

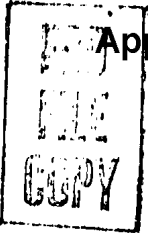
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REPORT

22 MAY 1959

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CENTRAL INTELLIGENCE AGENCY

SCIENTIFIC INFORMATION REPORT



22 May 1959

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PLEASE NOTE

This report presents unevaluated information extracted from recently received publications of the USSR, Eastern Europe, and China. The information selected is intended to indicate current scientific developments and activities in the USSR, in the Sino-Soviet Orbit countries, and in Yugoslavia, and is disseminated as an aid to the United States Government research.

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I. BIOLOGY

1. Radioresistance of Major Enzymes of Corn Kernels to Radioactive Cobalt

"Effect of Gamma Rays of Radioisotope Co⁶⁰ On the Activity of Corn Kernel Enzymes," by A. D. Chmir, and L. A. Ovchar, Department of Grain Biochemistry of the Odessa Technological Institute; Kiev, Ukrainskiy Biokhimicheskiy Zhurnal, Vol 31, No 1, 1959, pp 31-34

An investigation of the enzymatic activity and intensity of respiration in corn kernels subjected to gamma radiation of radioisotope Co⁶⁰ in doses of 10 thousand, 100 thousand, and 2.5 million r, revealed considerably radioresistance of the principle corn enzymes, i.e., dehydrase, beta-amylase, and lipase. A rise in the amylase and lipase activity was also noted with a radiation dose of 10 thousand r. The intensity of respiration was found to decrease in corn kernels with an increase in radiation dosage.

2. Scientific Conference on Plant Protection in Vil'nyus

"Scientific Conference on Plant Protection in Vil'nyus," by A. Minkyavichus; Moscow, Zoologicheskiy Zhurnal, No 2, Feb 59, pp 310-311

A conference on plant protection was held in Vil'nyus from 27-29 March 1958. The conference was organized by the Institute of Biology, Academy of Sciences Lithuanian SSR and the Lithuanian Scientific Research Institute of Soil Sciences, Ministry of Agriculture Lithuanian SSR. The conference was attended by plant protection specialists from Lithuanian SSR, Estonian SSR, Belorussian SSR, representatives of the All-Union Institute of Plant Protection, the Moscow State University, and the Botanical Gardens, Academy of Sciences Ukrainian SSR. This was the second such conference; the first was held in March 1956.

Over 60 reports were given on problems of phytopathology, entomology, pests, nematodes, ticks, rodents, and means of controlling pests and rodents. One of the reports concerned the possibility of using phytoncidal preparations against fungus diseases of plants.

3. Prof M. V. Fedorov, Soviet Microbiologist, Celebrates 60th Birthday

"Mikhail Vasil'yevich Fedorov 60th Birthday," by Ye. Z. Tepper; Moscow, Mikrobiologiya, Vol XXVIII, No 1, Jan-Feb 59, pp 144-147

Prof Mikhail Vasil'yevich Fedorov, Doctor of Biological Sciences, Corresponding Member of All-Union Academy of Agricultural Sciences, imeni V. I. Lenin, and Stalin Prize Winner, celebrated his 60th birthday and his 30th year of scientific and pedagogical activities in October 1958.

Fedorov has been associated with the Moscow Agricultural Academy imeni K. A. Timiryazev, since the early thirties and has been head of the Chair of Microbiology of the academy since 1950.

Fedorov is best known for this work in the field of the physiology of soil microorganisms, and his most famous work is the monograph Biologicheskaya Fiksatsiya Azota Atmosfery (Biological Fixation of the Nitrogen of the Atmosphere).

4. New Editorial Board for "Botanicheskiy Zhurnal"

"Confirmation of the Editorial Board of Botanicheskiy Zhurnal" (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, No 3, Mar 59, p 112

In connection with the serious and accurate criticism of the work of the editorial board of Botanicheskiy Zhurnal published in Pravda on 14 December 1958 and the critical comments presented at the December Plenum of the CC CPSU, the Presidium of the Academy of Sciences USSR has appointed the following new editorial board of the periodical:

V. F. Kuprevich, Corresponding Member of Academy of Sciences USSR, chief editor; P. A. Genkel', Doctor of Biological Sciences, deputy editor; M. V. Kul'tiasov, Deputy Editor; A. A. Avakyan, Corresponding Member of Academy of Sciences USSR, member of the board; B. K. Shishkin, Corresponding Member of Academy of Sciences USSR, member of the board; P. A. Vlasyuk, Active Member of All Union Academy of Agricultural Sciences, imeni V. I. Lenin, member of the board; N. A. Avrorin, Doctor of Biological Sciences, member of the board; L. V. Kudryashov, Doctor of Biological Sciences, member of the board; S. S. Prozorov, Doctor of Biological Sciences, member of the board; V. M. Razumov, Doctor of Biological Sciences, member of the board; K. A. Sobolevskaya, Doctor of Biological Sciences, member of the board; A. A. Shakhov, Doctor of Biological Sciences, member of the board; and M. S. Yakovlev, Doctor of Biological Sciences, member of the board.

The new board has been instructed to work out the proposals for basic improvements in the work of the periodical in developing the materialistic trend in biology.

5. Cytology Journal Published by Soviets

"The New Journal Tsitologiya (Cytology)," (unsigned article);
Moscow, Meditinskiy Rabotnik, 17 Apr 59

Just issued is a new medical periodical called Tsitologiya (Cytology), which is published bimonthly by the Academy of Sciences USSR.

The first issue includes a lead article discussing the aims of cytology "in light of the decisions of the XXL Congress of the CPSU." Also included is an article by D. N. Nasonov (deceased) on the problem of the physicochemical changes during cellular inhibition, and an article by B. P. Ushakov on the results of the changes of cellular mechanisms in the adaptation of animals to an environment. Also published are works by Moscow and Leningrad investigators on the study of the structure of cells with the aid of electronic microscopes, and on the changes in the protoplasm of cells of plants and animals occurring during the action of ionizing radiation.

II. CHEMISTRY

Electrochemistry

6. A Fuel Cell Operating on Gasoline

"Application of Hydrocarbon Fuel in Cells With Solid Electrolytes," by V. S. Daniyel'-Bek, M. Z. Mints, V. V. Sysoyeva, and M. V. Tikhonova; Moscow, Zhurnal Prikladnoy Khimii, Vol 32, No 3, Mar 59, pp 649-655

Thermodynamic calculations and experimental results obtained in the work described indicate that fuel cells with a solid electrolyte can operate on hydrocarbon fuel, specifically gasoline, developing a sufficiently high electromotive force (0.8-0.9 volts). In the investigation of experimental cells of this type, it was established that the optimum conditions of operation are achieved at a temperature of 700-750°. It was found that the cells develop current of a density amounting to 1.0-1.5 amperes per square decimeter at a potential of 0.5-0.7 volts.

However, at the expiration of several hours the electrical characteristics of the cell deteriorated because of insufficient chemical and mechanical stability of the solid electrolytes that were used.

In the work described, efficiencies were calculated on the basis of the ratio of the electric energy generated to the heat produced by the fuel under standard conditions at room temperature, rather than an elevated temperature. O. K. Davtyan's figures for the maximum theoretical values of the efficiency of the electromotive force of high-temperature fuel cells were re-calculated with the use of experimental data obtained subsequently to Davtyan's work published in 1946-1947.

Experiments with liquid fuel were conducted because application of gas as a fuel would be inconvenient in localities which lack a current network and in which current for radios and other appliances is to be supplied by fuel cells. Gasoline of the grade B-70 was used as fuel. However, similar results were obtained with other grades of gasoline. In addition to that, gaseous fuels, i.e., carbon monoxide and hydrogen, were used in the cells for purposes of comparison.

The solid electrolyte was prepared by melting together and keeping at 900-1000° (until the evolution of carbon dioxide ceased) of a mixture of sodium carbonate, technical sodium silicate, cerium dioxide, and tungsten trioxide. As hydrocarbon electrodes disperse carbonyl iron Davtyan's mixture, consisting of ferric oxide, iron, clay, iron oxide, and chromites of copper and magnesium, was tested. As materials, for the air electrode, different oxides (Fe_2O_3 , Fe_3O_4 , CuO , NiO , CeO_2 , CdO) were tested. The results with all of them were approximately the same. The majority of the experiments were conducted with Davtyan's mixture as material for the hydrocarbon electrode and magnetite as material for the air electrode. The deterioration of fuel cells of this type is due mainly to the considerable gas permeability of the solid electrolyte. Because of this permeability, gasoline penetrates into the electrolyte, reaching the air electrode. As a result of this, a sharp drop in the electromotive force of the cell takes place. This condition affects both cells operating on gasoline and cells operating on gaseous fuels, such as carbon monoxide and hydrogen. An additional circumstance arises when gasoline is used as fuel: in the pores and cracks of the solid electrolyte incomplete combustion of the gasoline takes place, with the result that carbon black is deposited. This carbon black conducts current and short-circuits the electrodes of the cell. To make cells of this type serviceable from the practical standpoint, one must, above all, develop a solid electrolyte which exhibits an adequate and lasting impermeability to gases.

Other conditions which lead to deterioration of the cells are (1) cationic conductivity of the solid electrolyte, which is responsible for changes in the composition of the electrolyte during the operation of the cell; and (2) reduction of some ingredients of the electrolyte (particularly Na_2WO_4) by the fuel, with the result that the electronic component of electrical conductivity increases and the electromotive force of the cell drops.

Fuels and Propellants

7. Formation of Nitrogen Oxides in a Shock Wave

"The Formation of Nitrogen Oxides in the Shock Wave of an Intense Explosion in Air," by Yu. P. Rayzer; Moscow, Zhurnal Fizicheskoy Khimii, Vol. 33, Mar 59, pp 700-709

A number of interesting optical phenomena observed in connection with intense explosions during the stage when the temperature of the shock-wave front drops from approximately 7000° to 1000° are due to the specific characteristics of processes of the formation of nitrogen oxides in the explosion wave and to the optical properties of these oxides (Yu. P. Rayzer,

Zhurnal Experimental'noy i Teoreticheskoy Fiziki, Vol 34, 1958, p 483). These phenomena comprise a glow of the shock wave at temperatures from 7000° down to 2000°, breaking away of the wave-front from the ball of fire at a temperature of the front close to 2,000°, and the characteristic minimum of the intensity of the fire-ball at the time of the breaking away of the wave front followed by a subsequent flare-up of this intensity (c.f. The Effects of Atomic Weapons, New York-Toronto-London, 1950). Consideration of the kinetics of the reactions of the formation of nitrogen oxides and of the distribution of their concentration through the shock-wave is of great importance for the explanation of optical phenomena observed in intense explosions. In the work reported in this instance equilibrium concentrations of nitrogen oxide and nitrogen dioxide in the air at temperatures from 2000° to 5000° were calculated. The kinetics of the oxidation of nitrogen are discussed. A method is given for the solution of the kinetic equation for adiabatically cooled particles of air in an explosion wave. It could be shown that at temperatures above 3000° the concentration of nitrogen oxide corresponds to equilibrium conditions while at temperatures below 2,300° stabilization of this compound by chilling takes place. In layers of air caught by the front of a shock wave having a temperature below 2000°, NO is not formed at all. The total quantity of the nitrogen oxidized during the explosion is estimated.

The kinetics of the formation of NO₂ are subjected to consideration. It is brought out that at temperatures above 2000°, the principal role is not played by the ordinary trimolecular reaction, but by the reaction $NO + O_2 = NO_2 + O$. The velocity of this reaction has been calculated by the activated complex method. It is brought out that at temperatures above 2000° nitrogen dioxide is in equilibrium with nitrogen oxide.

8. Hungarian Research in Petroleum Products

"Ten Years of Work by the Hungarian Petroleum and Natural Gas Experimental Institute (Magyar Asvanyolaj es Foldgaz Kiserleti Intezet)," by Dr. Mihaly Freund; Budapest, Magyar Kemikusok Lapja, Vol XIII, No 10-12, Dec 58

"The Hungarian Petroleum and Natural Gas Experimental Institute was formed in 1948, thus ending a deficiency of long standing. The Institute now has a central headquarters in Veszprem which has 35 modernly equipped laboratories, a 5,000-volume library, and numerous shops and offices; the institute also includes the Petfundo experimental plant, a 10-ton-per-day capacity petroleum plant, and its subsidiary plants, including gas technology and petrochemical experimental plants. In Budapest, we have a motor experiment station with special shops and laboratories for special equipment which has been installed in other factories, for instance, in Csepel, Rakoskeresztur, etc.

"As an example of our work we might cite research on adsorption, which includes work chromatographic methods for analyzing gases and liquids; the technological separation of gases using a moving activated carbon bed; and the hypersorption process, our experts on which are Dr. Pal Benedek and Laszlo Szepesy. The present work of Endre Vamos on a new chromatographic refining process for producing white oils and lubricating oils, for removing aromatics from gasoline, and for extracting aromatics is also being done here.

"We have accomplished much work on solvent and adsorption refining methods in order to improve motor oils, and at our motor experiment station, we tested and introduced the organic additive produced by Peter Bencze using test methods developed with the cooperation of Istvan Pallay and Dezso Haag.

"The key to improving the quality of other petroleum products is the scientific examination of petroleum which is being done by Ervin Kerenyi. Finally, the work of Dr. Gyula Nyul, Pal Zakar, and Gyula Mozes on Hungarian bitumen, which is already known abroad, is being accomplished here.

"As for petrochemistry, Laszlo Marko is working on a one-step oxo-synthesis for producing synthetic softening materials. One of the main fields of Dr. Jozsef Bathory is the production of normal [straight-claim] hydrocarbons using our carbamide separation methods. We are getting valuable ceresine products and chemical industry raw materials in this way. I must also mention our sulfochlorination processes. Detergents have been manufactured in this way from gas oil for years, and a new pilot plant is now being set up.

"Finally, I must mention one of our most important works, partial oxidation of methane. The years of work of Antal Laszlo and Andras Nemeth have led to the establishment of a pilot plant at Buciumeni on the basis of a Rumanian-Hungarian agreement. Acetylene and synthetic gas are being produced there, and a test plant under the leadership of Ivan Pallai is also being set up to produce acetone from acetylene."

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Industrial Chemistry

9. Chemical Developments in Uzbekistan

"Chemical Science and Industry in Uzbekistan" (unsigned article); Moscow, Vestnik Akademii Nauk SSR, Vol 29, No 3, Mar 59, pp 78-79

"On 20-21 November 1958, a joint session of the Academy of Sciences Uzbek SSR, the Department of Chemical Sciences of the Academy of Sciences USSR, the State Committee on Chemistry at the Council of Ministers USSR, and the Scientific-Technical Council of the Chirchik Electrochemical Combine was held at Chirchik. This session dealt with the prospects of the development of chemical science and industry in the Uzbek SSR. Representatives of the academies of sciences of union republics, of scientific research institutes of the country, of chemical chairs of higher educational institutions, and of Uzbekistan sovmarkhozes participated in the session.

"Kh. M. Abdullayev, President of the Academy of Sciences Uzbek SSR, in opening the session, pointed out that as a result of the execution of the plan high-lighted by the control figures pertaining to the development of the national economy of the USSR during 1959-1965, Uzbekistan will become an important center of the manufacture of chemical products obtained by the many-sided conversion of indigenous chemical raw materials.

"A report entitled 'Development of Chemical Science and Industry in the Uzbek SSR' was presented by M. M. Nabiyev. Nabiyev emphasized that the capital invested in the chemical industry will increase during 1959-1965 by a factor of 10, as compared with the preceding 7-year period. On the basis of the conversion of natural gas from Bukhara and of agricultural wastes, as well as of wastes of the cotton industry, it is intended to create enterprises at which acetate rayon, plastics, and linoleum coated with polyvinylchloride will be produced. Three nitrogen fertilizer plants and a plant for the production of artificial leather will be built. The solution of the problems involved requires from chemists an expansion of theoretical research by every possible means and reinforcement of cooperation between chemical science and production.

"Kh. Yu. Usmanov reported on methods of treating cotton cellulose with acrylonitrile. As a result of this treatment, fabrics will be obtained which have the properties of wool and also of capron, nylon, and other synthetic fibers. Fibers of this type do not rot, can be dyed with facility, and are stable at high temperatures.

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"It has been established by V. I. Ivanov and V. L. Zakharov that the strength of cellulose materials is closely related to the molecular weight dispersion of the cellulose in fibers. These investigators subjected to consideration the significance of homogeneity with respect to molecular weight for the strength of cellulose products. Removal of low-molecular products makes it possible to produce cellulose which has a high degree of homogeneity and exhibits a definite amount of orientation.

"E. S. Sadykov pointed out that it is advisable to change-over the hydrolysis plants in Uzbekistan to the conversion of uprooted cotton stalks ("guza-pai").

"V. S. Klementov noted that a continuous method for the polymerization of acrylonitrile in aqueous solutions with the application of redox systems for initiating the polymerization makes it possible to control the process more efficiently and to produce a polymer with the desired properties. Polyacrylonitrile fibers have a number of valuable characteristics as textile fibers.

"V. I. Tsvetkov described new methods for the synthesis of derivatives of phosphinous acids. On the basis of this work it became possible to produce phosphorus-containing polymers with carbon chains.

"I. Kotrylev reported that at an experimental installation a polycarbonate [polyester of carbonic acid] with a molecular weight of about 60,000 was obtained which exhibits superior mechanical properties, including a tensile strength of almost 600 kgs per cm² and a transverse strength below 1,000 kgs per cm² [sic]. It has satisfactory heat resistance up to a temperature of 165°. This material is suitable for the manufacture of gears, bearings, and other parts of machines and instruments. Furthermore, a polyformaldehyde has been obtained which has a hardness of 25 kgs, a transverse strength of 1,000 kgs, a melting point of 175°, and superior dielectric properties.

"A comparison of different methods for the production of acetylene from hydrocarbon gases was given by A. Ye. Volkov.

"V. I. Lutkova discussed ways of utilizing furfural as a raw material for the synthetic organic industry of Uzbekistan.

"A report by I. B. Burlachenko dealt with prospects for the development of different types of chemical production at the Chirchik Electrochemical Combine in connection with its transfer to natural gas.

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"The session passed an extended resolution on the basic directions along which chemical science must develop during the current 7-year period. This resolution included recommendations with respect to the subsequent development of the chemical industry of Uzbekistan."

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10. Work to be Done at Institutes of the Academy of Sciences Kazakh SSR in Connection with the Current Seven-Year Plan

"The Principal Directions of Scientific Activities at the Academy of Sciences Kazakh SSR During 1959-1965," by Academician A. P. Polosukhin, Vice-President of the Academy of Sciences Kazakh SSR; Alma-Ata, Vestnik Akademii Nauk Kazakhskoy SSR, Vol 15, No 1, Jan 59, pp 3-13

In connection with the 1959-1965 Seven-Year Plan, considerable attention will be paid in the Kazakh SSR to scientific problems connected with the development of the Dzhezkazgan, Karaganda, Kustanay, Pavlodar, and Altay industrial centers, problems pertaining to dispersed and rare elements, and investigation of deposits of petroleum and natural gas in Kazakhstan.

Hydrogeological maps of central, western, and northern Kazakhstan will be compiled. These maps will serve as a basis for the planning and carrying out of prospecting for water. Regions in which a great number of new sovkhoses are located and where virgin lands are being developed, and also regions in which major mining and smelting enterprises are situated will be mapped first.

Emphasis will be placed on the investigation of coal strata of the industrial region of Karaganda for permeability to gas and absorption capacity. Furthermore, the deformation of the massif in connection with the exploitation of seams in strata of the Karaganda Basin will be subjected to investigation with the aid of radioactive isotopes.

A considerable part of the planned work to be done by the Institute of Metallurgy and Enrichment will consist of scientific research conducted for the purpose of aiding further development of the nonferrous, rare metal, and ferrous metallurgy of Kazakhstan. This will include work on novel methods for the production of aluminum from new types of raw material, and the technology of the production of vanadium and titanium, and also methods for the extraction of dispersed elements that are of exceptional importance for the development of new technology from ores and products of enrichment plants. Considerable attention will be paid to the development of methods for the complete extraction of valuable components from polymetal and ferrous ores of Kazakhstan. Problems pertaining to the theory of metallurgical processes will be investigated, in addition to those connected with the introduction of new technological methods.

In scientific work done on the complete conversion of copper and polymetal ores, attention will be paid to the introduction of new pyrometallurgical and hydrometallurgical methods and also to the improvement of the technology of smelting of copper and polymetal concentrates as well as intermediate products. At present, the extraction of lead from ores comprises no more than 50-60%, while the extraction of metals accompanying lead is still less complete. The intention exists of developing complete technological flow-sheets and methods for the conversion of the raw material by different methods (cyclone, roasting combined with smelting in the suspended state, and others), so that all valuable components will be extracted. The methods that are developed will be tested on a semi-plant scale.

During recent years, rare metals have become an important factor in technological progress; there is almost no branch of the new technology in which they are not used. However, at present, the industry employs rare and dispersed elements only to a minor extent. They are being used only in certain branches of the national economy. The reasons are the low volume of the production of rare metals, their high cost, and insufficient knowledge of their properties. The Institute of Metallurgy and Enrichment has the task of studying problems pertaining to the distillation of compounds of rare metals from aqueous solutions. It is necessary to find new solvents for rare metal compounds, to investigate the kinetics of solution, etc.

Important work is foreseen on the application of the "cyclone" process in technological conversions utilizing power. Application of the cyclone method for the conversion of finely subdivided materials ought to prove of advantage whenever the technological conversion is based on diffusion processes and processes taking place at high temperatures. At a semi-industrial installation attached to the Balkhash Copper Plant, work will be done on the development and adaptation of the process of cyclone smelting of copper sulfide concentrates. As a result of this work, it will be possible to design and construct a new highly efficient industrial aggregate.

Cyclone smelting of lead-zinc intermediate products, sintered concentrates, and slags will be investigated at an enlarged installation at the Power Institute and at an experimental industrial installation of the Ust'-Kamenogorsk Lead-Zinc Combine.

Because of the high efficiency of the cyclone method, it is intended to investigate its applications in the smelting of iron ores and some processes of chemical technology which take place in the diffusion region. Theoretical research on the method will also be conducted.

An important part of the work to be done by the Institute of Chemical Sciences will be development of electrochemical and amalgam methods for the separation and determination of pure metals. The work in question will be aimed at the development of fundamentally new and improved technological procedures for the conversion of wastes of metallurgical production so that valuable metals will be recovered. The theoretical and experimental aspects of the production of zinc and the elements accompanying zinc will also be investigated.

In work done at the Petroleum Institute of the Academy of Sciences Kazakh SSR, work will be done on the separation of tarry fractions of petroleum, the purification of crudes, and the production of aviation kerosenes.

11. Resumption of the Publication of "Khimicheskoye Mashinostroyeniye"

"Announcement by the Board of Editors" (unsigned); Moscow, Khimicheskoye Mashinostroyeniye, No 1, Jan 59, p 1

"After a long interruption, the publication of the periodical Khimi-cheskoye Mashinostroyeniye [Chemical Machine Building -- Organ of the State Scientific Technical Committee at the Council of Ministers USSR] has been resumed. This periodical deals with problems pertaining to equipment for the principal technological processes applied at chemical enterprises and the operation of this equipment.

"The periodical publishes articles concerning calculations, designing, investigation, and execution of models of machines and equipment for the processes of agitation, settling, filtration, centrifuging, crystallization, evaporation, heat exchange, drying, adsorption and absorption, extraction, and distillation and also processes involving chemical transformations of substances, i.e., catalytic, thermal, polymerization, and other processes. The periodical publishes articles which deal with calculations and designing of equipment for the mixing of liquids and compression of gases in chemical production, i.e., piston and turbine compressors, equipment for the blowing of gas, and pumps.

"The periodical discusses problems of corrosion and protection from corrosion, considers the application of different metallic and non-metallic materials for the production of chemical equipment, publishes articles on problems of standardization, specialization of plants producing chemical equipment and cooperation between these plants, and reports on advanced experience acquired at plants, institutes, and in foreign technology.

