves to selection and have tried their method in medical practice. The results of their experiments indicate that here also its application may be very promising.

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CSO: 1840/717

MEDICINES FROM NATURE

Moscow SOVETSKAYA ROSSIYA in Russian 13 Aug 83 p 2

[Article by G. Krylov, Professor and Doctor of Biological Sciences, Novosibirsk]

[Text] Medical people derive many medicines from nature's arsenal. During the 10th Five-Year Plan alone industry acquired more than two hundred new preparations, effective means of treating serious illnesses. They were prepared from plants which everyone is familiar with--everlasting flowers, belladonna, wormwood, dog rose,.. A number of new medications which have been tried in practice are still in the process of being assimilated by industry. And still, natural elixers of health are being used shamefully rarely in practical medicine. Go into any city or rural pharmacy--at best they will offer you one or two dozen such preparations. Or try to buy sea-buckthorn oil--you won't find it no matter how hard you look. It is the rare physician at a rayon hospital who gives his patient even medicines made from local herbs. In the future the demand for medicines made from plant sources will probably increase, since, as medical care improves, certain negative sides to the excessive enthusiasm for "chemical" medicines emerge. The need for non-alcoholic mass-demand tonifying drinks is also growing, and these require specific berries and herbs--"Baikal", "Bodrost'", "Golden Altai", "Sayany", "Limonnik", "Taiga Giant". Several Soviet agencies are occupied with the procuring medicinal raw materials: the enterprises of the republic's Forestry Ministry, Rospotrebyuz (Union of Consumer Societies of the RSFSR) organizations, pharmaceutical boards and pharmacies, and specialized sovkhoses of the medicinal raw-materials trust. Many of these are concerned only with fulfilling procurement plans. This is sometimes done at the expense of the conservation of the basic medicinal raw-material resources, not always within the proper time-limits and not always by the best methods. Pickers sometimes almost totally denude forest glades of St. John's wort, thyme and dog rose thickets, not thinking of the future, not taking any measures to restore nature's reserves. Private individuals barbarically root up valuable plants to sell them on the market. In order that this should not happen it is necessary to organize continuously operating teams of procurers of medicinal raw-materials. They should be guided by manuals and tested technologies for the gathering, drying and storing of plants. They should be required not only to procure but also to restore the exploited areas within the optimal time-periods. The millions of tourists can provide considerable assistance in the procurement of medicinal

raw materials. But they also need to be prepared beforehand. A popular manual with colored drawings of useful plants and methods for collecting them, a color booklet and even a simple sheet of paper with recommendations regarding procurement periods and deposit locations for medicinal raw materials would be of use to them. It would also make sense for the RSFSR State Planning Commission to seriously consider regulating procurement, increasing the volume of medicinal raw materials without damage to their potential sources, and processing them at the proper time. It is necessary to precisely define the regions in which procurement of one or another raw material is best concentrated, including their animal forms (deer antlers and so on) and establish their dimensions and the scope of the restorative work required. It is finally time to properly engage in design and manufacture of special machines and apparatus for the picking of fruits and berries, especially sea buckthorn, berries, currants, fox-berries, cranberries, bilberries and blueberries. Our designers and machine builders, to put it bluntly, are indifferent to this problem, and, due to the lack of workers, it is becoming a stumbling block in many regions in the gathering in of harvests not only on uncultivated lands but also on plantations. A basic strengthening of the processing base of medicinal raw material is needed. Up to now we have not had good desiccators and presses for the creation of bricks from herbs or canning units for the preparation of juices and concentrates, in particular of complex medicinal-nutritive plants--bird cherry, fern... In the Russian Federation there are fewer than fifty specialized sovkhoses growing medicinal raw materials. In Siberia, with its unbounded resources, there are only a handful. And yet it is precisely here that it would make sense to organize a minimum of 10 to 15 farms (especially in the Altay, Kuzbas, in the south of the Krasnoyarsk Kray and the Irkutsk Oblast). Combines with equipment for the canning of medicinal and nutritive plant raw material are also few in number. The All-Union Scientific Research Institute of Medicinal Plants, the departments of many specialized scientific research institutes and botanists in the universities are very timid about including in their research plans the various plant species which have for many years been recognized in folk experience as containing valuable biologically-active compounds. The pharmacological study of plants and their introduction into medical practice is proceeding slowly. Could it be that the researchers engaging in this difficult, painstaking work are mostly still motivated by individual initiative and enthusiasm? Coordination of the research, by the Academy of Medical Sciences and the USSR State Committee on Science and Technology, is weak. The current interbranch council of the All-Union Council of Scientific and Technological Societies is insufficiently active. Yet this is a problem the solution of which could give the country products worth several billion rubles, a matter of the creation of an abundance of extremely necessary natural medicines, vitamin drinks, juices, concentrates and food seasonings, on which the health and spirit, and ultimately the efficiency, of millions of Soviet citizens to a large extent depends.

12344

CSO: 1840/717

UDC 547.996,02:594.96

STRUCTURE OF HOLOTOXIN A₁ (STICHOPOSIDE A), BASIC TRITERPENE GLYCOSIDE OF
PACIFIC OCEAN COMMERCIAL HOLOTHURIAN STICHOPUS JAPONICUS SELENKA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 2, Feb 83
(manuscript received 8 Sep 82) pp 280-281

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[Abstract] A glycoside isolated from sea cucumber *Stichopus Japonicus Selenka* collected in Peter the Great Bay near Vladivostok was found to have a different structure than that reported for sea cucumbers collected along the shores of Japan. The structure is; 3 β -O-[-2-O-[β -3-O-methyl -D- glucopyranosyl-(1-3)- β -D-xylopyranosyl-(1-4)- β -D-quinovopyranosyl]-4-O-[β -3-O-methyl-D-glucopyranosyl-(1-3)- β -D-glucopyranosyl-(1-4)] - β -D-xylopyranosyl}-holosta-9(11),25(26)-dien-3 β -ol-16-one. References 11; 5 Russian, 6 Western.
[655-2791]

UDC 591.1

NEUROPHYSIOLOGICAL PRINCIPLES OF NARCOSIS: GENERAL AND SELECTIVE EFFECTS
OF NARCOTIC AGENTS ON NEURONAL STRUCTURES OF CNS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian
No 3, May-Jun 83 (manuscript received 20 Jun 82) pp 432-439

