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CENTRAL INTELLIGENCE AGENCY

SCIENTIFIC INFORMATION REPORT

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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 United States Government research.

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I. BIOLOGY

1. Mobility of Trace Amounts of Radioactive Strontium, Cobalt, and Cesium in the Soil

"The Mobility of Cobalt, Strontium, and Cesium Compounds in the Soil," by A. A. Titlyanova and N. A. Timofeyeva, Ural Affiliate, Academy of Sciences USSR, Sverdlovsk; Moscow, Pochvovedeniye, No 3, Mar 59, pp 86-91

Because of the theoretical and practical significance of the mobility of radioactive elements in the soil and the resulting migration, accumulation, distribution, and level of these elements, tests were conducted on the mobility of radioactive strontium-90 (4 microcuries/l), cobalt-60 (20 microcuries/l), and cesium-137 (10 microcuries/l). Soil filters were used for the sorption and desorption of these elements under both dynamic and static equilibrium conditions.

Results prove that radioactive strontium is the most mobile; its salts are the most soluble; it can be completely desorbed from the soil; and its mobility is due to ion exchange reactions which occur in the form of a diffuse stream. The mobility of radioactive cobalt and cesium is much lower -- the least mobile being cesium. The sorption rate of cesium is determined by the amount of potassium present, the level of which does not exceed 0.1 mg equivalents/l, while the sorption rate of cobalt is determined by calcium and magnesium the content of which may be as high as 2.1 mg equivalents/l. This discrepancy probably explains the greater migration of cobalt in comparison to that of cesium.

The author theorizes that although cesium and potassium are very similar in their chemical properties, the two elements compete to form similar compounds, and the compounds of potassium are more soluble than those of cesium; therefore, the presence of large amounts of potassium in the soil reduces the absorption and, consequently, the mobility of cesium.

2. Preservation of Ustilago zeae Spores

"Duration of Preservation of Ustilago zeae," by T. D. Strakhov and I. V. Grechko, Byul. Ukr. N.-I. In-ta Rastenovodstva, Selekts., i Genet. (Bulletin of the Ukrainian Scientific Research Institute of Plant Growing, Selection, and Genetics), No 2, 1958, pp 115-116 (from Referativnyy Zhurnal -- Biologiya, No 21, 10 Nov 58, Abstract No 96262, by S. V. Gorlenko)

"Spores of Ustilago zeae falling into the soil in dust form can sprout immediately since they do not require a quiescent state. Sprouting can occur up to 78 days and is determined by environmental conditions. Basidiospores, conidia, and other mycelial formations which arises after the spores sprout are subjected to degenerative processes in the soil, which eliminates the possibility of the saprophytic development of molds and the accumulation of infection in the soil. The basic sources of infection to corn in the spring are seed infection and ustilaginous nodules, which have survived the winter."

3. Effect of Low Temperature on Potato Rot Bacillus Studied

"The Stimulating Effect of Low Temperature on the Antagonistic Activity of Potato Rot Bacillus, Strain No 34," by Yu. S. Babenko, Sb. Nauchn. Rabot. Dnepropetr. Med. In-t (Collection of Scientific Works of the Dnepropetrovskiy Medical Institute), No 1, 1956, p 9 (from Referativnyy Zhurnal--Biologiya, No 21, 10 Nov 58, Abstract No 95008, by L. V. K.)

"The placing of cultures of potato rot Bacillus (strain No 34) under decreased temperature conditions (2-4° C) immediately after seeding with subsequent incubation at 18-20° C increased its antagonistic activity."

II. CHEMISTRY

Fuels and Propellants

4. Synthetic Fuel Used To Launch the USSR Artificial Satellites

"The Decisive Stage in the Creation of the Material and Technical Basis of Communism (Discussions on the Subject of the Seven-Year Plan)," by L. Savel'yeva, Candidate of Economic Sciences; Moscow, Sovetskaya Aviatsiya, Vol 18, No 96 (3266), 24 Apr 59, pp 2-3

"It would not have been possible to launch the artificial earth satellites, or even a space rocket, if it were not for the availability of the necessary polymer materials and of snythetic fuel (sinteticheskoye goryucheye)."

5. Mechanism of the Initiation of Explosions as the Result of Impact Produced by a Falling Weight

"On the theory of the Initiation of an Explosion by the Falling Weight Test," by L. G. Bolkhovitinov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 125, No 3, 21 Mar 59, pp 570-572

Increases in the rate of chemical reactions taking place in substances subjected to impact can be produced only by the transformation of mechanical energy into heat energy. F. P. Bowden's assumption that local overheating is due to compression of gas occluded in the solid is incorrect. Frank-Kamenetskiy's critical reaction temperature T_*, which must be reached at foci of decomposition in order that the reaction propagate, must be higher than the melting point of the substance; a comparison of T_* values for foci of different dimensions with the melting points of "ten" [pentaerythritol tetranitrate], hexogen, tetryl, and trotyl shows that this is true. In order that the reaction propagate, heating of the substance, no matter by what mechanism, must be accompanied by compression from all sides: otherwise the heat energy being supplied will be used up in melting the substance. Using P. W. Bridgman's data on changes in the melting point with pressure, the necessary compression can be calculated. The hot foci of decomposition must have minimum dimensions; these dimensions depend on the particle size. On the basis of a formula for the maximum pressure produced by the impact in the falling weight testing device, the probability of an explosion can be correlated with the height from which the weight falls. Comparison with experimental data of "explosion frequency" curves

plotted on the basis of calculations carried out using this correlation indicates that, among variables which determine the probability of an explosion, the pressure produced by the impact is no less important than the yield strength of the substance.

Industrial Chemistry

6. Some Work Done at the Siberian Branch of the Academy of Sciences USSR

"For Further Advancement of Science in Siberia and in the Far East" (unsigned article); Novosibirsk, Izvestiya Sibirskogo Otdeieniya Akademii Nauk SSSR, No 2, Mar 59, pp 3-8

The following work was done in 1958 at the institutes and affiliates of the Siberian Branch, Academy of Sciences USSR.

In the field of physico-mathematical and technical sciences, the first results of value were obtained in the investigation of explosions in the ground and in research on spin detonations which originate when combustion processes are transformed into explosions. Research has been initiated on the strength of metals of high temperatures. The available geophysical methods of prospecting for useful minerals and surveying deposits of these minerals are being improved. New methods for this purpose are being devised. Work is being done on methods for the isolation of rare elements from coal in conjunction with the burning of coal for power generation.

In the field of chemical sciences, as a result of work in which central institutes of the Academy of Sciences USSR and of the ministries participated, an original design was developed of an automatic countercurrent disproportionation device [literally "distributing device"] by means of which the method of repeated extraction can be applied for the separation of rare earths, antibiotics, and higher alcohols. A method has been developed for the separation of the chlorides of such rare elements as tungsten and indium and, in conjunction with this, of the chlorides of aluminum, bismuth, zinc, tin, iron, and titanium from industrial waste sludges.

The conditions under which the maximum yield of acrolein is obtained in the oxidation of propylene were determined. The acrolein is to be used as a starting material in the synthesis of polymers.

Under the current Seven-Year Plan, all leading institutes of the Siberian Branch will have to contribute to progress in the fields of controlled thermonuclear power and of the use of nuclear energy for the generation of power and propulsion. The chemical institutes ought to expand work on wider application in the national economy of synthetic materials, products of nuclear fission, and radioactive isotopes.

Working in close collaboration with chemists, mechanics, geophysicists, and specialists in other fields, the scientists of the Institute of Hydrodynamics will have to expand the theoretical and experimental research already begun on problems relating to explosions. Already, in the next few years, it will be necessary to develop the theory of explosions to such an extent that practical recommendations can be made which will increase still further the effectiveness of blasting carried out in different types of ground and in liquids. To unify efforts in this field made by scientists of different specialties, engineers, and technicians active at numerous USSR institutions, a Joint Scientific Council on Explosion Problems should be organized at the Siberian Branch.

7. Chemical Research To Be Done in the Ukraine in Connection With the Current Seven-Year Plan

"Tasks of Chemical Research in the Ukraine in the Light of the Decisions of the 21st Congress of the CPSU" (unsigned article); Kiev, Ukrainskiy Khimicheskiy Zhurnal, Vol 25, No 1, Jan-Feb 59 (published in Mar 59), pp 3-7

Tasks to be accomplished by chemical scientists in the Ukraine in connection with the current Seven-Year Plan (1959-1967) include the following activities.

Up to now, research on the physical chemistry of high-molecular compounds was conducted in the Ukraine in an entirely unsatisfactory manner. In connection with this, new tasks have been set in fields such as the investigation of the lyophilic characteristics of polymers, formulation of a theory of emulsion polymerization, investigation of the polymerization of organosols of metals in different monomers, the rheological properties of polymers including rubber lattices and rubber solutions, filling (reinforcement) of polymers with different highly dispersed fillers, and the physical chemistry of synthetic substances.

Research to be done on the synthesis of organic ion exchangers comprises the development of ion exchange resins exhibiting a higher adsorption capacity and having a greater selectivity and also of ion exchangers exerting an oxidative or reducing effect. Availability of resins with these characteristics will make it possible to apply ion exchangers effectively in hydrometallurgy, the purification of water, the production of sugar, many industrial processes involving oxidation or reduction, analytical chemistry, etc.

Several years ago a major deposit of elemental sulfur was discovered on the Ukraine. However, up to now, neither the Academy of Sciences of the Ukrainian SSR nor the Gosplan of the Ukrainian SSR has designated the scientific institutions at which investigations are to be conducted on the extraction, conversion, and utilization of sulfur as one of the most important raw materials of the heavy chemical industry. In connection with the very extensive program of the development of new technology and of the production of new metallic materials with superior technical characteristics that is to be carried out, it is intended to conduct extensive research on rare and dispersed elements, nonferrous metals, and the production of chemically pure metals. In connection with this, work will be done on the concentration of mineral raw materials, improvement of technological processes for the production of rare metals, development and application of methods for the extraction and separation of rare and nonferrous metals, the production of pure metals, the production of heat-resistant alloys, the physico-chemical analysis of systems that are of importance in the technology of rare-earth elements and other metals, and many other problems. In addition to this, work will be done on measures for preventing the corrosion of metals and on the development of new types of anticorrosion coatings.

Efficient utilization of water supplies, first of all, water supplies derived from open bodies of water, for technical purposes and as drinking water requires the development of a modern technology of water purification and the creation of new water-treatment techniques. This problem can be solved by investigating the physico-chemical characteristics of substances which contaminate natural water and by developing methods for the improvement of the quality of water that are based on the application of adsorption and oxidation processes. One must also introduce many-sided automation of chemico-technological processes applied in water treatment and develop equipment for the purification of water to be used for drinking, as well as for the processing of waste water coming from industrial establishments.

In the current 7-year period, research will be continued on the chemistry of complex compounds with the view of solving problems pertaining to the development of methods for the synthesis of such compounds, investigating the structure of complex compounds and clarifying the relationships which underlie their reactions depending on the reaction conditions and the media, and developing methods for the practical application of compounds that have been synthesized. To solve these problems, it will be necessary to develop new methods and improve available methods for the investigation of complex compounds. The theory and practical application of methods of physico-chemical analysis will be advanced on an extensive scale. Without physico-chemical analysis, it is impossible to conduct fundamental research on complex systems and complex substances.

Many-sided investigations will be conducted in the field of the colloid chemistry of high-molecular compounds and of disperse systems. Particular attention will be paid to the problems of lyophilicity and stability of such systems. The regularities underlying the interaction of solid phases with different liquid and gaseous media will have to be investigated in connection with this. The increased interest in processes of this type is due in part to the great practical importance of the objects investigated (high polymers, surface-active substances, metal powders and powders of metal alloys, clay minerals, technical lubricants, aerosols, etc.)

8. Current Tasks of Polymer Science and the Program of the New Periodical--Vysokomolekulyarnyye Soyedineniya (High Molecular Compounds)

"From the Editors" (unsigned article); Moscow, Vysokomolekularnyye Soyedineniya, Vol 1, No 1, Jan 59, (published in Apr 59), pp 3-8

The extensive program of research on new monomers and new types of polymers which has been planned is imposed by the necessity of solving a number of problems that are of the greatest importance from a practical standpoint. The principal problem involved is the development of polymers which preserve their operational characteristics within the most extensive temperature range. To solve the problem in question, elastomers and plastics which combine heat resistance with stability at temperatures below the freezing point will have to be developed.

In connection with this, one must obviously expand research on purely organic polymers (particularly those which have a highly ordered structure of chains), organoelemental polymers, and inner-complex polymers of the chelate type. It is known that polymers with a highly ordered structure of chains exhibit significantly higher temperatures of vitrification and softening than polymers of the same composition which do not have a regular structure, that some polymers containing aromatic groups in their chains, e. g., polyparaxylylene, stand elevated temperatures, and that organoelemental polymers, e. g., those of the organosilicon and inner-complex types, exhibit thermal stability at elevated temperatures.

Conducting research along the directions suggested makes it possible to raise the thermal stability of polymer materials up to 300°-400° or, under exceptionally favorable conditions, even to 500°. A number of problems important from the practical standpoint will be solved thereby. However, the present stage of the development of aircraft and rocket construction and the progress in the electrical industry and other fields of technology urgently require the creation of polymer materials which have a still higher thermal stability. Apparently a satisfactory solution

of this problem depends on the development of heat-resistant inorganic elastomers and plastics. Work along these lines will have to be done on the widest possible scale with participation of the most prominent USSR scientists and specialists in the field of inorganic chemistry.

Expansion of research on new monomers and new types of polymers is also imposed by the necessity of expanding applications of polymer materials in the production of articles required in the national economy of the country. Of great practical importance is the development of polymer semiconductors, polymer dyestuffs, polymers which exhibit physiological activity, polymer fertilizers which have a prolonged action, polymers which are active from the standpoint of applications in photography, and a number of other polymer substances for diverse uses. The synthesis of these polymers will require the application of specially selected monomers and polymerization of these monomers to polymers that exhibit a specific structure.

Research will have to be done with the aim of developing new methods of synthesis. This refers to stereospecific polymerization and to the synthesis of block and graft polymers.

Physical and physico-chemical problems pertaining to the production of materials and articles from polymer materials will have to be solved.

Extensive application of crystallizing polymers with their high melting temperatures, the conversion of which involves, in a number of cases, molding of polymer articles from melts; application of graft and block polymers; and significant improvement in mechanical characteristics of finished products derived from polymers (particularly with respect to mechanical strength, especially as far as fibers and plastics are concerned) require extensive work on the structural and mechanical properties of polymers, involving studies of the orientation of chains and of their complexes, the nature of the crystalline state of polymers, and the stability of structures, as well as changes in these structures.

On the other hand, one must expedite work on the rheology of polymer melts and subject to a thorough-going study processes of the solution of graft and block polymers. These are problems which are of great practical importance and which have essentially not been investigated as yet to any extent either in or outside of the USSR. From the standpoint of the application of polymers for specific purposes in individual branches of technology, the electric, adhesion, and ion-exchange properties of polymers will have to be studied, as well as the dependence of these properties on the chemical structure of the polymer chains and the general characteristics of polymer products. Methods must be developed for grafting polymer chains with the purpose of clarifying the mechanism of the action of light, heat, radiation, and mechanical stresses on polymers.

The changes taking place in the properties of a polymer as a result of the effects mentioned above depend on the chemical nature of the polymer and also on the admixtures contained in it: both factors must be considered in the research that will be done. To find effective stabilizers, detailed research on the mechanism of the so-called ageing of polymers will have to be conducted.

Vysokomolekulyarnyye Soyedineniya is a periodical covering the fields of the theoretical and experimental chemistry and physics of polymers. It will serve the needs of scientists and specialists who are active in the field of high-molecular compounds, in the industry producing polymers, and in various fields of endeavor related to the application of polymers in the USSR economy.

The matter published in the periodical will be arranged according to the following subdivisions:

1. A scientific section in which original investigations in the fields of theoretical and experimental chemistry and physics of high-molecular compounds will be published, as well as scientific discussions on individual problems of polymer science;

2. Letters to the editor, a section in which brief communications will be published no later than 2 months after they have been received by the editors;

3. The "Scientific Chronicle," a section which will publish information on activities of the Council High-Molecular Compounds at the Department of Chemical Sciences, Academy of Sciences USSR, reports on conferences dealing with high-molecular compounds and held both in the USSR and abroad, information in connection with anniversaries and birthdays, reports on dissertations, etc.;

4. A bibliographic section containing reviews of new scientific publications on high-molecular compounds, reviews of new books, etc.

The Board of Editors of the new periodical Vysokomolekularnyye Soyedineniya consists of V. A. Kargin, Chief Editor; P. V. Kozlov, Deputy Chief Editor; G. S. Kolesnikov, Executive Secretary; K. A. Andrianov; V. A. Dogadkin; B. A. Dolgoplosk; A. A. Korotkov; V. V. Korshak; Yu. S. Lazurkin; I. P. Losev; N. V. Mikhaylov; S. S. Medvedev; A. G. Pasynskiy; V. S. Smirnov; and V. N. Tsvetkov. The address of the editorial office is Podsosenskiy Perulok 21, Moscow. All articles published in the periodical that report results of original research are followed by an English-language abstract. There is an English table of contents at the end of individual issues of the periodical.

9. A Book on the Metallurgy of Calcium To Be Published by Atomizdat

Metallurgiya Kal'tsiya (The Metallurgy of Calcium) by N. A. Doronin, Atomizdat, Moscow, 1959, six standard printed sheets, price 4 rubles (reviewed in Tematicheskiy Plan Izdaniy Atomizdata na 1959 God [Publications Plan of Atomizdat for 1959] Atomizdat, Moscow, 1958, p 11)

"This book gives information on raw materials from which metallic calcium is produced, the supplies of these materials, and their industrial classification. Detailed descriptions are given of the calcining of limestone, the design of furnaces used for calcining, the production of anhydrous calcium chloride, and the physico-chemical properties and technical applications of calcium. The methods for the production of metallic calcium and the theory underlying these methods are subjected to treatment. The book is to serve as an instruction manual for engineering and technical workers, as well as for students specializing in this field. An edition consisting of 10,000 copies is scheduled for publication in the first quarter of 1959."