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"The subdivision classifications which define the subject matter of the journal Khimicheskoye Mashinostroyeniye are as follows:

- 1) New equipment and machines; automation of the operation of this equipment and machines
- 2) Processes taking place in chemical equipment
- 3) Accessory equipment (fixtures) of chemical plants
- 4) Materials used for the construction of chemical equipment
- 5) The technology of the production of equipment for chemical enterprises
- 6) Exchange of experience on the operation of equipment
- 7) Organization and economics of chemical machine building
- 8) Standardization
- 9) Information on USSR and foreign technology
- 10) Reviews and bibliography

"The problems faced by the journal will be solved with the active participation of a wide circle of specialists who are active in the fields of chemical machine construction and chemical industry.

"The Board of Editors requests that articles for publication in the journal, also comments and requests, be addressed to the Board of Editors of the journal Khimicheskoye Mashinostroyeniye, Bol'shaya Novo-Dmitrovskaya, No 14, Moscow, A-15."

[SIR Note: According to an announcement on the inside front cover, the Board of Editors consists of the following persons: P. I. Bogatyrev, V. G. Bulgakov, P. V. Varentsov, Yu. L. Vikhman, V. A. Get'ye, N. I. Gel'perin, S. G. Goryunov, S. Ye. Zakharenko, V. V. Kafarov, I. Ya. Klinov, M. I. Kop'yev, N. A. Kozulin, A. V. Kuramzhin, A. M. Lastovtsev, A. N. Levin, M. I. Litvinenko, N. N. Loginov, N. N. Mal'tsev, V. B. Nikolayev (Chief Editor), A. N. Planovskiy, D. D. Ryabinin, V. M. Semin (Deputy Chief Editor), P. G. Udyma, B. P. Khrapunov, N. S. Chumichev, and F. N. Shakhov.]

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12. Tasks to be Accomplished by Chemical Machine Construction Under the Seven-Year Plan

"Tasks of Chemical Machine Construction" (unsigned article);
Moscow, Khimicheskoye Mashinostroyeniye, No 1, Jan 59, pp 2-4

In connection with the implementation of the current Seven-Year Plan, the production of chemical equipment must be increased by a factor of 3.2-3.4. It is necessary, within a short period of time, to design and develop the production of several hundreds of new types of devices and machines to be manufactured for the first time by the USSR machine building industry. An exceptionally large amount of work is to be accomplished by designers and other workers at enterprises of chemical machine building, as well as by scientific research institutes in connection with the development of equipment for the production of new plastics, synthetic resins, and elastomers and also in connection with the conversion of materials of this type into intermediate and finished products. To achieve the increases in production foreseen under the Seven-Year Plan, a considerable amount of automation will be necessary. In this connection, new demands are put to constructors of instruments, builders of electric machines, and workers of the electrical fixtures industry. One must develop thermochromatographic equipment; turbidimeters of high sensitivity equipped with photocells and an automatic control system which regulates the supply of products on the basis of the turbidity of the solution which is being fed in; special control devices for centrifuges which are activated when a definite thickness of the precipitated solid phase underlying the layer of the liquid has been reached; shielded electric motors which drive shafts that do not require packing; electric motors with a smooth control of the number of revolutions within limits of the ratio 1:4; valves and control equipment which operate in aggressive media and are provided with compact and reliable driving shafts and gears acting over long distances; also many other devices to be used in automation and control.

The special conditions under which chemical equipment operates involving exposure to corrosive media, very high and very low working temperatures, and a wide range of pressures beginning with high vacuum and ending with pressures of 1,500-2,000 atmospheres advanced new requirements as far as the characteristics of construction materials are concerned. First of all, it is necessary to expand the number of available grades of clad ("2-layer") steels, to organize the production of high-strength acid-resistant steels having a tensile strength in the range of 140-150 kilograms per square millimeter, and to develop the production of titanium, tantalum, and alloys of tantalum with niobium, as well as a number of other metallic materials. Plastics such as viniplast, polystyrene, and polyethylene, as well as some others, have the necessary characteristics required of construction materials. Being chemically inactive, having a sufficient

mechanical strength, and possessing the capacity of being welded or cemented, they can be shaped into sheets, pipes, or articles with other profiles and can also be readily worked with cutting tools. Because they exhibit these characteristics, they ought to find more extensive application as material for the production of chemical equipment.

Large-capacity chemical equipment, plates and filling of distillation columns and spray towers, centrifugal pumps, pipes, and many other parts of equipment can be constructed to advantage from ceramics. Consequently, products made of ceramics should be introduced at many chemical enterprises.

Standardization of equipment and parts of equipment will play an important part under the Seven-Year Plan in the development of chemical machine building. One of the primary tasks will be standardization of parts of equipment operating under pressures higher than 16 atmospheres.

One of the most important problems with which the constructors of machines will have to cope in the near future is the development of high-capacity gas-separation installations. The development of equipment required at such installations will make it possible to efficiently utilize petroleum gases as a raw material for the production of plastics and of other products of organic synthesis. Installations treating tens of thousands of cubic meters of initial gas per hour in the same assembly ("aggregate") will have to be built. The operation of these installations will be based on new and efficient procedures involving application of new types of compressors and gas separation equipment.

In connection with the expansion of chemical production, the demand for gas compressors and air compressors in 1965 will be greater by a factor of almost 10. Already it is necessary to develop 60 new types of equipment of this class, including a number of high-capacity turbo-compressors for the compression of hydrocarbon gases to 20 atmospheres, a number of high-capacity final stage piston compressors which will bring the final pressure to 200 atmospheres, compressors for gases containing acetylene, piston compressors for ethylene which will bring the pressure to 1,400 atmospheres and have a capacity of 3,000-5,000 cubic meters per hour, high-capacity screw compressors, hermetically closed turbo-circulation compressors, and other machines.

The Seven-Year Plan for the development of chemical production and particularly the production of plastics and other synthetic materials, as well as of products made of them, requires organization of the industrial production of new machines and equipment within the shortest possible time. Among the equipment required are continuous reactors for the production of low- and high-pressure polyethylene; assemblies for the production of films from polyethylene, polystyrene, and lavsan [terephthalic acid-ethylene glycol polyester], which are presently being tested at the Scientific Research Institute of Chemical Machine Building and at the research institutes of the chemical industry; continuous worm mixers for the compounding of plastics for cables and the mixing of synthetic rubber; a high-velocity rubber mixer operating at high pressure, which is presently being tested under industrial conditions; a high velocity four-roller cord calender for tire-manufacturing plants, which is already produced at one of the plants manufacturing chemical machinery; and vulcanizer molds, which are being developed by two plants. One must organize within a short time the series production of continuous centrifuges with high factors of separation and accelerate the development and introduction of a rotary "bucket" filter for phosphoric acid with a filtration surface of 50 square meters, as well as of many other types of equipment.

13. Epoxy Resins Production in Czechoslovakia

"From the Plastics-Maker's Workshop", (unsigned article);
Prague, Technicke Noviny, Vol VII, No 9, 4 Mar 59, p 5

The article lists eight epoxy resins produced by the Association for Chemical and Metallurgical Production (Spolek pro chemickou a hutni vyrobu) in Usti nad Labem.

[According to the No 9, 2 March 1958 issue of Hospodarske Noviny (Prague) the Association for Chemical and Metallurgical Production is composed of the following plants: Chemical Works, Nestemice; Chemotex, Bol-etice; ZVS (unidentified) plant, a part of the Velveta Works; the Glasura plant in Roudnice; and the Krasne Brezno shop in Kralupy.]

CHS-EPOXY PGA 40 is a resin varnish used primarily in the electrical industry for coating conductors 2 to 3 millimeters in diameter; it is used also as an internally applied baking varnish for food containers, tubes, and gasoline cans, and as an outside varnish where resistance to weather and chemical corrosion is required. It possesses outstanding properties of adherence and flexibility.

CHS-EPOXY 1200, with a hardening additive, solidifies at room temperature. It has strong adhesion to materials such as iron, light metals, ceramics, glass, and wood, and to plastics such as PVC, polyethylene, polymethylmethacrylate, etc.

CHS-EPOXY 1001 is used as a cement for metals, glass, ceramics, and other materials similar in characteristics to materials cemented with CHS-EPOXY 1200, except that it is applied at temperatures from 170° to 210° centigrade and heated for a period of from 40 to 60 minutes. When the resin is applied, the material must be preheated to 100°-120° centigrade. After hardening, this resin, when cold, withstands almost all solvents, water, and dilute acids. The resin can be ground to powder and then combined with fillers, similarly to CHS-Epoxy 1200, in a proportion of 30 to 40 percent, by weight, of the resin. It can also be used in an acetone solution.

CHS-EPOXY 2000, with the addition of a hardening agent, will solidify at 120° centigrade. It is used for pressureless molding and casting of a wide variety of parts. It is particularly useful in the electrical industry as it possesses good insulating and mechanical properties. Its shrinkage during hardening is negligible (at 100° centigrade, 0.5 percent; at 120°, 2.3 percent).

CHS-EPOXY 2100 is capable of solidifying at room temperatures when hardening and accelerating agents have been added. The resultant material is hard, tough, and milk-colored. It may be worked on metal-working machines. It has the same characteristics as Epoxy 2000 and is used for pressureless precision casting of models and patterns, and also for molding various parts whenever (by reason of the fact that it hardens at high temperatures) Epoxy 2000 cannot be used; it is also suitable for the production of laminated resins.

CHS-EPOXY 2200 is similar to Epoxy 2100 and is worked in a similar manner. The difference is that, after solidifying, it remains clear, so that in the molding of electrical parts the processes which take place may be watched; it has better characteristics for applications in the manufacture of electrical parts and a higher resistance to chemicals.

CHS-EPOXY 300 is a dissolved resin which may be hardened at room temperature when a hardening agent has been added. It is especially suitable for coating porous materials, such as wood and paper, on which it produces a hard and tough surface coating.

CHS-EPOXY 1/20 Al 15 is suitable for the production of other baking, internally applied varnishes. An optimal film is obtained at 200° centigrade. A film baked on at this temperature resists hot water, alkalis, various kinds of chemicals, fruit juices, wines, beer, fats, and fuels for internal combustion engines. Its mechanical qualities are extreme hardness, elasticity, and adhesive quality. It may be diluted with esters, ketones, and to a limited extent, with cyclic hydrocarbons.

This resin may be combined with various filling agents, in solutions, or in powder form. It may be cloudy or clear and it may or may not contain hardening agents.

Nuclear Fuels and Reactor Construction Materials

14. A Complex Citrate of Zirconium

"A Complex Zirconium Citrate" by L. N. Sheronov and B. V. Ptitsyn; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 367-371

It was established that as a result of the interaction of 1 mol of zirconium carbonate with 1 1/2 mols of citric acid half-neutralized with potassium hydroxide, a complex potassium zirconyl citrate is formed. The composition, structure, and properties of this compound were investigated.

15. Solubility of Niobium Pentoxide in Selenic Acid

"Investigation by the Solubility Method of the System Selenic Acid - Niobium Pentoxide-Water" by V. G. Chukhlantsev, Ye. I. Krylov, and V. S. Chunin, Ural Polytechnic Institute imeni S. M. Kirov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 478-482

The solubilities in solutions of selenic acid of a hydrate of niobium pentoxide dehydrated to the composition $Nb_2O_5 \cdot 2.8 H_2O$ were investigated at different concentrations and at different temperatures. By using a modification of Cameron's method and applying radioactive cobalt as a tracer, it was established that the bottom phases in the system $Nb_2O_5 - SeO_3 - H_2O$ are formed by niobium pentoxide hydrates with different contents of water. It was established that in solutions with a content of selenic acid lower than 75%, there is hydration of the gel of niobium pentoxide while at higher concentrations of selenic acid, dehydration takes place. It was found that when ammonia is added to solutions of niobic acid in selenic acid, there is complete separation of niobium from selenium: the niobium pentoxide precipitates while ammonium selenate remain in solutions.

[For information on physical chemistry see item No 7.]

[For information on radiation chemistry, see item No 119.]

Radiochemistry

16. Synthesis of Carrier-Free Radioactive Iodate

"Synthesis of Carrier-Free Tracer Iodate," by A. T. Musakin and L. V. Puchkov, Leningrad Technological Institute, imeni Lensovet; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 2, Feb 59, pp 483-385

A method has been developed for the preparation of a solution of radioactive potassium iodate which does not contain any carrier of the iodine isotope. The iodate was prepared by oxidation of iodide with permanganate or by electrolysis of the iodide. The application of paper chromatography made it possible to control the completeness of the oxidation of tracer quantities of iodide to iodate.

III. EARTH SCIENCES

1.7. Conference Calls for Deeper Digging for Minerals

"First All-Union Conference on Elaboration of Scientific Bases for Searches for Concealed Mineralization," (unsigned article); Moscow, Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, No 2, Feb 59

The First All-Union Conference devoted to the problem of searching out concealed ore bodies took place in Moscow on 18-24 November 1958. The conference was attended by representatives of scientific-research geological institutions in the Academy of Sciences USSR, the Union-Republic Academies, the Ministry of Geology and Mineral Conservation USSR, geological VUZES and geological faculties of the country's universities, as well as workers in the geological service of the USSR.

Foreign scientists -- representatives of the countries of the People's Democracy, specialists in the field of the study of ore deposits -- also participated in the work of the conference.

In 50 reports on the geology of ore deposits, including those of Academicians A. G. Betekhtin, D. S. Korzhinskiy, corresponding members O. D. Levitskiy, V. I. Smirnov, and F. V. Chukhrov, Minister of Geology P. Ya. Antropov, Doctor of Geological-Mineralogical Sciences F. I. Vol'fson, and Candidate of Geological-Mineralogical Sciences L. I. Lukin, Doctor of Geological-Mineralogical Sciences Ye. A. Radkevich, and many others, basic problems on the theory and methods of searching for blind ore bodies were dealt with, as well as problems concerning regularities in the formation of mineralization zonality and many other pertinent questions.

The reports read at the conference evoked active exchange of opinions and lively discussion.

Conference-adopted resolutions called for measures to further develop theory and practice of searching out and prospecting deep-lying ores.

The conference materials are being published in the journal Geologiya Rudnykh Mestorozhdeniy (Geology of Ore Deposits), No 1, 1959.

IV. ELECTRONICS

Acoustics

18. Damping Coefficient of Rayleigh Waves Calculated

"On the Damping of Rayleigh Waves Propagating Along an Uneven Surface," by L. M. Brekhovskiy, Corresponding Member of the Academy of Sciences USSR, Acoustics Institute, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 124, No 5, 11 Feb 59, pp 1018-1021

The damping coefficient of surface Rayleigh waves propagating along an uneven surface is calculated. Damping is due to scattering on the surfaces. It is noted that the results have application in acoustics when ultrasonic Rayleigh waves are employed.

Communications

19. Tropospheric Scatter Propagation

"Band-width and Intensity of Transient Noises for Communications Utilizing Tropospheric Scatter Propagation," by I. A. Gusyatskiy; Moscow, Elektrosvyaz', No 4, Apr 59, pp 3-12

Radio-communication systems utilizing the tropospheric scatter propagation of VHF signals, produce a multiplicity of signals at the reception point, due to the effect of individual inhomogeneities of air permittivity. The phase relationship between individual components of the signal are different for different frequencies, thus, the amplitude of the total signal will change at random with the change of frequency and will result in distortion of the amplitude spectrum of the transmitted signal.

In case of multiplex transmission with frequency-division of channels and a single-side band, such distortions will greatly affect the intensity level of individual channels.

This article presents a theoretical analysis of the amplitude spectrum distortion and the level of transient noises. A series of formulas are derived which are useful in the design of radio-relay lines operating on the tropospheric scatter propagation principle.

The author thanks S. V. Borodich for valuable assistance.

20. Recent Soviet Patents in the Field of Communications

"Authorship Certificates," (unsigned article); Moscow, Elektrosvyaz', No 4, Apr 59, pp 79

Class 21a¹, 9₀₃. No 105492. A. I. Borovikov, Frequency Relay.

Class 21a¹, 32₀₄, No 115446. M. V. Kukharev. A Device with Oscillating Mirror for Plane Scanning of an Image.

Class 21a¹, 32₁₀, No 115236. I. Ya. Lyamichev. Method and Device for Transmission of Television Signals.

Class 21a¹, 32₁₂, No 115585. A. M. Khal'fin and V. N. Krasnov. Method for Transmission of Television Signals

Class 21a¹, 32₃₄, No 115218. I. I. Tsukerman. Method of Transmission of Color Images.

Class 21a¹, 32₃₅, No 115353. A. S. Selivanov. Transmitting Television Tube.

Class 21a¹, 32₃₅, No 115577. B. V. Krusser, I. K. Malakhov and A. P. Nefed'yev. Method for Reducing Internal Noises in Transmitting Television Tubes.

Class 21a¹, 33₄₀, No 115490. A. P. Polonskiy. Compensating Method of Phosphor Afterglow in Scanning Beam Tubes.

Class 21a¹, 34₀₂, No 115617. I. Ya. Lyamichev. Receiving Television Screen.

Class 21a¹, 35₅₀. No 115221. B. I. Lytkin. Method for Separation of Field Synchronizing Signals in Television Receiver.

Class 21a³, 17₁₀. No 115403. I. V. Prangishvili. Contactless Switch.

Class 21a⁴, 6₀₂. No 115239. Yu. N. Prozorovskiy. Generator of Millimicrosecond Video Pulses of Triangular Form.

Class 21a⁴, 13. No 115445. M. Z. Tseytlin and K. N. Aref'yev. Transistorized Key Frequency Divider.

Class 21a⁴, 13. No 115726. A. D. Artym. Method of Phase Modulation.

Class 21a⁴, 22₀₂, No 115481. A. A. Bronnikov. Electromechanical Band-Pass Filter.

Class 21a⁴, 66₀₁. No 115634. A. M. Model'. Separating Filter for Feeding an Antenna from Several Transmitters.

Class 21a⁴, 71. No 115341. N. A. Isayev. Stepwise Compensated Frequency Divider.

Class 21a⁴, 71. No 115354. O. N. Tereshin and V. P. Pastukhov. Device for Measurement of Small Inhomogeneities Without Losses.

Class 21a⁴, 71. No 115709. P. Ye. Makhlin. Wavemeter With Two Tunings for Measurement of Small Frequency Differences.

Class 21a⁴, 72₀₄. No 115618. A. M. Model'. Separating Waveguide Filter.

Class 21e, 28₀₁. No 115347. N. N. Solov'yev. Two-Phase Two-Channel Wide Band Measuring Oscillator.

21. American Book on Theory of Information being Translated

"An Introduction to the Theory of Random Signals and Noise," reviewed by B. G. Belkin; Moscow, Novyye Knigi Za Rubezhom, Tekhnika, Seriya B. No 3, 1959, pp 62-66.

The book entitled An Introduction to the Theory of Random Signals and Noise, by W. B. Davenport and W. L. Root (McGraw-Hill, New-York, 1958, 393 p) is now being translated into the Russian language. Belkin concludes his review with the statement:

"The expediency of the forthcoming translation into the Russian language of the mentioned book is beyond any doubt."

Components

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22. Redundancy by Substitution

"Reliability Gain through Redundancy by Substitution," by M. A. Sinitsa; Moscow, Elektrosvyaz', No 4, Apr 59, pp 49-55

Formulas are derived to estimate the gain in reliability of electronic systems for various external conditions when redundancy by substitution is applied to the reserve components. The gain in reliability for redundancy by substitution depends in general on the external conditions, the degree of redundancy, the reliability of individual components and the mode of distribution probability.

Utilization of separate redundancy in conjunction with redundancy by substitution will permit securing a very high degree of performance reliability in certain electronic systems.

23. Television Synchro-Generators With Ferrite Components

"Prospects for Using Ferrites with Television Synchro-Generators," by L. A. Chenenkov and E. A. Demin, Novosibirsk Electrical Engineering Institute of Communications; Moscow, Nauchnyye Doklady Vyshey Shkoly, Radiotekhnika i Elektronika, No 3, 1958, pp 154-161

The article describes how ferrites with rectangular hysteresis loop can be advantageously incorporated into television synchro-generators. In synchro-generators ferrites can be used in the following circuits: frequency division circuit, pulse forming circuits, synchronizing circuits, and circuits for mutual synchronization of two synchro-generators.

The advantages of the ferrite components are high reliability, ruggedness and economy in current consumption. Incorporation of ferrites in synchro-generators has reduced the number of electron tubes to one eighth of the number generally needed with an all-tube unit.

24. Device for Automatic Reading of Printed Text

"A Method for Reading Text and An Apparatus for Realizing This Method," by M. O. Gliklikh, V. G. Tsukerman and A. Ya. Rogovskiy; Moscow, Byulleten' Izobreteniy, No 3, 1958, p 45

This is a description of Soviet Certificate of Authorship Class 21a¹, 32₂₁. No 110981 (570617 of 10 April 1957) filed with the Committee on Inventions and Discoveries under the Council of Ministers USSR.

"1. A method of reading a text by means of counting dark elements in letters, digits or signs in the course of scanning their images, for instance, with a horizontal-line scanning beam: The distinguishing feature of this method is that, in order to correctly perceive the defective images, for example, typewritten text, an additional count of dark elements is carried out during the scanning of letter, digit or sign images by a beam scanning with fewer vertical lines, so as to determine the existence of vertical lines running through the whole height of a letter, digit or sign.

"2. An apparatus for accomplishing the reading according to the method stated in paragraph 1 comprises a scanning-beam cathode-ray tube for scanning the text, and a photo-electron multiplier for perception of darkening of the beam by the text elements, both being a part of the electronic circuit. The distinguishing features of the device are the three electron counters incorporated in the electronic circuit for the purpose of counting the number of dark elements along the horizontal and vertical lines and for determination of dark vertical lines running through the whole height of letters, digits or signs. A matrix is connected by its input bus-bars to the counters and by its output bus-bars to the tube relays according to the number of letters, digits or signs in the text read. The relays are in turn connected to recording mechanisms, such as speaking, printing or counting devices."

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25. Reading Machine Built in USSR

"Reading Machine Sends Telegrams, Sorts Letters," (unsigned item); Stockholm, Dagens Nyheter, 12 Mar 59, page 6

At the Institute for Electronics in Odessa, a device has been developed which is able to transpose printed text into telegraphic signals without human intervention. In the device, which employs transistors, an [electronic] tube resembling that of a television camera, scans the text to be read. By means of various circuits, each letter or cipher is divided into a large number of zones. A special apparatus counts the number of black fields in each zone horizontally and vertically and registers the distance between lines. The resulting signals are automatically coupled to a series of relays which change them into telegraphic signals.

The device can also be used to transcribe texts and sort letters.

Computers and Automation

26. Development of Computer to Control the USSR Unified Power Network

"Meeting with the Future," by L. Zubkov; Moscow, Literatura i Zhizn', 15 Mar 1959

At the recently organized Institute for Electronic Control Machines in Moscow headed by Corresponding Member of the Academy of Sciences USSR I. S. Bruk, an electronic computer which is intended for the control of power flow in electric power networks is in the process of development. Candidate of Technical Sciences N. N. Lenov is in charge of the project. The final aim of the project is to design an electronic computer that will control electric power flow in the contemplated Unified Power Network for the European part of the USSR.

Instruments and Equipment

27. Loop Oscillograph with Lumped Liquid Damping

"Electromagnetic Moving-Coil Vibrator with Lumped Liquid Damping," by S. N. Gural'nik and A. N. Zaslavskiy; Moscow, Izmeritel'naya Tekhnika, No 3, Mar 59; pp 39-41

The author has suggested a radically new design of moving-coil vibrator for oscillographs which utilize the principle of lumped liquid damping (authorship certificates No 102877 and No 106854). The damping effect is attained by oscillations of the loop in miniature reservoirs with damping

fluid. Such reservoirs are located in a few restricted sections of the magnetic system gap. In case of lumped liquid damping the mirror remains in the air, thus eliminating the undesirable effect of contact with the fluid. The natural frequency of such a vibrator exceeds twice the natural frequency of an equivalent unit fully submerged in damping fluid.

Two models of such vibrators with lumped damping, designated N 135 and N 136, are now manufactured at the "Vibrator" Plant. The vibrators with lumped liquid have an operating frequency range above 3,000 cycles.