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[Abstract] The goal of the present study was to compare the functional states of the brain and its morphological structures under different types of narcosis. The state of CNS was studied by electrocorticography; to evaluate various neurons, a histochemical method was used; to determine cellular glycogen levels its histotopographic distribution was studied using a stereotactic atlas of a rat's brain. The studies were done on white male rats;

thiopental, medinal, hexenal, nembutal and sodium oxybutyrate were administered sc, while ethyl ether was given through a mask. The results have shown that the selectivity of their effects on the brain structures responsible for pain reaction and on the dopaminergic, adrenergic, serotonergic, etc., structures were relative, being manifested on the background of the functional states being altered in all neuronal brain structures. Analyzing the data in terms of modern concepts of neurophysiological mechanisms of narcosis it was concluded that the state of narcosis is a result of functional reorganization of integrative activity of CNS. Some of these phenomena are general for all types of narcotic agents, and at the same time specific for each individual one. Figures 2; references 35: 26 Russian, 9 Western, [663-7813]

UDC 612.822.3+612.821.6

EFFECTS OF DIAZEPAM (SEDUXEN) ON CORTICAL POTENTIALS (P_{300} WAVE) EVOKED BY NEUTRAL AND 'EMOTIONAL' WORDS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 33, No 3, May-Jun 83 (manuscript received 8 Jul 82) pp 449-455

KOSTANDOV, E. A., ARZUMANOV, Yu. L. and ZAKHAROVA, N. N., All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, Moscow

[Abstract] The effects of diazepam (Seduxen) on cortical potentials evoked by neutral (lamp, summer, book, etc.) words and those with emotional connotations (arrest, guilt, court, etc.) were investigated in 18 males, 22 to 42 years old, undergoing forensic psychiatric examination. Evaluation of the latent period and voltage of the P_{300} wave showed that the response to a visual presentation of a neutral word consisted of a 328.0 ± 5.4 msec latent period in the left occipital area, and a 297.0 ± 2.7 msec latency on the right side, a statistically significant difference ($P < 0.001$). Administration of diazepam (10 mg, i.m.) prolonged the latent period in the right hemisphere, without affecting the left hemisphere, to the point where there was no significant difference. Diazepam had no effect on the voltage in response to neutral words. The latent periods in response to emotional words on the left and right side were, respectively, 267.0 ± 5.9 msec and 298.0 ± 5.7 msec; marked prolongation of the latencies was seen in both hemispheres ($P < 0.001$) with diazepam, and was more pronounced on the left occipital side. In addition, diazepam reduced the elevated amplitudes in the right and left hemispheres seen with the emotional words. These findings underscore the differences in response of the cerebral hemispheres to emotionally-charged verbal stimuli, and the diminution of this difference by the minor tranquilizer under study. Figures 4; references 9: 7 Russian, 2 Western. [003-12172]

PUBLIC HEALTH

IMPROVEMENTS IN ARMENIAN MEDICINE

Moscow TRUD in Russian 19 Jun 83 p 2

[Commentary by E. Gabriyelyan, ArSSR Minister of Health]

[Text] Today is Medical Worker's Day. Reception on Tuesdays. The achievements of Soviet public health are well known. However there is still much to do to improve the quality of workers' medical care. This was discussed at the June (1983) Plenum of the CPSU Central Committee. Particular emphasis was given to the prevention of illness and the introduction of yearly preventive check-ups for the population. The letter, published below, from a worker, with comments from the Minister, discusses what is being done in this area in Armenia.

Several years ago we performed the following experiment: we asked workers, physicians and shop and section heads what most hinders the improvement of the organization of medical care. It turned out to be going to the clinic. It frequently happens that physicians at the medical department [medsanchast] need to consult a specialist. The patient sometimes needs special treatment which cannot be given at the medical department. These questions were widely discussed not only at our plant but also by the republic committee of the medical workers' union. And then the medical people decided to come out with an interesting initiative which permitted, on a social basis, without additional funds, an improvement in the medical care of workers and employees directly at the factory,

Every Tuesday the best specialists in the Yerevan clinics begin their working day at our medical department. Our physicians prepare their patients for consultation on this day. They set the reception time beforehand and prepare the required findings and analyses. The reception is conducted by specialists who are well-known in the republic, such as professors R. Stambol'tsyan, S. Galstyan, F. Drampyan and A. Midoyan, and associate professors A. Stepanyan, N. Gzgzyan and others.

This method of organization has permitted not only a high level of treatment, diagnosis and prevention and the solution, without delay, of problems associated with putting patients in the specialized clinics where our chiefs work, but also raises the professional level of the physicians in the medical department.

At our factory we are well acquainted with Doctor of Medical Sciences, and Professor F. Drampyan, who is, on a public basis, the chief physician of the consultative polyclinic of our medical department. He and his colleagues are with us not only on "Professors' Tuesdays". They organize scientific and practical conferences for the factory physicians, give reports and hold discussions in the shops and participate in the "health patrol's" raids and in the work of various union committee commissions.

A yearly report is compiled at the factory on the health of the labor collective, This document, in the compilation of which dozens of interested parties participate--physicians and factory committee and administration representatives--illustrates never before as well, the idea, that, in the conditions of modern production, only a multifaceted approach to workers' health care, well thought-out and systematic work, can be successful. Study of working conditions and the influence of harmful factors on the health and well-being of man, as well as concern regarding living conditions and relaxation, are the center of the factory committee's and medical section's attention, who consider that their primary task is to bring medical care to the factory.

In this regard we have done a great deal. Beside the polyclinic, which is fully equipped and staffed by good specialists, its shop sections operate in the factory, permitting treatment and prevention to be conducted. The Arzni health resort has a prophylactorium and pension [inn] which can take within a year practically everyone who needs treatment of cardiovascular and gastrointestinal disorders.

As compared to the last five-year plan more than ten thousand man-days have been saved at our factory. Instances of illness have decreased by almost a thousand, to say nothing of the fact that there have been no cases of occupational disease at all. [Letter by V. Akopyan, electrical fitter at the Erevan Tire Factory, member of the factory committee commission on social insurance.]

[Commentary by E. Gabrielyan, ArSSR Minister of Health]: Begun as an experiment, this form of bringing medical care to the work place has become firmly established. Major public health officials have become direct participants in the great work of public health and carry out at industrial enterprises not only preventive but also practical activities, acquainting their colleagues from the factory medical departments with the latest scientific and clinical achievements.