10. Experimental Investigation of Extraction Columns With Alternating Agitator and Packed Sections

"Investigation of an Extraction Column With Alternating Agitator and Packed Sections," by Prof N. I. Gel'perin, Doctor of Technical Sciences, and Engr I. I. Kravchenko; Moscow, Khimicheskoye Mashinostroyeniye, No 1, Jan 59, pp 28-32

An experimental investigation of the characteristics of extraction columns consisting of alternating agitator sections and sections filled with Raschig rings is described.

11. Separation of Aerosols by Centrifuging

Tsentrifugirovaniye Aerozoley v TsRP (Centrifuging of Aerosols in Centrifugal Rotary Dust Separators), by S. A. Prechistenskiy, Atomizdat, Moscow, 1959, eight standard printed sheets, price 4 rubles (reviewed in Tematicheskiy Plan Izdaniy Atomizdata na 1959 God, [Publications Plan of Atomizdat for 1959], Atomizdat, Moscow, 1958, pp 13-14

"The basic theoretical aspects of the centrifuging of aerosols in a new type of equipment, i.e., the centrifugal rotary dust separator (TsRP), are considered. The principal problems which must be solved in designing equipment of this type are discussed. Experimental data are given in connection with different technological processes carried out in equipment of this type. The book will serve the needs of designing engineers and researchers working in the field of the separation of aerosols.

"An edition consisting of 10,000 copies of the book is scheduled for publication in the third quarter of 1959."

Insectofungicides

12. New Contact Insecticide Synthesized

"C-Aroxy-P,P-dimethoxyisophosphazoacyls and Mixed Triaroxyisophosphazoacyls," by A. V. Kirsanov and G. I. Derkach, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 29, No 2, Feb 59, pp 600-605

A number of C-aroxy-P,P-dimethoxyisophosphazoacyls and a number of triaroxyisophosphazoacyls were obtained by the action of sodium arylates on C-chloro-P,P-dimethoxyisophosphazoacyls and C-chloro-P,P-diaroxyisophosphazoacyls. In all, 24 compounds were obtained and characterized. It was established that during the alkaline hydrolysis of mixed triaroxyisophosphazoacyls, the diaryl esters of acylamidophosphoric acids are obtained.

The authors state that the mixed triaroxyisophosphazoacyls did not exhibit any insecticidal activity. The compounds C-p-nitrophenoxy-P,P-dimethoxyisophosphazobenzoyl appeared to be an extemely active contact insecticide, while the remaining C-aroxy-P,P-dimethoxyisophosphazoacyls were only slightly active contact insecticides.

13. Some New Fungicides Synthesized

"From the Field of Organic Insectofungicides. XL. The Synthesis of Several New Derivatives of Sulfamides," by N. N. Mel'nikov, Ye. M. Sokolova, and P. P. Trunov, Scientific (Research) Institute for Fertilizers and Insectofungicides; Moscow, Zhurnal Obshchey Khimii, Vol 29, No 2, Feb 59, pp 529-32

In the search for new effective fungicides for attacking plant diseases, the authors synthesized a number of amides and trichloromethylthioamides of sulfacids, most of which were not previously described in the literature. Five of the 13 synthesized trichloromethylthiosulfamides proved to be active fungicides. These compounds were obtained by reacting perchloromethylmercaptan with the amides of sulfacids in a basic medium:

$$RSO_2NHR_1 + CCl_3SCl + NaOH \rightarrow RSO_2N\begin{matrix}R_1\\ \diagup\\ \diagdown\\ SCCl_3\end{matrix} + NaCl + H_2O.$$

The five amides of sulfacids were obtained by interacting the acid chloride of the corresponding sulfacid with a surplus of amine in a hydrophobic organic solvent (dry benzene).

The physical constants of the synthesized products are presented in tabular form.

14. Chemistry of Fertilizers and Insectofungicides

"Investigations on the Chemistry of Fertilizers and Insectofungicides," by S. I. Vol'kovich and V. K. Kuskov, Vestn. Mosk. Un-ta. Ser. Matem., Mekhan., Astron., Fiz., Khimii, 1957, No 6, pp 125-136 (from Referativnyy Zhurnal -- Khimiya, No 5, 10 Mar 59, Abstract No 16635, by I. Mil'shteyn)

Heptyloxychlorophosphine is obtained according to an earlier described method (L. Z. Soborovskiy, Yu. M. Zinov'yev, and M. A. Englina, DAN SSSR, 1949, 67, 293; 73, 333). From this compound, the ethyl esters of heptylphosphinic and heptylpyrophosphinic acids are obtained according to the Toy Method (A. D. F. Toy, J. Amer. Chem. Soc., 1948, 70, 3882). Upon phosphorylation of esters of boric acid with PCl_3 in the presence of oxygen and by subsequent hydrolysis, the oxyphosphinic acids are obtained; the position of the oxy-group in them was not determined. Upon reacting triethylthiophosphate (I) with para-nitrophenol (II) at 190-200°, a mixture of esters is obtained, which, according to insecticidal activity, is equivalent to thiophos; the reactions of I with Captax and trimethylthiophosphate with II proceed analogously. A review is given of other works of the Chair of Chemical Technology of Moscow State University on fertilizers and insectofungicides.

15. Interaction of Phosphorus Thiotrichloride and Alkyldichlorothiophosphates With Alcohols

"From the Field of Organic Insectofungicides. XXXVIII. On the Interaction of Phosphorus Thiotrichloride and Alkyldichlorothiophosphates With Alcohols," by N. N. Mel'nikov, Ya. A. Mandel'baum, and P. G. Zaks, Scientific (Research) Institute for Fertilizers and Insectofungicides; Moscow, Zhurnal Obshchey Khimii, Vol 29, No 2, Feb 59, pp 522-526

The reactions of phosphorus thiotrichloride and alkyldichlorothiophosphates with alcohols were studied. It was established that phosphorus thiotrichloride and alkyldichlorothiophosphates react with alcohol as normal acyl chlorides of acids, but alkylthiophosphoric acids are formed as by-products by the hydrolysis of the initial and final ester of chlorothiophosphoric acid. The four dialkylchlorothiophosphates with their physical constants are presented in tabular form.

A new method was developed for obtaining dialkylchlorophosphates by the interaction of alcohols with phosphorus thiotrichloride or alkyldichlorothiophosphate. The dialkylchlorothiophosphates obtained by this method, in a large number of cases, had very satisfactory yields.

The highest yields of dialkylchlorothiophosphates were obtained by the interaction of various alkyldichlorothiophosphates with methyl alcohol, which is explained by the high activity of the hydroxyl hydrogen in the methyl alcohol in comparison with other alcohols. The products obtained, the percentage yield, and other physical characteristics are presented in a table.

Isotopes

16. A Method for the Separation of Isotopes Based on Differences in Molecular Volume

"A New Method for the Separation of Isotopes," by G. M. Panchenkov, A. M. Tolmachev, and V. B. Kondratova, Moscow State University; Moscow, Zhurnal Fizicheskoy Khimii, Vol 33, No 3, Mar 59, pp 734-735

Recently, published experimental results obtained in work on H, Li, and Hg indicate that, contrary to the views on the subject held higherto, different isotopes of the same element have different molecular volumes. This difference in molecular volumes can be used to separate isotopes by reacting them with chemical compounds functioning as molecular sieves. Experimental results obtained by the authors with bis-(N, N'-disalicylal-ethylenediamine) -μ-aquadicobalt indicate that this compound, which

absorbs oxygen intensively at temperatures below 40° and releases it at temperatures above 60°, can be used for the concentration of O_{18} (enrichment of ordinary oxygen with $O_{16}O_{18}$ molecules).

The absorption of oxygen by the cobalt compound takes place intramolecularly with the formation of an -O-O- bridge between two cobalt atoms. Because the distance between the cobalt atoms is fixed, the compound acts as a molecular sieve for oxygen isotopes.

Research on the separation of isotopes of other elements on the basis of differences in the molecular volume is being conducted at present.

17. Isotopic Exchange of Nitrogen Between Aminocompounds and Ammonia

"Isotopic Exchange of Nitrogen Between Aminocompounds and Liquid Ammonia," by L. L. Strizhak, S. G. Demidenko, and A. I. Brodskiy, Corresponding Member Academy of Sciences USSR, Institute of Physical Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Vestnik Akademii Nauk SSSR, Vol 124, No 5, 11 Feb 59, pp 1089-1092

It was established that liquid ammonia does not exchange N^{15} with nitrogroups, the nitrogen of the pyridine nucleus, or aminogroups when they are bound directly to carbon atoms of aromatic nuclei or of alkyl groups. Exchange with aminogroups takes place when a strongly negative group, such as a nitrogroup or a sulfonic acid group, is present in the aromatic nucleus. Exchange proceeds at a relatively fast rate in substances in which the aminogroup is bound directly to carbonyl groups or analyogous CS or CNH groups. As far as the rate of exchange is concerned, acid amides form the following series:

$$CCl_3.CO.NH_2 > CH_3.CO.NH_2 > C_2H_5O.CO.NH_2 >$$

$$NO_2C_6H_4.CO.NH_2 > C_6H_5.CO.NH_2$$

It appears from this series that the rate of exchange increases with increased electrophilic strength of the carbon atom to which the aminogroup is bound. Analogous relationships are observed in urea derivatives.

Nuclear Fuels and Reactor Construction Materials

18. Uranates of Alkali Metals

"Investigation of the Composition of Alkali Metal Uranates Obtained by a Dry Procedure," by K. M. Yefremova, Ye. A. Ippolitova, U. P. Simanov, and Academician V. I. Spitsyn, Moscow State University; Moscow, Doklady Akademii Nauk SSSR, Vol 124, No 5, 11 Feb 59, pp 1057-1060

The composition and properties of the alkali metal uranates obtained by heating the carbonates of lithium, sodium, potassium, rubidium, and cesium with uranium oxide were investigated.

19. A Book on the Gamma-Assaying of Uranium Ores

Rukovodstvo po Gamma-Oprovoyaniyu Uranovykh Rud (A Manual of the Gamma-Assaying of Uranium Ores), by A. G. Grammakov, V. L. Shashkin, and M. V. Shiryayeva, Atomizdat, Moscow, 1959, four standard printed sheets, price 2 rubles (reviewed in Tematicheskiy Plan Izdaniy Atomizdata na 1959 God [Publications Plan of Atomizdat for 1959], Atomizdat, Moscow, 1958, p 11)

"The fundamentals of the theory underlying the method of radiometric assaying of uranium ores are discussed. The equipment used is described, and applications of gamma-assaying are reviewed.

"The book will serve the needs of geophysicists and geologists who are active in the fields of prospecting for and surveying of occurrences of uranium ores. It can also be used as a textbook by students specializing in the fields of geology and geophysics.

"Ten Thousand copies of the book will be published in the second quarter of 1959."

The Sulfate Method for the Separation of Transuranium Elements

"Investigation of the Sulfate Method for the Separation of Transuranium Elements -- Part I," by E. I. Grebenshchikova and N. B. Chernyavskaya; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 4, No 4, Apr 59, pp 941-949

In a paper presented by B. V. Kurchatov, V. N. Grebenshchikova, N. B. Chernyavskaya, and G. N. Yakovlev at the First International Conference on Peaceful Uses of Nuclear Energy, Geneva, 1955, the principal conditions for the analytical separation of Pu^{4+} and Np^{4+} by means of the double potassium-lanthanum sulfate were indicated. However, it was found in connection with the application of this method for the separation of americium from plutonium that there is a considerable difference in the behavior of these metals. Because of the importance of the sulfate method and its extensive use, the distribution of plutonium and americium between the double sulfate and solution was investigated more thoroughly in the work described in this instance. It was established that the coefficient of the distribution of americium does not depend on the concentration of potassium sulfate in solution, but that of the distribution of plutonium does. The maximum value of the coefficient of distribution of plutonium corresponds to the formation of the complex $Pu(SO_4)_3^{2-}$ ion in solutions. This complex is analogous in composition to the complex lanthanum sulfate ion present in the solid salt and differes from it only by its charge. The plutonium sulfate ion is smaller than the lanthanum sulfate ion because the charge of the plutonium ion (4+) is greater than that of the lanthanum ion (3+). This must have a favorable effect on the inclusion of the plutonium sulfate ion into the lattice of the macrocomponent.

The data obtained on the distribution coefficients of Am and Pu make it possible to select optimal conditions, not only for their joint separation from dilute solutions, but also for their separation from each other by the sulfate method. Experiments on the separation of plutonium from americium were carried out in an 0.19 molar solution of potassium sulfate because the coefficients of distribution of Pu and Am show the greatest difference at this concentration. The results obtained indicate that after separation of the total plutonium (97-98%), the precipitate is contaminated with a quantity of americium corresponding to 6-8% of the total amount of this element present initially. Reprecipitation of the precipitated salt makes it possible to eliminate americium completely from the plutonium.

21. Separation of Plutonium and Other Radioactive Elements by the Method of Combined Crystallization

"Concerning the Problem of the Combined Crystallization of Substances With Crystalline Precipitates," by V. I Grebenshchikova, R. V. Bryzgalova, N. B. Chernyavskaya, and V. N. Bobrova; Leningrad, Radiokhimiya, Vol 1, No 1, Jan 59, pp 11-21

The coprecipitation of radioactive elements with crystalline precipitates was studied on the following systems:

Group 1. Microcomponents Am^{241}, Eu^{154}, and Y^{91} - macrocomponents (carriers) lanthanum oxalate $La_2(C_2O_4)_3 \cdot 9H_2O$ and the double lanthanum sulfate $K_3La(SO_4)_3$;

Group 2. Microcomponent Pu^{239} in the tetravalent state - the same macrocomponents as in group 1);

Group 3. Microcomponents Y^{91}, Ce^{141}, La^{140}, and Am^{241} in the trivalent state and Zr^{95} and Pu^{239} in the tetravalent state - macrocomponent K_2SO_4.

With respect to the coprecipitation of plutonium in the systems of group 2, it was established that plutonium is enriched on the oxalate carrier at a lower solubility of plutonium oxalate than that of the lanthanum oxalate and enriched on the potassium-lanthanum sulfate at a higher solubility of potassium-plutonium sulfate than that of the double lanthanum sulfate carrier. The explanation given for the behavior of plutonium in the latter case is that complex ions of the composition $Pu(SO_4)_3^{2-}$ rather than Pu^{4+} ions enter into the lattice of the macrocomponent. Since the effective concentration of the complex ion varies with the concentration of K_2SO_4, one can, by manipulating the concentration of K_2SO_4, either precipitate both Am^{3+} and Pu^{4+} on the potassium-lanthanum sulfate carrier or precipitate Pu^{4+} selectively, thus separating it from Am^{3+}.

On the basis of the results obtained in the investigation described, it is concluded that determination of the valency of radioelements by the method of isomorphous combined crystallization may lead to erroneous results because of the absence of experimental methods for distinguishing between anomalous mixed crystals and true mixed crystals. In the coprecipitation of radioelements with complex and double salts under formation of anomalous mixed crystals, the coefficient of the crystallization of the microcomponent assumes a maximum value when the stoichiometric formula of the macrocomponent in the precipitate is the same as that of the microcomponent in the solution, independently of differences in the charges of the

ions (for instance, when $La(SO_4)_3^{3-}$ ions are replaced by $Pu(SO_4)_3^{2-}$ ions). The method of isomorphous crystallization can be applied for establishing the limits within which complex ions are formed and also for determining the dissociation constants of complex ions of radioactive elements in solution.

22. Selective Extraction of Rare-Earth Elements, Uranium, and Thorium in the Form of Their Salicylates

"Extraction of Salicylates of Scandium, Yttrium, Cerium, Lanthanum, Uranium, and Thorium," by B. N. Sudarikov, V. A. Zaytsev, and Yu. G. Puchkov, Chair of the Technology of Radioactive and Rare Elements, Moscow Chemico-Technological Institute imeni D. I. Mendeleyev; Moscow, Nauchnyye Doklady Vysshey Shkoly--Khimiya i Khimicheskaya Tekhnologiya, No 1, Jan-Mar 59, pp 80-83

The distribution of the salicylates of scandium, yttrium, cerium, lanthanum, uranium, and thorium between isoamyl alcohol and aqueous solutions, depending on the pH, was investigated. It was established that the salicylates are extracted quantitatively by isoamyl alcohol at the following pH values: scandium, 3.3-5.5; yttrium, above 4; lanthanum, above 4.5; cerium, above 5.0; thorium, above 3.0; and uranium, 2.5-5.5.

23. Radiation Changes in Metals

"On the Theory of Radiation--Induced Changes in Metals," by I. M. Lifshits, M. I. Kaganov, and L. V. Tanatorov; Moscow, Atomnaya Energiya, Vol 6, No 4, Apr 59, pp 391-402

The development of radiants of local heating produced by adsorption of the energy of nuclear particles passing through matter is considered. The interrelationships between electrons and the lattice which lead to an equalization of the temperature of both are discussed. A method is proposed for the calculation of the effective kinetic coefficients of media undergoing fission. The nature of changes in the mechanical properties of samples which arise because of local heating is explained.

24. The Effect of Irradiation on Nuclear Fuels and Reactor Construction Materials

"The effect of Irradiation on Solids," by Yu. N. Sokurskiy; Moscow, Atomnaya Energiya, Vol 6, No 4, Apr 59, pp 403-425

The papers on the effect of radiation on solids which have been presented at the Second International Conference on Peaceful Uses of Nuclear Energy (Geneva, 1958) are reviewed from a single viewpoint. Experimental work is discussed which dealt with the quantitative evaluation of radiation damage and also with problems of the action of neutron radiation on fissionable materials (uranium, plutonium, and some alloys of these elements). Data are listed on the effect of high rates of burn-out (up to 2 atomic percent) on the dimensions and shape of reactor parts made of uranium and its alloys and also on the increase of the volume (swelling) of uranium reactor parts under the effect of radiation. Detailed consideration is given to data on uranium alloys containing 9% by weight of molybdenum and also to data pertaining to pure uranium, which indicate that there is a high mobility of atoms in uranium and its alloys during irradiation. Data dealing with the effect of the temperature and of the dose of radiation, as well as other conditions, on the mechanical properties of steels and other construction materials are discussed. Results of work dealing with the effects of irradiation on nonmetallic materials such as BeO, UO_2 — BeO, UO_2 — Th O_2, and graphite are reviewed.