Materials

28. A Conference on Vitreous Semiconductors

"Investigation of Vitreous Semiconductors," by B. T. Kolomiyets, Doctor of Technical Sciences; Moscow, Vestnik Akademii Nauk SSSR, Vol 29, No 2, Feb 59, pp 103-104

"The Second Conference on Vitreous Semiconductors was held on 1-2 December 1958 at the Physico-Technical Institute, Academy of Sciences USSR. The purpose of the conference was discussion of experiments that had been carried out, exchange of information on the progress of research in this field, and general coordination of research. Representatives of 11 scientific institutions participated in the conference.

"V. V. Tarasov (Moscow Chemico-Technological Institute) presented a paper on the structure of chalcogenide glasses, in which he reported results of experimental work involving measurements of the low-temperature heat capacity of As_2S_2 and As_2Se_3 . The research in question, which was carried out by the Aspirant Huang Hsi-huai, demonstrated that the compounds in question have a chain structure. A second report by Tarasov dealt with the polymer conception as applied to vitrification and to semiconductors in general.

"A report by R. L. Myuller (State Optical Institute) noted the decisive role played by covalent bonds in the formation of glasses and also gave some quantitative evaluations of the capacity towards glass formation in chalcogenide systems based on Te, As, and Sb.

"Research on the structure of vitreous semiconductors was illustrated in two communications. A. A. Vaypolin (Institute of Silicate Chemistry, Academy of Sciences USSR) discussed structural investigations by means of the X-ray method in the system $As_2Se_3 - As_2Te_3$. It was established that, in As-Se-Te glasses, individual arsenic atoms are surrounded only by selenium atoms or only tellurium atoms forming, accordingly, regions of

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$As_2 Se_3$ and regions of $As_2 Te_3$. L. I. Tatarinova (Institute of Crystallography, Academy of Sciences USSR) reported on an investigation of the structure of some chalcogenides by the electronographic method. The results obtained by her indicate that there are some differences between the near order in the vitreous and crystalline states.

"Theoretical problems pertaining to the semiconductor properties of glasses were discussed in two communications by workers from the Physico-Technical Institute. One of them was by A. I. Gubanov, who exposed briefly his theory on the subject, and another by V. Ye. Khartsiyev, who discussed I. Z. Fisher's model.

"The Physico-Technical Institute also contributed a number of reports dealing with the many-sided investigation of chalcogenide glasses that exhibit a high conductivity. V. P. Shilo discussed the results of work on the determination of the limits of vitrification in systems formed by $As_2 S_3$ and $As_2 Se_3$ with the corresponding chalcogenides of elements of the I, II, III, and IV groups of the periodic system. An attempt to correlate data on the limits of the vitreous state in these systems with Zachariasen's and Winter-Klein's criteria of vitrification, which was made by N. A. Goryunova, showed that no correlation exists. A correspondence between the regions within which a vitreous state exists in the complex systems enumerated above and the heats of formation of the corresponding chalcogenides was found.

"An investigation of the electric properties of semiconductor glasses in the system Tl Se- $As_2 Se_3$, which was reported by T. F. Nazarova, showed that only a significant deviation from stoichiometric proportions or the presence of a large amount of impurities brings about a noticeable change in conductivity. The communication in question also pointed out that two or three phases are present in glasses.

"B. T. Kolomiyets reported on results obtained in an investigation of the inner photoeffect. The investigation in question was carried out by T. N. Mamontova. The inner photoeffect in a molten substance was measured for the first time. The spectral distribution of the photoeffect of [solid] $4 As_2 Se_3$. $As_2 Te_3$ at room temperature was found to be practically the same as in the melt. This testifies to the absence of change in the near order.

"D. V. Pavlov discussed results obtained in work on the position of the threshold of absorption as affected by changes in the composition of glasses based on chalcogenides of arsenic, antimony, and thallium, and also by the type of absorption in the wave-length range of 0.4-18 μ .

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"A communication by V. P. Pozdnev discussed results obtained in the investigation of the viscosity of glasses within the system $As_2Se_3 - As_2Te_3$. On the basis of results obtained in the work described, the structure of the glasses in question can be regarded as being one of monodimensional chains held together by covalent bonds and bound to each other by Van-der-Waals forces. A replacement of selenium atoms with tellurium atoms leads to a reduction of the bond energy within chains, so that an experimentally measurable lowering of the viscosity is brought about. In an address generalizing the results outlined above, which were obtained at the Physico-Technical Institute, B. T. Kolomiyets noted that the total electric and photo-electric data obtained indicate that the near order does not undergo any changes in the materials that have been investigated when transition from the vitreous state to the crystalline state takes place.

"Two reports were also presented on oxide glasses. O. V. Mazurin (Leningrad Chemico-Technological Institute) described results obtained in the investigation of the semiconductor properties of silicate and borosilicate glasses to which oxides of iron, cobalt, and titanium had been added. N. V. Petrovykh (Moscow Institute of Electrotechnical Glass) outlined the results obtained in the investigation of limits of vitrification and electric characteristics of adjacent semiconductor glasses having the composition $V_2O_5 - P_2O_5 - R_xO_y$ (where R is an element of the I, II, III, IV, or V group of the periodic system).

"The next conference on semiconductor glasses will be held in 1959."

29. A Review of USSR Work on the Growing of Single Crystals of Seignetteo-electrics

"Experience Acquired in Work on the Growing of Single Crystals of Seignetteoelectrics," by N. S. Novosil'tsev (deceased), A. L. Khodakov, M. L. Sholokhovich, Ye. G. Fesenko, and O. P. Kramarov, Rostov-on-Don State University; Moscow, Kristallografiya Vol 4, No 1, Jan-Feb 59, pp 101-108

USSR work on the growing of single crystals of seignetteoelectrics (particularly barium titanate and analogous titanates) is reviewed. A bibliography consisting of 48 references, 44 of them USSR, follows the article.

30. Preparation of Single Crystals of Titanate Seignettelectrics by the Method of Zone Refining

"Preparation of Single Crystals of Seignettelectrics by the Method of Zone Refining," by O. P. Kramarov, Scientific Research Physico-Mathematical Institute, Rostov-on-Don State University; Moscow, Kristallografiya, Vol 4, No 1, Jan-Feb 59, pp 109-113

Experimental work on the preparation of barium titanate and barium-lead titanate single crystals by the method of zone refining is described. On the basis of the results obtained, it is concluded that recrystallization of polycrystalline ceramic material into single crystals is possible without bringing the material into the liquid state. The method in question is applicable not only to seignettelectrics: single crystals of corundum and of other materials can presumably be produced in this manner.

31. Investigation of the Domain Structure of Barium Titanate Single Crystals by Examining the Microrelief on their Surface

"The Microrelief on the Surface of Single Crystals of Barium Titanate and the Domain Structure of these Crystals," by E. Igras, G. V. Spivak, and I. S. Zheludev, Moscow State University; Moscow, Kristallografiya, Vol 4, No 1, Jan-Feb 59, pp 121-123

The domain structure of barium titanate single crystals was investigated by examining in reflected light the surface microrelief at different temperatures by means of a metal microscope. By making electron-microscopic stereoexposures, the depth of the microrelief which forms when the crystal is subdivided into domains was measured. The surface microrelief was observed below and above the Curie point to determine changes in the domain structure. It was found that there are "elastic" surface deformations (associated with domains) which disappear at temperatures above the Curie point and "inelastic" deformations (due to differences in the etching of ends of dipoles) which do not disappear.

32. Seignettelectric Characteristics of Solid Solutions of Metaniobates

"Seignettelectric Properties of Solid Solutions in the $Pb Nb_2 O_6 - Ba Nb_2 O_6 - Sr Nb_2 O_6$ System," by G. A. Smolenskiy, V. A. Isupov, and A. I. Agranovskaya, Institute of Semiconductors, Academy of Sciences USSR, Leningrad; Leningrad, Fizika Tverdogo Tela, Vol 1, No 3, Mar 59, pp 442-449

The dielectric polarization of seignettelectric solid solutions within the system indicated in the title was investigated. The dependence of the Curie point on the composition was determined. It was shown that solid solutions based on lead metaniobate exhibit good piezoelectric characteristics in an extensive temperature range. Compositions were found which show a high dielectric permeability varying little from minus 60° to plus 240° C.

33. The Properties of Ultrapure Single Crystals of In Sb

"Production of Ultrapure Single Crystals of In Sb by the Method of Zone Refining," by K. I. Vinogradova, V. V. Talavanova, D. N. Nasledov, and L. I. Solov'yeva Physico-Technical Institute, Academy of Sciences USSR, Leningrad; Leningrad, Fizika Tverdogo Tela, Vol 1, No 3, Mar 59, pp 403-406

The characteristics of single crystals of In Sb prepared by the method of zone refining were determined. The results obtained are described.

34. The Piezoelectric Characteristics of Triglycine Sulfate

"The Preparation of Triglycine Sulfate Crystals and the Physical Properties of These Crystals," by V. P. Konstantinova, I. M. Sil'vestrova, and K. S. Aleksandrov, Institute of Crystallography, Academy of Sciences USSR; Moscow, Kristallografiya, Vol 4, No 1, Jan-Feb 59, pp 69-73

Data are given on the solubilities of triglycine sulfate at different temperatures. A technical method for growing crystals of this substance by the method of lowering the temperature is proposed. The values of piezoelectric moduli measured by the resonance-antiresonance method on vibrating slabs and plates are given; also the values of elasticity constants measured by a pulse ultrasound method and of dielectric permeabilities measured with a Q-meter.

Triglycine sulfate $(\text{NH}_2\text{CH}_2\text{COOH})_3 \text{H}_2\text{SO}_4$ has been prepared by the authors of the article using a procedure described by them.

[For additional information on materials see items No 42, 117 and 118.]

Radar

35. FM Range Finder

"Theory of the FM Radio Range Finder," by B. V. Malanov; Moscow, Radiotekhnika, No 4, Apr 59, pp 46-56

Detailed analysis of the output oscillations of a range-finder detector is given in the article. It is shown that the indicator display is practically independent of the mode of frequency modulation if a pulse counter with a limiter is used at the output of the FM range finder. The simplified treatment of the performance of an FM range finder is analyzed and the limits of its usefulness are established.

V. ENGINEERING

36. Radiation Analysis by the Network Method

"The Use of a Method of Electroanalysis for the Solution of the Problem of Radiant Heat Exchange," by V. N. Adrinov, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 20-25

The integral equations which describe the processes of radiant heat exchange in closed systems of bodies filled with a radiation retarding medium are shown to be satisfactorily approximate to a system of linear algebraic equations, which, in turn, are identical to a system of equations expressing the distribution of currents and voltages in a special electrical circuit. Such a circuit can serve as an analog for the solution of the integral equations of radiation exchange with the use of electrical integrators.

37. Equations of Hydrodynamics for Heat Exchange

"On the Derivation of the Equations of Hydrodynamics of the Theory of Heat Exchange," by P N Pinsker, Saratov; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 26-32

A system of equations of hydrodynamic theory of heat exchange, which takes into account the influence of a laminar (viscous) sublayer, is derived for a turbulent flow of a compressible and a noncompressible liquid. A method of integration of the initial system for a flow with a pressure gradient is given for the case when the velocity profile in the boundary layer and the coupling coefficient of friction are described for the entire thickness of the boundary layer by stepwise dependencies.

38. Aerodynamic Heating at High Speeds

"Aerodynamic Heating, Problems in Hypersonic Flight," by Engr Col V. Votyakov and Engr Lt Col V. Shumyatskiy, Docents, Candidates of Technical Sciences; Moscow, Sovetskaya Aviatsiya, 14 Apr 59, p 2

The authors review the problems involved in controlling aerodynamic heating during hypersonic flight. To control the aerodynamic heating of the air layer surrounding an airplane which, according to the authors, at a height of 30 kilometers and a speed of $M=2.7$ amounts to 290° (with

a ballistic rocket having a speed of $M=10.7$, a temperature of $3,150^{\circ}$ can be attained, and with an intercontinental ballistic missile traveling at $M=21.3$, a temperature of approximately $7,000^{\circ}$ can be attained), various methods can be employed, namely, metallic skirts, blunt nose cones, oxidized rather than polished surface, materials made of heat-treated steel alloyed with nickel which can withstand temperatures of $800-1,100^{\circ}$, and special heat-absorbing coverings, especially for ballistic rockets. This heat-absorbing material would cover only the nose portion of the ballistic rocket and would have a coefficient of linear expansion almost equal to that of the outer skin. In addition to coatings, liquid coolants could also be used, such as water being released through nozzles located on the outer skin of the vehicle or special liquid cooling devices inside the apparatus.

Control of the aerodynamic heating of a flying apparatus comes within the purview of a new science -- magnetoaerodynamics. Since the shock wave caused by hypersonic apparatus is highly ionized, strong magnetic poles, according to the authors, could be utilized to repel the hot layer of air away from the flying apparatus.

39. Control System For AC Induction Motors

"The Fundamental Characteristics of the Frequency Regulation of AC Electric Drives With a Single-Armature Transformer," by V. S. Kulebakin and A. A. Yanshin, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 11-19

A control system is described for the frequency starting and speed control of AC motors; the system provides a smooth regulation over a wide range, greater efficiency, constant cosine theta, and absolute slip for short-circuited induction motors. The system acts as an automatic speed stabilizer, provides a series electromechanical characteristic for induction motors, and makes it possible to start short-circuited induction motors smoothly and at lower frequencies and voltages, which is very favorable. A throttling of the system does not require the use of special apparatus or circuits. The system provides a means of reversing induction motors, is stable and responsive to control, dispenses with the necessity of a mechanical connection between the various elements, and provides a possibility of controlling the speed of synchronous motors.

40. Statistical Method for Determining Power Schedules

"Power System Schedules and the Theory of Probability," by N. A. Kartvelishvili, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 3-10

This article investigates the random factors which influence the use of power system schedules and defines the problem of applying the theory of probability to the scheduling of hydroelectric power systems.

Although the traditional calendar method of determining regimes and design considerations for hydroelectric power plants has been a very useful and practical tool, the time has come when it is completely possible to employ in practice a strictly statistical method.

41. Periodicity of "Byulleten' Izobreteniy" Increased

Moscow, Byulleten' Izobreteniy, No 5 and 6, 1959

The No 5 issue of the Byulleten' Izobreteniy was submitted for printing on 27 February 1959, while the No 6 issue was submitted on 19 March 1959, indicating that this publication, a monthly through 1958, will appear more than 12 times a year, possibly as often as 24 times.

The publication also announces that beginning 1 January 1959, the acquisition of the patent description will be changed from the former method of ordering by a set of one of the 88 classes to a system of ordering only one of the 296 subscription groups, thus permitting finer subdivision of the subjects.

42. A Heat-Resistant Microcrystalline Glass

"Harder Than Steel and Lighter Than Aluminum" (unsigned article); Moscow, Promyshlenno-Ekonomicheskaya Gazeta, Vol 4, No 28 (483), 6 Mar 59, p 4.

I. Tykachinskiy, Candidate of Technical Sciences, Head of the Laboratory of Glass Making ("Steklovareniye"), State Scientific Research Glass Institute, described in the following terms the material which he showed to the correspondent of the newspaper and which consisted of small white plates:

"This is a new material which has been recently developed by us. The name 'Sital' has been proposed for it. The new material, although derived from glass, is no longer glass. Its structure is microcrystalline, and the dimensions of the particles composing it are of the order of one micron. Sital is produced by subjecting to heat treatment glass with a special composition. Under the effect of the heat treatment, the structure of the glass becomes microcrystalline. A similar material has been obtained by a somewhat different method in a laboratory directed by Yu. Rogozhin, Candidate of Technical Sciences.

"Sital represents a considerable advancement as compared with the glass from which it is derived. It is difficult to name a material which would exhibit the same combination of valuable characteristics. Sital is four times stronger than glass, harder than high-carbon steel, and, at the same time lighter, than aluminum. As far as its electric characteristics are concerned, sital is superior to ceramics. From the standpoint of heat-resistance, sital is superior to the best heat-resistant glasses. Another valuable characteristic of sital is that its properties remain unchanged at high temperatures: it does not soften even at 1,400 degrees.

"The rare combination of the properties mentioned opens up extensive possibilities for the application of the new material. Bearings made of sital will stand prolonged exposure to corrosive media and to the effects of high temperatures. The new material will be irreplaceable as a material for vessels in which chemical liquids are kept. Other possible applications are as material for machine parts, pipes, and fire-proof partitions in buildings. Many additional uses which are too numerous to mention can also be visualized."

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43. Pressure Losses of Rotating Compressor Wheel

"Experimental Investigation of the Loss of Pressure in the Rotating Wheel of an Axial Compressor," by A. S. Ginevskiy and S. A. Dovzhik, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 45-52

A report is given on the results of an experimental investigation of the pressure losses during the rotation of the wheel of an axial compressor at low peripheral velocities. On the basis of total pressure measurements taken with radially positioned comb-shaped rods rotating in place of the wheel, the structure of the losses between the blades of the wheel was investigated, and certain quantitative data were obtained which characterize for a wide range of wheel operations both the general loss of total pressure and the distribution of loss along the radius of the wheel.

44. Accurate Formulas for Use in Navigation Given

"Increasing the Accuracy of Solution of Navigation Problems,"
by A. P. Yushchenko, Leningrad Higher Marine-Engineering School,
Chair of Navigation; Moscow, Nauchnyye Doklady Vyshey Shkoly,
Geologo-Geograficheskiye Nauki, No 1, 1958, pp 255-259

The problem of taking into account the sphericity of the earth in navigation problems is considered. Geodesic methods for transferring from the terrestrial spheroid to a sphere are termed excessively complicated for navigation practice. More convenient formulas of comparable accuracy are given for transposing from latitude difference to departure.

45. Chinese Test Concrete Directly Poured on Frozen Ground

"Experiment With Concrete Poured Directly on Frozen Earth,"
by Ni Hsiang-ken (倪祥根); Peiping, T'u-mu Kung-ch'eng
(Civil Engineering), Vol 3, No 12, 1958, pp 529-532

In an experiment performed in northern Manchuria, a 40-centimeter layer of concrete was poured on the frozen bottom of an excavation 70 centimeters deep. The top of the concrete, 30 centimeters below the surface of the frozen earth, was then covered with sawdust and rugs. For over a month, daily outdoor temperatures readings were recorded, as were temperature readings at various points in the concrete slab. Seven times during the period 29 January-3 May 1958, measurements were taken to determine the degree of depression which had developed in the foundation.

This article presents the details of the experiment and conclusions.

VI. MEDICINE

Antibiotics

46. Search for Anticancer Antibiotics

"Some Theoretical Problems of the Search for Anticancer Antibiotics," by G. F. Gauze, Vestn. Akad, med. nauk. SSSR (Herald of the Academy of Medical Sciences USSR), 1958, No 1, 37-41 (from Referativnyy Zhurnal--Biologiya, No 18, 25 Sep 58, Abstract No 84877, by S. A. Syrkina-Kruglyak)

"On the premise that an inherited impaired respiratory apparatus is characteristic of the metabolism of cancer cells, the possibility of utilizing mutants of yeasts and staphylococci with a weakened oxidation process as test objects for the selection of anticancer antibiotics has been investigated. Through the action of acriflavine, camphor, and ultraviolet rays on cultures of *Saccharomyces cerevisiae*, or ultraviolet rays on *Staphylococcus aureus* it was possible to obtain a number of strains with an inherited impaired oxidation process. The mutants did not oxidize the leukobase into methylene blue. The derived mutant strains were utilized (G. F. Gauze, G. B. Kochetkov, and G. B. Vladimirova, 1957) for the study of the properties of 2,500 cultures of different actinocymetes isolated from the soil. Within 48 hours the cultures seeded on agar were crossed with suspensions of either normal microorganisms or with microorganisms with an impaired respiratory apparatus.

"It was found (T. P. Preobrazhenskaya, Ye. S. Kudrina) that 53 of the cultures inhibited the growth of mutants with an impaired oxidation process, but had no effect on the other microorganisms. Most of these cultures, while active against staphylococci mutants, had no effect on yeast mutants; ten of these cultures depressed Ehrlich's ascitic cancer cells in experiments in vitro. Some of the cultures, however, inhibited the growth not only of staphylococci mutants, but also of yeast mutants; six of them were active against Ehrlich's cancer cells in vitro. Substances which selectively inhibited the growth of staphylococci mutants with impaired oxidation processes were isolated from the cultures of some of the actinomycetes by M. G. Brazhnikova. One of these, the crystalline antibiotic 992, when used in dilution of 1-5 million had a slight depressing effect on the development of Ehrlich's ascitic cancer in mice (V. A. Shorin and O. K. Rossolimo). The author thinks that the biochemical mutants of microorganisms with a correspondingly modified metabolism may be regarded as 'equivalents of cancer cells' and may be utilized for the selection of compounds in the development of cancer cells."

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47. Yugoslavia to Produce Terramycin

"Terramycin of Domestic Production" (unsigned article); Zagreb, Borba, 11 Apr 59, p 4

The Galenika Pharmaceutical Factory (Tvornica lijekova) in Zemun is preparing to produce several new products which have heretofore been imported. Among these is a broad spectrum antibiotic and having the characteristics of the American preparation imported under the trade name of terramycin. At the beginning of 1960 equipment will have been installed for the production of this preparation at the present penicillin production center. Production capacity will be 3,000 kilograms annually, and the value of the gross product will be 2.5 billion dinars. The technical equipment is being built by technicians of the enterprise.

Installation of equipment is nearing completion for the production of streptomycin. About 10,000 kilograms will be produced annually, valued at about 2 billion dinars. Agreements will be made with some foreign firm for the purchase of varieties of microorganisms with a high productivity.

Near the end of the year, synthesis of novalin, an antirheumatic preparation, will begin.

48. Antimycotic Action of Chlorpromazine and Promethazine

"On the Antimycotic Action of Phenothiazine Derivatives," by Stanislav Vacatko, Ceskosl. dermatol (Czechoslovakia), 1958, 33, No 3, 179-182 (From Referativnyy Zhurnal--Biologiya, No 4, 25 Feb 59, Abstract No 18547

"Experiments carried out in vitro established that chlorpromazine and promethazine have only a weak antimycotic action."

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49. Antifungal Antibiotic 26/1

"Biology and Isolation of the Antifungal Antibiotic 26/1," by V. A. Tsyganov, P. N. Golyakov, A. M. Bezborodov, V. P. Namestnikova, G. V. Khonko, S. N. Solovyev, M. A. Melyshkina, and L. O. Bol'shakova, Leningrad Scientific Research Institute of Antibiotics; Moscow, Antibiotiki, Vol IV, No 1, Jan-Feb 59, pp 21-26

Investigations were conducted to determine the antifungal properties of 26/1, and antibiotic isolated from the culture *Actinomyces globisporus* Kras., one of the 120 cultures obtained from actinomycetes found in the

soil of Leningrad and its environs. The antibiotic 26/1 is a part of the polyene series belonging to the heptane group. The investigations established that antibiotic 26/1 is an active fungicidal and fungistatic agent in relation to dermatophytes and yeast like fungi of the *Candida albicans* species; that it suppresses the growth of dermatophytes when used in concentrations of 0.1-100 gamma per milliliter; and that it suppresses the growth of yeast like fungi when applied in concentrations of 0.08-0.3 gamma per milliliter.

The toxicity of 26/1 was determined in experiments on mice. When administered intraperitoneally the LD₅₀ of the preparation was 9-11 milligrams per kilogram body weight; when administered subcutaneously, 520-740 milligrams per kilogram body weight. The toxic properties of the antibiotic may be reduced by purification with the help of ion exchange chromatography.