The "Professor's Tuesday" is not the only measure which is being undertaken in the republic within the framework of the program for improving medical care. In order to bring highly qualified medical assistance to the population, and, in particular, to the factory, a fundamentally new form of consultative assistance has been organized in the republic--"open door days". On Saturdays at all Yerevan clinics professors, assistant professors and leading specialists hold consultations with all auxiliary services operating. Any inhabitant of the city, as well as any visitor, may attend them. Fifteen thousand people have attended such consultations over the last three years. Twenty-five percent of these were hospitalized.

Practice has shown that 50 percent of the patients hospitalized on "open door days" are inhabitants of rural regions. Based on this fact, the republic's Ministry of Health together with party and union organizations has developed yet another efficient form of operation--the "public health week". On specific days, groups of highly qualified specialists travel out into the republic's rayons, where for five days they hold consultations in the polyclinics of industrial enterprises and at kolkhozes and building sites, read reports, give lectures and perform demonstration operations. All dispensary patients are examined. In only three years more than nine thousand workers have received consultative medical assistance in the republic's rayons.

In fulfilling the resolution of the CPSU Central Committee and the USSR Council of Ministers "On Further Measures to Improve Public Health Care", together with party, soviet and union organizations we are continuing improvements in this direction. The enterprises' collective agreements include points for the fulfillment of which not only the leaders of the enterprise but also medical people are specifically responsible. Surprise visits are systematically conducted to check the sanitary conditions at apartment blocks, plants and cafeterias, to check the delivery of medicines to the homes of invalids, veterans of labor and of the Great Patriotic War, and to speed up the inclusion of computers in the social management system in order--more precisely and efficiently--to supply the population with medicines.

12344

CSO: 1840/614

MINISTRY OF HEALTH CONFERENCE IN MOSCOW

Moscow MEDITSINSKAYA GAZETA in Russian 24 Aug 83 p 1

[Unsigned article: "High Requirements, Great Tasks, Expanded Conference of the collegium of the USSR Ministry of Health"]

[Text] Yesterday in Moscow an expanded session of the collegium of the USSR Ministry of Health took place. The health ministries of the union republics, heads of kray, oblast, city and rayon health departments and chairmen of the republic committees of the medical workers' union, directors of leading scientific research institutes, rectors of higher institutes of learning, head physicians of preventive-medical institutions and representatives of departmental health services participated. Problems faced by public health organs and institutions in fulfilling the resolutions of the June, 1983 Plenum of the CPSU Central Committee were discussed.

P. P. Shirinskiy, assistant director of the Department of Science and Educational Institutions of the CPSU Central Committee, and A. P. Biryukova, secretary of the All-Union Council of Professional Unions, took part in the collegium's work.

A report was read by USSR Minister of health S. P. Burenkov. He emphasized that the June, 1983 Plenum of the CPSU Central Committee and the speech given at the Plenum by General Secretary of the CPSU Central Committee, comrade Y. V. Andropov are a major contribution to the theory and practice of socialist construction and give a deep understanding of the current situation and prospects for the advance of our society, the main goal of which is concern for Soviet man, the betterment of his life, the preservation of world peace and the building of communism. At the present time, when the efforts of the Party and people are concentrated on realizing the tasks of the systematic and comprehensive development of the Soviet State, the qualitative level of public health should correspond to the high requirements of the day.

The public health organs are carrying out a wide complex of measures directed toward improvement of the health care of the population in accordance with the resolutions of the 24th CPSU Congress pursuant to the Plenums of the CPSU Central Committee, and in accordance with the decrees of the CPSU Central Committee and the USSR Council of Ministers "On Measures for the Further

Improvement of Public Health Care" (1977) and "On Further Measures to Improve Public Health Care" (1982).

The minister reported on results of work on improving primary public health units, increasing the quality of hospital care, improving nursing care, educating Soviet citizens to be conscientious in maintaining and improving health. At the same time the minister noted that the level of work of organs and institutions concerned with public health and medical care still does not correspond to the requirements for public health established by the June Plenum of the CPSU Central Committee.

The report paid special attention to further work on the prevention of disease and the introduction of yearly health check-ups (dispensarization) for the entire population. Check-ups should be regarded as a basic means to increase the quality of medical care and improve public health.

The report read by USSR Minister of Health S. P. Burenkov will be published in one of the coming issues of this newspaper.

The project entitled "Programs to Provide Health Check-ups for the Entire Population", developed by the USSR Ministry of Health, was reported on by O. P. Shchepin, first deputy to the USSR minister of health.

Taking part in the discussion of the report were the president of the USSR Academy of Medical Sciences N. N. Blokhin, first deputy to the minister of Medical Industries A. G. Sorokin, RSFSR Minister of Health N. T. Trubilin, Minister of Health of the Ukrainian SSR A. Ya. Romanenko, Minister of Health of the Belorussian SSR N. E. Savchenko, Minister of Health of the Latvian SSR V. V. Kanep, Minister of Health of the Uzbek SSR A. M. Khudaybergenov, director of the Main Public Health Administration of the Executive Committee of the Moscow City Council of Workers' Deputies (Mosgorispolkom) L. A. Vorokhobov, rector of the Tbilisi Medical Institute K. S. Virsaladze, head physician of the Sen'kovsk Uchastok hospital of the Dmitrovskiy Rayon of Moscow Oblast R. N. Sergeyeva, head physician of the Alma-Ata children's polyclinic No. 2, G. V. Chernysheva, head physician of the Zhezhmarsk ambulatorium of the Kayshyadorsk Rayon of the Lithuanian SSR A. P. Shumskene and other heads of ministries, agencies and institutions.

The speakers emphasized the importance of a new stage in the development of Soviet public health care and noted the measures being taken in situ to improve the quality and raise the sophistication of the medical care of the population, to improve the organization of primary public health links--polyclinics, first aid and emergency care institutions, and rural hospitals and ambulatoria, and to utilize more effectively and rationally the resources devoted to public health care.

The resolution issued by the collegium defined measures to raise the qualitative level of public health care and to put into effect the tasks posed in this area by the November, 1982 and June, 1983 Plenums of the CPSU Central Committee.