25. An Investigation of Heat Transfer to Liquid Metal Coolants

"Heat Transfer in Tubes to Sodium-Potassium Alloys and Mercury," by P. L. Kirillov, V. I. Subbotin, M. Ya. Suvorov, and M. F. Troyanov; Moscow, Atomnaya Energiya, Vol 6, No 4, Apr 59, pp 382-390

The results of experiments in which the coefficient of heat transfer to sodium-potassium alloy was measured made it possible to conclude that a boundary resistance to heat transfer exists and that this resistance changes with time. The experiments were conducted by two methods: measuring changes of the wall temperature and determining temperature gradients in the stream. The content of oxygen in the alloy was found to exert an effect on the boundary heat transfer resistance.

Measurements of the coefficient of heat transfer from a nickel tube to mercury showed that a boundary resistance is absent in this case. This result indicates that the surface material has an influence on the heat transfer.

Measurements with a moveable thermocoil made it possible to establish that end effects are absent and that the length of the section of heat stabilization for hydraulically stabilized flow comprises 10 l/d, where l/d is the relative length of the section being heated. Results obtained in the work described for the case when a boundary resistance to heat transfer is absent are in agreement with results obtained by other investigators.

Organic

26. Synthesis of Some New Esters of Phosphinic and Phosphoric Acids

"The Synthesis of Several Esters of Phosphinic and Phosphoric Acid," by B. A. Arbuzov and E. N. Ukhvatova, Scientific Research Chemical Institute, Kazan State University; Moscow, Zhurnal Obshchey Khimii, Vol 29, No 2, Feb 59, pp 503-507

The reaction of the chloromethyl-β -acetoxyethyl ester with trialkylphosphites leads to the synthesis of the esters of β -acetoxyethoxymethyl phosphinic acid. The diethyl, n-dipropyl, and n-dibutyl esters were synthesized and characterized. The constants are presented in the text.

Several esters of phosphoric and thiophosphoric acids containing heterocyclic radicals were synthesized. The acid chloride of diethyl phosphoric acid reacted with the sodium salt of 4-methyl-2-oxythiazole to form the corresponding diethyl ester of methoxythiazole phosphoric acid. The physical constants are given in the text. The corresponding n-butyl and isobutyl esters synthesized decomposed in the process of sublimation. The reaction between the acid cloride of diethylphosphoric acid and 4-methyl-2-aminothiazole yielded the corresponding substituted amide. The physical constants are listed. The 2,5-dimercaptothio-3,4-diazole was reacted with the acid chloride of the diethyl ester of phosphoric acid to form a product which decomposed in the process of sublimation.

The authors also studied the reaction of dioxylan and the acid chloride of dialkylphosphoric acid. But the reaction did not proceed in the desired direction, i.e., with a halide in the ester radical.

27. Reactions of Phosgene and Oxalyl Chloride With Esters of Phosphorous Acid

"On the Reactions of Phosgene and Oxalyl Chloride With Esters of Phosphorous Acid," by A. N. Pudovik and R. N. Platonova, Kazan State University; Moscow, Zhurnal Obshchey Khimii, Vol 29, No 2, Feb 59, pp 507-510

The authors established that the reactions of complete esters of phosphorous acid with phosgene and oxalyl chloride proceeds with the cleavage of carbon monoxide and leads to the formation of the acid chlorides of the dialkyl esters of phosphorous acid.

28. Fluorine-Containing Trichlorophosphazosulfonaryls and Their Derivatives

"Fluorine-Containing Trichlorophosphazosulfonaryls and Their Derivatives," by L. M. Yagupol'skiy and V. I. Troitskaya, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 29, No 2, Feb 59, pp 552-556

The purpose of this work was to synthesize and study the insecticidal properties of trichlorophosphazosulfonaryls and their derivatives which contain a fluorine atom or trifluoromethyl groups substituted in the aromatic nucleus.

The trichlorophosphazosulfon-p-fluoro- and the m-trifluoromethylbenzene and the products of their hydrolysis, were obtained.

The synthesis of nine trialkoxyphosphazosulfon- and triaroxyphosphazosulfon-p-fluoro- and m-trifluoromethylbenzene and nine diesters of p-fluoro- and m-trifluoromethylphenylsulfonamidophosphoric acids are described and their physical constants given.

Two compounds are mentioned as exhibiting some insecticidal activity.

29. A Method of Determining Purity of Organic Substances

"The Determination of the Purity of Organic Substances According to the Melting Curve," by A. K. Bonetskaya, S. M. Skuratov, and A. S. Monauenkova, Chair of Physical Chemistry of the Moscow State University imeni M. V. Lomonosov; Moscow, Nauchnyye Doklady Vysshey Shkoly -- Khimiya i Khimicheskaya Tekhnologiya, No 1, 1959, pp 113-116

The authors have developed a method which permits one to determine the degree of purity of organic substances with an accuracy of 0.01-0.03 mol.%.

This method essentially utilized a Smit apparatus (cf W. M. Smit, Rec. trav. chim., 1956, 75, 1309) with two important modifications: the measuring vessel is made of silver not of glass; and in place of the mercury thermometers used for measuring the temperature of the substance and for measuring the difference in the temperature between the substance and the block, the authors have employed a copper-constantan thermocouple.

The accuracy of the method was verified by determining the purity of diphenylamine, diphenyl, and caprolactam.

Radiation Chemistry

30. A Theoretical Treatment of Radiation-Chemical Reactions

"On the Theory of Radiation Chemistry," by L. S. Polak and A. Ya. Temkin, Institute of Petrochemical Synthesis, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 125, 21 Mar 59, pp 584-587

A theoretical treatment is given to problems involved in the interaction of tracks, and methods are derived for the approximate calculation of the number of free radicals and of the quantity of end-products of gamma- and beta-radialysis. The methods in question are stated to be suitable for calculations carried out on electronic computers.

31. Application of the Method of Radiation-Chemical Reduction To Produce Platinum Black With an Exceptionally High Catalytic Activity

"Radiation Method for the Production of Platinum Catalysts," by A. A. Balandin, V. I. Spitsyn, L. I. Barsova, and V. I. Duzhenkov, Moscow State University and Institute of Physical Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Fizicheskoy Khimii, Vol 33, No 3, Mar 59, pp 736-737

Irradiation with electrons of hydroxyl complexes of platinum prepared by the dissolution of sodium chloroplatinate in sodium hydroxide was found to result in the precipitation of finely dispersed platinum with a catalytic activity superior to that of ordinary platinum black. The catalytic activity was measured by determining the effectiveness of the platinum in the low-temperature hydrogenation of cyclohexene. The activity of fresh platinum catalyst prepared by the radiation-chemical method was found to be 15-20 times higher than that of ordinary platinum black prepared according to Loew. This activity, which was exhibited during the first few days after preparation, deteriorated gradually in 17 days, but still remained much higher than that of ordinary platinum black. The activity of samples obtained at 10-18° was lower than that of samples obtained at 45-50°.

Radiochemistry

32. Work on Radioactive Isotopes in Latvia

"News Item -- USSR" (unsigned report); Moscow, Atomnaya Energiya, Vol 6, No 4, Apr 59, p 496

The Institute of Physics, Academy of Sciences Latvian SSR, developed, jointly with enterprises of the Latvian Sovnarkhoz, a number of devices based on the utilization of radioactive isotopes. These devices are to be used for the automatic control of technological processes. Experimental prototypes of appliances to be used at enterprises of the metallurgical, chemical, food, and other industries were constructed by the following industrial plans: VEF, Hydrometric Appliances, "Kompressor," and the Radio Manufacturing Plant imeni A. S. Popov. The VEF Plant has launched the production of devices for automatic control of the temperature, potentials of direct and alternating current, and other variables. The Technico-Economic Council of the Latvian Sovnarkhoz outlined tentative measures for expediting the construction of instruments and expanding the use of radioactive isotopes at Latvian industrial enterprises.

Miscellaneous

33. Institute of Organic Chemistry, Academy of Sciences USSR To Be Established in Kazan'

"The Raw Resources of Tatar ASSR Should Be Developed Fully," by A. Shmarev, Chairman, Tatarskiy Sovnarkhoz; Moscow, Sovetskaya Rossiya, 24 Jan 59

To develop new technological processes of drilling, obtaining, and refining petroleum and gas, the Tatar Scientific Research Petroleum Institute will be greatly expanded, and a new Institute of Organic Chemistry (Institut Organicheskoy Khimii), Academy of Sciences USSR, will be established in Kazan'.

The new institute and the other institutes of the area will be staffed by personnel trained at the Kazan' University imeni V. I. Ulyanov-Lenin and at the Kazan' Chemico-Engineering Institute.

34. 40th Anniversary of the Physico-Chemical Institute imeni L. Ya. Karpov

"Major Center of Chemical Sciences," by N. M. Zhavoronkov, Corresponding Member of Academy of Sciences USSR; Moscow, Khimicheskaya Nauka i Promyshlennost', No 6, Nov-Dec 58, pp 813-814

The Scientific Research Physico-Chemical Institute imeni L. Ya. Karpov was founded in 1918 in Moscow as the Central Chemical Laboratory of the Chemistry Division of the Supreme Council of National Economy (VSNKh). The founder was L. Ya. Karpov. Between 1930-1932, the institute gave up several of its specialized laboratories, which became the bases for the establishment of new chemical institutes. After World War II, the institute's research program was greatly accelerated. New laboratories were added, and many of the scientific associates of the institute received Stalin prizes for their discoveries and developments.

At the present time, the institute has 2 academicians on its staff, 5 corresponding members of Academy of Sciences USSR, 15 doctors of sciences, and nearly 90 scientific associates having a candidate of sciences degree. The institute has 18 scientific research laboratories, headed by well-known chemists of various specialities.

The theoretical research conducted at the institute is primarily concerned with the study of the kinetics and mechanism of various physico-chemical processes and with working out the problems of the theory of chemical structure of substances. These problems primarily concern the solution to the structure and properties of polymers; the formation of new bases for the selection of catalysts; the study of radiation-chemical processes and the developing of methods of utilizing the energy of radioactive radiation; the study of conditions for the formation of aerosols; the study of their properties; and the development of methods of filtration.

The institute's laboratories are equipped with the latest instruments and apparatus, and the techniques employed in research and development are the most advanced.

III. ELECTRONICS

Acoustics

35. Theory of Scattering of Sound Waves in the Atmosphere Tested

Experimental Investigation of the Scattering of Sound in a Turbulent Atmosphere," by M. A. Kallistratova, Institute of Physics of the Atmosphere, Academy of Sciences USSR; Moscow Doklady Akademii Nauk SSSR, Vol 125, No 1, 1 Mar 59, pp 69-72

"Scattering occurs in the propagation of sound waves and radio waves in a turbulent atmosphere. Observations in the region of the shadow of those signal levels which greatly exceed the levels determined by diffraction serve as an indirect indication of the scattering of waves. Much has been written on the propagation of ultrashort waves beyond waves beyond the horizon. The analogous phenomenon for sound waves was studied by Pridmore-Brown and Ingard. The scattering of sound waves is evidently caused by microheterogeneities in the wind and temperature fields. Pulsations in temperature and humidity are responsible for the scattering of radio waves in the troposphere. The theory of the scattering of sound waves in turbulence was first advanced by A. M. Obukhov and further developed by D. I. Blokhintsev and V. I. Tatarskiy. Actual formulas for the scattering cross section of radio waves were obtained by Silverman on the basis of the current picture of the microstructure of the temperature field, i.e., the 2/3 law of Kolmogorov and Obukhov."

Following the above introduction, the author describes a direct experimental study of the scattering of sound in the ground layer of the atmosphere, which was made to test the theory of wave scattering in turbulence. This layer was chosen since its turbulence characteristics could be determined on the basis of meteorological measurements. The study of sound scattering was made in September 1958 at the Tsimlyanskiy station of the Institute of Physics of the Atmosphere. The experimental set-up is described and graphs of the measurements are given. Good agreement was found between the formulas and the measurements. It is concluded that the theory based on the hypothesis of locally homogeneous turbulence correctly describes the relationship observed between scattering intensity and the magnitude of the pulsations.

36. Powerful Pulse Transformers

"Calculation of Powerful Pulse Transformers Generating Long-Duration Pulses," by P. N. Matkhanov, Leningrad Electrical Engineering Institute imeni V. I. Ul'yanov; Minsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No 3, Mar 59, pp 18-27

An extensive application of pulse technique in various fields of engineering created a demand for powerful high-voltage generators of square pulses, with power in the pulse varying from tens of megawatts to hundreds of kilowatts, and with pulse duration from a fraction of a microsecond to several milliseconds. An important element of such powerful pulse generators is the pulse transformer which serves to change the voltage, to match the load impedances or to change the pulse polarity.

The purpose of this study was to analyze the problem of electrical calculation of powerful pulse transformers generating long-duration pulses. The sequence of calculations for a pulse transformer was as follows: the cross-section of wires were selected with consideration to heating; the value of the demagnetizing field of the transformer was estimated; a preliminary selection of wire cross-section and number of turns was made; the selection of winding height coefficient ($\frac{h}{n}$, where h is height of winding and n is number of turns) was carried out to assure the desired pulse duration; final checking of the pulse transformer performance was conducted.

37. Transistorized Device for Power Directional Control

"Transistorized Pulsed Device for Power Directional Control," by O. V. Mamontov, the Laboratory for Control Machines and Systems, Academy of Sciences, USSR; Minsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No 3, Mar 59, pp 28-30

Pulsed circuits possess a higher degree of performance accuracy than continuous action circuits, therefore their use in electronic relay protection is of great interest. A pulsed circuit of phase-differential, high-frequency protection relay incorporating transistors developed at the Laboratory for Control Machines and Systems, possesses high performance reliability. The power-directional relay built with transistors operates on the principle of detection of phase relation between two sinusoidal voltages, one of which is proportional to the line current and the other to the line voltage. In such a relay, a pulse appears to the output of the circuit only when the direction of current in the power line changes. Transistors of type P3 and P4 were used in this experimental relay.

This directional relay was tested at the Laboratory for Control Machines and Systems, Academy of Sciences USSR and proved to be accurate and reliable in operation.

38. Semiconductor Type Refrigerators

"With Semiconductors," by .V. .Potapov, Chief Engineer, "Santekhnika" Plant; Moscow, Promyshlennaya-Ekonomicheskaya Gazeta, 18 Mar 59

The collective of the Moscow plant "Santekhnika," in cooperation with the workers of the Heating Systems Laboratory, Scientific Research Institute for Sanitary Engineering at the Academy of Building and Architecture USSR, have built a heating-cooling system using semiconductors. In summer, it is used to cool the air and in winter, to heat it. Wide-scale research conducted by Soviet physists and in particular, the Institute for Semiconductors, Academy of Sciences USSR, preceded the development of such a system.

39. Piezoelectric Accelerometers

"Wide-Band Piezoelectric Transducers for Accelerometers," Ye. A Korepin; Moscow, Izmeritel'naya Tekhnika, No 4, Apr 59, pp 21-25

The article supplies data needed for the design of piezo-transducers used in accelerometers and other pick-up units. Special calculation for "bonded" transducers, consisting of piezoelements connected to the inertial mass and to the frame with a polymerizing glue, can be carried out with the help of an equivalent circuit.

The following piezoelectric crystals were examined: quartz, Rochelle Salt, dihydro ammonium phosphate and barium titanate. The article recommends a technique for crystal cutting to improve the acceleration sensitivity of the transducers.

40. Use of Computers at Academy of Sciences Kazakh SSR

"Electronic Machines in the Laboratory of Machine and Computer Mathematics," by M. V. Pentkovskiy, Academician, Academy of Sciences Kazakh SSR; Alma-Ata, Vestnik Akademii Nauk Kazakhskoy SSR, No 1, Jan 59, p 101

The Laboratory of Machine and Computer Mathematics of the Academy of Sciences Kazakh SSR obtained two computers in 1958. One was a EV-80-3 computer and the other was the similar IPT-5.

The electronic EV-80-3 computer is a high-speed, digital machine. The computer performs the arithmetical operations of addition, subtraction, multiplication, and division, and a series of logical operations necessary for control by a computer process. Data is fed into the machine with the help of standard punched cards. The computer processes 80 punched cards per minute. The results of the computer are also given in the form of perforations either on a new block of punched cards or on the original block of cards. The computer makes it possible to simultaneously process three blocks of cards. The results are obtained in digital form with the help of the T-5 tabulator.

The EV-80-3 is convenient for processing a large volume of initial information when the processing is not mathematically difficult. During the process of calculating, blocks of punched cards may be repeatedly passed through the computer, whereupon the program of calculations may be shortened. The laboratory intends to utilize the computer for mechanization of calculations concerning natural resources. The electronic computer is already installed and ready.

In the second machine, the IPT-5, it is possible to reproduce and register processes described by systems of ordinary differential equations with constant or variable coefficients. The equation of the system may be either linear or nonlinear. The IPT-5 is as yet not installed.

41. Computers Controlling Power Distribution in Electric Systems

"Selection of Proper Setting of Shunt-Capacitor PF Correcting Equipment by a Digital Computer on Long-Distance Transmission Lines," by Z. B. Golembo and I. A. Bochek, Laboratory of Controling Machines and Systems, Academy of Sciences USSR; Minsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No 3, Mar 59, pp 12-17

The main problem of long-distance electric power transmission is the maintenance of stability of parallel operation for several electric stations spaced a considerable distance from each other. The capability of a digital computer to handle a great number of variable data can be effectively utilized for investigation and calculation of electric power systems. In examining such difficult problems as the determination of losses in complex systems, calculation of current distribution, calculation of short-circuit current, estimation of stability and automatic control of the system, the computers become indispensable.