Epidemiology

50. Virus Transmission in Two-Wave Meningoencephalitis

"Data on the Study of the Role of Milk in the Transmission of the Virus of Two-Wave Meningoencephalitis," by V. I. Il'yenko; Ezhegodnik, In-t Eksperim. Med. Akad. Med. Nauk SSSR, 1955 (Yearbook, Institute of Experimental Medicine, Academy of Medical Sciences USSR, 1955); Leningrad, 1956, pp 248-252 (from Referativnyy Zhurnal--Biologiya, No 21, 10 Nov 58, Abstract No 94852, by V. A. Lashkevich)

"Eight hundred and sixty milk samples were examined and 15 strains of DME (two-wave meningoencephalitis [drukhvolniy meningoentsefalif]) virus were isolated in two foci. An increase in the titers of neutralizing antibodies was established in goats during the epidemic season. In experiments, the DME virus was observed regularly and in large quantities in milk on the 3d to 6th day after goats had been infected subcutaneously or ticks had fed on them, but not in milk from immunized animals. The DME virus in the blood of the goats was found in the milk of susceptible animals, guinea pigs, and mice but was not observed in the milk of nonsusceptible cattle, rabbits, cats, and rats. The tick-borne encephalitis virus was observed in milk in experiments on goats, and the virus of Japanese encephalitis, Taylor's encephalitis, and lymphocytic choriomeningitis, in experiments on guinea pigs. The quantity of DME virus in the blood of mice infected subcutaneously was considerably lower (except for the first day) than in the mammary glands (3.48). A somewhat higher virus titer (4.0) was reached in the spleen. The author proposes that the DME virus replicates in the mammary gland, but is not isolated from the blood or lymph depending on the type of secretion."

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51. Chinese Study Distribution of Dysentery Bacilli in Urumchi

"Preliminary Report on the Distribution of Dysentery Bacilli in Urumchi in 1957," by Chao Yu-lin (趙裕琳), Department of Microbiology, Sinkiang Medical College; Peiping, Jen-min Pao-chien (People's Health), Vol 1, No 4, 1959, pp 342,344

This item reports the typing of 47 strains of dysentery bacillus recovered from patients in Urumchi during the second half of 1957. The distribution according to Shigella species was found to be as follows: Shigella shigae, one strain (2.1%); Sh. ambigua, 2 strains (4.3%); Sh. sonnei, 4 strains (8.5%); Sh. flexner, 40 strains (85.1%), and Sh. boydii, none.

The distribution of the 40 strains of flexner according to type or variant was as follows [numbers in parentheses represent number of strains]: la (2), lb (1), 2a (21), 2b (1), 3 (6), 4 (0), 5 (1), 6 (1), x (0), y (1), unidentified (6).

Immunology and Therapy

52. Combination of Live Vaccines With NIISI Polyvaccine

"The Problem of the Immunological Effectiveness of Live Vaccines in Combination With NIISI Polyvaccine" (Report II), by F. A. Shpugunov, Chair of Microbiology, Military Medical Academy imeni Kirov; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 30, No 4, Apr 59, pp 19-23

This article, the second published on this subject by the same author, reports a study of the immunological effectiveness of smallpox vaccine and its combination with brucellosis vaccine and polyvaccine which was carried out on four groups of immunized rabbits. The animals of the first group (controls) were immunized with smallpox vaccine alone; the second, with smallpox and brucellosis vaccines; the third, with smallpox vaccine and polyvaccine; and the fourth, with smallpox, brucellosis, and polyvaccine. Immunological effectiveness was evaluated according to virus-neutralizing capacity of the sera, which was determined by intracutaneous reaction according to the Grot method (described in detail). Results of this evaluation are shown in a table entitled: "Virus-Neutralizing Strength of Sera From Rabbits Immunized With Smallpox Vaccine and Its Combination With Brucellosis Vaccine and NIISI Polyvaccine (cutaneous reaction following titration of sera at different intervals)." The intervals at which titers were checked varied from 15 to 60 days after immunization.

In another group of experiments, four groups of guinea pigs were immunized in the following manner: group one, with brucellosis and smallpox vaccines and polyvaccine; group two, with brucellosis vaccine and polyvaccine; group three, with brucellosis and smallpox vaccines; and group four, with brucellosis vaccine alone. No local reactions to the introduction of brucellosis vaccine were noted. The smallpox inoculation reaction differed slightly in intensity. Agglutinin titers determined by the Wright reaction and the Burnet allergy test served as indexes of immunological reconstruction with respect to brucellosis antigen. These titers were determined before immunization, 30 and 60 days after immunization, and one month after challenge (90 days after immunization). Challenge and further serological and bacteriological observations were made at the Leningrad Veterinary Institute. Results of these experiments are presented in Table 2, entitled: "Summary Indexes of Immunological Reconstruction in Guinea pigs Immunized With Live Brucellosis Vaccine and Its Combinations With Smallpox Vaccine and NIISI Polyvaccine." Agglutination titers were determined as in the rabbits.

The following conclusions are presented on the basis of the results of these experiments:

"1. Simultaneous immunization of rabbits with smallpox vaccine combined with live brucellosis vaccine or NIISI polyvaccine, and also all three indicated vaccines, does not essentially affect the immunological effectiveness of smallpox vaccine.

"2. On immunization of guinea pigs with various combinations of live brucellosis vaccine, NIISI polyvaccine, and smallpox vaccine, the immunological effectiveness of the brucellosis vaccine is less pronounced than on immunization with brucellosis vaccine alone."

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53. Information on Dry Live Antirabies Vaccine

"Further Observations on a Stabilized Dry Live Antirabies Vaccine," by Sh. G. Khanin; Tr. Smolenskogo Med. In-ta (Works of the Smolensk Medical Institute), No 6, 57, pp 141-147 (from Referativnyy Zhurnal-- Biologiya, No 18, 25 Sep 58, Abstract No 81286, by I. A. Shumeykina)

"Dry antirabies vaccine prepared from rabbit brains previously kept at 1-3° C for 24 hours in a 1% phenol solution maintained its initial virulence and immunogenicity for at least 4 years. When prepared by an analogous method with 1% phenol added as a preservative, the vaccine lost its virulence but maintained its immunogenicity toward the end of a 4-year period. There is no strict parallelism between the virulence and the immunogenicity of dry antirabies vaccine; however, the completely inactivated vaccine became nonimmunogenic."

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54. Vitamin B₁₂ in the Therapy of Poliomyelitis

"Massive Doses of Vitamin B₁₂ in the Complex Therapy of the Acute Phase of Poliomyelitis," by T. V. Skripko. Tr. Kliniki nervn. bolezney. Gorkovsk. med. in-t (Works of the Clinic of Nervous Diseases, Gorky Medical Institute), 1958, No 1, 21-25 (from Referativnyy Zhurnal--Biologiya, No 4, 25 Feb 59, Abstract No 18642)

"Twenty-four children aged 5 months to 15 years, suffering from different forms of poliomyelitis, were administered vitamin B₁₂ (12-15 injections of 1,000 gamma daily regardless of ages) as a part of the therapy complex. Eleven of the patients completely recovered, and a considerable improvement in 11 of the other children was noted. It was found that vitamin B₁₂ in the indicated doses halted the development of paralysis, inhibited the development of atrophies, and had a pain relieving effect. There were no side reactions."

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55. "Vitamin B₁₂ in the Therapy of Nervous Diseases

"Therapy of Nervous Diseases With Relatively Large and Massive Doses of Vitamin B₁₂," by Sh. S. Royzen and F. A. Poyemnyy, Tr. Kliniki nervn. bolezney. Gorkovsk. med. in-t (Works of the Clinic of Nervous Diseases, Gorky Medical Institute), 1958, No 1, 10-15 (from Referativnyy Zhurnal--Biologiya, No 4, 25 Feb 59, Abstract No 18643)

"A group of patients suffering from different affections of the nervous system were treated with relatively large doses of vitamin B₁₂ (90-120 gamma in 24 hours for a period of about 15 days with a total average dose of 1,410 gamma) and massive doses of the vitamin (1,000 gamma in 24 hours for a period of about 14 days with a total average dose of 14,000 gamma). Vitamin B₁₂ was found to be highly effective in cases of polyneuritis of various etiologies; somewhat less effective in other diseases of the peripheral nervous system (radiculitis, plexitis, mononeuritis); little effective in organic inflammatory diseases of the central nervous system; and almost completely ineffective when used in the therapy of aftereffects of inflammatory diseases of the spinal cord and cerebrum, diffused sclerosis, and hereditary-degenerative diseases of the nervous system. In diseases in which B₁₂ was effective, best results were obtained when relatively large doses instead of massive doses of the vitamin were administered. The important role which the benzamidazole ring plays in the mechanism of B₁₂ action was noted."

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Instruments and Apparatus

56. Soviet "Living Hand"

"The 'Biohand'" (unsigned item); Berlin, Wissenschaft und Fortschritt, No 3, Mar 59, p 116

The following text accompanies a photograph showing the Soviet "biohand" holding a book and a human hand and forearm to which the "biocurrent-pickup" bracelet is attached:

"A group of Soviet scientists have been successful in designing the so-called biohand. The operation of this instrument is based on the fact that the current impulses produced in human muscle are picked up with a bracelet in which very sensitive current sensing devices are contained. These biocurrents are fed to an amplifier, which activates the device which actuates the movements of the artificial hand.

"With the biohand, the motion of the human hand can be imitated almost perfectly. After the special bracelet has been put on, a motion can be carried out 'only in thought'; the biohand performs this imagined motion. (In our photograph it is receiving a book.) The current impulses can also be transmitted over thousands of kilometers by radio. The instrument, which was developed jointly by the Institute for Prosthetics and Prosthetic Design [Central Scientific Research Institute of Prosthetics and Prosthetic Design] and the Institute of Machine Science, Moscow, is suitable for use in atomic laboratories, in earth satellites, etc., thus in places where the presence of humans is to be avoided."

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Oncology

57. Cancer Research

"Intensification of Scientific Research on Oncology"; Moscow, Meditsinskiy Rabotnik, No 19 (1767), 6 March 59, p 4

"The Ministry of Health USSR adopted a decision in regard to measures for the intensification of scientific research on the problem of cancer which has been given priority rank.

"Notwithstanding the fact that some successes have been achieved in the study of cancer and the organization of an anticancer campaign, oncological diseases remain one of the most frequent causes of death. The level of scientific research in this field as yet fails to correspond to the level of present-day demands. Wider participation of biologists,

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chemists, physicists, and other specialists in the solution of the problem of cancer, as well as an increase in the number of accepted aspirants and hospital physicians are anticipated.

"It is proposed that the Presidium of the Academy of Medical Sciences USSR broaden the scope of its investigations in the field of oncology and that it provide scientific and methodical leadership and consultative assistance to the scientific institutes of the union republics.

"The Ministry of Health USSR also confirmed a committee for the coordination of scientific research in the field of oncology. Its membership includes the greatest scientists of the country. An all-union coordinating conference to which specialists in various sciences will be invited will be held in Moscow."

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58. Hepatomas Induced by Synestrol and Testosterone-Propionate

"Development of Hepatomas in Male Rats through the Action of Synestrol and Testosterone-Propionate," by V. P. Konoplev, Laboratory of Experimental Hormonotherapy, Institute of Experimental Pathology and Therapy of Cancer, Academy of Medical Sciences USSR; Moscow-Leningrad, Voprosy Onkologii, Vol V, No 2, 1959, pp 138-144

Male rats were used in experiments conducted to determine the role played by a disturbed hormonal balance in the development of hepatomas in the organism. Synestrol and Testosterone-Propionate in the form of tightly pressed cylindrical pellets were placed under the skin of the animals to be partly absorbed by the organism. The rats were divided into four groups: Group 1 animals received testosterone alone for a period of 14 months until total maximal doses of 800-1,000 milligrams were administered; group 2 animals were administered synestrol alone for a period of 7 months until total maximal doses of 420 milligrams were given; group 3, comprising 37 rats, were administered synestrol alone for periods of 2-7 months, and alternately synestrone and testosterone for one month; group 4 animals were administered synestrol alone for a period of one month, and then alternately synestrol and testosterone for a period of 14 months. Hepatomas began to develop in the animals during the fifth month after the beginning of the experiments. The largest number of hepatomas developed in group 4 animals, that is, the group in which the hormone balance was disturbed by the administration of both hormones over a prolonged period of time. The tumors as a rule were located on the surface of the liver and were 0.3-0.5 centimeter in diameter. Slight degenerating and cyrrhotic processes only were noted during the development of the tumors. The mechanism of the development of the hepatomas induced by synestrol and testosterone-propionate has not yet been determined and requires further study.

59. Morphogenesis of Osteogenic Sarcoma Caused by Strontium 90

"Problems of the Morphogenesis of Osteogenic Sarcoma Developing as a Result of the Intraperitoneal Administration of Sr⁹⁰," by L. A. Cherkasskiy, Pathologicoanatomical Laboratory of the Leningrad Scientific Research Institute of Diseases of the Ear, Nose, Throat, and Speech, and the Pathologicomorphological Laboratory of the Central Scientific Research Institute of Medical Radiology, Ministry of Health USSR; Moscow-Leningrad, Voprosy Onkologii, Vol V. No 2, 1959, pp 144-154

Rats were used in experiments which were conducted to determine the morphogenesis of osteogenic sarcoma which develops as a result of the introduction of radioactive substances into the organism. Radioactive strontium -- Sr⁹⁰-- selected because of the great social danger it now presents, was administered to the animals. Two series of experiments were carried out: the animals of the first series were administered Sr⁹⁰ in doses of 0.75-7.5 µC/r; the animals in the second series were given Sr⁹⁰ in doses of 0.25-0.75 µC/r. Observations established that the development of osseous carcinoma was preceded by morphological changes in the bone tissue. Some of these changes were of a background character, creating conditions which made the development of sarcoma possible; other changes were closely linked with the neoplastic processes and in themselves were presarcoma manifestations. Four types of changes in the morphological structure of bone tissue were noted. These were the development of foci of abnormal osteogenesis; development of atypical cell proliferation of the fibroblast type; development of atypical proliferation of the periosteum; and development of giant cell growths with atypical cells.

60. Experimental Cancer of the Liver

"Experimental Cancer of the Liver Induced by 4-dimethylaminoazobenzene. III. Histochemical Investigation of Modifications in Ribonucleic Acid," by A. A. Khadzhiolov, Izv. In-ta morfol. Bulg. AN (News of the Morphology Institute, Bulgarian Academy of Sciences), No 2, 1957, pp 453-460 (from Referativnyy Zhurnal--Biologiya, No 3, 10 Feb 59, Abstract No 13549, by the author)

"In the initial stage of tumor development, the content of ribonucleic acid in the dying parenchyma cells and in the bile duct cells is reduced. A maximal accumulation of ribonucleic acid was noted in bile duct cells during the development of cholangio-fibrosis. In hepatomas and cholangiomas, the cytoplasm of the nuclei is rich in ribonucleic acid; the nucleoli are hypertrophied. The more expressed the atypia of the tumor cells is, the

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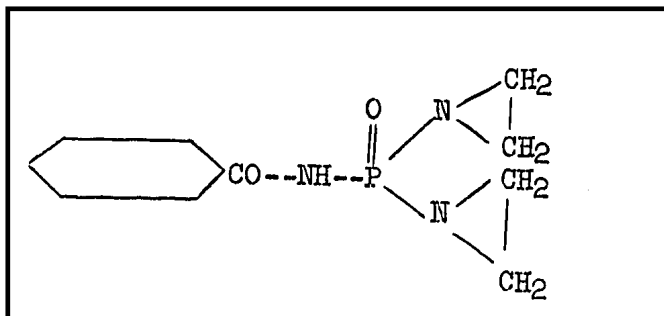
greater the content of ribonucleic acid. Cell mitosis does not involve a reduction in ribonucleic acid. Groups or individual plasmocytes rich in ribonucleic acid are found in the stroma of the tumors. Many small circular cells with a high content of ribonucleic acid and with active mitosis are found in atypical sections. These, in the author's opinion, are young lymphocytes. In the cytoplasm of parenchymatous hepatic cells the content of ribonucleic acid is reduced; their nucleoli are hypertrophied."

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61. Antitumor Preparation

"Antitumor Action of N-benzoyl-N',N',N'',N''-diethylene triamide of Phosphoric Acid," by Prof I. M. Peysakhovich, Candidate of Medical Sciences P. Ya. Sologub, and Candidate of Chemical Sciences L. D. Protsenko (Kiev) of the Ukrainian Scientific Research Sanitation-Chemical Institute; Kiev, Vrachebnoye Delo, No 12, Dec 58, pp 1249-1254

This article is a report on the results of experiments which were conducted to determine the effectiveness of N-benzoyl-N',N',N'',N''-diethylene triamide of phosphoric acid, a newly synthesized preparation, when used in the therapy of tumors. The new preparation is a white crystalline powder, soluble in water and alcohol. It has a melting point of 130-216 degrees. Its structural formula is:



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The antitumor action of the preparation was tested on sarcoma-45, Geren's carcinoma of rats, Crocker's sarcoma of mice, Brown-Pearce epithelium of rabbits, and leukosis of chickens. The results of the experiments were as follows:

1. N-benzoyl-N',N',N'',N''-diethylene triamide of phosphoric acid when administered to the animals subcutaneously or by mouth inhibited the growth of mesenchymal tumors and leukosis in chickens. The preparation was effective in the initial stages of the development of the transplant as well as when the tumors reached considerable size.

2. The preparation effectively inhibited the growth of tumors of epithelial origin: Geren's carcinoma and Brown-Pearce epithelium.

It was found to be only slightly toxic.

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62. Antitumor Immunity

"Attempt to Develop Antitumor Immunity to Experimental Tumors," by F. M. Khaletskaya, Tr. Molotovsk. med. in-ta (Works of the Molotov Medical Institute), 1957, No 26, 89-97 (from Referativnyy Zhurnal--Biologiya, No 5, 10 Mar 59, Abstract No 22764, by R. M. Radzikhovskaya)

"The intracutaneous administration to mice of the noncellular filtrate of cutaneous mouse carcinoma which had been induced in the animals by methyl cholanthrene was not effective; no increase in the resistance of the animals to subsequent administration of methyl cholanthrene was noted; an acceleration in the process of the development of the tumors was observed even during the first few months. Resistance was increased by the intracutaneous immunization of the animals with the noncellular filtrate of a papilloma induced in mice by methyl cholanthrene: tumors developed less frequently and later than in control animals. The immunization of mice with the noncellular filtrate of spontaneous carcinoma of the mammary gland somewhat retarded the growth of Ehrlich's cancer. A single immunization of a small number of rabbits with the noncellular filtrate of Pearce-Brown carcinoma created an immunity to inoculations with this tumor in the animals."

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63. Hormone Therapy of Cancer

"New Data on the Hormone Therapy of Cancer of the Mammary Gland," by D. Rosner, J. Lupovici, R Schreiber, Chirurgia (Rumania), 1958, 7, No 1, 1-14 (from Referativnyy Zhurnal--Biologiya, No 3, 10 Feb 59, Abstract No 13585, by the author)

"Clinical, pathogenic, and experimental data which indicate the role played by disturbed hormone functions in cancer of the mammary gland are examined. A rise in hypophysis activity, an increase in the content of estrogens, and a drop in the content of androgens is noted in these patients. Surgical, radiation, and hormone methods of therapy are recommended to restore the endocrine balance of the organism."

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64. Therapy of Cutaneous Epitheliomas

"Therapy of Cutaneous Epitheliomas With 'Dermopan,'" by S. Tsvejih and A. Vermesh, Med. pregled. (Yugoslavia), 1957, 10, No 5, 265-276 (from Referativnyy Zhurnal--Biologiya, No 4, 25 Feb 59, Abstract No 18314, by L. N. Mashkilleysen)

"Results of the treatment of 136 patients suffering from different forms of cutaneous epitheliomas with an apparatus called 'dermopan' (short focal length roentgenotherapy) are reported. Thirty-three of the

patients were afflicted with basal cellular epithelioma, 25 with planocellular epithelioma, and 5 with mixed epitheliomas. The technical methods of irradiation are described. The total dose of the irradiation was 600-12,000 r. Good therapeutic results were obtained in the therapy of 119 (94.4 percent) of the patients. Control was exercised for periods of 1-18 months. Deep-seated cutaneous tumors cannot be treated with the help of 'dermopan.'

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65. Use of Radioactive Phosphorus in the Therapy of Tumors

"Effect of Radioactive Phosphorus (P^{32}) on Spontaneous Tumors of the Mammary Glands in Mice," by E. Ya. Smoylovskaya, Laboratory of Experimental Therapy of Cancer, Institute of Oncology, Academy of Medical Sciences USSR; Moscow-Leningrad, Voprosy Onkologii, Vol V, No 2, 1959, 222-223

This is a report on the results of experiments conducted to determine the effect of radioactive phosphorus -- P^{32} -- when used in the therapy of spontaneous cancer of the mammary glands in mice. Forty-two male mice were used in the experiments. They were divided into two groups: 23 experimental and 19 control. The experimental animals were administered solutions of sodium phosphate -- $Na_2HP^{32}O_4$ -- until a total of 500 μC was received by each mouse. All the animals were killed from 4 to 16 days after the beginning of the experiments and their bodies carefully examined. The results were as follows:

1. Some of the animals lost weight after radioactive phosphorus was introduced into the organism, while control animals gained weight during the same period.
2. A retardation in the growth of the tumors was noted in all the experimental animals.
3. The tumors in the experimental animals weighed less than the tumors in the control animals.

No concentration of phosphorus in the tumors occurred, apparently, because of accelerated metabolism. A sharp depression of the reticulo-endothelial system was observed.

Pharmacology and Toxicology

66. Trends in Pharmacological and Toxicological Research During the Coming 7-Year Plan

"The Prospective Plan of Development of Scientific Research in Pharmacology and Toxicology During the Next 7-Year Plan (1959-1965)", Prof V. V. Zakusov, Acting Member, Academy of Medical Sciences USSR; Prof G. A. Ponomarev; Yu. V. Drugov; Moscow, Farmakologiya i Toksikologiya, No 1, Jan-Feb 59, pp 3-6

In the prospective plan of development for medical science, the most important problems of public health having great importance for the economic development of our country during the Seven-Year Plan have been taken into account: the therapy and prophylaxis of cardiovascular diseases, malignant neoplasms, tuberculosis, radiation diseases, and virus infections, as well as the development of newer contemporary methods of surgical anesthesia.

In relation to this in the Seven-Year Plan for pharmacology, attention will be paid to searching for new substances for the therapy and prophylaxis of cardiovascular diseases (myocardial infarction, hypertension, arteriosclerosis, rheumatism, and others), malignant neoplasms (especially leukosis), radiation diseases, tuberculosis, and a number of virus infections; the discovery of more effective and improved substances for general and local anesthesia; and additional substances having an effect on the neuroreflex regulation of functions.

In addition, during the next 7 years, it is planned to increase the production of more effective organophosphorus preparations for the control of pests and diseases affecting agricultural crops. In connection with this, it is necessary to plan research on the selection of the best specific preparations having minimal effect on warm-blooded animals. Intensive development of work in this field requires supplementary work on the mechanism of the action of organophosphorus compounds on enzymatic processes, and on biochemical systems, which affect the reactivity of receptive substances of the effector organs. Because of the increased use of chemical poisons in agriculture, more attention should be paid to searching for radically acting antidotes. This should be included in the plans for toxicology.

Furthermore, because of the increased use of atomic energy for peaceful purposes, there should be an increase in the study of radiation diseases and research on therapeutic and prophylactic substances (hematopoietic stimulators, substances which lower the permeability

of vascular walls, and detoxifying substances). In searching for new preparations, it is not only necessary to search for substances which restore the function of a diseased organism but also to discover ways for accelerating the elimination of radioactive elements from the body.

In connection with the search for biological substances for protection against virus diseases, work must be conducted on the synthesis of chemotherapeutic substances. The discovery of the enzymatic processes peculiar mainly to viruses will facilitate accelerated research and lead to the synthesis of effective chemotherapeutic substances. This is especially important with regard to influenza.

Because of the increased use of a new class of chemical substances having an effect on the cardiovascular system, such as the derivatives of phenothiazine, lysergic acid, corticoid, and other substances, special effort should be made in searching for effective substances of this type.

67. Minsk Medical Institute Expanding Organophosphorus Research

"Chemistry -- in the Service of Public Health" (unsigned article); Moscow, Meditsinskiy Rabotnik, 13 Mar 59, p 2

"The medical scientists of Belorussia are devoting great attention to the study of organic compounds and their biological action on an organism. During the next Seven-Year Plan this problem will occupy an important place in scientific research.