12344

CSO: 1840/634

RAYON HEALTH CARE

Moscow MEDITSINSKAYA GAZETA in Russian 24 Aug 83 p 2

[Article compiled by MEDITSINSKAYA GAZETA correspondent A. Lepekhin:
"There Are Strengths and Reserves, Comments Kirishi Gorispolkom
Chairman N. Drobyazko"]

[Text] Concern about people's health is a very important social task, the rule in the socialist way of life, and the law of our society. This was emphasized with new vigor at the June 1983 CPSU Central Committee Plenum, in the speech of Comrade Yu. V. Andropov,

The constant attention paid to the health of every individual, particularly every Soviet citizen--this, as I see it, is the significance of the system of annual check-ups (dispensarization) for the entire population.

The rayon's health care personnel already have such experience, and they are, you might say, not starting from scratch.

But universal check-ups are not just the business of physicians. Soviet organs, trade union organizations, and managers of enterprises must be actively included in the work. The rayon also has experience of this sort of cooperative action. Suffice it to say that many public health projects have been built on the funds of our enterprises. These include the stomatological polyclinic, the polyclinic of the central rayon hospital, and the first aid [skoraya pomoshch] station. Business organizations have obtained equipment for a radiological laboratory, a six-bed system of ward observation in the department of resuscitation, and other expensive medical equipment. Last year alone, two of our largest enterprises allocated more than 100,000 rubles to medical personnel for purchasing various treatment and diagnostic equipment. Sovkhozes too are helping rural health care as much as they are able.

But the material support, of course, is not limited to the ties between the central rayon hospital and other organizations and enterprises. The gorkom bureau and the city ispolkom have, more than once, discussed at their meetings questions relating to the development of public health. And in our everyday work, we keep a close watch on the processes which go on in the rayon health service.

I cannot help feeling joy and satisfaction when I see kindergarten children, in all sorts of weather, dressed in light sports clothing, doing calisthenics outside. The strong, fighting contingent grows up into members of the Kirishi Komsomol--the builders through whose efforts the rayon firmly holds first place in the oblast with regard to the development of physical culture and sports.

For their concern about children's health we must thank our physicians, feldshers, and nurses. From the heart we salute the leaders in health care, who include six physicians of the highest qualification category and 39 of the first category.

But not only successes are observed. The hospital is experiencing difficulties in resolving the cadre problem. Last year alone, through the action of the city council ispolkom, more than 50 physicians and over 100 mid-level medical personnel were sent to the rayon. We were able to bolster the pediatric and therapeutic departments, bringing them up to the norm. And this is a big reserve for prevention, increased effectiveness, and implementation of the check-up system.

But last year, 27 physicians and 49 specialists with secondary education left their jobs at hospitals, polyclinics, and outpatient clinics of the rayon. And so we say to the leaders of the central rayon hospital; work harder with people, try to get them interested, show your concern about improving their working and living conditions, make wider use of the rights given to you by the Labor Collective Code and the recent decrees of the CPSU Central Committee, USSR Council of Ministers, and AUCCTU concerning the strengthening of discipline.

In short, our joint work to improve people's health care still has a number of unresolved problems, but we have sufficient work experience, sufficient powers and resources to solve these problems and carry out the assigned tasks.

12255

CSO: 1840/635

BRIEFS

UNMERITED MEDICAL PRIVILEGE--The reader's opinion. Unmerited privilege. Is it correct that medical aid be given to drunkards free of charge? One I. Minenkov, A. Kemerovo railroad worker, having imbibed to the point of losing consciousness, during performance of his occupational duties, fell under a train. For nine days, physicians of the reanimation section fought for his life. For a month and a half after that he lay in an ordinary hospital ward, and after discharge remained on the sick list until complete recovery.

Let us now add up the cost to the state of preserving his health. For medication alone, 550 rubles were spent (we note, in passing, that, on the average, for the treatment of an ordinary hospital patient, the cost for the same length of time is 135 rubles). Then there's nursing care, feeding, physicians' labor... The total is more than a thousand rubles! We are not even considering the fact that, for more than two months someone had to fill in for this malicious violator of labor discipline who had had an accident which was his own fault. So that his unpaid medical certificate is small comfort...

We have become accustomed to such concepts, intrinsic only to a socialist society, as free education and free medical care. But, unfortunately, we rarely note that these things are free only for the individual--the student, patient, etc. For society, they are expensive--they cost billions of rubles and are paid for by the difficult labor of those who produce material values.

Take, for example, the Kemerovo "First Aid" [Skoraya pomoshch] station: every day its teams bring 20 to 25 victims of the "green snake" [booze] to the hospital. And each "first aid" excursion costs nine rubles on the average. Each fifteenth flight of medical aircraft also involves the treatment of this category of victim. And one hour of flying time costs 130 rubles for an AN-2 aircraft and 530 rubles for an MI-8 helicopter. We recently calculated and ascertained that the state spends more than 100 thousand rubles per year in our city for the transportation of alcoholic patients alone!

But even more is spent for treatment. For example, last year in three departments of our hospital alone (trauma, neurotrauma and poisoning) 1,460 people were treated whose illnesses were preceded by drunkenness. They occupied hospital beds a total of more than 15 thousand days. Dozens of physicians and nurses spent more than one sleepless night saving drunkards'

lives and health. And the government's expense for these 1,460 people exceeded 150 thousand rubles.

At times we are forced to put beds in the corridor because of patient overflow, and at the moment there is a drunkenness-related trauma case in the ward. The "First Aid" service is out helping a victim of drunkenness and...because of this is late for the next emergency call. This is distressing and shameful...

But we are in no way advocating that care for such victims should be restricted. A patient is a patient, and physicians always do their duty honestly in all cases, whatever they may be thinking. It is what physicians think that we are speaking of here.

Is it just or humane to society, to honest workers, that they, essentially, bear the expense of the medical care and treatment given to drunkards? You see, if the sufferer ends up at a medical sobering station, he pays in full for all of the care received to bring him back to normal. Why, then, is treatment given free of charge to a patient who has been traumatized or poisoned as a result of drunkenness?

We are aware that self-supporting trauma departments for this type of patient have been created in certain cities as an experiment. If you got your injury in an inebriated condition--kindly pay for your treatment. However, it is far from possible to provide such premises, or their staffs, everywhere.