The present work describes a method for selection and proper setting of PF correcting shunt-capacitors by a digital computer to control the power flow in an intricate electric power network with stations spaced a great distance from each other. The M-2 digital computer of the Laboratory of Controlling Machines and Systems was used in this experiment. The block diagram of the computer program contains four basic parts. The first part serves to form the commands, depending on the number of sections in the line and to enter the initial data into the computer. The second part performs the calculation of the first section of the line for given voltages at the beginning and end of the section. The third part performs the calculation of any k-th section. The fourth part performs calculation on a section with power takeoff and for fixed value of voltages at the section.

For transmission lines with a great number of junctions, the actual calculation time is but a few seconds. However more time is consumed in recording the results; this is due to the slowness of the present mechanical recording devices.

Electromagnetic Wave Propagation

42. Scatter Propagation of Microwaves

"Transmission Distortions of Microwaves Scatter Propagation," by A. V. Prosin; Moscow, Elektrosvyaz', No 5, May 59, pp 32-42

The main reason for signal distortion in distant tropospheric propagation of microwaves is the scattering of waves from various layers of troposphere, resulting in signal arrival at different intervals. An investigation was conducted on scattering of microwaves from turbulent nonhomegeneities of the troposhere and the resulting distortions for distant transmission. Expressions for the transfer characteristics of the troposphere are derived. A frequency band is determined for which scatter propagation is possible at a great distance. It was observed that for scatter propagation the distortions in the leading and trailing edge of the pulse signal are similar to distortion caused by the passage of a pulse through a filter circuit. This led to an expression for the transfer coefficient of a network which simulates the conditions in the troposphere. A formula is also derived for cross-noises in a multichannel communication system operating with frequency modulation.

As a result of this study, the author concludes that, in order to increase the troposphere band-pass for the scatter propagation of microwaves, it is essential to increase the directivity of transmitting and receiving antennas and to line up the axis of the antenna with the plane of the horizon.

43. New High-Power Radio Telescope

"New High Resolving Power Radio Telescope," by S. E. Khaykin and N. L. Kaydanovskiy, Main Astronomical Observatory, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar-Apr 59, pp 19-24

The large radio telescope of the Main Astronomical Observatory was built in 1956, and, at present, it has 90 reflecting elements each 1.5 m long and 3 m high. These flat reflecting elements are placed along an arc segment ($2\alpha \approx 80^\circ$) of 100 m radius and are arranged as if they were touching the surface of an imaginary paraboloid with its axis directed toward the point of observation, while the points of contact lie in the horizontal plane passing through the focus of the paraboloid. The relatively high accuracy of the segmented reflecting surface of this new telescope is attained through exact positioning of its individual elements. The reflector converts the plane wave into a cylindrical wave with a vertical axis. The cylindrical wave is further converted into a spherical

wave by a second parabolic cylinder. By shifting the reflecting elements and the exciter, the axis of the radiation pattern can be pointed in any direction. The antenna exciter is made in two variants: in the form of a parabolic-segment reflector (cheese type) and in the form of a parabolic cylinder.

This telescope makes it possible to realize, for the wave length of 3 cm, a directivity pattern with a angle of 1.2 minutes in the azimuth plane and one degree in the elevation plane. Telescopes of this type can be built with a reflecting area of from 10^4 to 10^5 square meters. A sensitive receiver for 3.2 and 10 cm waves makes this telescope suitable for observation of discrete radio-wave sources.

Laboratory Instruments and Equipment

44. Image Recording With a Cathode-Ray Tube

"Recording Images With a Cathode-Ray Tube," by Yu. Ye. Karpeshko; Moscow, Elektrosvyaz', No 5, May 59, pp 58-62

Recording of images with the aid of a cathode-ray tube is becoming widely used in various branches of science and engineering. Investigations carried out at the Television Chair of the Leningrad Electrical Engineering Institute for Communications (LEIS) and the Phototelegraph Laboratory of the Scientific Research Institute of City and Rural Telephone Communications (NIITS) have shown that the use of electronic scanning for the purpose of securing an image makes it possible to greatly speed up the analysis and recording, and to introduce some elements of automation into the process of transmission. The latter is possible because of the continuity of such recording.

Factors influencing the nature of recording when scanning with the aid of an electron-ray tube are studied. An analytical expression is derived describing the character of positive photographic recording on high-sensitivity paper.

45. High-Vacuum Meter

"Ionization Vacuum Meter for Measurement of Pressure Between 10^{-4} and 10^{-10} mm Hg," by V. M. Gavrilyuk and Ya. M. Kucherov, Physics Institute, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar-Apr 59, pp 83-85

The authors have developed a vacuum meter and manometer tube to measure pressure as low as 10^{-10} mm Hg. The cathode of the manometer tube is made of 0.1-mm tungsten wire about 110 mm long. The grid of the tube is in the form of a helix about 30 mm in diameter and 50 mm long, wound from 0.4-mm tungsten wire. A 0.2-mm tungsten filament, about 50 mm long, serves as ion collector. This manometer tube is highly sensitive because it encompasses a large space where ionization occurs and from where ions are admitted to the collector. The tube constant is 0.15 a/mm Hg at 5 milliamps of electronic current. The measuring circuit of the vacuum meter incorporates the metering tube 2E2P. The output signal from the metering stage is fed to the input of the dc amplifier, which contains two balanced stages and a cathode follower. The whole amplifier circuit is shunted by a 100% negative feedback. The voltage amplification factor of the circuit is about 500. The whole range of pressure measurement is from 10^{-4} to 10^{-10} mm Hg, and is divided into 7 subranges. The rectifier unit is built with six diodes of DG-Ts27 diodes.

This instrument was tested at a laboratory of the Physics Institute of the Academy of Sciences USSR, and proved to be reliable and accurate. The authors thank N. D. Morgulis and G. F. Kobenchuk for their assistance.

Patents

46. Soviet Patents in the Field of Electronics

"Electrical Engineering," unsigned; Moscow, Bylleten' Izobreteniy, No 7, 1959, pp 17-31

Class 21a, 7_{05}. No 118850. P. A. Kotov, Device for Registering Coded Combination Distortions.

Class $21a^1$, 5_{02}. No 118852. V. I. Grigor'yev and M. Zh. Zhdanova, Automatized Method for Telegram Reception in a System of Direct Connections.

Class $21a^1$, 34_{11}. No 118855. Yu. M. Brande-Zolotarev, Image Analyzer.

Class $21a^1$, 35_{30}. No 118857. Yu. G. Danilevskiy, Method for Drum Phase-Position Control in a Receiving Facsimile Apparatus.

Class $21a^2$, 36_{14}. No 118859. I. G. Katayev, Device for Forming Pulses with Steep Leading Edge.

Class $21a^2$, 39_{10}. No 118860. A. N. Svenson, Method for Narrowing the Spectrum of Group Signal in Multiplex Communication Systems with Frequency Division of Channels.

Class $21a^3$, 4107. No 118861. V. A. Zameshayev and A. V. Nitsiyevskaya, Remote Control Method of Bilateral Underwater Amplifiers.

Class $21a^4$, 8_{01}. No 118863. A. I. Popov and V. G. Popelishev, Method for Stabilizing the Leading Edge of Pulse from SHF Tube Oscillator.

Class $21a^4$, 22_{06}. No 118865. V. M. Semenov and V. V. B. Sergeyev, Reception with Two Antennas.

Class $21a^4$, 48_{66}, No 118868. A. S. Surikov, Pulse Modulator with Partial or Complete Discharge of Stored Energy.

Class $21a^4$, 71. No 118873. V. P. Vasil'yev, Method for Measuring the Phase Shift.

Semiconductors

47. The Properties of Solid Solutions of $Pb_3NiNb_2O_9$ in $Pb_3MgNb_2O_9$

"The Mechanism of Polarization in Solid Solutions of $Pb_3NiNb_2O_9$ in $Pb_3MgNb_2O_9$," G. A. Smolenskiy, A. I. Agranovskaya, and S. N. Popov; Leningrad, Fizika Tverdogo Tela, Vol 1, No 1, Jan 59, pp 167-168

It was established that in the solid solutions $Pb_3(NiMgNb_2)O_9$ the ions of each of the two initial compounds preserve their individuality. Measurements of the dielectric polarization of solid solutions of this composition indicated that a hysteresis loop is formed when a strong field is applied. The compound $Pb_3MgNb_2O_9$ exhibited a hysteresis loop which is typical for seignettoelectrics, while the compound $Pb_3NiNb_2O_9$ showed a loop without a regional saturation, even in strong fields. The two compounds form an uninterrupted series of solid solutions. In these solid solutions there is a gradual transition from the properties of one compound to those of the other. The possible mechanism of polarization in solid solutions of this type is discussed.

48. Solid Solutions in the System Zinc Selenide-Gallium Arsenide

"Solid Solutions in the System ZnSe-GaAs," by N. A. Goryunova and N. N. Fedorova; Leningrad Physico-Technical Institute of the Academy of Sciences USSR and All-Union Scientific Research Storage Battery Institute at the Gosplan USSR; Leningrad, Fizika Tverdoga Tela, Vol 1, No 2, Feb 59, pp 344-345

Results obtained by the investigation of the pseudobinary section ZnSe-GaAs of the four-component system Zn-Ga-As-Se are briefly reported. The work in question represents a part of an investigation conducted at the Leningrad Physico-Technical Institute, Academy of Sciences USSR, on the homogeneous regions of multicomponent semiconducter alloys for the purpose of studying the possibilities of the variation of electrical characteristics.

49. Lithium Silicate Scintillator Glasses

"Lithium Silicate Scintillator Glasses for the Detection of Slow Neutrons," by V. K. Voytovetskiy and N. S. Tolmacheva; Moscow, Atomnaya Energiya, No 4, Apr 59, p 474.

The effects of the addition of cerium, phosphorus, and boron to lithium silicate scintillator glasses were investigated. When a silicate glass of this type is activated with cerium, it becomes a very effective scintillator for the detection of thermal neutrons. The results obtained indicate that by varying the composition of scintillator glasses, one can produce selective detectors of nuclear radiation.

50. Cadmium Sulfide Photoresistors for Radiation Dosimetry

"The Application of Cadmium Sulfide Photoresistors in the Dosimetry of Ionizing Radiation," by Yu. S. Deyev; Moscow, Atomnaya Energiya, Vol 6, No 4, Apr 59, pp 458-465

The advantages of using crystals as sensitive elements in the dosimetry of ionizing radiation are emphasized. It is brought out that cadmium sulphide photoresistances have a considerably greater sensitivity to various types of radiation than air ionization chambers. The high sensitivity of cadmium sulfide and the small dimensions of the crystals of this substance which have to be employed make it possible to solve successfully a number of problems in dosimetry.

A review of USSR and non-USSR work on the subject is given. Methods for the production of single crystal and polycrystal photoresistances based on cadmium sulfide and their dosimetric, temperature, and time characteristics are discussed. Some shortcomings of cadmium sulfide crystals as sensitive elements and possible ways of removing these shortcomings are subjected to consideration. The circuits of cadmium sulfide dosimeters are shown.

As far as methods for the production of cadmium sulfide crystals are concerned, it is stated that work on the subject progressed considerably, subsequent to 1946, when R. Frerichs found a convenient method for the production of Cd S crystals. The method devised by Frerichs, which received extensive application, consists in carrying out a reaction between vapor of metallic cadmium and hydrogen sulfide in the gas phase, with subsequent crystallization of the cadmium sulfide. The techniques for the preparation of single cadmium sulfide crystals have been improved since then. Among the methods used at present, the reaction of cadmium vapor with sulfur in a stream of argon gives the best results. Single crystals formed by this method have a surface up to several square centimeters. Good results are also obtained by using another method of producing the crystals; at the State X-ray-Radiological Institute, large single crystals of cadmium sulfide were obtained by subliming cadmium sulfide luminophore in a stream of nitrogen. Work done by USSR and non-USSR scientists showed that polycrystalline cadmium sulfide prepared by special methods has a high photosensitivity approaching that of single crystals. By subjecting calcium sulfide power to pressing and subsequent heat treatment, photoresistances were obtained which exhibit a high over-all photosensitivity. In 1957, polycrystal layers which are highly sensitive to ionizing radiation were prepared at the Physico-Technical Institute, Academy of Sciences USSR, by evaporating cadmium sulfide powder in vacuum and depositing it on a conducting support. Beginning with 1951, photoresistors of the single crystal and polycrystalline types have been produced on an industrial scale in the USSR.

At present, cadmium sulfide crystals are used for counting individual particles (protons, alpha particles, and deuterons) and also for determining the magnitude of doses of different types of ionizing radiation.

IV. ENGINEERING

Heat Transfer and Fluid Flow

51. Theory of Porous Cooling for Rocket Motors Given

"Gas Flow Through Porous Metal Walls," by Yu. V. Il'in, Moscow Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 65-73

The flow of gases through porous metal walls without heat exchange is studied. The introduction states that "the development of liquid rocket motors has led to successively higher temperatures and pressures in the combustion chamber, and a resulting increase in the heat flux in the chamber walls. The method of porous cooling is one promising method of heat elimination. The method is also applicable in high-pressure gas turbines and in developing means for returning scientific apparatus from satellites to earth...."

A theory of the hydraulic resistance of a porous medium is developed and the results of an experimental study are given.

52. Energy Flow Considerations Used To Calculate Axial Flow Turbines

"Variational Principle of Maximum Flow of Mechanical Energy and its Application in Calculating Axial Flow Turbines," by V. N. Yershov, Khar'kov Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 46-54

It is shown that the steady-state motion of a viscous medium responds to the condition of maximum flow of mechanical energy across the determining cross section, i.e., the surface on which the processes of energy exchange and dissipation are concentrated. The principle of maximum flow of mechanical energy is applied to calculate the axial velocities in the spaces between the blade lattices of axial flow turbines. A comparison of the calculations with experimental measurements gave satisfactory results.

53. Flow of Liquid Through Prepumps Calculated

"Calculation of Characteristics of Axial Prepumps," by I. V. Mirolyubov, Moscow Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 81-88

A method is given for calculating the flow of liquids through axial prepumps, which are installed before the main centrifugal pump in the feed system of aircraft engines. The purpose of the axial prepumps is to improve the anticavitation properties of the main pump.

54. Elliptical Openings Suggested to Avoid Cracking in Combustion Chambers

"Temperature Stresses at Elliptical Openings," by L. I. Fridman, Kuybyshev; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 134-143

The problem arose in finishing the combustion chamber of a gas turbine. To avoid splitting at the circular openings in the cylindrical casing of the combustion chamber, it was proposed that elliptical openings be substituted for circular. It was then necessary to know how to orient the elliptical opening in a given temperature field and what should be the shape of the ellipse. Since there was no considerable temperature variation through the thickness of the casing, and since the radius of the casing is large in comparison with the semiaxes of the ellipse, a nonuniformly heated thin plate of infinitely large dimensions, and with elliptical openings, was studied.

It is first shown that the plane-temperature problem may be reduced to finding a particular solution of the Poisson equation, the right side of which is defined by the given temperature field, and the contour problem of elasticity theory. Since the particular solution of the Poisson equation is independent of the form of the region, the temperature problem is reduced to an ordinary contour problem.

Next, a nonuniformly heated, infinite plate with elliptical openings is considered. The particular solution of the Poisson equation and the stress equation are obtained for an infinite plane subjected to imaginary stresses applied to the contour of the elliptical opening. Finally, the temperature stresses at any point of an infinite plate with an elliptical opening are derived.

Mechanical Engineering

55. Universal Method for Profiling Turbine Blades Presented

"Profiling Turbine Blades in a Subsonic Flow," by N. Ye. Salamatin, Kazan' Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 95-104

A lack of a single method for constructing the profile of a turbine blade has resulted in various profiles being obtained for identical conditions, it is commented. Although the individual methods produce profiles with a sufficiently high efficiency, it is stated further, it would be desirable to have a universal method of profiling which would be sufficiently simple and guarantee that losses are slight. A universal method for profiling turbine blades in subsonic flow is presented and an example is worked.

56. Dynamical Rigidity of Two- and Three-Bearing Rotors

"Determining the Dynamical Rigidity of Rotors by the Method of Expanding the Dynamical Bending into a Series in Terms of Characteristic Forms," by L. D. Vil'ner and N. Ya. Osipov, Kuybyshev; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 111-124

Formulas are given for calculating the dynamical rigidity of two- and three-bearing rotors. The method is said to yield relatively simple working formulas for calculating the distribution of mass and moments of inertia along rotor.

Propulsion

57. Combustion in Turbulent Flow Studied

"Method of Determining Combustion Characteristics in Turbulent Flow," by E. A. Petrov and A. V. Talantov, Kazan' Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 89-94

The development of small-scale combustion chambers with a high heat-release rate is directly connected with problems of organizing the fuel combustion process in a high-velocity flow, or with problems of turbulent

combustion, the introduction states. A method is given for determining the velocity of flame propagation, the extent of the combustion zone, and combustion time. The only initial information required for the calculations is the interior and exterior boundaries of the inverted cone of the flame.

58. Turbulent Flame Velocity Studied

"Effect of Initial Parameters on the Turbulent Flame Velocity of Homogeneous Fuel-Air Mixtures," by K. P. Vlasov and N. N. Inozemtsev, Moscow, Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 38-45

Various experimental results on the effect of initial parameters on turbulent flame velocity are reviewed and generalizations are drawn. Variables examined are fuel-air ratio, initial temperature and pressure, and turbulence of the incident flow. It is noted that a knowledge of the effect of initial parameters on the turbulent flame velocity is essential for understanding turbulent combustion and for designing the firing chamber of jet engines.

59. Gas Used as Exhaust Valve in Turbine

"Gas Screen in Gas Turbines With Periodic Combustion," by V. I. Lokay, Kazan' Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 74-80

The possibility of approaching the cycle v = const in a gas turbine with periodic combustion is investigated. A gas screen is used to partially close the exhaust chamber at the moment of firing. The gas screen operates automatically. The turbine is described, and a theory of its operation is developed.