"A collective of the Chair of Pharmacology, General Chemistry, and Biochemistry of the Minsk Medical Institute is working closely together on various types of organophosphorus substances. They are studying the toxicological and pharmacological properties of the precipitation products of these compounds and their effect on organisms to further improve the system of protecting laborers in chemical industries, etc.

"As indicated by the laboratory investigations, organophosphorus compounds act on the nervous system, respiratory organs, and vascular motor centers. The experiments conducted by the chair of pharmacology indicated that good protective and therapeutic effects could be obtained against these preparations by the use of atropine, pachycarpine, scopolamine and pentaphene.

"It is known that certain types of organophosphorus compounds can serve as the source of medicinal preparations; therefore, chemotherapeutic substances for the treatment of peripheral paresis and paralysis will be investigated. Methods will also be developed for obtaining ganglioblockers, pain relievers, and antituberculosis preparations. Studies

will be conducted to study the effect of these preparations on the biosynthesis of proteins. In the search for new medicinal substances, actual importance will be focused on solving problems of the dependence of the pharmacological properties of organophosphorus compounds on their chemical structure.

"The study of the chemical structure of organic compounds will permit the arming of Soviet medicine with new effective substances in the fight for human health and for increasing the life span."

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68. Anticholinesterase Action of Organophosphorus Compounds Enhanced

"On the Intensification of the Anticholinesterase Action and the Ability to Induce Bronchial Spasms by the Methylsulfomethylation of Some Organophosphorus Substances," by I. V. Semenov and N. K. Fruyentov, Sb. tr. Kafedry sudebn. med., 1-yy Leningr. med. in-t, (Collection of Works of the Chair of Forensic Medicine, First Leningrad Medical Institute), 1958, No 2, 183-187 (from Referativnyy Zhurnal -- Biologiya, No 5, 10 Mar 59, Abstract No 23139)

"In experiments on cats it was found that by making it possible for an anticholinesterase organophosphorus compound to fully ionize, by means of the methylsulfomethylation of the sulfur atom in the beta-position, the anticholinesterase action of the compound in vitro and its ability to induce bronchial spasms in animals is intensified."

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69. Parathion Intoxications

"Four Cases of Parathion Intoxication," by D. Dochev and K. Latifyan, Sovrem. meditsina (Contemporary Medicine, Bulgaria), 1958, 9, No 4, 92-95 (from Referativnyy Zhurnal -- Biologiya, No 4, 25 Feb 59, Abstract No 18782, by the author)

"Four cases of parathion intoxication are described. Two of the cases which recovered were the result of occupational intoxication caused by the penetration of parathion into the organism through open parts of the body or the respiratory system. When parathion was taken internally (the two other cases), the intoxications were fatal."

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70. Ganglioblocking Drugs

"Effect of Pendiomid Derivatives on Nerve Ganglia," by M. Wilimowski and H. Djaczyszyn, Arch. immunol. i terap. doswiadc. (Poland), 1955, 3, 555-566 (from Referativnyy Zhurnal -- Biologiya, No 5, 10 Mar 59, Abstract No 23114, by I. V. Sanotskiy)

"Experiments conducted on animals established that the dibromides of 3-methyl-NN,N-tetraethyl-3-azopentane (I), N,N,N-N-3-pentamethyl-N,N-dibenzyl-3-azopentane (II), and N,N-3-trimethyl-N,N-dipiperidyl-3-azopentane (III) are more toxic than pendiomid (IV). III is the least toxic and has the greatest effect on nerve ganglia (when intravenously administered it is eight times as potent as IV). The effect of I and II is of greater duration than that of IV. In experiments on the contraction of the third palpebra of a cat the highest activity was exhibited by III (ten times the potency of IV). I, II, and III possess a greater hypotensive action than IV. They do not induce tachyphylaxis."

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71. Electric Method of Drug Administration

"Introduction of Medicinal Substances Into the Organism by Means of an Electric Current," by I. Ipser, Czechosl. med. obozreniye (Czechoslovak Medical Review), 1957, 3, No 1, 13-24 (from Referativnyy Zhurnal -- Biologiya, No 4, Feb 25 59, Abstract No 18439, by A. G. Brusilovskaya)

"The authors have previously indicated (Czechosl. med. obozreniye, 1956, 2, 327) that the introduction of strong electrolytes into the organism by means of an electric current takes place in accordance with the laws of electrolysis. In these investigations the loss from a solution when introduced into the organism and the quantity of the iodide anion which was excreted with urine after iontophoresis were determined. The figures which were obtained coincided with those obtained in the calculation of the loss of iodine from a cathode solution. Best results were obtained when acidified solutions were used; poorest, when alkaline solutions were used. A calculation of the degree of dissociation of weak electrolytes, novocain for instance, has shown that their introduction into the organism proceeded in accordance with the laws of electrolysis. Novocain was introduced into organism by means of iontophoresis. A sufficient quantity of a 15-percent solution of KOH was added to a 2-5-percent solution of novocain hydrochloride to completely precipitate the novocain base. The precipitate was washed several times in a glass filter and then air dried. About 800 grams of the novocain base were added to 800 milliliters of a one N solution of HCl; the solution was left standing for a period of several hours to permit part of the novocain base to settle on the bottom, and to

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impart an alkaline reaction to the solution. The solution was then filtered, and 3.2 grams of NaOH were added. For the purpose of iontophoresis four to seven parts of distilled water were added to one part of the solution. The solution that was obtained contained 3-5-percent novocain hydrochloride and a small quantity of the novocain base (in the form of a saturated solution). About 7 milligrams of novocain a minute were introduced into the organism by the passage of a current of 100 map. The results which were obtained contradict the widespread impression that in iontophoresis the mechanism of introduction of substances into the organism is based on electroosmotic action. Accordingly, the experiments conducted with living skin tissue of cadavers by Rein, the chief advocate of this theory (Z. Biol., 1924, 81, 124, 141; 1925, 83, 553; 1926, 84, 118, 85, 195; Klin. Wochenschr., 1925, 4, 1601), were carried out again with some modifications. Platinum electrodes were used by the author. The experiments demonstrated that in electroosmosis with living skin, electro dialysis of several hours duration may be produced. This effect on living tissue produces a counteraction expressed as hyperemia and hastened diffusion, and that if this reaction is not effective, skin necrosis sets in. It is therefore not possible to introduce medicinal substances into an organism by the mechanism of electroosmosis."

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72. Benactyzine in the Therapy of Depression

"Experiment of Clinical Application of Benactyzine, a New Drug for the Therapy of Anxiety Conditions," by M. Vinarova, O. Vinar, M. Vojtechovsky, Casop. lekaru ceskych (Czechoslovakia), 1958, 97, No 34, 1059-1062 (from Referativnyy Zhurnal -- Biologiya, No 4, 25 Feb 59, Abstract No 18557, by the author)

"In 101 of 106 depressed patients, benactyzine therapy produced a considerable improvement in the patients' condition. The indications for the application of benactyzine were purely symptomatological. Benactyzine was also highly beneficial when used in the therapy of patients suffering from states of anxiety and depression which developed as a result of the therapy of hypertension with reserpine. The drug was not effective when used in the therapy of hysteria."

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73. Effectiveness of Largactil in Influenza

"Course of Experimental Influenza in Mice Treated With Largactil," by N. Cajal, N. Manouliu, and N. Draganescu, Studii si cercetari inframicrobiol., microbiol., si parazitol (Rumania), 1957, 8, No 4, 503-506 (from Referativnyy Zhurnal -- Biologiya, No 4, 25 Feb 59, Abstract No 18536, by the author)

"Largactil when administered to mice suffering from experimental influenza prolonged the incubation period of the disease but had only an insignificant effect on mortality in the animals."

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74. Effect of Largactil on Renal Functions

"Investigation of the Effect of Largactil on Renal Functions With the Application of the Coefficient of Purification From Endogenic Creatinine," by Konstanty Markiewicz, Polski tygod. lekar. (Poland), 1958, 13, No 20, 751-752 (from Referativnyy Zhurnal -- Biologiya, No 4, 25 Feb 59, Abstract No 18540, by the author)

"A creatinine test was conducted on 31 patients before the administration of largactil and on the third day after its oral administration. Filtration in the glomeruli increased in most of the patients under the influence of largactil. No improvement was noted in two of the patients who were suffering from insufficiency of renal functions. In three of the patients who were suffering from first and second degree hypertension at the time largactil was administered, filtration in the glomeruli increased; in three of the patients with third degree hypertension, filtration in the glomeruli decreased; no change took place in one patient."

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75. Effect of Largactil on Shock

"Experimental Investigation of the Effect of Largactil When Administered During Shock," by A. Nana, V. Vasilescu, and C. Toader, Fiziol. norm. si patol. (Rumania), 1958, 5, No 3, 207-213 (from Referativnyy Zhurnal -- Biologiya, No 4, 25 Feb 59, Abstract No 18535, by the author)

"A state of shock was induced in rats by means of a tourniquet, and in rabbits by bloodletting. The dependence of the effectiveness of largactil on the degree of the shock was noted. The preparation is highly effective in the prevention of shock, but aggravated the condition of the animals during the period of decompensation."

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76. Complication in Largactil Therapy

"Rare Complication in Therapy With Largactil," by D. Chasovnikarov, Sovrem. meditsina (Contemporary Medicine) (Bulgaria), 1958, 9, No 2, 96-97 (from Referativnyy Zhurnal -- Biologiya, No 4, 25 Feb 59, Abstract No 18546)

"A syndrome of torsion dystonia developed in a schizophrenic patient 35 years of age on the third day of therapy with largactil in doses of 100 milligrams a day. The syndrome disappeared on the ninth day after therapy was halted."

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77. Toxicity of Some Species of Wormwood

"Toxicity of Some Species of Wormwood Growing in the Azerbaydzhan SSR," by A. M. Bagdasarov, Tr. Azerb. N.-i. vet. opyt. st. (Works of the Azerbaydzhan Scientific Research Veterinary Experimental Station), 1957, 6, 79-85 (from Referativnyy Zhurnal -- Biologiya, No 5, 10 Mar 59, Abstract No 23309, by R. S. Vorobyeva)

"The toxicity of wormwood species *Artemisia meyeriana* Bess (I) and *Artemisia szovitsiana* Bess (II) in the different periods of their growth was determined on mice, rabbits, and horses. The subcutaneous injection of an aqueous extract of wormwood in a dose of 0.3-0.5 milliliters to mice produced convulsions in the animals and led to their death. The lethal dose of the volatile oil of wormwood (III) when administered subcutaneously to mice was 0.1 milliliter; and when administered through the vein of an ear to rabbits, 0.4 milliliter. Epileptic attacks were produced in rabbits within 10-15 minutes after the administration of 0.2 milliliter of III to the animals. The content of III in I during the period before flowering is 0.13 percent, in II, 1.41 percent; during the flowering period it is correspondingly 0.15-0.17 percent and 20 percent; when ripe it is correspondingly a trace and 0.15 percent. By feeding horses I and II gathered in different areas of the Azerbaydzhan SSR it was established that I is poisonous during all periods of its growth."

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78. Phosphacol Intoxication

"Modifications of Cholinesterase Activity of the Cerebrum and Muscles in Experimental Phosphacol Intoxication," by Isaak Florin, Sb. Tr. Kafedry sudebn. med. 1-y Leningr. Med. in-t (Works of the Chair of Forensic Medicine, First Leningrad Medical Institute), 1958, No 2, 191-194 (from Referativnyy Zhurnal -- Biologiya, No 5, 10 Mar 59, Abstract No 23147, by the author)

"In experiments conducted on mice, phosphacol in doses of 0.1 milligram per kilogram body weight depressed cholinesterase activity of the brain and muscles respectively to 61.9 and 55.7 percent; in doses of one milligram per kilogram body weight, to 31.5 and 34.9 percent [the doses in the first and second cases should probably be reversed]; in doses of 10 milligrams per kilogram body weight, to 96.6 and 99.9 percent of the initial activity."

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79. Intoxication by Ascomycetes

"Occupational Intoxications Caused by the Processing of Dry Ascomycetes," by V. P. Syrnikov, Sanitation Physician of Gomel Oblast Consumer Cooperative Union; Minsk, Zdravookhraneniye Belorussii, Vol V, No 1, Jan 59, p 53

"In May 1958, the rayon procurement offices of the Belorussian SSR purchased from the people about 20 tons of dry morel and gyromitra. The mushrooms were received at the Kalinkovichskiy Mushroom Canning Combinat for processing. Thirty-five workers were engaged in the processing operations. On the third to the fifth day after the beginning of the work all the workers began to complain of epiphora, photophobia, pain in the eyes, especially in the evening and at night, disturbed vision ("fog"), a burning sensation in the mucous membranes of the nose and eyes, sneezing, and headaches. On the eighth to tenths days they began to complain of difficulty in breathing, chest pains, cough, dyspnea, and loss of appetite.

"It was established that in the process of sorting, purifying, and cutting the radicles, an organic dust was given off which caused the intoxication of the workers. Employees who have been employed in processing mushrooms for the past 10-20 years reported that similar intoxication was noted each year, but to a lesser degree than this year.

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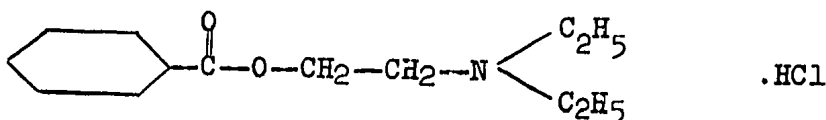
"Individual protection means -- protective goggles (drivers' goggles), nose and mouth masks prepared from four layers of gauze, effective artificial ventilation, frequent moistening of the air in the shops, obligatory washing of the hands before eating, and showers after work -- are the fundamental prophylactic measures which should be taken to protect the workers engaged in processing of dry ascomycetes from intoxication."

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80. Local Anesthetics

"Pharmacological Characteristics of Certain Complex Esters of Diethylaminoethanol and Aromatic Acids," by M. Ya. Melzobs, Sb nauchn. rabot Rizhsk. med. in-t (Collection of Scientific Works of the Riga Medical Institute), 1956, No 5, 5-22; (from Referativnyy Zhurnal -- Biologiya, No 3, 10 Feb 59, Abstract No 13808, by N. B., Vysotskaya)

"A quantitative and comparative study has been conducted of the anesthetic, cholinolytic, antihistaminic, and myotropic, spasmolytic actions of novocain; spasmolytin; Ye-22- the diethylaminoethyl ester of glycocholic acid; Ye-96 -- the diethylaminoethyl ester of 2,3-diphenyl succinic acid; and Ye-78 which has the following structural formula:



On the basis of their pharmacological action the preparations under investigation may be grouped in the following order (according to their diminishing activity): surface anesthetic -- Ye-22, Ye-96, spasmolytin, novocain, and Ye-78; regional anesthetic -- Ye-22, spasmolytin, Ye-96, novocain, Ye-78; infiltration anesthetic -- Ye-96, Ye-22, spasmolytin, novocain, Ye-78; N-cholinolytic action -- spasmolytin, Ye-96, Ye-22, novocain, Ye-78; M-cholinolytic action -- Ye-22, spasmolytin, Ye-96, novocain, Ye-78; antihistamine action -- Ye-22, spasmolytin, Ye-78, novocain, Ye-96; myotropic spasmolytic action -- Ye-22, spasmolytin, Ye-96, novocain, Ye-78; toxicity -- Ye-22, Ye-96, novocain, spasmolytin, Ye-78.

"It is thought that the anesthetizing action of the preparations has no connection with their N-cholinolytic and antihistamine activities. Ye-96 is a more active anesthetic than novocain. It is superior to novocain in the spectrum of its therapeutic action and causes no irritation when locally applied. It withstands sterilization by boiling. It is recommended for clinical use as a local anesthetic. The shortcoming of the preparation is its vasodilating effect."

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Physiology

81. The Biochemistry of Adaptation

"Biochemical Principles of Adaptation," by Prof M. Merszhinskiy, Minsk; Moscow, Meditinskiy Rabotnik, 20 Mar 59, p 3,

"There is no doubt that the biochemical principles of adaptation are of great theoretical and practical interest. Some aspects of this subject were discussed in the section on 'Biochemistry' of the eighth Mendeleev congress.

"Ability of the human organism to adapt itself to various environmental factors and to some physiological and pathological conditions is an important function. The human organism is provided with many biological systems within which arise a number of specific biochemical processes which are adequate both in intensity and in direction. Investigation of the biochemistry of nervous activity, muscular contraction and exercise, acclimatization, injuries, and regeneration and the study of the role that hormones, vitamins, various food products, etc. play offer the possibility of visualizing the biochemical machinery of adaptation.

"Resistance of the living organism to such an adverse factor as cold decreases when the food consumed does not contain sufficient calories. However, this resistance of the living organism is determined not only by the number of calories in the food consumed, but also by the quality of its composition: its content of proteins, thiamin, vitamin A, pyridoxine, riboflavin, and pantothenic and ascorbic acids. Proper amount of pantothenic acid in the organism of swimmers enables them to stay in cold water for a long period of time and increases their ability to endure the ordeal of a long-distance swim. Pantothenic acid stimulates the suprarenal glands, the formation and secretion of corticosterones which influence energy metabolism, the decomposition and intracellular utilization of carbohydrates, and the formation of macroergic phosphorus compounds. All this effects the functional competence of the organism favorably.

"Results of experiments on rats revealed that the biosynthesis of ascorbic acid becomes more intense during cold weather. Some animals became adjusted to low temperature; others appeared to be less adaptable: swelling, edema, and reddening of paws, ears, and tail was observed in those animals; their weight declined and some of them did not survive. It was noted that within 3 months after being exposed to temperature of 2°C to - 2°C, the concentration of vitamin C in the liver, kidneys, suprarenal glands, small intestines, and skin was twice as great in animals that became adjusted to cold as in those animals which did not

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become adjusted. The animals that were exposed to cold required high caloric food, particularly food that had high fat content. Resistance to cold developed simultaneously with relative increase of protein substances in the tissues.

"In guinea pigs which, like humans, do not synthesize vitamin C, we observed that adaptation to cold developed after they received an additional supply of vitamin C, when the ascorbic acid content in food rations was 10-15 times greater than it was in the usual portion (100-150 mg per 24 hours). Symptoms of maladjustment, increased susceptibility to disease, and an increase in mortality rate was noted in animals that did not receive any additional ration of vitamin C.

"Adaptation to cold also depends on increased intensity of oxidizing-deoxidizing processes and on the intensity of tissue respiration. This is explained by the fact that an organism exposed to cold requires not only food that is high in vitamin C content and high in caloric value, but it also must be supplied with vitamins that increase tissue respiration, intensify metabolism, and guarantee biosynthesis of protein which is necessary for the preservation of the morphological structure of the tissues and organs.

"The process of adaptation is closely dependent on mobilization of the compensatory mechanisms. It manifests itself in a specially vivid manner when the organism is under great stress or is suffering from some morbid condition. During the first hours and days after an injury, metabolism is characterized by an increase in the processes of synthesis and decomposition. An active metabolic reaction of the organism to an injury consists of intensification of decomposition of protein substances, carbohydrates, and fats. Subsequently, predominance of synthesis processes is observed and replacement of lost tissues and regeneration ultimately takes place. Sluggish metabolic reaction retards the development of regeneration, prolongs the course of the disease, and causes various complications. Intensification of metabolism in the organism and successful regeneration of tissues serves as evidence that mobilization of compensatory mechanisms has taken place and the organism is making proper adjustment.

"The question of energy supply for the process of biosynthesis, the end result of which is healing of the injury and recovery of the organism, is interesting. Not only carbohydrates, but fats are also utilized for this purpose. Research of Zdenek, Gruz, Khitila, and others, conducted in the laboratory of physiology and pathology of metabolism of the Academy of Sciences of Czechoslovakia, showed that survival of white rats that had suffered an injury depended on the intensity of lipolysis. Animals possessing powerful lipolytic enzymes became adjusted to an injury and survived. Others in which the lipolytic activity of blood and tissues was weak died.

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"Utilization of ketone substances as energy sources that contribute to regeneration of tissues increases considerably in surgical patients. From this viewpoint, symptoms of ketosis following an operation must be looked on as an adjustment of the organism to increased expenditure of energy. Utilization of ketone substances in surgical practice, as a supplementary high caloric material, is based on this.

"A study of the mechanism of adjustment of animals to a severe injury revealed that lipolytic enzymes possess a protective function. This found a practical reflection in the effective utilization of fats to speed up regeneration and to increase the endurance of animals that had survived a serious injury. The importance of vitamins, which are necessary for enzyme systems and which provide for the oxidation of both ketone substances and the fatty acids in the tissues, was demonstrated at the same time. Results of experimental research were used as the basis for therapeutic diet of surgical patients.

"Investigation of the role that the liver plays in the process of fat metabolism disclosed that the function of the cardiovascular system depends on formation of the necessary amount of heparin in the liver. Neutral fat and other lipids circulate in the blood serum in the form of very small emulsions. The diameter of such fat droplets is less than half a micron. They are called chylomicrons. Turbidity of the serum is observed when the concentration of fat droplets in the blood is high. This occurs after a meal with high fat content. A glass of cream causes hyperlipemia and turbidity of the serum which lasts for a period of 7-8 hours.

"A high concentration of lipids in the blood may be the reason for a spasm of the coronary vessels. And, vice versa, a decrease in concentration of chylomicrons reflects favorably on the function of the cardiovascular system and on the condition of coronary vessels. A 'clearing' of the serum is due to several factors. Heparin is one of them. A 'clearing' occurs more rapidly when heparin formation in the liver is sufficient. This reduces the danger of development of a spasm of the coronary vessels. Elimination of chylomicrons and 'clearing' of serum take place more rapidly in young people than in elderly people. Alimentary hyperlipemia lasts 12 hours and longer in older people. Excessive amount of chylomicrons in the serum has an adverse effect on the metabolic processes within the membranes of blood vessels, leading to development of arterosclerosis.

"A situation like this proves that with age the organism loses its ability to adjust to food of high caloric content which is rich in fats. Adaptability to cooling and to changes in climatic conditions and resistance to various diseases becomes weaker with age. Ability of people of various ages to adapt themselves also depends on intake of certain vitamins, proteins, and bioelements (zinc, chlorides, cobalt, copper,

and manganese). Elderly people, it seems, often need additional amounts of these substances. All this must be taken into consideration when evaluating a diet which would help the organism to adapt itself to various conditions.

"Forming, evolving, and preserving the capacity for adaptation depend on the condition of the endocrine system and, to greater extent, on the nervous system. The nervous system, particularly its central branches, plays a significant role in the regulation of metabolic processes and, all things considered, determines the ability of the organism to adapt itself to various conditions of existence."

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82. Morphological Effects of Oxygen Starvation

"Pathomorphology of Human Brain During Acute Oxygen Starvation," by T. S. Matveyeva, Central Forensic Medical Laboratory (scientific director, Prof M. I. Avdeyev); Moscow, Zhurnal Nevropatologii i Psikhatrii imeni S. S. Korsakova, No 12, 1958, pp 1455-1464

The author of this article states that she had an opportunity to analyze a few histories of the morbid condition of 21 people who were resuscitated after being subjected to mechanical strangulation. She also had an opportunity to conduct histological examinations of the brains of 17 people in whom mechanical strangulation produced rapid onset of oxygen starvation and of one person who died after resuscitation. Her aim was to attempt not only to get an idea of how rapidly various parts of the human brain undergo changes after being subjected to acute oxygen starvation, but also to ascertain the capacity of those parts of the brain to regain their lost functions.

Out of 21 people, 11 lived after resuscitation for a period of from 2 to 6 days and then died; vital functions were restored completely in 10 people. Those people who survived a brief period of strangulation (2-3 minutes) and lived did not, as a rule, remember the moment it occurred. A retrograde amnesia persisted sometimes for one or 2 days after strangulation. Consciousness, in such cases, returned rapidly, but the victims subsequently complained about stammering, dizziness, and impairment of memory; hysterical reactions were sometimes observed in them. It is impossible to explain all these symptoms as the result of having gone through a psychiatric trauma. The morphological changes that took place in the brain, evidently, were the result of acute oxygen starvation.