We consider as timely and entirely acceptable the proposal which many physicians, union representatives and industrial workers have made: that is should become required by law that all forms of medical assistance given to persons injured as a result of drunkenness be charged to those persons directly. This money could be used for the further strengthening of the material facilities of the medical establishments. We estimate that for the funds spent last year for the treatment of drunkenness-related disorders in our oblast alone another major hospital could be built. Thus, the introduction of medical care requiring payment for such patients will be, we are convinced, a just measure in all respect. [By. V. Kostyuk, head physician of the Kemerovo Central City Clinical Hospital, and V. Afanas'yev, director of the poisoning treatment center] [Text] [Moscow TRUD in Russian 24 Jul 83 p 2 (24)] 12344

BRIEFS

SCIENTIFIC AND TREATMENT CENTER--In the Moscow Urology NII [Scientific Research Institute], a unique medical complex has begun to operate. In this contemporary complex equipped to the last word with medical equipment, everything has been foreseen for effective performance of extensive research, for therapy and for active rest of patients. In the departments and laboratories, the most complex computer systems have been installed and diagnostic equipment has been completed; they are capable, in just minutes, to produce data on almost any parameter of a patient's condition. "We have produced an excellent scientific complex with a therapeutic foundation," says Nikolay Alekseevich Lopatkin, director of the Urology NII and academician of the USSR Academy of Medical Sciences. "This is very significant for the development of our urology, the development of new methods of diagnosis and treatment and, also, prophylaxis of various illnesses. There will be, for example, the possibility to study and develop in more detail the newest methods of prophylaxis and therapy of many inflammatory illnesses which lead to kidney insufficiency. In the biochemical laboratory we will closely study litholysis--the problem of dissolving stones in human organs. Possibilities of the bacteriology laboratory and immunology have been expanded greatly (sensitivity and perfection of equipment here are so high that they are able to perform an analysis on a billionth percent of protein). [Text] [Moscow IZVESTIYA in Russian 29 Jul 83 p 3] [Article by G. Alimov] 12473

NEW METHOD FOR SIGHT RESTORATION--In the Institute of Experimental Medicine of the USSR Academy of Medical Sciences, unique work has been conducted under the direction of N. P. Bekhtereva, academician of the USSR Academy of Medical Sciences. For the first time in the world, a new method of restoring sight with electric stimulation of the optic nerve by very fine electrodes inserted into it. The procedure has been worked out and introduced into clinical practice. The use of electrodes has become a reliable and effective means for treating blind people and those with poor vision. Basically, the method developed at the institute is used for atrophy of the optic nerve, when treatment with medicines and surgical intervention do not give results. [Text] [Moscow KOMSOMOL'SKAYA PRAVDA in Russian 13 Aug 83 p 4] 12473

CSO: 1840/624

POSSIBILITIES FOR USING EPIDEMIOLOGICAL METHOD AND SOME RESULTS OF POPULATION STUDIES OF SCHIZOPHRENIA

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian
Vol 83, No 5, May 83 (manuscript received 2 Jul 82) pp 707-716

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[Abstract] Clinical epidemiological studies reveal new approaches to the fundamental processes occurring in schizophrenia. In a pooled study of 5073 patients hospitalized with the condition the occurrence of schizophrenia was 8.24 per 1000 general population. Mildly progressive and paroxysmal forms were most prevalent, contradicting concepts of schizophrenia as a severely progressive condition. Length of hospitalization was 9.8% of total disease duration. The juvenile pernicious type was more common in males, while the recurrent was more common in females. In addition, 1461 patients in Moscow suffering from paroxysmal schizophrenia for 15 years or more were studied. About one-third had only a single incident during the 15 years; 70% had three or less. Mild personality changes during the first remission were correlated with a greater risk of repeated incidents. The more severe the personality defect in the first remission, the less the probability of frequent relapses. Moderately severe defects were seen in 70% of cases after the first episode and 90-95% of these remained at the same level in subsequent remissions. Those patients with mild personality changes after the first episode experienced progressively more severe defects after subsequent relapses. In contrast, more severe productive symptoms correlated with low relapse probability. The clinical form of the disease was retained in subsequent cycles. References 24: 20 Russian, 4 Western.
[650-12126]

INFLUENCE OF STIMULUS INFORMATION CONTENT ON EVOKED POTENTIALS IN HUMANS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 33, No 3,
May-Jun 83 (manuscript received 2 Feb 82) pp 514-521

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[Abstract] Investigations were conducted on 27 men and women, 18 to 20 years old, to determine the effects of various visual stimuli (checkerboard, image of house, word "house") on the evoked potentials of the occipital and posterior temporal areas. In each of the subjects the stimuli evoked multicomponent potentials on the basis of which histograms were constructed of the distribution of the maxima of the positive and negative components. The histograms were compared by means of the Brandt-Snedecor formula. Fragments of the histograms were isolated in which differences in the evoked potentials were at a maximum; all such fragments fell into the 0 to 250 msec range. Reproducibility of the evoked potential waveforms depended on the stimulus and recording region. The most stable waveforms were obtained in the occipital and posterior temporal regions of the left hemisphere with the checkerboard and the house image stimuli, while the derived discrimination indices underscored the importance of the stimulus information content on the evoked potentials in these areas of the left hemisphere. Figures 2; references 17: 8 Russian, 9 Western.
[003-12172]

UDC 577.391:547.963.3:576.8

DNA-MEMBRANE INTERACTIONS IN BACTERIAL CELLS AFTER GAMMA-IRRADIATION

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 1, Jan-Feb 83
(manuscript received 17 Nov 81) pp 3-8

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USSR Academy of Sciences, Pushchino

[Abstract] Experimental results are reported of the effect of ionizing radiation on DNA interaction with bacterial cell membranes in *E. Coli* and *Bac. subtilis* species. It was shown that along with gamma-radiation-induced breaks in the DNA strands, disturbance of the DNA-membrane interactions in bacterial cells leads to relaxation of the nucleotide. Dissociation of DNA-membrane bonds is due to the disturbance of the structure of cell wall plasmatic membrane. Along with dissociation of DNA-membrane bonds, a DNA-membrane complex (DMC) is formed in the postradiation period which differs from the DNA-membrane contacts in the intact cell by its resistance to oxalic acid which inhibits replication of DNA. It is possible that formation of this type of DMC creates conditions for reparation of gamma-induced DNA damage. Figures 4; references 19: 5 Russian, 14 Western.
[665-7813]

UDC 577.391

COMPARATIVE ANALYSIS OF EFFECT OF ALKYLATING AGENTS, IONIZING AND UV RADIATION ON MAMMALIAN CELL PROGRESSION THROUGH ITS MITOTIC CYCLE. COMMUNICATION 2. EFFECT OF GAMMA-RAYS AND N-METHYL-N'-NITRO-N-NITROSOGUANIDINE ON DNA SYNTHESIS IN HeLa CELLS