60. Nozzle Area of Turbojet Controlled With Air Ducts

"Gas Dynamical Control of the Jet Nozzle of a Turbojet Engine," by A. G. Zenukov, Kazan' Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 55-64

The gas dynamical method of controlling the area of a jet nozzle, it is observed, in which a change in the effective area is achieved by compressing the main gas flow with a stream of air or gas injected into the flow at a certain angle is one of the simplest in comparison with mechanical methods. Research conducted to find the best design for such a nozzle is described. The study was made during 1957 and 1958 at the Scientific Research Laboratory of Gas Turbine Engines, Kazan' Aviation Institute.

Results showed that the method is feasible and that the best nozzle would have two rows of openings at an angle of 90 degrees to the main flow and arranged in a checkerboard pattern. Any angle greater than 90 degrees caused a considerable loss in thrust.

61. Design of Centrifugal Compressor Given

"On a Design for a High-Pressure Centrifugal Compressor," by V. A. Strunkin, Kazan' Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 105-110

The reasons for the decline in interest in centrifugal compressors are given as low coefficient of productivity, caused by the low specific frontal thrust of turbojet engines; pressure insufficient for turbojet engines in a single-stage design and structural complexity in multistage designs; and lower efficiency in comparison with axial-flow compressors. The advantages of the centrifugal compressor for use in gas turbines for transportation purposes are then stressed. The design of a centrifugal compressor for these purposes is described.

Structural Engineering

62. High-Pressure Tanks With Wire Windings Calculated

"On Calculating High-Pressure Tanks," by B. M. Luk'yanov, Kazan' Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 125-133

It is stated that a considerable decrease in the ratio of the weight of a tank to the weight of the gas contained in it can be achieved by winding several layers of a thin band or wire around a thin-walled cylinder. It is noted that, until now, only indications have appeared in the literature as to how such a tank should be calculated. Stresses in the wall of the cylinder and in the wire winding are determined for the general case. Axial stresses in the walls of the cylinder caused by gas pressure on the bottom of the tank are taken into account.

The theoretical results for a particular case concerning stresses on the inner surface of the cylinder wall are compared with experimental data.

63. Bending of Cylindrical Shells With Large Openings Studied

"On the Action of Cylindrical Shells With Large Openings, by S. N. Kan, Khar'kov Higher Aviation Engineering Military School; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya, Aviatsionnaya Tekhnika, No 1, 1959, pp 32-37

The bending and twisting of cylindrical shells with large openings is considered. The case of a joint consisting of a number of points of contact is also considered. The closed shell directly adjacent to the region of the opening is studied in particular.

Tunnel Building

64. New Tunnel and Duct-Building Device

"Russian Subterranean Rocket for Tunnels" (unsigned article), Delhi, Navbharat Times, 20 Apr 59

Tadzhik engineers have constructed a subterranean rocket for building tunnels and underground irrigation works. The equipment has a powerful head which crushes the rock after which the rocket builds the tunnel according to specifications. The rocket engine is also useful in constructing underground irrigation ducts.

65. USSR-Report On the New Underground Duct-Building Device

"Fire-Spitting Mole" (unsigned article); Moscow, Leninskoye Znamya, 21 Feb 59

"Scientific workers at the Tadzhik Institute of Water Problems have given the name "Firing-Spitting Mole" (Ognennyy Krot) to the device invented by Engineers G. Mosevich and N. Vasil'yanovskiy and Technician Kh. Nasretdinov. This device is also called a subterranean rocket. It consists of a cylinder resembling an artillery shell. Its purpose is the construction of subterranean pipelenes.

"The head of the shell-shaped device has a burner or jet to which liquid fuel and air are conducted. The device, which is secured by a cable to a tractor, moves underground. The hot flame projected from the burner fuses the ground, with the result that a large cylindrical opening is left behind the "mole." This cylindrical opening is suitable for use as a water conduit; it is neither washed out nor does it collapse. The pipeless water conduit which has been built in this manner is capable of serving for tens of years. The new invention will considerably facilitate the irrigation of "bogar" lands (lands that are not flooded) which are suitable for gardens and pastures."

V. MATHEMATICS

Approximation Theory

66. Approximation of Functions Vanishing Together With the Gradient

"Concerning the Approximation of Functions Vanishing Together With the Gradient on the Boundary of a Region by Functions of a Particular Form," by I. Yu. Kharrik; Moscow, Matematicheskiy Sbornik, Vol 47 (89), No 2, Feb 59, pp 177-208

The boundary value problem for the equation

$$\Delta^2 u = \sum_{i,j=1}^{m} \frac{\partial^4 u}{\partial x_i^2 \partial x_j^2} = f(x_1, \ldots, x_m) \qquad (1)$$

under the boundary conditions

$$u|_\Gamma = 0, \quad \text{grad}\,|_\Gamma = 0 \qquad (2)$$

is considered in a m-dimensional space having the boundary Γ defined by the given equation $\varphi(x_1, \ldots, x_m) = 0$. It is known (see V. P. Il'in, "Concerning the Convergence of Variation Processes," DAN SSSR, Vol 81, No 2, 1951, pp 137-140), that if u is an exact solution of the equation (1) under the boundary conditions (2), and $\bar{u}$ is an approximate solution, then the value

$$\max_{(x_1, \ldots, x_m) \in D} |u(x_1, \ldots, x_m) - \bar{u}(x_1, \ldots, x_m)|$$

may be reduced to an estimate of the integral

$$I(\bar{u}) = \int \cdots \int_D \left[\sum_{i,j=1}^{m} \left(\frac{\partial^2 (u-\bar{u})}{\partial x_i \partial x_j} \right)^2 - 2f(u-\bar{u}) \right] dx_1 \cdots dx_m.$$

It is assumed that the method of Pitts is employed for solution of the problem where u_n, the n^{-th} approximation, is sought in the form

$$[\varphi(x_1, \ldots, x_m)]^2 \sum_{i_1 \ldots i_m = 0}^{n} a_{i_1,\ldots,i_m} x^{i_1} \ldots x^{i_m}. \qquad (3)$$

Since the value of $I(u_n)$ may only be increased upon the replacement of u_n of any other function of the form (3), it is sufficient to know with which degree of accuracy we may approximate the solution u with arbitrary second order functions of the form (3) for an estimate of $I(u_n)$. The final estimate is naturally connected with the differential properties of the function u. In connection with this, L. V. Kantorovich asked the following question:

Given a function $u(x_1, \ldots, x_m)$ having continuous partial derivatives up to the k^{-th} order e^D vanishing on Γ along with the gradient where Γ is the boundary of an m-dimensional region defined by the equation $\varphi(x_1, \ldots, x_m) = 0$. What is the possible order of the approximating function $u(x_1, \ldots, x_m)$ and its derivative functions of the form $[\varphi(x_1, \ldots, x_m)]^2 P_n(x_1, \ldots, x_m)$, where $P_n(x_1, \ldots, x_m)$ is a polynomial of a degree not exceeding n, relative to each of the arguments x_i $(i=1, 2, \ldots, m)$? The present work is dedicated to the investigation of this question.

67. Summation of Fourier-Tchebycheff Series by the Fejer Method

"On the Problem of Summation of Fourier-Tchebycheff Series by the Fejer Method," by B. L. Golinskiy; Moscow, Matematicheskiy Sbornik, Vol 47 (89), No 2, Feb 59, pp 255-264

Let $f(\varphi)$ be a real, periodic function of period 2π belonging to the class $L^r(0, 2\pi; p)$, i.e.,

$$\int_0^{2\pi} |f(\varphi)|^r p(\varphi)\, d\varphi < \infty, \quad r \geq 1, \qquad (1)$$

where $p(\varphi)$ is a summable function of period 2π. As usual in this space we assume that

$$\| f \|_r = \left\{ \frac{1}{2\pi} \int_0^{2\pi} | f(\varphi) |^r \, p(\varphi) \, d\varphi \right\}^{\frac{1}{r}}. \tag{2}$$

The weight function of Steklov is introduced on an interval $[a,b] \subset [0, 2\pi]$; namely,

$$\Phi_{\theta,r}(h) = \frac{1}{h} F_{\theta,r}(h) = \frac{1}{h} \int_{\theta}^{\theta+h} | f(\varphi) - f(\theta) |^r \, p(\varphi) \, d\varphi,$$

$$\theta, \ \theta+h \in [a, b]. \tag{3}$$

The notation

$$\sup_{|h| \le \delta} | \Phi_{\theta,r}(h) | = \widetilde{\Phi}_{\theta,r}(\delta) \text{ is introduced.}$$

Let $\{ P_n(e^{i\varphi}) \}_0^{\infty}$ be an orthonormal system of polynomials on the segment $[0, 2\pi]$ corresponding to the weight $p(\varphi)$, i.e.,

$$2\frac{1}{\pi} \int_0^{2\pi} P_n(e^{i\varphi}) \, \overline{P_m(e^{i\varphi})} \, p(\varphi) \, d\varphi = \begin{cases} 0, & m = n, \\ 1, & m = n, \end{cases}$$

and

$$K_\nu(e^{i\theta}, e^{i\varphi}) = \sum_{k=0}^{\nu} P_k(e^{i\theta}) \, \overline{P_k(e^{i\varphi})}$$

is the Dirichlet kernal of this system of polynomials. A segment of the Fourier-Tchebycheff series was denoted by $S_\nu(f;\theta)$ the Tchebycheff function of $f(\varphi)$ and let

$$\rho_n^{(k)}(\theta) = \left\{ \frac{1}{n+1} \sum_{\nu=0}^{n} | S_\nu(f;\theta) - f(\theta) |^k \right\}^{\frac{1}{k}} \quad (n=1, 2, \ldots),$$

(4)

where k is any positive number.

The author, after the above introduction, proved the following lemmas and theorems:

Lemma 1. If $f(\varphi) \in L^2[0, 2\pi; p]$, then

$$\rho_n^{(1)}(\theta) \leq C\left[\frac{K_n(e^{i\theta}, e^{i\theta})}{n}\right]^{\frac{1}{2}} \left\{ \widetilde{\Phi}_{\theta,2}^{\frac{1}{2}}\left(\frac{2}{n}\right) + \frac{1}{\sqrt{n}}\left[1+n\widetilde{\Phi}_{\theta,2}\left(\frac{2}{n}\right) + \right.\right.$$

$$\left.\left. + \int_{\frac{1}{n}}^{2\pi+\theta} \frac{\Phi_{\theta,2}(t)}{t^2}\, dt \right]^{\frac{1}{2}} \right\} \qquad (5)$$

where C is constant, not depending on the choice of θ.

Lemma 2. Let $p(\varphi) \succ 0$ almost everywhere in $[a, b] \subset [0, 2\pi]$ and $f(\varphi)$ $L^s[0, 2\pi; p]$, $s \geq 1$. Then almost everywhere in $[a, b]$

$$\Phi_{\theta,s}(h) = \frac{1}{h} \int_{\theta}^{\theta+h} |f(\varphi)-f(\theta)|^s p(\varphi)\, d\varphi = o(1).$$

Theorem1. Let $f(\varphi) \in L^2[0, 2\pi; p]$ and $p(\varphi) \geq m \succ 0$ almost everywhere in $[a-\eta, b+\eta]$, $\eta \succ 0$. Then $\rho_n^{(k)}(\theta) = o(1)$ for k=1, 2 almost everywhere in $[a, b]$.

Theorem2. If $f(\varphi) \in L^2[0, 2\pi; p]$ and $f(\varphi)$ is continuous in $[a, b]$, and the weight $p(\varphi)$ satisfies the conditions $p(\varphi) \geq m \succ 0$ almost everywhere in $[a-\eta, b+\eta]$, $\eta \succ 0$, and $p(\varphi) \leq M$ almost everywhere in $[a, b]$, then

$$\rho_n^{(1)}(\theta) = o(1) \quad \text{uniformly according to } \theta \text{ within } [a, b].$$

Theorem 3. If $f(\varphi) \in L^2[0, 2\pi; p]$ and the weight $p(\varphi) \geq m \succ 0$ almost everywhere in $[a+\eta, b-\eta]$, $\eta \succ 0$, and with a bounded variation in $[0, 2\pi]$, then

$$\rho_n^{(k)}(\theta) = o(1) \text{ almost everywhere in } [a, b] \quad [0, 2\pi] \text{ where k is}$$

any positive number.

Theorem 4. If the functions $f(\varphi)$ and $p(\varphi)$ satisfy the conditions of theorem 3 and if $f(\varphi)$ is continuous in $[a, b]$, then $\rho_n^{(k)}(\theta) = o(1)$ uniformly according to θ for any positive k within (a, b).

66. Summation of Series by Cesaro Methods Over $L_p[a,b]$ Space Bases

"Summing of Series Over L_p [a, b] Space Bases, $p \geq 1$ by Cesaro Methods," by A. A. Talalyan, Institute of Mathematics and Mechanics; Moscow, Doklady Akademii Nauk SSSR, Vol 124, No 5, 11 Feb 59, pp 987-989

Let there be given an infinite matrix

$$\left\| \begin{array}{cccccc} a_{11} & a_{12} & \cdots & a_{1k} & \cdots \\ a_{21} & a_{22} & \cdots & a_{2k} & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{i1} & a_{i2} & \cdots & a_{ik} & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \end{array} \right\| . \qquad (1)$$

It is assumed that the elements of this matrix satisfy the following conditions:

1. The series $\sum_{k=1}^{\infty} a_{ik}$ converges absolutely for all sufficiently large values of i, where the $\lim_{i \to \infty} \sum_{k=1}^{\infty} a_{ik} = 1$.

2. For all sufficiently large values of i the inequality $\sum_{k=1}^{\infty} |a_{ik}| < M$ is satisfied where M is independent of i.

3. $\lim_{i \to \infty} \max_{1 \leq k < \infty} |a_{ik}| = 0$.

It is said that the infinite series $\sum_{n=1}^{\infty} u_n$ is summed by the method T' corresponding to the matrix (1) if the series $\sum_{k=1}^{\infty} a_{ik} \sum_{n=1}^{k} u_n$ converges for all sufficiently large values of i and has a sum which tends to a definite finite limit as $i \to \infty$. It is known that for any Cesaro method of positive order there is a T' method, (see D. Menchoff, Bull. Soc. Math. Franch, Vol 64, No 160, 1936).

The following three theorems are proved:

Theorem 1. Let $\{\varphi_n(x)\}$ be a normalized basis of the space $L_p(a,b)$, $p \geq 1$ and let $f(x)$ be an arbitrary, almost everywhere finite measurable function defined on $[a,b]$. Then, if there is given a countable sequence of methods $T'_1, T'_2, \ldots, T'_n, \ldots$ it is possible to change the orders of the functions in such a manner that for the obtained new system $\{\varphi_n(x)\}$ there exists a series $\sum_{n=1}^{\infty} c_n \varphi_{\nu_n}(x)$ which sums to $f(x)$ by any method T'_n, $n = 1, 2, \ldots$, where the $\lim_{n \to \infty} c_n = 0$.

Theorem 2. Let $\{\varphi_n(x)\}$ be a normalized basis of the space $L_p(a,b)$, $p \geq 1$, and let $f(x)$ be an arbitrary, almost everywhere finite measurable function defined on $[a,b]$. Then it is possible to change the orders of the functions that for the obtained new system $\{\varphi_{\nu_n}(x)\}$ there exists a series $\sum_{n=1}^{\infty} c_n \varphi_{\nu_n}(x)$ which sums to $F(x)$ by any Cesaro method of positive order for $\lim_{n \to \infty} c_n = 0$.

Theorem 3. If $\{\varphi_n(x)\}$ is a system of functions defined on $[a,b]$ and forming a normalized basis in the space $L_p[a, b]$, $p \geq 1$, then for any measurable function $f(x)$, defined on $[a,b]$ there exists a series $\sum_{n=1}^{\infty} a_n \varphi_n(x)$ which converges according to the measure on $[a,b]$ to $f(x)$, for $\lim a_n = 0$ (see A. A. Talalyan, Izv. AN ArmSSR, ser fiz.-matem. nauk, Vol 10, No 1, 1957).

69. Calculation of the Integral $\int_0^\infty x^s e^{-x} f(x)\,dx$

"Remarks Concerning the Calculation of the Integral $\int_0^\infty x^s e^{-x} f(x)\,dx$," by V. I. Krylov, N. I. Korolev, and N. S. Skoblya; Minsk, Doklady Akademii Nauk Belorusskoy SSR, Vol 3, No 1, Jan 59, pp 3-7

During calculation of the integral

$$I(f) = \int_0^\infty x^s e^{-x} f(x)\,dx$$ a mechanical quadrature of the form $I(f) \approx \sum_{k=1}^{n} A_k f(x_k) = Q_n(f)$ is frequently employed. The abscissae of the quadrature, x_k, are roots of the polynomial

$$L_n^{(s)}(x) = (-1)^n x^{-s} e^x \frac{d^n}{dx^n} [x^{s+n} e^{-x}]$$ and the coefficients have the values $A_k = n! \Gamma(n+s+1) / \left\{ x_k [L_n^{(s)'}(x_k)]^2 \right\}$.

The quadrature mentioned above permits calculation of I(f) to any desired accuracy for an extremely wide class of functions f, if n is taken sufficiently large; however, in practice, cases are often encountered where the convergence of $Q_n(f)$ to I(f) as n approaches infinity occurs very slowly. Thus, in order to obtain I(f) with the required accuracy, it is necessary to take a large number of terms in the sum $\Sigma A_k f(x_k)$. The latter often makes calculations difficult to accomplish.

The cause of the slow convergence may be seen in the following: the values of x_k and A_k indicated above are obtained if necessary for the equation involving the quadrature to be exact for polynomials of a possible high order. The formula involving the quadrature is constructed such that, the closer according to the character of its behavior the function f for the weight $x^s e^{-x}$ is to the polynomials, the more rapid the convergence. If that is not correct, and if the character of the behavior of f on the half line [0, ∞] is different from the behavior of the polynomials, then, for that number n of abscissae x_k the accuracy of the calculation of the integral becomes, generally speaking, worse and convergence of the quadrature process is made worse.