When strangulation was protracted, consciousness in victims was absent up to the time they died several days later. This took place even though measures for resuscitation and temporary restoration of respiration and circulation were taken.

Pathologicohistological changes in the brains of people who died at the moment of strangulation were the same as changes in the brain of people who died 3 1/2 days after resuscitation; the extent to which the brain was affected was the only difference.

How greatly the tissue of the brain is affected as a result of strangulation depends primarily on the duration of life of the victim after the occurrence of acute oxygen starvation. The greater the time lapse from the moment of strangulation until the onset of biological death, the more profound are the changes observed in the human brain.

The author further states that results of her analysis revealed that even after strangulation was discontinued and resuscitation of the victim took place, under conditions favorable for the elimination of oxygen starvation, the dystrophic process in the brain continued, leading to formation of necrotic foci. Results of microscopic examination of the cortex of the brain revealed that some sort of dystrophy spreads most diffusely to cells of layers II, III, and IV of the brain, the lower layers of cells and the cells of the stem of the brain being affected to a lesser degree.

Predominance of morbid symptoms in the upper layers of cells, proves that they are also affected to a considerable extent when the metabolic process in the brain is disturbed.

83. Neural Regulation of Response to Hypoxia

"The Role of Splanchnic Nerves and Abdominal Sympathetic Chains in the Response of Rats to Acute and Chronic Hypoxia,"
by Z. I. Barabashova, Institute of Evolutionary Physiology
imeni I. M. Sechenov, Academy of Sciences USSR; Leningrad,
Fiziologicheskii Zhurnal SSSR, No 2, Feb 59, pp 163-170

The author of this article states that the results of experiments with rats showed that the sympathetic nervous system plays an important role in the process of acclimatization to an oxygen deficiency in the inspired air. Following ablation of splanchnic nerves and abdominal sympathetic chains containing 5 to 6 ganglia (sympathectomy), 28 mature male albino rats weighing between 250 and 300 grams were put through a month's training in a pressure chamber at an altitude of 7,600 meters. Not all of the sympathectomized rats showed tolerance to repeated exposure to simulated altitude: some of them died at various intervals during

the pressure chamber training, and the survivors were not able to become acclimatized to hypoxia. Training in the pressure chamber not only did not increase their altitude tolerance, but also did not increase their general resistance; their respiratory system remained unstimulated. The red blood count and hemoglobin level were found to have increased considerably. The discrepancy between marked polycythemia and low tolerance to oxygen deficiency lends further support to the assumption that the stimulation of erythropoiesis and hemopoiesis may, at times, prove the inadequacy, rather than the efficiency, of the process of acclimatization.

84. Conditioned Emetic Reflex Produced

"Cortical Control of the Emetic Reflex in Irradiated Animals,"
by R. I. Lomonos, Department of Radiology of the Institute of
Experimental Medicine, Academy of Medical Sciences USSR;
Leningrad, Fiziologicheskii Zhurnal SSSR imeni I. M. Sechenov,
No 2, Feb 59, pp 157-162

The author of this article states that the results of experiments conducted on four dogs showed that a conditioned emetic reflex can be developed following 7-8 reinforcements of the conditioned stimulus by subcutaneous administration of morphine. Morphine conditioned nausea may become inhibited shortly after being established, if salivary reaction increases. The latter is considered a part of the defense response by the body against a toxic agent. Salivary secretions increased, together with general increase in defense reactions during the experiments involving, the administration of morphine after exposure to ionizing radiation. The emetic reflex, however, becomes inhibited in irradiated animals during the later stages of radiation sickness to a greater degree than in nonirradiated animals.

Public Health, Sanitation and Hygiene

85. Air Pollution Problems in Kiev

"Field Experience in Determining the Dust in the Air of Kiev,"
by State Sanitary Inspector G. Ye. Tsapko and Chemist A. I.
Serebraya, Kiev Sanitary Epidemiological Station; Moscow,
Gigiyena i Sanitariya, No 2, Feb 59, pp 74-75

During 1956, experiments were conducted by the Laboratory of the Communal Division of the Kiev Sanitary Epidemiological Station to determine the amount of dust in the atmosphere in the city of Kiev. Samples were collected from three locations in the city: a populated area, a suburban area, and a park area.

The air was analyzed by gravimetric (487 analyses) and tabular (977 analyses) methods. The air samples were collected by cotton on adaptors and air deflectors constructed by the Institute of General and Communal Hygiene of the Academy of Medical Sciences USSR. As the air sample was collected, the temperature, barometric pressure, and wind velocity were recorded. The air sample was collected by a rotating apparatus at the rate of 20-30 liters per minute for 1 1/2 - 2 hours; the total amount of air filtered was 3,000 liters. The tabulation of the dust particles was conducted with a microscope with the aid of ocular and objective micrometers after increasing the size of the particles 400 times. This permitted measurements of dust particles up to one micron in size.

Charts accompanying the article present data on the distribution of dust particles up to one micron, to 5 microns, to 10 microns, and larger than 10 microns.

86. Review of Book on Public Health Achievements in the USSR

Zdravookhraneniye v SSSR i Dostizheniya Sovetskoy Meditsiny
(Public Health in the USSR and Achievements of Soviet Medicine),
by Nikolay Ivanovich Grashchenkov and Yuriy Pavlovich Lisitsyn,
State Publishing House of Medical Literature, Moscow, 1958,
124 pages

The authors state that all phases of public health service and medical scientific research have undergone changes during the past 40 years in the USSR. Discussion of the progress of this field of public service has been attempted by many. However, no one has made any attempt to describe these developments in a manner that could be understandable to the novice and, at the same time, provide a sufficiently

comprehensive technical review for the specialist. It can be gathered from the text that technical changes which occurred during search for methods to eradicate social diseases, like venereal diseases and tuberculosis, parallel the development of national economy, increase in the number of trained medical personnel, increase in hospital facilities and outpatient clinics, and higher cultural level of the population.

The authors point out that the extent of activities of medical science in the USSR clearly shows the growing improvement of professional medical service and the manufacture of better grade medical instruments; the Soviets, they state, are lagging behind the Western countries in manufacture and discovery of new medical preparations.

A short account is also given of the state of health service and medical science in Russia prior to the Bolshevik revolution. Some references are made to health service in West European countries and the US.

Prior to the October revolution, according to the authors, Russia consistently had one of the highest mortality and morbidity rates in the world. This was publicly acknowledged by the Tsarist officials. Mass epidemics of typhus and scarlet fever were not uncommon. Trachoma and plague raged unabated within many okrugs. Two million infants and one million adults died each year as result of epidemics of one disease or another. Zemstvos (elective local district and provincial administrative assemblies) did try to hold the line, but their efforts were in vain: their appeals fell on deaf ears of agencies of the Tsarist government.

In the whole Imperial Russia there were in 1913 only 16 universities, 13 of which had medical faculties. There was one military medical Academy in the country and only one scientific research institute that had modern equipment at its disposal and sufficient personnel. This institute is the Institute of Experimental Medicine, established in Leningrad in 1890. A few laboratories, within the framework of the Russian Academy of Sciences, carried on research in theoretical medicine. Some chairs of medical faculties had small institutes attached to them. A Psychoneurological Institute in Leningrad conducted research in anatomy and physiology of the brain, experimental psychology, and a clinical course in mental diseases.

New directorates of health were organized in Leningrad and elsewhere immediately after the Soviets gained control of the government. A health program was drawn up at the Eighth Congress of the Communist Party which was held in March 1919. That document stated that preventive medicine is to be the mainstay of the new health service organization. Theories of Morgan and Weisman were to be rejected. Marxist-Leninist theories were to be the acceptable theories. Marxist-Leninist

theories maintain that social conditions and environment exert an influence on the human organism and that possibilities exist for man to transform nature and to control both the biological and social environments.

Consequently, the number of hospitals and outpatient clinics were increased, sanitary-epidemiological service was organized, and regulations governing the All-Union State Sanitary Inspection was approved in July 1935 by the Council of People's Commissars USSR.

The State Institute of Public Health (GINZ), headed by Prof L. A. Tarasevich, was established to unify the efforts of scientific research institutes. The constituent parts of this State Institute of Public Health were: Institute of Hygiene and Sanitation, Institute of Microbiology, Tropical Institute, Institute for Control of Vaccines and Serums, Institute of Physiology of Nutrition, Institute of Experimental Biology, Biochemical Institute, and Tuberculosis Institute.

There were 55 medical institutes in the USSR by 1935; by 1941, there were 72 such institutes. By 1941 there were 223 scientific research institutes in the country which conducted research in various fields of medicine. Before the war there were 20,000 medical scientists in the USSR.

The most important scientific medical establishment during these years was the VIEM (All-Union Institute of Experimental Medicine), organized in 1932. The Moscow branch of this institute had at its disposal 23 laboratories, divisions, and clinics; its Leningrad affiliate had 14 divisions, clinics, and laboratories. This institute also had an affiliate in Sukhumi which had laboratories and a monkey colony. In 1940 this institute and its affiliates had 2,750 people in its employ. By 1941 almost 5,000 scientific works were published by researchers of VIEM.

The Academy of Medical Sciences USSR was established in 1944. The purpose of this academy was to further scientific medical research. The academy unified all leading scientific research institutes, including a number of divisions of VIEM which were converted into institutes. N. N. Burdenko became the first president of the Academy of Medical Sciences USSR. Altogether, 28 institutes became part of the Academy of Medical Sciences USSR and were headed by topnotch scientists of the Soviet Union. Rapid development of medical science brought into existence new institutes which became part of the Academy of Medical Sciences USSR. The Institute of Thoracic Surgery and the Institute of Poliomyelitis are two of the newer institutes of the academy. There are 28,000 scientific workers in the scientific research institutes, vuzes (higher educational institutions), and therapeutic preventive establishments of the country. These figures are not complete, but they are sufficient to show what progress has been made since the days of the October Socialist Revolution. Having created a single system of national medicine that is based on Marxist-Leninist theory

and having established a general line of development of medical theory and practice, the October Revolution transformed radically the entire health service in the country.

The session of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin, held in 1948, confirmed the basic hypothesis of Michurin biology about the role that environment plays in the vitality of organisms. This strikes a blow at the main position of Weisman, Mendel, and Morgan.

Soviet scientists fought against the concept of cellular pathology of R. Virchow. "That theory, having served its purpose in the days when medicine was in a state of stagnation, became a stumbling block in the path of modern science because of its metaphysical reasoning. This theory boiled down to the idea that all infections are purely local, structural diseases of cells. The theory ignored the importance of the organism as a whole, significance of environment, and importance of the so-called functional changes that take place in tissues and organs. The joint session of the Academy of Sciences USSR and Academy of Medical Sciences USSR, dedicated to problems of physiological teachings of I. P. Pavlov, was held in 1950. Resolutions adopted at this session gave a decisive blow to the Virchow theory."

In the past few years Soviet scientists have been conducting research to determine the composition of various foods, and food requirements of individuals of various professions and ages, in various climatic belts, and under various conditions of work and rest. This is a special science: a science of nutrition of both the healthy and the sick. The Institute of Hygiene of Nutrition of the Academy of Medical Sciences USSR, headed by O. P. Molchanova, has earned great fame for its work on nutrition. Workers of that institute, as well as scientists of other institutes, chairs, and laboratories of the country have been conducting research to determine the value of proteins, fats, carbohydrates, mineral substances, vitamins, and water in maintaining the vitality of the human organism under the most varied conditions of its existence.

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I. P. Pavlov stated that the brain acts as a "distributor and regulator" of the activity of the entire organism. "The more developed the nervous system of an animal is, the more centralized it becomes, and becomes distributor and regulator to a greater degree," said I. P. Pavlov. The principle of nervism was developed by Pavlov's predecessors. I. P. Pavlov directed all his efforts toward confirming and developing that principle. I. P. Pavlov discovered that physiological regularities of activity of large hemispheres of the brain are results of interaction of two principal processes: stimulation and inhibition. He found specific properties of higher nervous activity in humans and brought about a sort of an understanding of the second signal system or human speech and human abstract thought. The second signal system explains "unlimited orientation of individuals and adaptability of human organisms to their environment."

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"Aside from its theoretical significance, Pavlov's theory literally tore its way into the field of clinical medicine and medical practice and surgery. Teachings of I. P. Pavlov are the backbone of Soviet medicine. The materialistic theory of Pavlov enriched the natural scientific foundation of Marxist-Leninist philosophy and his physiological theory contributed greatly to the development of a general trend in public health service and medical practice in the USSR: the preventive trend."

Long search for drugs against tumors led to some success in treating lymphogranulomatosis and leukocytosis. L. F. Larionov and other scientists suggested the use of embikhin, novoembikhin, and dopane. L. F. Larionov also synthesized an antitumorigenic preparation, sacrolysin, at the Institute of Experimental Cancer Pathology and Therapy, Academy of Medical Sciences USSR. This preparation acts well against seminoma and some forms of reticular endothelium. Synthesis of this preparation is significant because it shows that search for chemiotherapeutic substances which could be used in treating various types of tumors may produce good results. Ye. M. Vermel and G. N. Men'shikov stated that they found an ointment, called omaine, which proved to be effective in treating cancer of the skin.

"Representatives of the USSR have attended many international scientific conferences. Delegates of Canada, England, and the US have attended conferences held in the USSR. Extension of international scientific medical relations emphasizes even more the need for preserving and strengthening Soviet ideological lines in medicine and biology. Everything new proposed abroad must be evaluated objectively; Soviet scientists must always be vigilant against various theories and opinions which aim to propagate ideologies alien to the Soviet system: they must uphold steadfastly and be ready to defend the dialectic-materialistic Marxist-Leninist world outlook. The Soviet Union's adherence to a policy of peaceful co-existence does not imply a let-up in the ideological struggle against every kind of reactionary theories and opinions.

"Bourgeois theories such as Neomalthusianism, 'new' Freudianism, psychosomatics, and all kinds of veiled racist theories are harmful to Soviet principles of medical practice and health service. Bourgeois theories must be recognized and exposed."

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Radiology

87. Role of Thrombocytes in the Development of the Hemorrhagic Syndrome During Radiation Sickness

"The Role of Thrombocytes in the Development of the Hemorrhagic Syndrome During Radiation Sickness," by A. S. Petrova (Moscow); Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 4, No 3, Mar 59, pp 14-17

The hemorrhagic syndrome is considered by most investigators as perhaps the gravest symptom of radiation sickness. Although it is known that the hemorrhagic syndrome depends on permeability changes in the vascular walls, and on a disturbed blood coagulation system, the subject of the morphological changes found in thrombocytes (or platelets which are basic to blood coagulation) due to external and internal irradiation remains almost uninvestigated. In view of the above-mentioned facts, the author deemed it advantageous to study the qualitative changes in thrombocytes together with certain other essential blood indices.

In dogs radiation sickness was provoked by (1) a single, general, external X-ray irradiation (600 r), (2) the intravenous injection of 0.15 millicuries of strontium-90 per kilogram, and (3) by the intravenous injections of 0.005 millicuries of polonium-210 per kilogram of body weight.

Results indicate that during the first few days of experimentation, both as the result of external irradiation by X-rays, and internal irradiation by radioactive strontium and polonium, although external symptoms of hemorrhage were absent, signs indicating a disturbed blood coagulation system could be detected. The number of thrombocytes was decreased in each case, the thrombocyte picture was altered (disappearance of young forms, and the appearance of large numbers of pyknotic forms), the index of blood clot retraction was decreased, and coagulation time was increased.

These changes were evident in each of the three experimental groups, but to different degrees. They appeared sooner in the animals in the first experimental group, attained their maximum on the 15-20th day, and returned to normal (in those animals which survived) on the 40-60th day. Radiation effects were most severe in the animals of the second group, i.e. internal irradiation due to radio-active strontium, evidently because strontium was deposited in the bones and directly affects bone marrow. Only mild injury resulted from radioactive polonium poisoning.

The author concludes that the study of these blood indices, and especially the morphological changes in thrombocytes, has great significance in explaining the hemorrhagic syndrome in radiation sickness, and to a certain extent, it may prove useful in the early, differential diagnosis of radiation sickness caused by various radioactive substances."

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88. Role of Serotonin in the Hemorrhagic Syndrome Caused by Acute Radiation Sickness

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"A Study of the Role of Serotonin (5-Hydroxytryptamine) in the Pathogenesis of Acute Radiation Sickness," Report No 1, The Activity of Serotonin of the Blood of Animals During Acute Radiation Sickness, by Prof M. O. Raushenbakh, and G. A. Chernov, Central Order of Lenin Institute of Hematology and Blood Transfusion (director, Prof A. A. Bagdasarov, Active Member of the Academy of Medical Sciences USSR), Ministry of Health USSR; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 4, No 3, Mar 59, pp 3-10

The aim of the present research was to determine the role and content of serotonin at various periods during acute radiation sickness caused by the effect of single lethal X-ray doses. Tests were conducted on 15 dogs, 4 monkeys, 30 rats, and 30 guinea pigs. Tables and diagrams accompany the article.

A review of pertinent literature, and the author's experimental results indicate the possibility of serotonin having a pathogenic role in the development of the hemorrhagic syndrome following penetrating radiations. A decrease in the serotonin level in the blood occurred simultaneously with the onset of the hemorrhagic syndrome in dogs, monkeys, and guinea pigs, but no change was observed in the serotonin level of the blood of rats in which no hemorrhagic syndrome was observed. Fluctuations in the heparin level were in reverse ratio to the serotonin level; for as the serotonin level rose to its maximum, the heparin level fell to its minimum, and vice versa. Changes in vascular permeability were also in reverse ratio to the blood serotonin level.

The author concludes that:

"The quantity of serotonin in the blood of irradiated animals (dogs, monkeys, rats, and guinea pigs) undergoes phasic changes, progressively decreasing down to its complete disappearance.

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"During the preterminal period of the disease, sometimes despite apparent thrombopenia, one can notice a significant rise in the serotonin level which may attain its original level, or even exceed it.

"During the terminal period in a number of animals (dogs, and monkeys), the acetone extract of the blood produces a paradoxical reaction, i.e., instead of muscle contraction it causes muscle dilatation.

"Further, thorough research is necessary in regard to the role of serotonin in the pathogenesis and therapy of radiation sickness."

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89. Metabolic Disturbances of Labile Phosphorus Compounds in Muscle Tissue Due to Radiation Injuries

"The Metabolism of Labile Phosphorus Compounds in Muscle Tissue Due to Radiation Injuries," by V. G. Remberger; Minsk, Doklady Akademii Nauk BSSR, Vol 2, No 9, 1958, pp 389-391

The aim of the present research was to study the amount of adenosine triphosphate (ATP), and creatine phosphate found in muscle tissue; and also to study the rate of P³² inclusion.

Tests were conducted on 125 rats which were subjected to a single general X-ray irradiation, 600-700 r, LD-40%, over a period of 120 days. The author presents experimental data in the form of a table.

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Results indicate that "radiation injuries caused by general X-ray irradiation (600-700 r) causes disturbances in the metabolism of labile phosphorus compounds found in rat muscle tissue, which is expressed by both the amount of adenosine triphosphate, and creatine phosphate found, and by the rate of the inclusion of P³² into these compounds at various periods during the sickness."

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90. Liver Function Study of the Content, Absorption, and Deposition of Vitamin B₁₂ During Radiation Sickness

"A Study of the Content, Absorption, and Deposition of Vitamin B₁₂ by the Liver During Radiation Sickness," by G. D. Berdyshev, Chair of Biology (head, Prof V. V. Rever-Datto, Honorable Worker of Science) and Pathophysiology (head, Prof D. I. Gol'dberg) Tomsk Medical Institute; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol. 4, No 3, Mar 59, pp 10-13

The aim of this research was to clarify controversial findings concerning vitamin B₁₂ deficiency during radiation sickness, and to elaborate on the poorly studied subject of the absorption and deposition of vitamin B₁₂ by the liver during radiation sickness.

Tests were conducted on mice, guinea pigs, and dogs irradiated by an X-ray apparatus (250, 350, 500, and 750 r) and by a betatron (1,200-25,000 r), and the vitamin B₁₂ concentration in the liver and blood serum was determined by microbiological methods using E.coli. Tables and diagrams accompany the article and present the vitamin B₁₂ content found in the liver, the effect of general X-ray irradiation on the absorption and deposition of vitamin B₁₂ in the liver, and the changes in the concentration of vitamin B₁₂ in the blood serum of irradiated and unirradiated dogs after the administration of vitamin B₁₂ into the duodenum.

The author concludes that "in the experimental animals irradiated by lethal and sublethal doses, no noticeable changes were noted in the vitamin B₁₂ content found in the liver and blood serum either in the immediate or subsequent periods after irradiation. The permeability of intestinal walls of dogs injured by irradiation seemed increased with regard to the vitamin B₁₂ doses that were studied. Liver function with regard to vitamin B₁₂ deposition did not undergo essential changes in irradiated animals."

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91. Therapeutic Effect of Polyvinylpyrrolidone in Acute Radiation Sickness

"A Study of the Effect of the Transfusion of Polyvinylpyrrolidone on the Course of Acute Radiation Sickness," by G. V. Sukyasyan, N. S. Dzhevadyan, M. N. Novikova, B. F. Belyayeva, N. A. Probatova, and M. G. Shitikova, Central Order of Lenin Institute of Hematology and Blood Transfusion (director, Prof A. A. Bagdasarov, Active Member of the Academy of Medical Sciences USSR), Ministry of Health USSR; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol. 4, No 3, Mar 59, pp 48-55

Since one of the most effective methods of treating acute radiation sickness is the transfusion of blood and of blood substitutes, the effect of the transfusion of PVP (polyvinylpyrrolidone) was tested on the course of acute radiation sickness on dogs and mice.

Three to five transfusions of PVP, in amounts ranging between 6 and 8 ml per kilogram of body weight, were administered during the first few days after the irradiation of the dogs by 600 r, and a favorable effect was noted. The therapeutic and disintoxicating effect of PVP was also confirmed on mice. Tables and diagrams accompany the article.

The author presents the following conclusions:

"The transfusion of polyvinylpyrrolidone during the first days after the general irradiation of animals by lethal doses of X-rays alleviated the course of the sickness and prolonged the life span of the animals.

"The therapeutic effect of polyvinylpyrrolidone is caused by its high disintoxicating property. Polyvinylpyrrolidone sharply accelerates the elimination of toxic substances from the organism through the kidneys.

"The transfusion of polyvinylpyrrolidone significantly reduces the development of the hemorrhagic syndrome, but it does not prevent the development of radiation anemia."

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Serology

92. Peculiarities Noted in Study of Hemorrhagic Nephroso-Nephritis

"From a Practical Study of Hemorrhagic Nephroso-Nephritis,"
by S. I. Bibergal; Moscow, Laboratornoye Delo, Vol 5, No 2,
Mar/Apr 59, pp 56-57

The following phenomena which were observed during examination of urine from hemorrhagic nephroso-nephritis patients are reported in this article:

a. The formalin test with urine was positive from the first day of the disease following the appearance and an increase in the concentration of albumin in the urine; this reaction was negative when performed with blood serum. Depending on the concentration of albumin in the urine, the formalin test proceeded at different rates and differed as to color and transparency of the coagulant.

b. Blood serum of hemorrhagic nephroso-nephritis patients coagulated their own urine. Furthermore, this serum coagulated not only serum from the patients themselves, but also serum from persons with other diseases and from healthy persons.

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The author concludes that further study of the coagulating properties of urine and blood serum from hemorrhagic nephroso-nephritis patients must establish the pathogenic significance of this coagulation and the specificity of the phenomena observed. The extent to which, and the manner in which, the proteins and protein fractions of the blood and urine affect the coagulation phenomena must also be determined.

Space Medicine

93. Opinions on Human Cosmic Flight Offered by Medical Experts

"For Astronauts of the Future," Meditsinskiy Rabotnik,
20 Jan 59, No 6 (1754), p 4

"The entire world was filled with delight at the news of a new achievement of Soviet science and technology: the launching of a cosmic rocket which became a permanent artificial satellite of the Sun. This event, which signifies the beginning of the era of cosmic flights, is now inspiring all Soviet people.