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 1, Jan-Feb 83
(manuscript received 27 Oct 81) pp 44-49

BELOSTOTSKAYA, G. B. and MALINOVSKIY, O. V., Leningrad Institute of Nuclear Physics, USSR Academy of Sciences, Gatchina

[Abstract] An attempt was made to compare the total damage due to an alkylating agent N-methyl-N'-nitro-N-nitrosoguanidine (MNNG) administered

at different concentrations and different doses of gamma-radiation in the G₁ phase with the inhibition of DNA synthesis of HeLa cells. Lower concentration (1 µg/ml) of the alkylating agent showed weaker inhibition of the DNA synthesis than the 2 µg/ml dose. When cells were exposed to gamma-rays at 50 Gy dose, only an insignificant delay was noted in DNA synthesis; at 200 Gy dose a definite inhibition of DNA synthesis was observed with longer replication period, resembling the behavior seen with the 2 µg/ml dose of MNNG. It would appear that elongation in DNA synthesis over a damaged matrix was affected. When exposed to UV, the cells showed a similar effect but with considerably higher level of primary damage to DNA. Figures 3; references 25: 2 Russian, 23 Western.
[665-7813]

UDC 577.391:591.473

USE OF HELIUM-NEON LASER TO STIMULATE REGENERATION OF SKELETAL MUSCLE DAMAGED BY IONIZING RADIATION

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 1, Jan-Feb 83
(manuscript received 29 Jun 81) pp 50-53

POPOVA, M. F., BULYAKOVA, N. V. and AZAROVA, V. S., Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences, Moscow

[Abstract] Therapeutic effect of transplantation of regenerating muscular tissue combined with helium-neon laser radiation was studied on skeletal muscles of white male rats exposed to 20 Gy X-rays. Four experiments were carried out: cross-cutting of the muscle without radiation exposure (control); same damage with exposure to 20 Gy X-ray, same cross-cut with X-ray exposure followed by transplantation of minced muscular tissue into the affected area, and the same cross cut/X-ray regimen followed by laser therapy. Both the transplantation of regenerating muscular tissue and laser therapy showed similar therapeutic effect. It was concluded that the basis of this stimulating effect is the same: it is the ability to eliminate results of the X-radiation trauma. Figures 1; references 15: 12 Russian (1 by Western authors), 3 Western.
[665-7813]

INCREASED RADIOSENSITIVITY OF DNA PRETREATED WITH REDUCED NITROIMIDAZOLES AND NITROFURANS

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 4 Nov 81) pp 291-295

ODINTSOVA, S. P. and GONIKBERG, E. M., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Supercoiled DNA from phage PM2 and murine hepatic DNA were used to study the radiosensitivity to ionizing radiation of DNA pretreated with xanthine oxidase or sodium dithionite-reduced nitroimidazoles (NI) and nitrofurans (NF) under anaerobic conditions. The results showed the formation of single-strand breaks in both species of DNA as a result of exposure to the reduced NI and NF derivatives, and a marked increase in the number of such breaks following irradiation. The number of single-strand breaks seen with the reducing agents alone or with the unreduced radiosensitizers without irradiation was negligible. Double-strand breaks were seen in the hepatic pretreated DNA after irradiation, but not in the supercoiled DNA. Figures 2; references 15: 2 Russian, 13 Western,
[667-12172]

UDC 597.391;577.15;547.963.3

MECHANISM OF SECONDARY POSTIRRADIATION DEGRADATION OF DNA IN THYMOCYTES OF IRRADIATED RATS

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 8 Feb 82) pp 302-306

IVANNIK, B. P. and RYABCHENKO, N. I., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] Studies were conducted on the enzymatic mechanisms of secondary postirradiation DNA degradation in thymocyte homogenates of irradiated (9 Gy γ -quanta; ^{60}Co ; 0.5 Gy/min) outbred rats. Comparison of viscosimetric and spectrophotometric evaluations of alkaline endonuclease activities showed that the former technique measures the activities of several alkaline endonucleases, including that of DNAase, I, while the latter determines activation of DNAase I only. The increase with time of acid-soluble products was due to the temporal increase in activity of the alkaline endonucleases, including DNAase I, and degradation of single- and double-stranded DNA molecules and was not due to the synthetic accumulation of such products. Figures 2; references 20; 11 Russian, 9 Western.
[667-12172]

THEORETICAL ANALYSIS OF PHOTOREACTIVATION OF γ -IRRADIATED E. COLI

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 9 Jan 82) pp 307-311

PITKEVICH, V. A., DUBA, V. V., MYASNIK, M. N., PETROVA, I. V. and
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[Abstract] A mathematical analysis was made of the photoreaction factors in the case of thymidine dimer formation in E. coli subjected to γ -irradiation in a transparent solution. Analysis of the volume factors, energy of radiation, and the energy attenuation and absorption coefficients, as well as the wavelength spectrum of attendant Cerenkov radiation of previously published experimental studies (Myansnik, M. N., et al., Int. J. Rad. Biol., 31(1):95, 1977; 37(1):81, 1980) indicated that most of the dimers were formed as a result of Cerenkov radiation. For more definitive conclusions regarding the involvement of Cerenkov radiation in the formation of thymidine dimers following exposure to ionizing radiation, further studies will have to be done to define the light yield and its wavelength in relation to attenuation and absorption coefficients. Figures 2; references 25: 8 Russian, 17 Western. [667-12172]

UDC 577.391:577.17

EFFECTS OF HORMONES AND γ -IRRADIATION ON FREE RADICALS AND METAL ION
PARAMAGNETIC CENTERS IN RAT TISSUES

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 4 Aug 81) pp 312-317

MARKEVICH, L. N., KOLOMIYTSEVA, I. K., KAYUSHIN, L. P. and AZHIPA, Ya. I.,
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[Abstract] Studies were conducted on the relationship between metabolic uniqueness and the effects of gamma-irradiation (8-16 Gy) which showed that at this level irradiation had no effect on the number of paramagnetic centers of heme ($g = 2.42$, $g = 2.25$) and nonheme ($g = 1.94$) iron in the tissues of the Wistar rat. Five minutes after 16 Gy irradiation the free radical concentration fell markedly, while a combination of gamma-irradiation (8 Gy) and ubiquinone-9 (70 mg/kg) also decreased the number of ESR signals of the frozen tissues. Administration of methyltestosterone to the male rats resulted in a 30% increase in the free radical concentration of the heart but had no effect on the other tissues. The free radical concentration of the liver, kidneys, and spleen fell by 30-40% 28 days after castration, while the concentration in the heart remained unaffected. It is evident that the free radicals and paramagnetic centers are convenient parameters on the basis of which to evaluate

biostructural changes in the different tissues induced by irradiation.
Figures 3; references 15: 6 Russian, 9 Western.
[667-12172]