Functions, continuous for $0 \leq x < \infty$ and possessing asymptotic representations of the form

$$f(x) \sim c_0 + c_1/x + c_2/x^2 + \ldots \qquad (1)$$

are considered. Functions of this type are often met in approximations. Their behavior on the half line $0 \leq x < \infty$ differs significantly from the behavior of polynomials, which apparently are impossible to acknowledge as a good tool for the approximation of functions of that type.

The quadrature process for them will converge, but the convergence will be extremely slow. The quadrature formulae described above are not a good instrument for the integrals $\int_0^\infty x^s e^{-x} f(x)\,dx$ when f belongs to the indicated class of functions.

Here, as an apparatus for the approximation of f, it would probably be more advantageous to employ rational functions in place of polynomials. The choice of them must in some sense be in agreement with the properties of the integrated functions of f. Thus, while defining the class of functions f we are limited only by the requirement of the existence of the asymptotic equation (1) and we do not make other assumptions as a basis for construction of the quadrature formula. We may take any system of rational functions bounded on the ray $0 \leq x < \infty$ sufficiently complete for calculation of the integral.

Difference Equations

70. Systems of Two Difference Equations Discussed

"Concerning a System of Two Difference Equations," by A. G. Naftalevich; Moscow, Matematicheskiy Sbornik, Vol 47(89), No 1, Jan 59, pp 131-140

As is known, the problem of solving the difference equation

$$f(x+n) = \sum_{k=0}^{n-1} p_k(x)\, f(x+k) + a(x),$$

where the variable x assumes only integral values, consists of the following: at n consecutive integral points of a straight line values of the function f(x) are given and it is required to determine f(x) at all integral points of the straight line. This problem is one dimensional, i.e., it is solved in a one-dimensional space or, more exact, on the integral lattice of the straight line.

The two-dimensional generalization of the indicated problem is the following

Given the system of equations

$$\begin{aligned} f(z+n\alpha) &= \sum_{k=0}^{n-1} p_k(z)\, f(z+k\alpha) + a(z) \\ f(z+m\beta) &= \sum_{j=0}^{m-1} q_j(z)\, f(z+j\beta) + b(z) \end{aligned} \qquad (1)$$

$$p_0(z) \not\equiv 0,\ q_0(z) \not\equiv 0,\ I\,\frac{\alpha}{\beta} \neq 0,$$

where the variable z assumes integral points of the complex plane, and values of the function f(z) are given (initial data) at the integral points of the rectangle having the vertices z, $z+(n-1)\alpha$, $z+(n-1)\alpha+(m-1)\beta$, $z+(m-1)\beta$ (z is an integral point); it is required to determine the function f(z) as a solution of the system (1) on the entire integral lattice of the complex plane.

For convenience of exposition, the author assumed that $\alpha = 1$ and $\beta = i$; however, the results obtained hold for any α and β satisfying the condition $I\,\frac{\alpha}{\beta} \neq 0$.

The author began his paper by considering the system

$$\begin{aligned} f(z+\alpha) &= p(z)\, f(z) + a(z), \\ f(z+\beta) &= q(z)\, f(z) + b(z), \\ p(z) &\not\equiv 0, \quad q(z) \not\equiv 0, \quad I\,\frac{\alpha}{\beta} \neq 0 \end{aligned} \qquad (2)$$

In this case the initial data reduces to the given function f(z) at one integral point z.

The system (2) (as well as system (1)) is called joint, if for any initial conditions, i.e., for any choice of the initial condition (or initial conditions) and an arbitrary choice of the initial point (or initial rectangle), a solution of the system exists.

The following proposition was proved:

A necessary and sufficient condition for system (2) to be joint is that the equations

$$q(z+\alpha)\ p(z) = p(z+\beta)\ q(z) \quad \text{and}$$

$$q(z+\alpha)\ a(z) + b(z+\alpha) = p(z+\beta)\ b(z) + a(z+\beta) \quad \text{hold.} \quad (3)$$

It was noted that system (2) suggests a system of two differential equations in partial derivatives.

Analogously, it was found that a necessary and sufficient condition for system (1) to be joint is that the equations

$$q_j(z+n\alpha)\ p_k(z+j\beta) = p_k(z+m\beta)\ q_j(z+k\alpha), \quad 0 \leq j \leq m-1, \quad 0 \leq k \leq n-1$$

$$\sum_{k=0}^{m-1} q_k(z+n\alpha)\ a(z+k\beta) + b(z+n\alpha) = \sum_{j=0}^{n-1} p_j(z+m\beta)\ b(z+j\alpha) + a(z+m\beta)$$

hold.

Attention was again given to system (2) where z was considered an unrestricted complex variable. The following proposition was proved: If the condition (3) is satisfied and p(z), q(z), a(z) and b(z) are meromorphic functions, then system (2) has a meromorphic solution.

In the following section the difference equation

$$P(z)\ f(z+\alpha) + Q(z)\ f(z+\beta) = R(z)\ f(z), \quad I\frac{\alpha}{\beta} \neq 0$$

is considered where $P(z)$, $Q(z) \not\equiv 0$ and $R(z) \not\equiv 0$ are given meromorphic functions satisfying the condition

$P(z)\ Q(z+\alpha)\ R(z+\beta) \equiv Q(z)\ R(z+\alpha)\ P(z+\beta)$. The latter condition is satisfied, for example, if $P(z)$, $Q(z)$ and $R(z)$ are elliptical functions with the periods α and β or constants.

In the final section of the work, the inhomogeneous difference equation

$$(A+B)\ f(z) = f(z) + H(z), \quad I\frac{\alpha}{\beta} = 0$$

is considered where

$(A+B)\ f(z) = f(z+\alpha) + f(z+\beta)$ and $H(z)$ is a given meromorphic function.

VI. MEDICINE

Antibiotics

71. Fungicidin, an Antibiotic From Strains of Actinomyces A-94

"Fungicidin (Nystatin) Produced by the New Strain of Actinomyces A-94 Isolated From the Soils of China," by Tsai Yung-sheng, Wu Tsu-yuan, Sheng Li-chung, Liang Shu-fen, Po Cheng-chu, and Kang Ping-yung, Institute of Medicinal Preparations, People's Republic of China; Moscow, Antibiotiki, Vol IV, No 2, Mar/Apr 59, pp 3-5

A report on a method of preparing fungicidin, a polyene antibiotic obtained from actinomycete A-94 isolated from the soils of South China. In the selection of strains for their antibiotic activity, it was found that Strain A-94 possessed a strong inhibitory effect on the growth of Glomerella cingulata spores, the growth of Candida albicans, Klockera brevis, and a number of yeast cultures, but had no effect whatsoever on bacteria. The culture liquid of strain A-94 was found to inhibit the growth of Ehrlich's ascitic carcinoma and the influenza virus in tissue cultures.

72. Comparative Study of Properties of Amphomycin and Crystallomycin

"Comparative Investigation of the Antibacterial and Therapeutic Properties of Crystallomycin and Amphomycin," by V. A. Shorin and S. P. Shapovalova, Institute for the Search of New Antibiotics, Academy of Medical Sciences USSR; Moscow, Antibiotiki, Vol IV, No 1, Jan/Feb 59, pp 77-81

Investigations conducted to determine the comparative antibacterial and therapeutic properties of amphomycin (an antibiotic obtained from Actinomyces canus) and crystallomycin (an antibiotic obtained from cultures of Actinomyces violaceniger var. cristallomicini) established that both antibiotics possess a similar bactericidal spectrum in regard to microbes which are sensitive to them; their therapeutic effect is diminished under the influence of phosphates; both produce hemolytic shock in humans when administered parenterally; crystallomycin is considerably more effective than amphomycin when applied in the therapy of pneumococcus sepsis; and despite the similarity of action, they are not identical compounds.

73. Review of Pamphlet on Side Reactions Caused by Antibiotics

Oslozhneniya Vyzyvayemyye Antibiotikami (Complications Caused by Antibiotics), by V. A. Shorin, Moscow, Medgiz, 1958, 35 pp

The pamphlet deals briefly with the subject of side reactions caused by antibiotics when used in the therapy of infectious diseases. It consists of a brief introduction, a discussion of the different types of side reactions caused by antibiotics, a bibliography, and a table of contents.

The problem of the control of infectious and other diseases has been successfully solved with the discovery of antibiotics, the author writes in the introduction. However, their use has, at the same time, created a number of new problems in the form of side reactions, especially in patients who are particularly sensitive to one antibiotic or another.

The side reactions caused by the antibiotics fall into four groups:

1. Allergic reactions

2. Side reactions of the Herxheimer type.

3. Side reactions caused directly by the toxic properties of antibiotics.

4. Side reactions which develop as a result of what the author calls "disbacteriosis." The reaction results because antibiotics kill not only the causative agent of the infection, but also other bacteria which are sensitive to the drug, with the result that bacteria resistant to the antibiotic are left free to reproduce with intensity, thus destroying the balance of the microorganisms in the body. Hypovitaminosis and secondary and fungi infections are some of the side reactions caused by "disbacteriosis."

The fact that antibiotics produce side reactions in the organism does not detract from their value as important therapeutic agents. Physicians, however, should be well aware of the complications which may be caused by the antibiotics and should be ready to apply means for their control.

The bibliography contains 25 references, 14 of them of Soviet origin.

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Aviation Medicine

74. Spatial Orientation in Humans

"Mechanism of Spatial Orientation in Humans," by I. S. Beritov, Institute of Physiology, Academy of Sciences Georgian SSR; Tbilisi, Zhurnal Vysshey Nervnoy Deyatel'nosti imeni I. P. Pavlova, No 1, Jan/Feb 59, pp 3-13

The author of this article states that results of experiments with children revealed that humans orient themselves in space mainly by means of visual and labyrinthine receptors. These receptors bring about the projection in the environment of all objects perceived by other receptors: tactile, temperature, gustatory, and even olfactory and acoustic receptors. It is due to vestibular analysor that a human perceives images of the path traversed with its projection in the environment. Localization in the environment of all these external objects which a human perceives when he traverses the path depends on vestibular analysor also. This results in an acquired capacity for oriented movements.

A deaf-mute man, with functional labyrinths, orients himself in space when blindfolded just like a normal man. A deaf mute, with nonfunctional labyrinths, cannot orient himself in space when blindfolded. However, after frequent repetitions, he can make more or less oriented movements when blindfolded (which is due to conversion of proprioceptive irritants into conditioned signals to certain movements).

A blind man orients himself in space mainly by means of labyrinthine receptors. Labyrinthine reception causes localization of external objects which a blind man perceives by means of other organs of sensation during a given experience. Labyrinthine reception, however, plays an important role in oriented movements.

Experiments were conducted in a large room, specially equipped for filming. Healthy children 5 and 6 years of age and between 12 and 14 years of age, deaf-mute children between 7 and 12 years of age, and blind children between the ages of 7 and 14 were used in the experiments.

Bacteriology

75. Radiosensitivity of Microorganisms to Gases Under Pressure

"Method of Irradiating and Incubating Microorganisms Under Different Gas Pressures," by A. Kh. Tambiyev and K. D. Kalantarov; Moscow, Vestnik Moskovskovo Universiteta, Seriya Biologii, Vol 13, No 4, Oct-Dec 58, pp 57-58

This article is a description of a new and simplified method for determining the role played by oxygen and other gases in the development of the primary processes in radiation affections. The new method is based on the principle of utilizing a solid nutritive medium instead of a liquid medium for incubating and irradiating the microorganisms. The microorganisms are distributed in a uniform layer over the surface of the solid medium, making it possible to provide equal doses of irradiation and gases to all the microorganisms. Oxygen and other gases are supplied to the microorganisms from special containers outfitted with special gas pressure equipment. The new method has been found useful in the study of the effect of different gases over a fairly large range of pressures on the radiosensitivity of microorganisms.

76. Differentiation of Brucella Strains

"Differentiation of Strain Br. bovis No 19 From Epizootic Strains," by M. M. Ivanov and L. V. Kirillov, Tr. Gos. Nauchno-Kontrol'n. In-ta Vet. Preparatov (Works of the State Scientific Control Institute of Veterinary Preparations), No 7, 1957, pp 47-50 (from Referativnyy Zhurnal--Biologiya, No 22, 25 Nov 58, Abstract No 99435, by M. A. Gruzman)

"Brucella bovis No 19 and Institute imeni Gamaleya vaccine strains seeded in one loop amounts of Brucella suspension with a concentration of one billion microbial bodies per ml in a test tube containing semiliquid agar, and 0.2 ml of basic 0.1% thionin (I) per 50 ml of medium, did not grow in 96 hours. Highly virulent epizootic strains of Br. bovis grew well under the same conditions. All 18 epizootic strains seeded from a suspension containing 6-17 billion microbial bodies per ml grew well on media which contained 0.7-1.4 ml of basic (I) solution per 50 ml of medium. Vaccine strains seeded from suspensions containing 11-17 billion per ml grew very poorly on a medium containing 0.2 ml of basic (I) solution per 50 ml of medium. The different growth capabilities on media containing (I) can be used, in the author's opinion, for the initial selection of slightly virulent strains."

77. Biological Characteristics of Brucella Strain No 19 Studied Comparatively

"A Study of the Biological Characteristics of Strain No 19 in Comparison With Other Brucella Strains," by M. M. Ivanov, A. M. Romanov, and I. G. Levina, Tr. Gos. Nauchno-Kontrol'n In-ta Vet. Preparatov (Works of the State Scientific Control Institute of Veterinary Preparations), No 7, 1957, pp 12-19 (from Referativnyy Zhurnal--Biologiya, No 22, 25 Nov 58, Abstract No 99436, by G. Ye. Frumkina)

"It was found that vaccine strain Brucella bovis No 19 has definite type and biological characteristics which are not changed after three passages of the strain through the sheep or guinea pig organism. It was also shown that this strain has residual virulence. Brucella were rapidly disseminated in the organism on infection of guinea pigs in doses of 1,000-100,000 microbial bodies. Thirty to 35 days after infection, Brucella were not observed in the internal organs and were only rarely seeded from regional lymph nodes. The vaccinated animal organism quickly eliminated Brucella, aquiring immunity to virulent Brucella strains of the bovis and melitensis types. Br. suis strain No 55 conferred immunity to brucellosis after its introduction to sheep in doses of 5 and 10 billion microbial bodies, but the biological characteristics of this strain were not stable."

78. Modifying Effects of Various Factors on B. perfringens Tested

"Modifiability of Bac. perfringens," by S. Ye. Ol'shteyn, Tr. Otchetn. Nauchn. Konferentsii, 1956 (Works of the Rostov-n/D Med. In-t During 1956), Rostov-na-Donu, 1957, pp 573-575 (from Referativnyy Zhurnal--Biologiya, No 22, 25 Nov 58, Abstract No 99285, by V. G. Petrovskaya)

"By the use of the chromatographic adsorption method, changes in the amino acid and carbohydrate content of Bacillus perfringens during the process of modification under the effects of various factors were established."

79. Tick-Borne Encephalitis Virus Cultured in Tissues

"Culturing of Virus Strains of the Tick-Borne Encephalitis Group in Cultures of Chick Embryos and HeLa Cells," by P. S. Andonov and A. K. Shubladze, Institute of Virology imeni D. I. Ivanovskiy; Moscow, Voprosy Virusologii, Vol 4, No 1, Jan/Feb 59, pp 94-99

The authors cultured three strains of tick-borne encephalitis virus ("YaS-8", "Ikh-10", and "Im") in cultures of chick embryo tissue (cutaneous and muscular) and in HeLa cells. The methodology is described in detail. Four illustrations show normal and degenerated cultures, and two tables are given to summarize the cytopathogenic action of the various strains; a third table shows the extent of degeneration of HeLa cells after infection with the three strains, and virus titers in the cultures.

The following conclusions are presented on the basis of the results obtained:

"1. Zeyfert's data concerning the possibility of culturing chick embryo tissues without plasma were confirmed. The possibility of culturing human embryo tissues without plasma was also indicated.

"2. Virus strains of the tick-borne encephalitides group 'YaS-8', 'Ikh-10', and 'Im' successfully replicated in cultures of chick embryo tissue and HeLa cells.

"3. Strains 'YaS-8' and 'Ikh-10' had a cytopathogenic effect on a culture of fibroblasts from chick embryo cutaneous-muscular tissue and on HeLa cells when the culture was infected with large doses of virus at the time of seeding.

"4. Culture liquid from tissues of chick embryos infected with 'YaS-8', 'Ikh-10', and 'Im' strains evidently can be used as antigen without any additional treatment for the complement fixation reaction, and also for preparing formolvaccine."

Epidemiology

80. Brucella Among Agricultural Animals

"The Problem of Brucella Migration Among Agricultural Animals," by M. V. Vorob'yev, S. A. Novik, and N. N. Mityureva, Tr. Omskogo N.-I. In-ta Epidemiol., Mikrobiol., i Gigiyeny (Works of the Omsk Scientific Research Institute of Epidemiology, Microbiology, and Hygiene), No 4, 1957, pp 245-248 (from Referativnyy Zhurnal--Biologiya, No 22, 25 Nov 58, Abstract No 99441, by L. G. Ivanova)

"The possibility of the migration of Brucella of ovine origin to cattle was established by means of titrating cultures."

81. Hemorrhagic Nephroso-Nephritis in the Transcarpathian Area

"Hemorrhagic Nephroso-Nephritis in the Transcarpathian Region (Hemorrhagic Fever With a Nephritic Syndrome)," by A. A. Avakyan, S. B. Shemshilevich, and V. M. Meshchenko, Institute of Virology imeni D. I. Ivanovskiy; Moscow, Voprosy Virusologii, Vol 4, No 1, Jan/Feb 59, pp 90-94

This article discusses a study of 20 patients with a disease diagnosed as hemorrhagic nephroso-nephritis in Uzhgorod hospitals and an examination of 50 case histories of patients whose illnesses had been diagnosed as typhoid, paratyphoid, gastritis, malaria, and toxic influenza in Beregovskaya hospital. Clinical and epidemiological data are presented. The following conclusions are given:

"1. In the summer of 1952, 20 patients were examined in rayons of Zakarpatskaya Oblast, and 50 case histories were studied. Clinical and laboratory data permitted a diagnosis of hermorrhagic nephroso-nephritis.