"The editors of Meditsinskiy Rabotnik asked several medical scientists to give their opinions concerning the possibilities and prospects of sending a man into outer space. The statements of these medical scientists are given below."

"Factors of Physiological Action" by M. Ye. Marshak, Corresponding Member, Academy of Medical Sciences USSR

"Several factors, that affect the human organism must be taken into account when considering sending a manned rocket into outer space. Acceleration during take-off and the rotary motion of the rocket around its axis are factors. Astronauts will also feel the effects of cosmic rays and will find themselves in a state of weightlessness.

"Nothing was known until recently about the effect of cosmic rays and weightlessness on the human organism because it was impossible to reproduce these conditions experimentally. It can be assumed, however, that the condition of weightlessness affects body movements and other functions of the body, such as blood circulation, because of the absence of hydrostatic conditions which normally exist on earth. The question of accommodating blood circulation in humans to conditions existing during flights into outer space requires special study. Investigation of heat exchange in humans under cosmic conditions is also extremely important.

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"Work on supplying the human organism with oxygen and eliminating carbon dioxide is sufficiently advanced and will present no serious difficulties.

"Data obtained from the second artificial earth satellite threw light, for the first time, on the condition of the dog Layka and clarified some important physiological questions previously not clear to scientists.

"We are probably standing on the threshold of the creation of a new science -- cosmophysiology -- the task of which will be to investigate the effect of cosmic environment on a living organism."

"The Cosmos and Microorganisms," by O. P. Peterson, Deputy Director, Institute of Virology imeni D. I. Ivanovskiy, Academy of Medical Sciences USSR

"If physiological functions of the human organism undergo specific changes while in flight through outer space, then the following question is in order: what changes take place in vital activities of the virus-saprophytes which are usually found in a living human organism, but which produce no harmful effect?

"It is known that saprophytes may intensify their pathogenic properties and cause severe sicknesses, as in case of herpes, when unfavorable conditions exist. It can be assumed, however, that the compensatory mechanisms of the natural body defenses will help to regulate disturbances and thereby prevent the development auto-infection. In other words, astronauts flying in outer space are in no danger of being exposed to increased pathogenic activity of the saprophytic flora which normally inhabit the human organism.

"It is of great interest for virologists to see how conditions in outer space affect the vital activity of various viruses, bearing in mind their capacity to multiply and live only in the healthy living cells of various human and animal tissues. In connection with this, new opportunities are unfolding for scientists to investigate the pathogenic action of viruses on humans and animals flying through outer space. It is possible that a need may arise to develop new methods of identifying viruses and to develop special preventive epidemic control measures, etc."

"Effect of Ionizing Radiation," by Prof A. V. Kozlova, Chief of Division of Radiology, Institute of Roentgenology and Radiology, Ministry of Health RSFSR

"Cosmic radiation becomes more intense as one goes higher into cosmic space. The level of energy of such radiations and peculiarities of their biologic action are not yet known. The biological action of

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such types of radiation as gamma, beta, and Roentgen rays is, of course, well known. It is also known that in small doses they are harmless; in large doses, they can cause serious consequences.

"Before a man can be sent up into outer space, we must have exact information concerning the effects of cosmic radiation on a living organism. Such information is necessary to provide protection for cosmic vehicles.

"The job of medical people is to make recommendations to the designers about the protective measures needed to guarantee the safety of humans during their travel through outer space."

"Biology of Cosmic Flights," by Prof V. S. Gostev, Deputy Director, Institute of Experimental Biology, Academy of Medical Sciences USSR

"Future space travels present a number of new problems for biology. One of the problems requiring solution is whether living creatures born on earth can live in an environment found in interplanetary space. Experiment with the dry Layka indicated that they can. This much is known, a highly developed animal organism is capable of surviving the conditions existing beyond earth's atmosphere and beyond earth's gravitational attraction for several days.

"But there is no doubt that biological phenomenon become modified under interplanetary space conditions. Microorganisms, vegetation, lower animals, warm-blooded animals, and humans will all behave differently in outer space.

"The behavior of a human organism in outer space ought to be looked upon as a general biological problem. Only through general biology and its future new branch, cosmobiology, will it be possible to determine properly and profoundly the laws and the peculiarity of the functioning of the human organism in interstellar flight.

"Protection by Means of Drugs," by Prof G. A. Ponomarev, Deputy Director, Scientific Section, Institute of Pharmacology and Chemotherapy, Academy of Medical Sciences USSR

"Pharmacologists are confronted with the problem of studying the most vulnerable physiological functions of the organism in order to discover preparations which would serve to protect the space travelers. Such preparations should include substances which have a lenitive action that tone up the blood circulation system or effect internal and external respiration.

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"In the USSR preparations have been synthesized and are being tested. These preparations prevent the various unpleasant sensations which may arise as the result of higher nervous activity. Some lenitive preparations are also being tested.

"Medical preparations that accelerate or retard metabolic processes will play an important role in normalizing the physiological functions of space travelers."

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Veterinary Medicine

94. Bacterial Dissociation in Cultures of Brucella Abortus Buck-19 Vaccine

"The Importance of Bacterial Dissociation for the Value of Living Brucella abortus Buck-19 Vaccine," by H. Jendrusch, Research Institute for Vaccines, Dessau; Leipzig, Archiv fuer Experimentelle Veterinaermedizin, Vol 13, No 1, Jan/Feb 59, pp 121-131

Since no simple method is known for maintaining the S-phase of Brucella during cultivation, the original culture for these experiments had to be obtained through repeated selection and reinoculation of S-colonies. A dextrose-glycerin medium was used for typing the cultures. In a majority of cases, the tested dry vaccine cultures, dissolved in distilled water, physiological salt solution, or tryptone solution, showed, after reinoculation into a dextrose-glycerin-agar medium, 100% pure S^S-types, with and without the addition of serum, and only 3-5% fluctuating intermediate forms.

Through a systematic selection of cultures which had been derived from individual bacteria, a subculture of Buck-19 was found which even in cattle-glycerin-bouillon passages, guaranteed a relatively high stability of the S-form. Reinoculations of passed individual colonies of this subculture of Buck-19-S₂ always revealed, in the fundamental medium, the tendency to return to the original S-form.

The noninherited variability (modification), even in the case of the assumed hereditary cell material, seems to be subject to a change, within an approximately equal variation range, during the course of the generation cycle, provided that the experimental conditions are standardized.

It is assumed that, in the S₂-culture, the behavior of the total bacterial population is conditioned almost exclusively by hereditarily equal isogenic bacteria. This fact alone explains why the inoculations

of S₂-descendants remain relatively constant over several passages. The descendants of individual clones, however, because of their peculiar biological and genetic variability and mutability, can, under similar conditions, show new intermediate dissociation values with more or less large fluctuations.

To guarantee an optimal immunogenic and antigenic effect of the cultures to be used for production or research purposes, a constant check on the purity of the growth phases of the particular subcultures, suspension, and finished vaccines is necessary. Failure to heed the possibility of bacterial dissociation, particularly in the case of Brucella abortus Buck-19 vaccines, could lead to serious errors, with unforeseeable consequences as far as the battle against brucellosis is concerned.

95. Brucella Allergen Injections and Agglutination Titers

"On the Influence of Repeated Injections of Brucella Allergen On the Agglutination Titer in Pigs," by Ch. Lehnert, Institute for Veterinary Microbiology and Veterinary Medicine, Karl Marx University, Leipzig; Leipzig, Monatshefte fuer Veterinaermedizin, Vol 14, No 7, 1 Apr 59, pp 215-216

In experiments on ten pigs, no nonspecific serological reactions could be detected, even with repeated injections with the Dessau Brucella allergen. Since the allergen test was simpler and less expensive than serological methods, it was concluded that it would find general use as a preliminary test before serological examination.

96. Adaptation of Foot-and-Mouth Disease Virus to Central Nervous System

"On the Problem of the Adaptation of the Standard-A Foot-and-Mouth Disease Virus to the Central Nervous System of the Mouse Report No 2, Dependence On Degree of Adaptation and Blood Picture," by W. Koetsche and A. Veckenstedt, Friedrich Loeffler Institute, Riems; Leipzig, Archiv fuer Experimentelle Veterinaermedizin, Vol 13, No 1, Jan/Feb 59, pp 40-51

The importance of the degree of adaptation and blood picture are reported in the case of the foot-and-mouth disease Standard-A virus cultured in the mouse brain. The three series of passages investigated showed a characteristic, qualitatively similar pattern for the blood cell curves. No matter what type of administration was employed during the passage series, in each case the mouse organism responded to the infection with an unmistakable increase in neutrophil values. In the first mouse passage, the neutrophil values were 46-61%, and could

which, in all eight cases, no longer showed any reaction after 4-5 hyper-immunizations. Complement-fixing antibodies could be detected in seven of 20 tested serums of infected swine, and in six of these seven only in low titers (1:10 to 1:20). No antibodies could be detected in 15 cattle which had been vaccinated only once, and in 80 cattle vaccinated several times with trivalent vaccine, 28 cases of complement-fixing antibodies, mostly of two types, were determined.

98. Effects of Weather On Foot-and-Mouth Disease Infection

"On the Question of the Dependence of Foot-and-Mouth Disease on Weather Factors," by W. Koetsche, Friedrich Loeffler Institute, Riems; Leipzig, Archiv fuer Experimentelle Veterinaermedizin, Vol 13, No 1, Jan/Feb 59. pp 141-156

Comparative observations on the course of a foot-and-mouth disease infection in adult mice during natural weather conditions and during experimentally induced atmospheric conditions revealed the following:

Unequivocal results can be obtained only when the experiments are conducted with weakly virulent material or low virus concentrations.

There are connections between the appearance of certain weather processes, particularly large-scale weather patterns, and the vulnerability to and the intensity of the infection.

High atmospheric pressure, low relative humidity and low temperatures have a restraining effect on the development of the infection.

Low air pressure, particularly, however, decreasing air pressure, high humidity, and high temperatures all accelerate the development of the infection.

Light has no apparent effect on the course of the infection.

Virology

99. Disinfection of Water Containing Polio Virus

"The Disinfection of Water Contaminated by Poliomyelitis Virus," by Docent N. V. Ryzhov, Candidate of Medical Sciences, and Ye. V. Shtannikov, Military Medical Order of Lenin Academy imeni S. M. Kirov; Moscow, Gigiyena i Sanitariya, No 3, 1959, pp 19-23

The purpose of this work was to study experimentally the decontamination of water containing the poliomyelitis virus (Type II Lansing). The following substances were used as decontaminants: gasiform chlorine, chlorine containing compounds (pantocide), including among these bisulfate and iodine-containing pantocides. In addition, the possibility of decontaminating water through a preparation of carboferrogel M was investigated.

As a result of the experiments, it was concluded that:

"1. An effective method for the decontamination of water containing poliomyelitis virus is chlorination for at least 30 minutes with 0.5-2.1 mg/l of residual chlorine. Contact for less than 15-20 minutes is not effective.

"2. Chlorine-containing compounds (pantocide, pantocide-bisulfate and iodine compounds) possess the ability to inactivate the poliomyelitis virus in amounts where the residual chlorine (iodine) in the water is equal to 1.5-2.1 mg/l, after 30 minutes. Contact for less than 15-20 minutes is not effective.

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100. Scientific Session on Problems of Virology Held in Moscow

"Current Problems of Virology" (unsigned article); Moscow, Meditsinskiy Rabotnik, 3 Apr 59

The 12th Scientific Session of the Institute of Virology imeni D. I. Ivanovskiy, Academy of Medical Sciences USSR, was recently held in Moscow. The program of the session included reports on the nature of viruses, pathogenesis of virus diseases and antiviral immunity, and general epidemiology of virus infections.

Professors V. L. Ryzhkov, V. M. Zhdanov, A. T. Kravchenko, A. V. Pshenichnov, and others spoke on the nature of viruses. The next series of reports were given by L. A. Zil'ber, A. D. Ado, R. M. Shen, A. K. Shubladze, and others. V. D. Solov'yev, P. N. Kosyakov, O. G. Andzhaparidze, and others spoke on the study of antiviral immunity. Prof O. P. Peterson spoke on the influence of ionizing radiation on natural and acquired antiviral immunity.

Miscellaneous

101. First Scientific Conference of Microbiologists and Infectionists of the Urals

"Microbiologists and Infectionists of the Urals," by I. Vaysman, physician; Moscow, Meditsinskiy Rabotnik, 17 Apr 59

The first scientific conference of microbiologists and infectionists of the Urals was held recently in Perm in honor of the 60th anniversary of the Perm Scientific Research Institute of Vaccine and Sera. The conference was attended by 250 physicians and scientific workers of the Ural area.

A. P. Kobyl'skiy, director of the institute, reported on the activities of the Perm Institute of Vaccine and Sera during the past 60 years. N. P. Yefimova, V. N. Mirskova, L. N. Shishkina, and others of the institute reported on the improvement of antitoxic sera, vaccines, and rickettsial preparations. Prof A. V. Pshenichnov read a paper discussing the theory that the recurrence of typhoid fever in persons previously infected is unfounded. Prof L. G. Perets read a paper on the problem of the mutation of microbes and its role in epidemiology and in the infectious disease clinic.

The participants of the conference approved the proposal for the publication of an epidemiological atlas of the Urals.

102. Congress of Ukrainian Urologists To Be Held at Odessa in May 1960

"Congress of Ukrainian Urologists" (unsigned article); Moscow, Urologiya, No 2, Mar/Apr 59, p 95

"The next Congress of Ukrainian Urologists will be held in May 1960 in Odessa. The program of the congress will include the following:

"1. The Status of the Urological Service in the Ukraine, and Methods for Its Improvement.

- "2. New Therapeutic Methods in Urology.
- "3. Acutely Purulent Kidney Diseases.
- "4. Complications in the Examination and Treatment of Urological Patients.
- "5. Tumors of the External Genitalia.

"Inquiries about reports should be directed to Prof P. I. Gel'fer (Kiev, Krasnoyarskaya Ul., 4 kv. 2) or to Dr L. Ye. Tsybul'sky (Kiev, Ul. Polupanova, 16 Kv 8). Reports should be submitted 1 October 1959."

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103. Prof I. S. Koryakin, Soviet Hygienist and Sanitation Expert, Celebrates 60th Birthday

"Prof Ivan Sergeyevich Koryakin, Honored Worker of Science of Kazakh SSR, (60th Birthday)," (unsigned article); Alma-Ata, Zdravookhraneniye Kazakhstana, No 12, Dec 58, pp 56-58

Prof Ivan Sergeyevich Koryakin, Honored Worker of Science Kazakh SSR; director, Kazakh State Medical Institute; and head, Chair of General Hygiene, Kazakh State Medical Institute, recently celebrated his 60th birthday. Koryakin was born in Vyatskaya Guberniya and graduated from the Medical Faculty of the Kazan University in 1927. For the next 10 years he held the position of sanitation inspector in various areas of Kazakhstan. In 1938 he was appointed State Sanitation Inspector of the Kazakh SSR and in 1941 he was appointed deputy Commissar of Health Kazakh SSR. In 1938 Koryakin also began his pedagogic work at the Kazan State Medical Institute; during 1946-1951 he was head of the Chair of Municipal Hygiene and since 1953 he has been the head of the Chair of General Hygiene of the institute, and from 1955 its director.

Koryakin obtained his doctoral degree in 1949 with a dissertation on the "Sanitary-Epidemiological Status and Basis for Improving Sanitary Conditions in the Cities of Kazakhstan," and received the title of Professor in 1950.

Koryakin is also active in local and all-union hygiene societies and in the Hygiene Committee of the Scientific Medical Council, Ministry of Health USSR and Kazakh SSR. His awards include the Order of Labor Red Banner, the Order of the Red Star, the Badge of Honor, honor certificates, and medals.

104. Prof O. N. Podvysotskaya, Soviet Dermatologist, Dies

"Olga Nikolayevna Podvysotskaya" (unsigned article); Moscow, Vestnik Dermatologii i Venerologii, No 1, Jan-Feb 59, pp 91-92

Prof Olga Nikolayevna Podvysotskaya, Corresponding Member of the Academy of Sciences USSR, Active Member of the Academy of Medical Sciences USSR, Honored Worker of Science RSFSR, and an outstanding Soviet dermatologist and venereologist, died on 1 December 1958.

Podvysotskaya was born on 12 December 1884 and graduated in 1911 from the Women's Medical Institute in St. Petersburg. She was associated with the St. Petersburg Medical Institute from 1912 to 1927. From 1927 to 1938 she was head of the Chair of Skin and Venereal Diseases, Leningrad Institute for the Advanced Training of Physicians; and from 1938 until her death, she was head of the Chair of Skin and Venereal Diseases, First Leningrad Medical Institute imeni I. P. Pavlov. From 1940 until her death she was chairman of the Leningrad Scientific Society of Dermatologists and Venereologists imeni V. M. Tarnovskiy. She was also the scientific director of the Leningrad Skin-Venereological Institute from 1930 to 1950.

Podvysotskaya is the author of over 100 publications, among which are five monographs. Her fields of speciality were dermatomycosis, tuberculosis of the skin, and the role of the nervous system in diseases of the skin.

Her awards included the Order of Lenin, the Order of Labor Red Banner, two orders of the Badge of Honor, and medals of the USSR.

105. Data on Number of Soviet Medical Scientists and Scientific Workers

"Statistical Data" (unsigned article); Moscow, Sovetskoye Zdravookhraneniye, No 4, Apr 59, pp 63-64

The following tables give the number of Soviet medical scientists and scientific workers in scientific-pedagogical medical institutions and organs of public health of the USSR and union republics for 1940, 1950, 1955, 1956, 1957, and 1958:

Number of Scientific-Pedagogical and Scientific Workers in
Vuzes, Scientific Research and Therapeutic-Prophylactic
Institutions, and Organs of Public Health (1940-1958)

	<u>1940</u>	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Total No of workers	21,243	22,939	27,500	28,663	30,487	32,007
No in vuzes	11,556	12,396	15,394	16,411	17,505	18,093
No in scientific research institutions	9,687	9,413	10,014	10,169	10,962	11,866
No in therapeutic-prophylactic institutions and organs of public health	--	1,130	2,092	2,083	2,020	2,048

Scientific-Pedagogical and Scientific Workers According
to Scientific Titles as of 1 October (1957, 1958)
(Basic Positions)

<u>Scientific Titles</u>	<u>Vuzes</u>		<u>Scientific and Other Institutions</u>		<u>Total</u>	
	<u>1958</u>	<u>1957</u>	<u>1958</u>	<u>1957</u>	<u>1958</u>	<u>1957</u>
Academicians (active and corresponding members)	99	112	84	83	183	195
Women	4	4	5	6	9	10
Professors	1,521	1,515	628	605	2,149	2,120
Women	195	180	121	119	316	299
Docents	2,957	2,945	512	491	3,469	3,436
Women	1,074	1,034	136	136	1,210	1,170

<u>Scientific Titles</u>	<u>Vuzes</u>		<u>Scientific and Other Institutions</u>		<u>Total</u>	
	<u>1958</u>	<u>1957</u>	<u>1958</u>	<u>1957</u>	<u>1958</u>	<u>1957</u>
Senior Scientific associates	119	116	1,914	1,938	2,033	2,054
Women	47	47	1,088	1,117	1,135	1,164
Junior scientific associates	2,619	2,389	1,365	1,183	3,984	3,572
Women	1,680	1,726	959	849	2,639	2,575
Persons with no scientific titles	10,778	10,428	9,411	8,682	20,189	19,110
Women	6,327	6,038	6,304	5,751	12,631	11,789
Total men	18,093	17,505	13,914	12,982	32,007	30,487
Total women	9,327	9,029	8,613	7,978	17,940	17,007

Distribution of Scientific-Pedagogical and Scientific Workers
 by Union Republics as of 1 October 1958
 (Basic Positions)

<u>Republic</u>	<u>No in Vuzes</u>	<u>No in Scientific Institutes</u>	<u>Total</u>
RSFSR	10,180	9,266	19,446
Ukrainian SSR	3,569	2,326	5,895
Belorussian SSR	534	177	711
Uzbek SSR	848	297	1,145
Kazakh SSR	849	229	1,078
Georgian SSR	384	712	1,096
Azerbaijdzhan SSR	388	317	705

<u>Republic</u>	<u>No in Vuzes</u>	<u>No in Sci- entific Institutes</u>	<u>Total</u>
Lithuanian SSR	183	65	248
Moldavian SSR	162	31	193
Latvian SSR	217	66	283
Kirgiz SSR	208	76	284
Tadzhik SSR	168	42	210
Armenian SSR	206	181	387
Turkmen SSR	197	74	271
Estonian SSR	--	55	55
Total	18,093	13,914	32,007

VII. METALLURGY

[See II. Chemistry, Industrial Chemistry.]

VIII. PHYSICS

Atomic and Molecular Physics

106. Phase Shifts in Statistical Theory of the Atom

"Phase Shifts in the Statistical Theory of the Atom," by T Tietz, Institute of Theoretical Physics, University of Lodz (Poland); Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 105-112

With the aid of both the Born approximation and the asymptotic Wenzel-Kramers-Brillouin approximation, this article derives closed formulas for the phases of the coherent scattering of electrons by the Thomas-Fermi and Hartree atom and gives the results in tabulated form. Approximate solutions of Byatt (Physic. Rev., Vol 4, No 5, 1956, pp 1298-1300) and other authors (A E Ruark, Physic. Rev., Vol 57, 1940, p 62; J Holtzmark, Z. Physik, Vol 55, 1929, p 437; Ibid, Vol 66, 1930, p 49) are used for the reduced effective nuclear charge [screening factor], Z_p/Z . The Thomas-Fermi function of the free neutral atom is approximated here by means of the approximate solutions of Moliere (Z. Naturforschg., 2a, 1947, p 133) and Rozentel (Z. Physik, Vol 98, 1935, p 42).

The numerical results obtained show that, for small secondary quantum numbers, the Born approximation differs somewhat from the Wenzel-Kramers-Brillouin method. As far as the accuracy of the larger secondary quantum numbers is concerned, the asymptotic Wenzel-Kramers-Brillouin method is on a par with the Born approximation; moreover, for the larger secondary quantum numbers, the Born approximation actually goes over into the asymptotic Wenzel-Kramers-Brillouin approximation.

The article also shows how the relativistic correction for the phases is computed in both of the above approximations. In the opinion of the author, the numerical methods for computing the phases for small secondary quantum numbers are the only reliable methods of obtaining information on the quality of suggested potentials. For larger secondary quantum numbers, either the formulas of the Born approximation, which apply for small phases, or the asymptotic Wenzel-Kramers-Brillouin method can be used.

Atomic Energy Development

107. Research Reactor To Be Built by Academy of Sciences Belorussian SSR

"The Construction of a Nuclear Reactor," (unsigned article);
Moscow, Vestnik Akademii Nauk SSSR, No 3, Mar 59, p 81

A research reactor of one MW is being built by the Academy of Sciences Belorussian SSR. The reactor is scheduled for scientific research in nuclear physics, for the production of radioactive isotopes including short-lived isotopes, for the study of the properties of certain materials, and for the study of heat exchange in the reactor core. The reactor will also be used to train specialists in nuclear technics and for biological research and the development of power engineering.

108. Energy Values and Eigenfunctions of Lower States of Atoms and Ions

"Calculation of the Lowest $3P$ -, $1D$ - and $1S$ Terms of C , N^+ , O^{++} , F^{3+} , Ne^{4+} With the Aid of the Variation Method,"
by N Salie, Institute of Theoretical Physics, Karl Marx University, Leipzig; Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 48-54

For certain atoms and ions with 6 electrons, energy values and eigenfunctions of the three lowest states are computed approximately by means of the variation method. Use is made of linear combinations of Slater determinants which consist only of $1s$, $2s$, and $2p$ single electron functions, the radial components of which contain variational parameters.