UDC 577.391

ENHANCEMENT OF BIOLOGICAL EFFECTS OF IONIZING RADIATION. PART 11.
COMPARATIVE EVALUATION OF RADIOSENSITIZING EFFECTS OF METRONIDAZOLE ON
NEONATAL AND MATURE RATS

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 12 Apr 82) pp 323-327

VINSKAYA, N. P., VYGODSKAYA, A. L., ZHURBITSKAYA, V. A., IVE, B. Z. and
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Medical Sciences; Scientific Research Institute of Experimental Tumor
Diagnosis and Therapy, Moscow

[Abstract] Experimental studies were conducted on the therapeutic effective-
ness of metronidazole, a radiosensitizing agent, in mature (2-3 months)
hypoxic (5% O₂ + 95% N₂ or 7% O₂ + 93% N₂) (CBA x C57Bl)F₁ mice and in
hypoxic and anoxic (100% N₂) neonatal (24 h) mice subjected to gamma-irradiation
(6.5 Gy/min; 6.9-17.2 Gy; ¹³⁷Cs). The animals were exposed to the hypoxic
or anoxic mixture for 1 min before irradiation and during irradiation, with
the mortality rate followed over the subsequent 30 days. The results showed
that metronidazole (1 mg/g, s.c. or i.p), given 20 min prior to inhalation
of the hypoxic or anoxic mixtures, was most effective as a radiosensitizer in
the animals rendered anoxic or hypoxic vis-a-vis control (normoxic) animals,
with the effectiveness decreasing as the O₂ concentration of the inhalation
mixture was increased. The drug was less effective in neonates adapted to
oxygen deficiency than in mature animals. In the case of tumor therapy the
efficacy of metronidazole can be expected to be affected by the relative
number of hypoxic cells. Figures 1; references 10: 2 Russian, 8 Western.
[667-12172]

RADIOPROTECTIVE EFFECTS OF GAS HYPOXIC MIXTURE GGS-10 IN FRACTIONAL IRRADIATION OF RAT AND HUMAN SKIN

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 10 Dec 81) pp 358-362

STRELKOV, R. B., CHIZHOV, A. Ya., TOKAREV, O. Yu., TOLSTYKH, V. N. and KUCHERENKO, N. G., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] Studies were conducted on the protective effect on the skin that inhalation of a hypoxic gas mixture (10% O₂ + 90% N₂; GGS-10) might have on exposure to fractionated doses of gamma-irradiation. Experimental studies on Wistar rats demonstrated that administration of GGS-10 for 5 min before and during irradiation for a cumulative dose of 66 Gy (16.8 Gy/min) over a 5 day period significantly reduced the incidence and duration of radiodermatitis. Similarly, studies on volunteers and oncologic patients demonstrated that inhalation of GGS-10 for 5 min prior to and during irradiation with fractionated doses for a total dose of 43.9-51.0 Gy per field retarded the onset of erythema and dry and moist dermatitis. In the case of moist dermatitis the incidence was reduced to 4.0 ± 2.8% from 46.0 ± 7% in control subjects (P < 0.001), while the coefficient of effectiveness for erythema was 1.38 ± 0.06. Consequently, administration of GGS-10 was seen to exert a protective effect on the skin of irradiated subjects. Figures 2; references 11 (Russian).
[667-12172]

UDC 577.391

CIRCULATING MACROMOLECULAR COMPLEXES IN RATS SUBJECTED TO RADIATION, THERMAL TRAUMA, AND COMBINED CHALLENGE

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 1 Apr 82) pp 369-372

KOROGODIN, D. V., KUROCHKINA, O. I., POVERENNYI, A. M. and BRITUN, A. I., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] Nephelometric studies were conducted on circulating macromolecular complexes in Wistar rat sera following gamma irradiation (7.5 Gy), III-B degree burn covering 15% of skin surface, and combination of the two factors. The results showed that a statistically-significant reduction in the quantity of circulating complexes was seen 24 h after irradiation, and within 6 h after the thermal application. The decrease was even more pronounced with the combined factors and, in comparison with the values obtained with irradiation and thermal injury, was statistically significant at 24 h (P < 0.05) and 72 h (P < 0.01). Depression with the combined treatment persisted for six

days, after which a weak trend toward elevation of the complexes was discernible. It appears that the physical insults potentiated the removal from the body of the macromolecular complexes which represented tissue destruction. These findings constitute the first demonstration of a reduction of circulating macromolecular complexes following irradiation or thermal injury alone or in combination. Figures 1; references 5: 3 Russian, 2 Western.
[667-12172]

UDC 577.391:612.273

PREDICTION OF RADIATION DAMAGE FROM PHYSIOLOGICAL RESPONSE TO ACUTE HYPOXIA

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 1 Feb 82) pp 412-415

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[Abstract] Studies were conducted on outbred rats to correlate susceptibility to acute hypoxia with subsequent rate of survival following 8 Gy gamma-irradiation (LD₅₀₋₃₀). The animals were decompressed to a pressure-chamber altitude of 11200 m (164 mm Hg) and maintained under those conditions as long as they retained a vertical posture on a moving platform, then were returned to ambient pressure and, a week later, irradiated. Analysis of the survival data and of the time required for loss of the vertical posture and the time of posture regain showed that rats more tolerant of acute hypoxia were also more resistant to the effects of gamma-irradiation. On the basis of tolerance to hypoxia, the response to gamma-irradiation with these outbred rats could be predicted with 57.7-65.8% certainty. Figures 1; references 6 (Russian).
[667-12172]

UDC 577.391:539.125.5

RADIOBIOLOGIC EXPERIMENTS WITH FAST NEUTRON BEAM FROM ISOCHRONIC CYCLOTRON U-240 AND ITS DOSIMETRIC CHARACTERISTICS

Moscow RADIOBIOLOGIYA in Russian Vol 23, No 3, May-Jun 83
(manuscript received 11 Dec 81) pp 421-425