"2. Hemorrhagic nephroso-nephritis in the Transcarpathian area is similar to hemorrhagic nephroso-nephritis in the Far East and in Yaroslavskaya Oblast.

"The course of the disease can be divided into three periods: (1) infectious-toxic, (2) hemorrhagic with pre-eminant effection of the kidneys; this period is divided into two phases--anuria and polyuria, and (3) convalescence.

"3. Hemorrhagic nephroso-nephritis occurs in a relatively mild form in comparison with hemorrhagic nephroso-nephritis in the Far East and in Yaroslavskaya Oblast. Hyperalbuminuria, hyperhematuria, and acute 'myeloid shifts' to the left in the blood formula are absent.

"4. The age of the patients, their occupational composition, the nature of work performed, etc. led to the assumption that infection occurs chiefly during agricultural work and work in wood-processing areas. It is important to note that the majority of patients mentioned an abundance of mouselike rodents in the work area.

"5. The pronounced seasonal character (end of the summer to the beginning of autumn), the distribution of the disease in rural localities, the absence of cases of transmission from sick to healthy persons, and other epidemiological characteristics permit us to assume that hemorrhagic nephroso-nephritis in the Transcarpathian area is an infection with a natural focus."

82. Chinese Study Distribution of Salmonella in China

"Study of the Occurrence of Salmonella in Egg Products (Typing of Salmonella Found in Egg Products and Their Distribution)," by Chou Kuei-lien (周 桂 蓮) and Ho Shih-hai (郝 士 海), Department of Nutrition, Chinese Academy of Medical Sciences; Peiping, Jen-min Pao-chien (People's Health), No 4, Apr 59, pp 353-357

This item presents the procedure followed in typing 476 strains of Salmonella isolated in 1956 from Chinese egg products and results of this investigation. The following species reportedly were identified by serological and biochemical methods: S. irumu, S. muenster, S. hartford, S. kottbus, S. daytona, S. colorado, S. lomita, S. abony, and S. new brunswick, the occurrence in China of which "heretofore had not been recorded in the literature"; and S. thompson, S. senftenberg, S. pullorum, S. aberdeen, S. typhi murium, S. anatum, S. newport, S. paratiphi B, S. derby, S. oslo, S. enteritidis, S. meleagridis, S. newington, S. potsdam, S. braenderup, S. muenchen, S. cholerae suis, S. blegdam, and S. london.

The article includes an analysis of the geographic distribution of the above-mentioned Salmonella species as indicated by the origins of the products from which they were isolated.

Hematology

83. Mechanism of Disturbed Blood Coagulation

"Experimental Study of Thrombus Formation in the Blood Stream," by Prof B. A. Kudryashov, and P. D. Ulitina, Laboratory of Physiology and Biochemistry of Blood Coagulation, Moscow State Order of Lenin University imeni M. V. Lomonosov; Moscow, Khirurgiya, No 2, Feb 59, pp 77-82

The authors conducted this research to prove that the preservation of the circulating blood in its fluid condition is brought about by the presence in animal organisms of a physiological anticoagulating system (ACS), and that a disturbance in the function of this system creates favorable conditions for thrombus formation.

Tests were conducted on rats which received intravenous injections of thromboplastin or thrombin in definite doses, and results were compared with in vitro experiments.

The following are the authors' conclusions:

"1. The intravenous administration of definite doses of tissue thromboplastin (prothrombokinase) speeds blood coagulation in vitro and also leads to disturbed coagulation of in vivo circulating blood.

"2. This effect of thromboplastin is conditioned by the appearance in the circulating blood of thrombin, which leads to disturbed blood coagulation when administered intravenously in definite doses to healthy animals.

"3. The loss by the blood of its capacity to coagulate after the intravenous administration of thromboplastin or of thrombin is brought about by a precipitous decrease in the thromboplastic activity of the blood of the experimental animals, a sharp decrease in the fibrinogen concentration of plasma, and a decrease in the capacity of blood to interact with thrombin, and is also due to the appearance of heparin-like substances in the blood.

"4. This protective reaction which preserves the blood in its fluid state in case thrombin appears in it, is brought about by the physiological anticoagulation system (ACS).

"5. Ether anesthesia temporarily disturbs the function of this anticoagulation system; therefore, animals under ether anesthesia and subjected to the intravenous administration of definite amounts of thrombin die from thrombosis which arises as a result of blood coagulation."

84. Preparation and Mass Storage of Dry Plasma in Flasks

"Concerning a Method of Drying Plasma in Flasks," by G. A. Foigel', Kh. S. Lerner, and R. S. Romanyuk, Odessa Regional Station for Blood Transfusion; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 4, No 3, Mar 59, p 61

"For the mass storage of dry plasma, we suggest a modification which permits the use of currently available equipment for the assembly of the system.

"The assembly of the upper vessel into which natural plasma is pumped and its connection with the lower flask and the method of taking plasma samples for bacteriological checking remain the same as before. The special feature of the assembly concerns the flask in which the plasma is dried (see diagram).

"In the center of the stopper, which is designed for sealing, a hole with an 8-mm diameter is drilled from the inside out, either by the usual or by a specially designed cork borer. The stopper with the hole is inserted into the neck of the flask and is covered by a metal cap which is screwed on tight. The central part of the metal cap is removed and the lower end of a glass tube 12-cm long and 10 mm in diameter is inserted into the hole of the rubber stopper.

"Either a tube or another T-piece for the sampling of plasma for bacteriological checking, as well as a vessel for natural plasma, are mounted on the upper end of the T-piece. A bent glass tube, the curved and pointed end of which is joined to the usual receptacle for the condensation of water which evaporates during the drying of the plasma, is connected to the side extension of the T-piece by means of the same rubber tubing.

"All the glass parts (tubes and T-pieces) which have the same diameter (10 mm) are connected, usually, by white rubber.

"If flasks which have two openings are used for the drying of plasma, the lower neck of the flask is closed by means of a stopper and covered by a metal cap before assembly. On the completion of drying, the cap and the stopper are removed under sterile conditions from the upper neck of the flask, and instead of them a cork without an opening is inserted, and this is covered by a metal cap.

"We are now producing mass stores of dry plasma in flasks which are assembled by the method described above. A total of 250 ml of plasma is dried under vacuum for 6 hours at a temperature of 50° C, and then completely dried for a period of 2 hours at the same temperature."

A diagram accompanies the article.

85. Slovak Periodical Says Soviets Use Ultrasonics in Blood Plasma Sterilization

"Ultrasound Sterilizes Blood Plasma" (unsigned article); Bratislava, Priroda a Spolocnost, No 5, 1959, p 4

The Leningrad Institute for Blood Transfusion has brought out large ultrasonic equipment for sterilizing blood plasma and substitute solutions. Prof L. Bogomolova and Dr V. Malinova worked out the new method. "With ultrasound," said Professor Bogomolova, "it is possible to break up molecules and to kill viruses and bacteria of every type immediately. This method also permits strengthening of the activity of cells of the human body and regulation of the biological activity of living organisms." The sterilization of blood plasmas and substitute preparations may not be done in autoclaves, for albumens cannot take high temperatures. At present, chemical materials and antibiotics are used for this purpose. The new ultrasonic equipment achieves from 200,000 to 2 million cycles per second. In this way, it could be determined under what conditions ultrasound destroys disease-causing bacteria without destroying valuable biological properties of blood plasma. Tests are continuing.

86. Antibotulinus Serum Prepared From Cattle

"The Experimental Preparation of Antibotulinus Sera From Cattle," by A. T. Kravchenko and F. F. Rezepov, Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 30, No 4, Apr 59, pp 79-82

Following a brief discussion of previous work on the subject, the authors present experimental data on the preparation of therapeutic antibotulinus sera from cattle. Twelve cattle, ranging in age from 10 months to 9 years, were hyperimmunized with botulinus antigens-antitoxins; 2 were immunized with type A anatoxin, 5 with type B, and 5 with type E. Antitoxin was not observed in the blood of the animals before immunization. The immunization procedure is described.

The effectiveness of the serum obtained from cattle as compared with the effectiveness of serum obtained from horses was tested in experiments on white mice. The results showed that antibotulinus serum obtained from cattle is not inferior to that prepared from horses. In cross anaphylaxis experiments, shock was not produced by the introduction of the cattle serum to guinea pigs sensitized with horse serum; also, the introduction of cattle serum after the horse serum, was not accompanied by accelerated elimination of antitoxin from the organism. The possibility of using cattle serum after horse serum and vice versa in cases where second administration is necessary was therefore demonstrated. In addition, the author points out the economic implications of using cattle destined for slaughter as serum producers.

The authors arrived at the following conclusions as a result of the research described:

"1. The possibility of obtaining types A, B, and E antibotulinus sera from cattle in average titers of 3,000-5,000 AE was indicated. The sera obtained experimentally were not inferior in effectiveness to horse sera.

"2. Anaphylactic shock and accelerated elimination of antitoxin from the organism were not observed following the introduction of cattle serum after horse serum.

"3. There are concrete possibilities of preparing inexpensive therapeutic sera from cattle destined for slaughter."

17 IEM Polyvaccine and NIISI Tetravaccine and Polyvaccine Evaluated

"The Problem of the Reactogenicity of the IEM imeni Gamaleya Polyvaccine and NIISI Tetravaccine and Polyvaccine," by A. Z. Ter-Karapetyan, Central Institute for the Advanced Training of Physicians and Institute of Epidemiology and Microbiology imeni Gamaleya; Moscow, Zhurnal Mikrobiologii, Epidemiologii, i Immunobiologii, Vol 30, No 4, Apr 59, pp 32-37

The reactogenicity of the polyvaccines mentioned in the title was tested in the research reported in this article. It is pointed out by way of introduction that an official directive on the methodology of testing the reactogenicity of corpuscular intestinal vaccines and polyvaccines, which was approved in 1950, stipulated that a vaccine may not be employed for mass inoculations if severe or moderate temperature reactions are observed in more than 7% of an inoculated control group within 24 hours. However, the author observes that this directive does not take into account the fact that the nature and extent of the reactions are determined not only by the antigen, protein substrate, and depot (in the case of precipitated vaccine), but also by the physiological and immunological condition of the organism and by the environmental conditions under which the vaccine is administered.

In the spring of 1957, the mass vaccination of people in populated areas of Moskovskaya Oblast and the Dagestan ASSR was organized by a group from the Institute of Epidemiology and Microbiology imeni Gamaleya. The Gamaleya polyvaccine is described as a chemical vaccine precipitated by aluminum hydroxide, which contains whole antigens of typhoid, paratyphoid B, Flexner and Sonne dysentery bacteria, and tetanus anatoxin; it is administered subcutaneously in 0.5 ml doses twice (at an interval of one month). The first phase of the experiments was a comparative study of the reactogenicity of the Gamaleya polyvaccine, and the NIISI polyvaccine and tetravaccine. Results are shown in four tables. Reactogenicity was also checked in young children.

Conclusions presented on the basis of the results obtained in these experiments are as follows:

"1. The reactogenicity of the polyvaccine developed at the Institute imeni Gamaleya approximately corresponded to the reactogenicity of the widely used tetravaccine and was considerably lower than that of the NIISI polyvaccine series which we use.

"2. The data obtained lead us to question the use of the Gamaleya polyvaccine for the prophlaxis of young age groups (school children in the lower classes).

"3. Reaction following the introduction of the vaccine studied depended on the properties of the vaccine itself and on the physiological condition of the vaccinates; it is therefore expedient to re-examine the portion of the directive which concerns the rejection of a vaccine in the event that more than 7% severe and moderate temperature reactions occur, irrespective of the group of vaccinates.

"4. The majority of reactions to the introduction of the vaccines appeared in 6-12 hours (the first night) and rarely lasted more than 2 days.

"5. The most frequent manifestations of the reactions in vaccinates were: elevated temperature, headache, and painfulness and hyperemia at the inoculation site."

88. Immunization Methods Studied

"An Experimental Study of Methods of Immunizing Through the Skin," by A. V. Lizgunova, Uch. Zap. 2-go Mosk. Med. In-ta (Scientific Notes of the Second Moscow Medical Institute), No 7, 1957, pp 149-155 (from Referativnyy Zhurnal -- Biologiya, No 22, 25 Nov 58, Abstract No 102378, by K. N. M.)

"After the immunization of rabbits with staphylococcus anatoxin, anthrax vaccine (STI), and heat-killed typhoid vaccine, the highest antibody titers were achieved upon the introduction of antigen into the skin. This method permits strict dosing of the vaccine administered."

89. Therapy of Bacterial Dysentery

"Report on Curing 61 Patients Affected With Acute Bacterial Dysentery by Coptis chinensis French," by Wen Chao-jung, and Ch'en Wen-chao, Chunhua Ihsueh Tsachih (China), 1957, 43, No 8, 632-634; (from Referativnyy Zhurnal -- Biologiya, No 6, 25 Mar 59, Abstract No 27873, by Sun Pai-wei)

"Sixty-one patients affected with acute dysentery were treated with Coptis chinensis administered orally in doses of one gram every 24 hours, for a period of 6-8 days. In all cases, clinical and laboratory cure was obtained within a week. The effectiveness of Copris chinensis is similar to that of sulfonamides, but, in the author's opinion, the former is less toxic than the latter. Coptis chinensis is not effective in chronic dysentery cases."

90. Chlortetracycline in the Therapy of Dysentery

"Effect of Chlortetracycline on the Functional Condition of the Central Nervous System in Dysentery Patients," by A. P. Kazantsev, Chair of Infectious Diseases Military -- Medical Order of Lenin Academy imeni S. M. Kirov; Moscow, Antibiotiki, Vol IV, No 1, Jan/Feb 59, pp 59-63

A report on the results of the investigation which were conducted to determine the effect of chlortetracycline on the functional condition of the central nervous system under clinical conditions is presented. The dynamics of the modifications which take place in the functional condition of the nervous system in dysentery patients as a result of the administration of therapeutic doses of chlortetracycline hydrochloride were observed. The method for determining optically adequate chronaxy was used. The investigations established that a single administration of a therapeutic dose of chlortetracycline produced an expressed prolongation in optically adequate chronaxy, a fact which pointed to a decrease in the irritability of the cerebral cortex; modifications of the functions of the central nervous system appeared 20-30 minutes after the oral administration of the drug, reaching the maximum within 45-60 minutes; in the course of 7-day therapy of acute dysentery with chlortetracycline, modifications in the functions of the central nervous system continued to increase to the second or fourth day of the treatment. They remained at the same level after therapy was terminated. The reduction in the time of the optically adequate chronaxy to its initial value took place only on the fifth to the seventh day after the administration of the antibiotic was stopped.

91. Therapy of Tetanus

"Curare Preparations in Tetanus," by Candidate of Medical Sciences K. Proshunin, Leningrad; Moscow, Meditsinskiy Rabotnik, No 14 (1762), 17 Feb 59, p 4

"During the past few years a new method of therapy for treating tetanus with curare preparations has been developed at Clinic No 1, Faculty of Surgery, Military Medical Academy imeni S. M. Kirov, headed by Prof V. N. Shamov. Curare preparations exert selective action on the neuromuscular synapses of striated muscles, reducing the contractions and paralyses of these muscles; they have no effect on the functions of other organs and systems. Experiments on animals afflicted with tetanus have shown that when preparations possessing curare-like action (diplacine, paramion, pyrolaxone) are administered, muscular rigidity, opistotonus, and spasms are either considerably reduced or completely eliminated.

CPYRGHT

"The positive results obtained in experiments conducted on animals made it possible to clinically test diplacine, a Soviet preparation possessing curare-like action, in the treatment of tetanus. Following the intravenous administration of diplacine to a woman patient (in a dose of 60-70 milligrams), optitonus disappeared and pain and spasms became more relaxed and finally disappeared; the patient then fell asleep. The preparation was administered intravenously once or twice a day for 10 days; it was accompanied by artificial respiration when necessary.

"Reports on the successful treatment of tetanus with Soviet curare-like preparations were recently made by K. M. Loban (Moscow) and K. A. Nurishchenko (Leningrad)."

92. Sleep Therapy in Lead Intoxication

"Therapy of Experimental Lead Intoxication by Medically Induced Sleep," by Khr. Tsolov, Izvest. otd. biol. i. med. nauki, Bulg. AN (News of the Division of Biological and Medical Sciences, Bulgarian Academy of Sciences), 1958, 2, No 1, 31-35 (from Referativnyy Zhurnal--Biologiya, No 23, 10 Dec 58, Abstract No 107241, by the author)

CPYRGHT

"In experiments carried out on dogs, prolonged sleep induced by luminal increased the resistance of the organism to a number of intoxications. As a result of sleep therapy the animals gained weight, and an increase of the Hb content of the blood was noted. The author thinks that the described method of therapy is indicated in chronic lead intoxication."

93. Burn Therapy

"Effect of the Juices of the Black Fruit Mountain Ash and of Sea Buckthorn on the Rate of Burn Healing," by M. Malgin and L. Zubova, Uch. zap. Gorno-Altayskiy gos. ped. in-t (Scientific Notes of the State Gorno-Altayskiy Pedagogical Institute), 1957, No 2, 281-282 (from Referativnyy Zhurnal--Biologiya, No 23, 10 Dec 58, Abstract No 107348)

CPYRGHT

"Juices of the black fruit mountain ash or of the sea buckthorne were applied to experimental burns induced in six rabbits. In addition, the rabbits received the juices internally (2 milliliters each per 24 hours). It was found that the burns healed in 37 days in the control animals (the rate of healing--0.12 cm^2 in 24 hours); when treated with the juice of the black fruit mountain ash, the burns healed within 27 days (0.4 cm^2); and when treated with the juice of sea buckthorn, within 32 days (0.24 cm^2). Fresh juices only provide good therapeutic effect."