Mechanics

109. Equations for Loaded, Reinforced, Ring-Shaped Plate Given

"Axially Symmetrical Stress State of a Thin Ring-Shaped Plate,"
by R. A. Adadurov; Moscow, Doklady Akademii Nauk SSSR, Vol 124,
No 5, 11 Feb 59, pp 1005-1008

The stress state of a circular ring-shaped plate is investigated. The plate is reinforced on the inner and outer concentric surfaces by absolutely rigid rings and subjected to moments applied to these rings in the plane of the rings. The plate is assumed to be thin and incapable of receiving compressing stresses. Folds are formed in the plate under the loads described above. The main stresses are the stretching stresses in

the direction of these folds. Normal stresses perpendicular to the fold are equal to zero. Tangent stresses perpendicular and parallel to the folds are also equal to zero. This uniaxial stress state is axially symmetrical. An exact solution of the problem in the linear representation is given.

110. Condensation of Steam Jet in Liquid Medium

"Experimental Investigation of the Condensation of a Jet of Steam in an Area Filled With a Liquid," by B F Glikman, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 39-44

The article points out that the process of the condensation of a steam jet in a liquid medium, which occurs in a number of technological operations, has been studied thus far only on the basis of visual observations and photographic recordings. Boehm (Gesundheits-Ingenieur, No 28, 1939), who studied a jet 3-mm in diameter, reported that an opaque cloud of fine bubbles, which forms around the exit aperture as a result of supercooling of the steam, varies in size according to the temperature of the liquid medium and the pressure of the steam. P. A. Vecherskiy (Trudy Kiyevsk. Tekhnologich. In-ta Pishchev. Promyshi., No 3, 1940) investigated the phenomenon with even smaller jets (0.4-0.75 mm in diameter) and found that emulsions are produced during the contact of steam with the liquid as a result of the breakdown of the steam into fine bubbles; the condensation takes place quickly because of the sudden enlargement of the surface of phase separation.

On the other hand, the author of this article concluded earlier (Izv. AN SSSR, OTN, No 2, 1957), on the basis of a theoretical solution of the problem of the condensation of the jet of steam, that a rapid condensation of the steam jet does not require a large surface of contact between steam and liquid because of the great intensity of heat transfer resulting from the turbulent mixing during the formation of the liquid jet beyond the surface of condensation.

In the hope of clarifying the peculiar process of the condensation of the steam jet, further experiments were carried out, in which measurements were made of the velocity pressure and temperature in various cross sections of a jet with a tapered circular nozzle 20 mm in diameter. For the sake of comparison, experiments were also conducted with a flat nozzle, 8 mm high and 25 mm wide. Plotted isotherms show that, just beyond the limits of steam nuclei, the temperature begins to drop, i.e., beyond this surface of condensation (in the case of equilibrium), steam cannot exist. Condensation is also not possible within the steam nuclei because the velocity pressure, and thus the density of the medium, remains practically constant up to the boundary of the nucleus. The conclusion is drawn that the condensation originates in a rather thick layer at the boundary between the vapor and liquid phases.

Although the experiments afford the possibility of determining dimensionless coordinates (angular coefficients) for the surface of condensation and the width of the boundary layer, no satisfactory agreement is reached between theoretical and experimental findings.

111. Laminar Boundary Layer in Sweat-Cooled Surfaces

"A Calculation of the Heat Exchange and Friction of a Flat Plate Subjected to Supersonic Gas Flow Through Pores and of the Sublimation for the Case of a Laminar Boundary Layer," by V. P. Motylevich, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 34-38

Recently, many investigators have treated the phenomena of the drag, heat exchange, and mass-exchange of bodies subjected to a flow of gas with an inflow or outflow of various substances at the boundaries of these bodies. There is interest in this type of phenomena because the solution affords the possibility of working out many problems of great practical interest, including convective drying, the evaporation of a liquid on a free surface, the condensation of steam, and the protection of surfaces subjected to high operational heat or high-speed flows.

A number of theoretical works in this direction are based on the supposition of the existence of a laminar boundary layer. In many cases, the problem is solved by an asymptotic method or by an integral method for a boundary layer of finite thickness. All of these methods are based on the fact that there are definite limitations, either on the dependence of the physical properties of matter on temperature or on the correlation between the thicknesses of the dynamic and the heat layers.

The purpose of this article is to work out, independent of these limitations, an integral method of computing the laminar boundary layer in the presence of an inflow or outflow of matter at the boundary.

The results of the calculation for a plate and a cylinder are in complete agreement.

It is shown that, in order to calculate the local values of heat flow and friction for a cone, it is first necessary to calculate these values for a plate, the intensity of gas inflow of which is $\frac{\sqrt{3}}{\sqrt{3}}$ times less than for a cone, and then to multiply these values by $\frac{\sqrt{3}}{\sqrt{3}}$.

112. Stabilization of Nonlinear Automatic Systems

"On the Separation of Areas of Stability of Nonlinear Automatic Systems on the Basis of Harmonic Linearization," by Ye. P. Popov, Leningrad; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 1, 1959, pp 53-64

A description is given of a method of separating areas of stability of nonlinear systems using the Hurwitz criterion, after harmonic linearization of the nonlinearities. The necessary and sufficient conditions for stability are found. It is shown that the first of these conditions accurately conforms to the sufficient conditions for stability obtained for the same problem by the Lyapunov method. The author draws attention to the problem of demonstrating a rigorous foundation of the method, in view of an effective practical application.

113. Nonlinear Auto-oscillatory System Treated

"Small Fluctuations in an Essentially Nonlinear Auto-oscillatory System," by L. I. Gudzenko, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 125, No 1, 1 Mar 59, pp 62-65

A system with one degree of freedom acted on by a small oscillation force is considered. The force is described by a two-dimensional random process defined in the phase plane. Expressions for the correlation function and dispersion of the tangential component of the departures of the phase point are derived.

Plasma Physics

114. Screening Effect of Boundary Layer of Moving Plasma Studied

"Theory of the Magnetic Boundary Layer," by V. N. Zhigulev, Central Aerohydrodynamics Institute imeni N. Ye. Zhukovskiy; Moscow, Doklady Akademii Nauk SSSR, Vol 124, No 5, 11 Feb 59, pp 1001-1004

Examples are given which illustrate how a moving plasma is screened from an external magnetic field and from electric currents flowing in it. The thickness of the screening layer, called the magnetic boundary layer, is of the order of $1/Re_m$ at high magnetic Reynolds numbers. The equations of the magnetic boundary layer and their solutions are given. The solutions are examined for various boundary conditions.

115. Diffusion Theory for Striae in Positive Gas-Discharge Column

"Simplified Diffusion Theory of Moving Striae," by K Wojaczek, Physical-Technical Institute, Radiation Sources Area, German Academy of Sciences, Berlin; Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 37-47

The moving striae in the positive column of an inert gas discharge are considered to be electron temperature waves of small amplitude. From an equation system consisting of the two carrier-balance equations, the energy balance for the electrons, and the Poisson equation, it is possible to obtain relationships which reproduce qualitatively and, to a very limited extent, quantitatively the phenomena observed in artificially produced striae in an argon discharge if the thermal conductivity of the electrons is entered into the computation and if the dependence of wave number and amplification on frequency is taken into account.

The author is working toward a refinement of the theory, on the basis of which a more exact quantitative agreement between theory and experiment can be achieved.

116. Plasma Behavior With Rapid Changes of State

"On the Behavior of a Plasma During Rapid Changes of State," by R. Rompe and H. Rother, Physical-Technical Institute, German Academy of Sciences, Radiation Sources Area, Berlin; Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 28-36

A method is described with which the time response of adjustment processes in plasma can be analyzed oscillographically. Measurements on high-pressure plasmas with adjustment times greater than 10^{-5} sec show reasonable agreement with the theoretical curves.

Solid State Physics

117. Program of the Periodical 'Fizika Tverdogo Tela'

"Announcement by the Board of Editors of Fizika Tverdogo Tela" (unsigned article); Leningrad, Fizika Tverdogo Tela, Vol 1, No 1, Jan 59, p 174.

"The separation from Zhurnal Tekhnicheskoy Fiziki of the periodical Fizika Tverdogo Tela [Solid State Physics] became necessary because of the rapid development of solid state physics and its increased application in all fields of the national economy. A special role is played [in this] by the physics and technology of semiconductors, which now have become a major prerequisite for technical progress.

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REPORT

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"The periodical Fizika Tverdogo Tela sets itself the task of expediting as far as possible the development mentioned above by publishing work done in the USSR and also investigations by physicists and engineers of the People's Democracies in the field of the physics of semiconductors and dielectrics, as well as on problems of applied physics related thereto. (The physics of metals has its own publication medium which has been separated earlier from Zhurnal Tekhnicheskoy Fiziki.) The new periodical will publish investigations on electronic phenomena associated with processes taking place both in the volume of solids and on their surface. The periodical will not draw a line between experimental and theoretical investigations carried out within the range of solid state physics and its technical applications."

[SIR Note: According to an announcement on the back of the front cover, the board of editors consists of A. I. Ansel'm, N. N. Davidenkov, E. V. Deryagin, L. N. Dobretsov, V. P. Zhuze, S. N. Zhurkov, A. F. Ioffe (Chief Editor), M. I. Kornfel'd, L. I. Korovin, I. M. Lifshits, G. A. Smolenskiy, and V. M. Tuchkevich (Deputy Chief Editor)].

CPYRGHT

118. The Infrared Absorption Spectrum of Germanium

"Investigation of the Infrared Absorption Spectrum Due to Minor Current Carriers in Germanium" by Yu. I. Ukhanov, Military Order of the Red Banner Academy of Communications imeni S. M. Budemyy; Leningrad, Fizika Tverdogo Tela, Vol 1, No 3, Mar 59, pp 363-367.

Absorption spectra due to injection holes in germanium were investigated in the wave length range of 2-13 microns at room temperature and at $T = 105^{\circ}\text{K}$. At room temperature, two weak maxima were observed at 3.4 and 4.7 microns. At wave lengths greater than 5.5 microns, the absorption increased sharply and remained constant in the region of 9-13 microns. At $T = 105^{\circ}\text{K}$, instead of the two maxima at 3.4 and 4.7 microns, an intense band at 4 microns was observed, where the absorption was on a level comparable with that occurring at room temperature. On both sides of the maximum, the absorption dropped to an insignificantly small value. In the region above 6 microns, the absorption increased smoothly, reaching a maximum at 12 microns. The height of this maximum was close to that observed at room temperature.

It was established that the absorption spectra due to injection current carriers in n-germanium correspond closely to absorption spectra due to equilibrium carriers in p-germanium.

119. Formation of Frenkel' Defects in Crystals Under the Action of Gamma Rays

"Displacement of Atoms in Solids Under the Action of Gamma Rays" by V. V. Galvanov, Leningrad Physico-Technical Institute; Leningrad, Fizika Tverdogo Tela, Vol 1, No 3, Mar 59, pp 432-441.

The possible mechanisms of the development of a Frenkel' lattice defect (displacement of an atom into a nearby interstitial position -- formation of a lattice vacancy) in crystals under the action of gamma-quanta with an energy of about one mega-ev are discussed.

120. Effects of Microdefects in Metals Studied

"On the Energy Spectrum of Electrons in a Nonideal Metal Lattice," by V. L. Bonch-Bruyevich and V. B. Glasko, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 124, No 5, 11 Feb 59, pp 1015-1017

The influence of structural microdefects on the energy spectrum of a metal is studied. Expressions are given for the change in energy of a system of electrons and the change in electron density when a defect occurs in an ideal lattice. A table of critical values for the binding constant was obtained on the "Strela" computer.

121. Interpretation of Magnetic Proton Resonance Absorption in Crystals

"On the Interpretation of the Magnetic Proton Resonance Absorption in Oriented Crystalline-Liquid Preparations of Azoxyphenol-di-p-n-alkyl Ether," by K H Weber, Physics Institute, Karl Marx University, Leipzig; Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 1-27

On the basis of the van Vleck theory, the average 2d moment $\overline{\Delta H^2}$ of the nuclear resonance absorption lines is computed for the protons contained in the molecules of azoxyphenol-di-p-n-alkyl ether, with due consideration given to the characteristic fluctuations of the crystalline-liquid phases of the nematic type (pl-phases). Under the assumption that the rotation of the molecules around their longitudinal axes is not, or is only slightly, obstructed and that the substances in the magnetic field are homogeneously oriented, $\overline{\Delta H^2}$ can be represented as the product of a factor μ , which depends only on the structure and the internal degrees of freedom of the molecules and the square of the molecular degree of order S, the temperature dependence of which can be computed with the aid of the theory of cooperative phenomena. From a

comparison of the experimentally determined temperature-dependent protons μ with the μ values computed theoretically for the various molecular models and from the analysis of the alternating behavior of the line forms observed in the investigated homologous series, various conclusions are drawn on the structure and the internal mobility of the alkoxy chains of the examined molecules.

122. Conductivity of Copper Suboxide

"Conductivity Measurements of Copper Suboxide in the Existence Range in the Case of Disturbances of the Thermodynamic Equilibrium," by K. Stecker, Second Physics Institute, Martin Luther University, Halle (Saale); Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 70-81

The diffusion coefficient of Cu holes is determined approximately by measuring the isothermal rate of adjustment of the electrical conductivity of copper suboxide specimens to a new pressure at 700-1,000 deg C. The results reveal the necessity of revising the cooling model devised by G. Blankenburg and O. Boettger (Annalen der Physik, Vol 6, No 10, 1952, p 241).

Earlier discovered "anomalous hystereses" are found to be the result of a superpositioning of a single interference. This interference is described in detail, and, with this interference approximately eliminated, cooling measurements are given which can serve as a starting point for the necessary revision of the cooling model.

"The Conductivity of Copper Suboxide Within the Existence Range at High Temperatures in the Range of Low Pressure," by K. Stecker, Second Physics Institute, Martin Luther University, Halle (Saale); Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 55-69

It is shown that the strong drop of electrical conductivity of copper suboxide in the 700-1000 deg C range, heretofore found in the case of oxygen pressures under 10^{-2} mm Hg, is based on faulty measurements. With the error eliminated, the uniformity $\kappa \sim P_{O_2}^{1/n}$ with $n \approx 8$ is confirmed for the entire area investigated, and the work function is determined to be 1.30 eV (0.65 eV).

Contrary to observations made up until now, the Knudsen effect introduces no error into the measured values.

The Cu_2O/CuO limit of existence is once more determined.

Theoretical Physics

123. Causality and Quantum Mechanics

"Critique of von Neumann's Proof Against Causality in Quantum Mechanics," by G. Schulz, Institute of Optics and Spectroscopy of the German Academy of Sciences in Berlin, Berlin-Adlershof; Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 94-104

In treating the theme "Determinism (Causality) -- Indeterminism," von Neumann (Mathematische Grundlagen der Quantenmechanik [Basic Mathematical Principles of Quantum Mechanics], Berlin 1932) adduces proof, according to which causality is in logical contradiction to quantum mechanics, i.e., that, according to this proof, quantum mechanics is either objectively false or a causal description of elementary processes is fundamentally impossible. This article purports to show that there is a gap in the series of conclusions leading up to this proof adduced by von Neumann. In the opinion of the author, this gap shows von Neumann's "proof" to be unproved.

The author also points out the error in a critique of von Neumann's proof presented by P. K. Feyerabend (Z. Physik, No 145, 1956, p 421).

124. Microscopic Inertial Effects in Relaxation

"On the Theory of Relaxation. III. Accounting for Microscopic Inertial Effects Within the Framework of the Theory of Statistical Thermodynamics," by S Kaestner, Institute for Plastics, German Academy of Sciences in Berlin, Berlin-Adlershof; Leipzig, Annalen der Physik, Vol 3, No 1/2, 1959, pp 82-93

The generalized Kramer equation of the Brownian movement given by Meixner (Z. Physik., No 149, 1957, p 624) for systems with N degrees of freedom is used to obtain the basic thermodynamic equations of relaxation for the special case where the distribution function $f(q^k, p_k, t)$ of the system in question differs only slightly from the equilibrium distribution with respect to their dependence on impulses p_k . Along with the two known terms, which are derived from the free energy density and the dissipation function of the system, they contain a third term, which is connected with the kinetic energy density and thus takes into account the microscopic effects of inertia.

IX. MISCELLANEOUS

125. Academy of Sciences Uzbek SSR Plans Establishment of New Institutes for 1959-1965

"Every Control Figure in the Development of the National Economy USSR for 1959-1965 Is a Task of Science," by Kh. Abdullayev, president, Academy of Sciences Uzbek SSR; Tashkent, Pravda Vostoka, 2 Dec 58

To meet the goals for scientific and technical development in the Uzbek SSR for 1959-1965, the Academy of Sciences Uzbek SSR has made plans for the establishment of the following institutes:

Institute of Mechanics (Institut Mekhaniki); Institute of the Chemistry of Polymers (Institut Khimii Molimerov); Institute of Geophysics (Institut Geofiziki); Kara-Kalpak Institute of Natural and Technical Sciences (Kara-Kalpakskiy Institut Yestestvennykh i Tekhnicheskikh Nauk); Institute of Microbiology (Institut Mikrobiologii); Institute of Ethnography and Archeology (Institut Etnografii i Arkheologii); and a number of sectors, divisions, and laboratories.

126. Institute of Forests and Forest Products Chemistry, Academy of Sciences USSR, Organized in Arkhangel'sk

"On the Organization of the Institute of Forests and Forest Products Chemistry in Arkhangel'sk," (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, No 2, Feb 59, pp 88-89

The Presidium of the Academy of Sciences USSR has decided to reorganize the Northern Branch of the Institute of Forests in Arkhangel'sk into the Institute of Forests and Forest Products Chemistry (Institut Lesa i Lesokhimii). The institute will be subordinate to the Department of Biological Sciences, Academy of Sciences USSR.

The fundamental research of the institute will include a study of the natural peculiarities of Siberian Forests, the development of the scientific problems of the organization of forestry economy, the conservation and restoration of forests, the improvement of the productivity of timber lands, the solution of problems involving the chemical utilization of wood by-products, pulp, cellulose, and general problems of forest-chemical products.

127. Institute of Forest and Woods Transferred to Siberian Department, Academy of Sciences USSR

"Concerning the Transfer of the Institute of Forests to Krasnoyarsk," (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, No 2, Feb 59, p 88

By decree of the Presidium of the Academy of Sciences USSR, the Institute of Forests has been transferred to Krasnoyarsk and included into the system of the Siberian Department. In addition, it has been renamed as the Institute of Forest and Woods (Institut Lesa i Drevesiny).

The main tasks of the institute include the development of the scientific basis of the correct organization of the forestry economy, the utilization of timber, the preservation of timber lands from fire and pests, and the maintenance of forest reserves in Siberia and the Far East.

128. New Petroleum Industry Institute Established in Kuybyshev

"New Research Institute of Petroleum Industry in Kuybyshevskaya Oblast," by N. Timofeyev; Moscow, Neftyanoye Khozyaystvo, No 9, Sep 58, pp 61-62

A new Scientific Research Institute of the Petroleum Industry (Nauchno-Issledovatel'skiy Institut Neftyanoy Promyshlennosti) has been established in Kuybyshev under the Kuybyshevskiy Sovnarkhoz. The institute was based on certain laboratories and technological divisions of the State Institute for the Design and Planning of Petroleum Industry Establishments in the Eastern Regions.

The new institute has the following divisions: Geology, Geochemistry, Geophysics, Drilling, Production, Automation and Telemechanics, Fuels, Oils, and Design; each division also has several laboratories.

V. A. Lobov, Doctor of Geologicomineralogical Sciences, is the director of the institute. The institute will occupy new buildings during the first quarter of 1959. The aim of the institute is to develop the petroleum industry in Kuybyshevskaya Oblast.

129. New Directors Appointed to Soviet Scientific Institutes

"Appointments and Transfers," (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, No 2, Feb 59, p 89

The following Soviet scholars, subject to approval by the General Assembly of the Academy of Sciences USSR, have been appointed as directors of scientific institutes:

Academician B. A. Arbuzov, appointed director of the Institute of Organic Chemistry, Academy of Sciences USSR, in Kazan;

V. S. Rusinov, Doctor of Biological Sciences, appointed director of the Institute of Higher Nervous Activity, Academy of Sciences USSR; the former director, L. G. Voronin, Doctor of Biological Sciences, was released from his duties due to ill health;

A. B. Zhukov, Doctor of Agricultural Sciences, appointed director of the Institute of Forest and Wood (Institut Lesa i Drevesiny), Siberian Department, Academy of Sciences USSR;

I. S. Melekhov, Active Member of All-Union Academy of Agricultural Sciences imeni V. I. Lenin, appointed director of Institute of Forests and Forest Products Chemistry (Institut Lesa i Lesokhimi), Academy of Sciences USSR;

Academician V. N. Sukachev, appointed director of the Laboratory of Forest Studies, Academy of Sciences USSR.

130. New Appointments of Soviet Scholars

"Appointments and Transfers," (unsigned article); Moscow Vestnik Akademii Nauk SSSR, No 3, Mar 59, p 112

The following Soviet scholars have been appointed to new positions as directors or heads of Soviet scientific institutions:

I. S. Rozhkov, Doctor of Geologicomineralogical Sciences, has been appointed Director of the Institute of Geology, Yakutsk Affiliate, Siberian Department, Academy of Sciences USSR, subject to confirmation by the General Assembly of the Academy of Sciences USSR.

V. N. Avdeyev, Corresponding Member of Academy of Sciences USSR, has been appointed, subject to confirmation by the General Assembly of the Academy of Sciences USSR, as Head of the Laboratory of Measuring and Computer Electronics, Siberian Department, Academy of Sciences USSR.

131. Soviet Scholars Decorated

"The Decoration of Scholars," (unsigned article); Moscow, Vestnik Akademii Nauk SSR, No 3, Mar 59, p 115

The following Soviet scholars received state decorations for achievements in science and for other reasons:

Academician V. A. Ambartsumyan, President, Academy of Sciences Armenian SSR, awarded the Order of Lenin by decree of the Presidium, Supreme Soviet USSR, on 17 September 1958 for his work in the field of astronomy and in connection with his 50th birthday;

Academician T. D. Lysenko, awarded the order of Lenin by decree of the Presidium Supreme Soviet USSR, on 27 September 1958 for his activities in the field of agricultural sciences and for demonstrating practical assistance in production;

Academician P. A. Rebinder, awarded the order of Labor Red Banner by decree of the Presidium, Supreme Soviet USSR, on 2 October 1958 for his work in the field of Physicomathematical Sciences and in connection with his 60th birthday.

Academician S. L. Sobolev, awarded the Order of Lenin by decree of the Presidium, Supreme Soviet USSR, on 30 October 1958 for his work in developing mathematics and mechanics and in connection with his 50th birthday;

Academician A. N. Tupolev, awarded the Order of Lenin by decree of the Presidium, Supreme Soviet USSR, on 9 November 1958 for his work in the field of Soviet Aviation and in connection with his 70th birthday;

Academician S. A. Khristianovich, awarded the Order of Lenin by decree of the Presidium, Supreme Soviet USSR, on 13 November 1958 for his work in the field of mechanics and lengthy services in the Scientific Pedagogical fields and in connection with his 50th birthday;

Academician A. A. Balandin, awarded the Order of Labor Red China by decree of Presidium, Supreme Soviet USSR, on 19 December 1958 for his services in the Development of Chemical Sciences and in connection with his 60th birthday;

Academician V. A. Fok, awarded the Order of Lenin by decree of the Presidium, Supreme Soviet USSR, on 21 December 1958 for his work in the development of Physics and in connection with his 60th birthday;

Academician L. D. Shevyakov, awarded the Order of Lenin by decree of Presidium, Supreme Soviet USSR, on 27 January 1959 for his work in the development of the Mining Industry and in connection with his 70th birthday;

Academician V. G. Fesenkov, awarded the order of Labor Red Banner by decree of the Presidium, Supreme Soviet USSR, on 29 January 1959 for his work in the development of Astrophysics and in connection with his 70th birthday.

132. Chinese To Publish Original Reports on Atomic Energy Research

"Journal's Announcement," by Editorial Committee of Yuan-tzu-neng; Peiping, Yuan-tzu-neng (Atomic Energy), Vol 3, No 12, 1958, p 1186

This announcement states that in 1959, the journal will begin to publish on a continuous basis original papers, as well as review articles, by Chinese authors. It will also publish technical information on atomic research in China. As in the past, there will be translations of articles published in the Soviet journal Atomnaya Energiya and in the literature of other countries.

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