CHEBOTAREV, Ye. Ye., BUKANOV, V. N., KATAYEVSKIY, Yu. F., TKACHENKO, N. A. and SERKIZ, Ya. I., Institute of Oncologic Problems imeni R. Ye. Kavetskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] A special converter was employed with the isochronic cyclotron U-240 at the Institute of Nuclear Studies of the Ukrainian SSR Academy of Sciences for the transformation of charged particles into a beam of fast

neutrons suitable for biological studies. Mean energy of the neutron beam has been calculated at about 20 MeV, and contains a 2-6% gamma-radiation component, depending on the target material, its thickness, and the energy of the particles bombarding the target. Measurement with tissue-equivalent phantoms showed that the dose absorbed, 125 cm from the target, was 1.46×10^{-2} Gy/min/ μ A with a field suitable for the irradiation of small laboratory animals, plant seeds, tissue cultures, etc. Figures 1; references 6 (Western). [667-12172]

CONFERENCES

BRIEFS

PROBLEMS OF PSYCHOLOGY--On August 22, a conference of the USSR Society of Psychologists was concluded in Moscow. The session of this forum was aimed at working out the most important problems of theoretical experimental and applied psychology and the mobilization of psychologists for resolving the practical tasks posed by the June (1983) Plenum of the CPSU CC. Problems of training the new man, increasing labor productivity and improving work activity depends in many ways upon the knowledge of laws of the development of the human personality and psychology: abilities, motives and needs. Much was said at the conference about practical results of the activity of specialists in such scientific disciplines as psychology of labor, management and economics and engineering and social psychology. Just one example: a special service has existed for more than 10 years in the system of an entire industrial sector--in the USSR Ministry of Petrochemical Industry. The introduction of developments of psychologists in many enterprises has helped to improve work conditions, decrease labor turnover and to raise the efficacy of production. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 19 Aug 83 p 2] 12473

PSYCHOLOGIST FORUM--On August 18, the Sixth All-Union Conference of Psychologists opened in Moscow. The motto of the forum was "Psychological Science in Practical Service". B. F. Lomov, President of the USSR Society of Psychologists and corresponding member of the USSR Academy of Sciences, presented a report on the condition and development of Soviet psychological science. For five days, delegates have exchanged opinions on psychological problems of personality formation, the effectiveness and quality of work, medicine, propaganda, lifestyle and other topics. A "round table" conference was scheduled. Its participants were to discuss problems of psychological service in our country. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 23 Aug 83 p 2] 12473

CSO: 1840/624

MISCELLANEOUS

BRIEFS

SECRETS OF THE OCEAN--In Petropavlovsk-Kamchatskiy, a department has been created in the Institute of Marine Biology of the DVNTs [Far Eastern Science Center], USSR Academy of Sciences. This is what V. Geletyuk, senior assistant of the institute and candidate of biological sciences, related to our correspondent: The main task of the new department is a study of the biological shelf of Kamchata and adjoining aquatoria, a study necessary for the development of scientifically-substantiated trade forecasts. The Kamchata shelf now supplies up to 10 percent of production of traditional types of trade and is promising for the transition to the introduction of marine agriculture--the creation of a farm for breeding mollusks and sea animals, a "garden" for the development of nutritional and technical seaweed, fish-culture plants with technology which uses recent achievements in biotechnology and gena engineering industries for extraction of chemical elements from the sea, including precious metals.... Personnel of the laboratories of hydrology and microbiology were the first in the new department to begin work. They are studying the benthic society in the Avachinskiy and Kronotskiy Gulfs, composing plans for many years of study of the shelf. They are already discovering unique types of invertebrates which could be used for artificial cultivation. [By A. Klimenko] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 11 Aug 83 p 1] 12473

PLANTATION BELOW THE SEA--FACT AND COMMENTARY--A year ago, scientists of the marine culture laboratory of the Polar Institute of Marine Fish Agriculture and Oceanography completed an experiment. They were conducting studies along with associates of the Zoological Institute of the USSR Academy of Sciences. Results of the experiment contributed to the basis for the creation of the first shell fish agriculture in the north in the Chupskaya Gulf of the White Sea. The matter was undertaken by specialists of the All-Union Association "Sevryba". "Now the plantation in the Chupskaya Gulf is technically prepared," related Candidate of Biological Sciences T. Pushchaeva. "Floats have been established with submarine sections for the cultivation of shell fish." In the natural marine environment, a shell fish grows slowly, reaching production size in seven to ten years. This is explained by the fact that in periods of low tides, mollusks are not able to eat. But if mollusks in special containers are lowered to a five-meter depth in the gulf waters, then they will be able to feed around the clock and will grow two to three times more quickly. Mollusk meat is delicious and nourishing. [By A. Khrantsov] [Text] [Moscow PRAVDA in Russian 12 Aug 83 p 6] 12473

CSO: 1840/624

LIGHT-WEIGHT UNIVERSAL "LEPESTOK" TYPE RESPIRATOR

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 8,
Aug 83 (manuscript received 28 Sep 82) pp 38-40

KOSHCHEYEV, V. S., GOL'DSHTEYN, D. S., SHATSKIY, S. N., LOBAREV, V. N.,
PETRYANOV, I. V., BORISOV, N. B., BASMANOV, P. I. and CHURKIN, S. L.

[Abstract] A new type of adsorption-filter respirator, based on the ShB-1 Lepestok, is charged with powdered carbon adsorbent in a layer of FP filtering material and is intended for one-time use. In Lepestok-G respirators, the adsorbent is finely divided, powdered activated carbon, grade OU-A, impregnated with 10-15% iodine. Duration of protective action in an atmosphere of 0.4 mg/m^3 mercury is not less than six hours. Lepestok-A respirators are intended to trap organic solvent vapors and other easily adsorbed gases. They contain activated carbon; at 0.4 mg/m^3 hexachlorobutadiene, which is 40 times the maximum allowable concentration (MAC), and 50% humidity they protect for at least eight hours. Lepestok-V respirators contain finely divided sodium carbonate to remove acid fumes, especially hydrofluoric acid. At 40 MAC (2 mg/m^3 HF) they function for not less than six hours. The technology of respirator production has been mechanized. Polyacrylamide PAN adsorbent fibers are promising as replacements for the FP filtering material. However, methods for introducing water soluble adsorbents into the fibers must be developed. References 6 (Russian).

[648-12126]

- END -