94. Therapy of Injured Tissue

"Effect of Black Fruit Mountain Ash and of Sea Buckthorn on the Regeneration Rate of Injured Tissue," by K. I. Koroleva, E. Krasnoperova, M. Volynchikova, and G. Korchuganova, Uch. zap. Gorno-Altayskiy gos. Ped. in-t (Scientific notes of the Gorno-Altayskiy State Pedagogical Institute), 1957, No 2, 278-280 (from Referativnyy Zhurnal--Biologiya, No 23, 10 Dec 58, Abstract No 107351)

"Juices of the black fruit mountain ash and sea buckthorn were applied to experimental wounds in rabbits. Observations revealed that wounds treated with the juices, especially if accompanied by the simultaneous administration of the juices internally in doses of 3 milliliters, healed within 15-16 days at a regeneration rate of 0.4-0.56-cm^2. The wounds of the control animals healed in 18-23 days."

95. Validity of Chinese Traditional Medicine Defended

"On the Case for Traditional Chinese Medical Treatment," by Shen Tzu-yin; Peiping, K'o-hsueh Hua-pao (Pictorial Science), No 3, Mar 59, pp 114-115

This article presents arguments supporting the validity of various Chinese traditional medical theories and practices.

On the relationship between the "appendix depression" (the site for insertion of needles in acupunture therapy for appendicities) and appendicitis, the author provides a diagram (Figure 1) to show location of the site and gives the following explanation: -

"During a surgical conference at a certain hospital, the suggestion offered by two young practioners of traditional medicine that acupuncture-moxibustion therapy could cure acute appendicitis without surgery provoked outright laughter from senior physicians. One exclaimed, 'Acupuncture and moxibustion for acute appendicitis? Is there a scientific basis? If the scalpel is not needed for acute appendicitis, we surgeons will go out of business!' The two young physicians, undaunted, eventually proved their point. In clinical tests they showed that the patient with acute appendicitis senses pain upon palpation of his 'appendix depression' while the normal person does not. In further investigation, acupuncture was administered to a patient whose abdomen had just been opened for an appendectomy. It was observed that right after application of the needle, the appendix kept jiggling and contracting until the fecalith inside was expelled. It was only then that these surgeons' doubts were satisfied."

In another paragraph, the author refers to an electrical machine of Japanese origin, called the "meridian locator" (經絡儀測), as scientific evidence for the Chinese traditional medical theory of meridians. This theory recognizes over 250 sites for stimulation in acupuncture and moxibustion therapy and systematically locates these sites according to their function along 12 theoretical lines, or meridians. According to the author, the meridian locator measures electrical potential at points on the body to which electrodes are applied and that it has been demonstrated that abnormal potential along a meridian is related to disease. He includes diagrams showing the structure of the meridian locator.

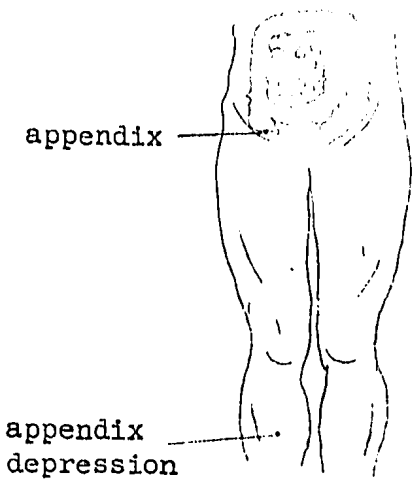

Figure 1

/SIR Note: Chinese medical periodicals which only a few years ago restricted their articles to reports on the implementation of Western medical practice and drugs are now giving an increasing amount of space to reports on the effective use of Chinese traditional medicine and pharmacology. The articles mentioned below are typical of others which claim the efficacy of acupuncture therapy for radiation sickness, schistosomiasis, sequelae of poliomyelitis, deaf-muteness, infectious hepatitis, and acute appendicitis./

96. Acupuncture Therapy Cures Acute Appendicitis Without Surgery

"Report on Acupuncture-Moxibustion Therapy for 89 Cases of Acute Appendicitis (With Analysis of Follow-Up Results)," Chung-shan Hospital of Shanghai First Medical College; Shanghai, Shang-i Hsueh-pao (Journal of the Shanghai First and Second Medical Colleges), Vol 2, No 1, 1959, pp 7-12

This article presents an analysis of 89 cases of acute appendicitis which were treated at the Chung-shan Hospital of the First Medical College of Shanghai during the period 24 September-30 November 1958 when the hospital's policy was to treat the disease with acupuncture. (Actually, only 83 of the 89 cases received acupuncture, 6 cases refused it or were otherwise uncooperative.)

The article divides the period in question into three stages as follows:

1. Experimental stage (15 days). Individual physicians experimented independently. There were 15 cases; rate of cure 80.0%

2. Concentration stage (11 days). All cases assigned to a few doctors who worked cooperatively to establish parameters. Rate of cure 91.3% for 23 cases.

3. Promotional stage (42 days). All physicians administering acupuncture under guidance for experience. Rate of cure 76.5% for 39 cases.

Tables and graphs support the textual analysis of clinical findings. Indications for acupuncture therapy and factors which influence response to treatment are discussed.

97. Efficacy of Acupuncture in Infectious Hepatitis

"Report of 20 Cases of Infective Hepatitis Cured With Acupuncture Therapy," by Department of Medicine, Ho-p'u Hsien People's Hospital; Canton, Kuang-tung Chung-i (Kuang-tung Chinese Traditional Medicine), Vol 4, No 4, Apr 59, pp 150-151

This article reports that all of the 20 cases of acute infectious hepatitis admitted to Ho-p'u Hsien People's Hospital from 1 January to 15 February 1959 were cured with acupuncture-moxibustion therapy without the use of drugs. Three case histories (ages 20-30) are given with an identification of the acupuncture points and schedules of treatment.

In conclusion, the article states that acupuncture-moxibustion therapy effects a marked increase in urination (having a pale yellow color) only 3-6 hours following the first administration. The following day, blood analysis showed a sudden drop in the icteric index and other shifts toward a normal blood picture. Acupuncture therapy shortens the period of illness to 7-10 days as opposed to 1-2 months when treated with drugs.

Oncology

98. Cytosine in the Therapy of Leukosis

"Effect of Cytosine on the Course of Spontaneous Leukosis in Mice of the afb Strain," by G. I. Felistovich, Chair of Pharmacology, Pharmacy, and Pharmacognosy, Military-Medical Order of Lenin Academy imeni S. M. Kirov; Moscow-Leningrad, Voprosy Onkologii, Vol 5, No 4, Apr 59, pp 420-425

Results of experiments carried out to determine the effect of cytosine on mice affected with spontaneous leukosis are reported. Twenty-six mice, 14 of them controls, were used in the experiments. Cytosine was administered to the experimental animals in doses of 25, 50, and 100 milligrams per kilogram of body weight daily, until the number of leukocytes decreased. Therapy was then halted until the number of leukocytes began to increase again. The experiments established that 50 and 100 milligrams of cytosine per kilogram of body weight were the effective doses and prolonged the lives of the animals. Hematological remission was noted in some cases.

Some of the mice were found to be resistant to cytosine, or developed cytosine resistance in the course of the therapy. The addition of uracil (25 milligrams per kilogram body weight) was found to be effective in these cases. The cytosine and uracil combination decreased the activity of the thymust gland and lymphatic ganglion, and decreased the size of the spleen. The results of the experiments lead to the conclusion that cytosine is effective in the therapy of the lymphatic form of leukosis in mice. However the authors warn, final conclusions on the effectiveness of the drug in the therapy of spontaneous leukosis must, as yet, be clinically established.

99. Effect of Hexokinase Activity on Tumors

"On Hexokinase From Skeletal Muscles and From Rhabdomyoblastoma of a Rat," by S. A. Neyfakh and M. P. Fomina, Yezhegodnik In-ta eksperim. med. Akad. med. nauk SSSR (Yearbook of the Institute of Experimental Medicine, Academy of Medical Sciences USSR), 1955 L. 1956, 217-218 (from Referativnyy Zhurnal--Biologiya, No 23, 10 Dec 58, Abstract No 107022, by Ye. A. Sherstnev)

"Hexokinase activity of the rhabdomyoblastoma of a rat is 1.7 times higher than that of the skeletal muscle. It is believed that higher hexokinase activity is one of the reasons for the acceleration of glycolysis in tumors. Hexokinase activity in tumors is less sensitive to the action of oxidizers. Thus, 2,6-dichlorphenolindophenol in a concentration of 4.10^{-4} M while depressing hexokinase activity in muscles by 90 percent, decreases hexokinase activity in the tumor by only 40-50 percent."

100. Effect of Gold on Ehrlich's Ascitic Tumor

"Effect of Radioactive Colloidal Gold on Ehrlich's Ascitic Tumor," by S. M. Volodarskaya, Chair of Roentgenology and Radiology, First Moscow Order of Lenin Medical Institute imeni I. M. Sechenov; Moscow-Leningrad, Voprosy Onkologii, Vol 5, No 4, Apr 59, pp 416-420

Mice were used in experiments which were conducted to determine the effectiveness of radioactive colloidal gold when used in the therapy of Ehrlich's ascitic carcinoma. Ascitic fluid containing from 80,000 to one million cancer cells was administered intraperitoneally to the mice. The mice then received radioactive colloidal gold intraperitoneally in doses of 0.025-0.05 mC. The experiments established that the colloidal gold, in doses of 0.025 mC, inhibited the growth of the ascitic tumors without affecting the organism as a whole, and prolonged the life of the animals. The administration of the radioactive metal in doses of 0.05 mC inhibited the growth of the tumors, but failed to prolong the lives of the animals because of the development of radiation sickness, which killed the animals. The organism affected by cancer is apparently more sensitive to radiation than is the healthy organism, with the result that doses of the radioactive colloidal gold not toxic to the healthy animals are lethal to cancerous organisms.

101. Tumor Therapy Using Sea Kelp

"Experimental Use of Sea Kelp (Laminaria) in Oncological Practice," by I. M. Vorontsov, Tr. Zaporozhsk. in-ta usoversh. vrachey (Works of the Zaporozhye Institute for the Advanced Training of Physicians), 1957, 1, 27-31 (from Referativnyy Zhurnal--Biologiya, No 23, 10 Dec 58, Abstract No 107345, by the author)

"Laminaria saccharina, a sea kelp, is widely utilized in China and Japan as a valuable food product and as a therapeutic agent. Sea kelp, in powder form, was administered to 500 tumor patients as a supplementary remedy to other essential therapy methods (surgery and radiation therapy). The protracted application of sea kelp (a teaspoonful three times a day) produced a gradual improvement in the general condition of the patients, improved their physical strength, and had a beneficial effect on their psychic state. There was a considerable improvement in the gastrointestinal activity of the patients, they gained weight, and an increase in the Hb and erythrocyte content of the blood was noted. The author recommends the wide application of Laminaria saccharina in oncological practice."

Pharmacology and Toxicology

102. Toxicological Comparison of Organophosphorus Compounds

"The Toxicological Properties of Some Mixed Esters of Pyrophosphoric and Thiopyrophosphoric Acids," by I. D. Neklesova and M. A. Kudrina, Izv. Kazansk. Fil. AN SSSR. Ser. Khim. N., 1957, No 4, 83-92 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 3, 10 Feb 59, Abstract No 3214, by R. Il'yuchenok)

The relationship between the chemical structure and the pharmacological activity in a series of mixed esters of pyro- (I), thio- (II), and dithiopyrophosphoric acids (III) was investigated. It was shown that esters of II are more toxic than the corresponding esters of I and III. Toxicity decreases upon substituting ethyl groups by methyl groups. Unsymmetric dimethyldiethyl esters are more toxic for warm-blooded animals than the symmetric forms; this relationship is reversed in the barn curculionidae. The investigated compounds suppress pseudo- and true cholinesterase in concentrations of 9.5×10^{-4} to 2.7×10^{-9} M, whereby the toxicity of the compounds and the miotic strength are in conformity with the inhibitory strength of the compound.

103. Salivation and Intestinal Secretion Affected by Organophosphorus Compounds

"The Effect of Organophosphorus Compounds on Salivation and Intestinal Secretion," by T. Yu. Il'yuchenok, Khimiya i Primeneniye Fosfororganicheskikh Soyedineniy (The Chemistry and Application of Organophosphorus Compounds); Moscow, Academy of Sciences USSR, 1957, pp 318-323 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya. No 6, 25 Mar 59, Abstract No 7673)

"Dogs were given hypodermic injections of small, single doses of organophosphorus compounds (preparations No 1, 3, 5, 14, 75, 83, and 'phosphacol') over a long period of time. This intensified the secretions of the parotid and the submaxillary salivary glands and decreased the contents of the solid residue in saliva as much as 66-87%. Preparations No 3, 5 and 75 decreased cholinesterase activity."

104. Effect of Intoxications on the Nervous System

"Experimental Investigation of the Functional State of the Central Nervous System in a Clinic for Occupational Intoxications," by Yu. V. Vasilenko, V. sb.: Vopr. gigiyeny truda i profzabolevaniy v gornorudn., khim., i mashinstroit. prom-sti (Problems of Labor Hygiene and Occupational Diseases in the Ore Mining, Chemical, and Machine-Building Industry), Kiev, Gosemdizdat, Ukrainian SSR, 1958, 72-77 (from Referativnyy Zhurnal--Biologiya, No 23, 10 Dec 58, Abstract No 107454, by U. G. Gasanov)

"Motor conditioned reflexes reinforced by speech were studied in 36 patients with symptoms of chronic intoxication by manganese, lead, mercury, and ethylated benzene, and acute intoxication by CO. Disturbed conditioned reflex activity was characterized by weakness in the locking function of the cortex, weakened processes of internal inhibition, and the rapid advent of extinguishing inhibition."

105. Aminoesters of Diphenylalkylacetic Acid

"Investigation in the Field of Substituted Acetic Acid Derivatives. Report XVI. Aminoesters of Diphenylalkylacetic Acids," by Academician of the Academy of Sciences Armenian SSR A. L. Midzhoyan, G. T. Tatevosyan, S. G. Arbalyan, and R. Kh. Bostandzhyan, Institute of Fine Organic Chemistry, Academy of Sciences Armenian SSR; Yerevan, Doklady Akademii Nauk Armyanskoy SSR, Vol 28, No 1, 1959, pp 11-26

Methods for the synthesis of a new series of aminoesters of diphenylalkylacetic acids are described. Amino alcohols, which, in combination with acids, form biologically active preparations -- α-methyl, α, β-dimethyl-, β, β-dimethyl-γ-dialkinopropil -- were used for esterification. These preparations have been found to possess spasmolytic properties surpassing those of papasmolytin. The general method for the derivation of diphenylalkylacetic acids consists of the alkylation of the methyl ester of diphenylacetic acid by an alkyl haloid in the presence of metallic potassium, and subsequent saponification of the methyl esters of the diphenylalkylacetic acids which are formed. The alkylation of benzyl cyanide with alkyl haloids and the use of lithium hydride as an alkaline condensation agent until the corresponding phenylalkylacetonitriles were obtained has been accomplished.

106. Magnolin -- a New Alkaloid

"On the Pharmacology of Magnolin -- a New Alkaloid," by E. Ye. Aleshinskaya, Tr. Krymsk, med. in-ta (Works of the Crimean Medical Institute), 1957, 18, 675-682 (from Referativnyy Zhurnal -- Biologiya, No 23, 10 Dec 58, Abstract No 107346, by V. V. Berezhinskaya)

"The alkaloid magnolin belongs to the series of esterlike bimolecular benzylisoquinoline compounds. When administered to animals, it produces symptoms of irritation; in large doses it produces convulsions. Its DL_{50}, when subcutaneously administered to mice, is 291 milligrams per kilogram of body weight. When intravenously administered to the animals in doses of 0.5-10 milligrams per kilogram of body weight, it lowers blood pressure as a result of its effect on the vasomotor centers of the medulla oblongata and its adrenolytic properties. Magnolin has no appreciable effect on the isolated organs. It affects the organism as a whole by enlarging the spleen, intestines, and extremities and by reducing renal hyperemia. In concentrations of 10^{-7} to 10^{-5}, magnolin has no effect on the functions of the isolated hearts of either warm-blooded or cold-blooded animals. In a concentration of 10^{-4} it somewhat depresses cardiac activity. When locally applied, magnolin inhibits the passage of stimuli in the sympathetic ganglia. Magnolin

possesses strong anticholinesterase activity. In its ability to depress cholinesterase activity and increase the sensitivity of the spinal muscle of a leech to acetylcholine, magnolin is close to eserine and proserine. A characteristic feature of the alkaloid is its affinity to 'true' cholinesterase."

107. Effect of White Deadnettle on the Uterus

"Effect of the White Deadnettle on the Contractive Activity of the Uterus in Experimental Animals," by N. K. Nigmatullina, Tr. Kirg. med. in-t (Works of the Kirgiz Medical Institute), 1957, 9, 77-79 (from Referativnyy Zhurnal-Biologiya, No 23, 10 Dec 58, abstract No 107347, by T. A. Shtessel)

"Lamium album, the white deadnettle, is widely distributed in Eastern and Western Siberia, Caucasus, Central Asia, and in the Kazakhstan mountains. It has long been used in folk medicine as a blood coagulant in cases of uterine and parenchymatous hemorrhages. Alcohol and aqueous extracts prepared from the leaves and flowers of deadnettle were administered intravenously and subcutaneously to rabbits and cats in doses of 1.0-1.5 milliliters per kilogram body weight. The Subbotin-Nikolayev method of registering uterin contractions was used. It was found that white deadnettle contracts the uterus with particular strength if administered in the last stages of gravidity, and in the post-natal period. In nonpregnant animals, the preparation exhibits its greatest activity during the estral phase. The uterus of not fully matured animals is only slightly sensitive to the action of deadnettle. The author regards white deadnettle as an effective uterine drug."

Physiology

108. Drugs Affecting Dark Adaptation

"The Nature of Some Agents Which Influence the Time it Takes to Become Adapted to Darkness," by P. V. Simonov; Fiziologicheskiy Zhurnal SSSR imeni I. M. Sechenov, No 4, Apr 59, pp 389-395

The author of this article states that of the three drugs (caffeine, bromine, and luminal) used in experiments to determine the nature of conditions that effect the time needed to become adapted to darkness, bromine prossesses a distinctly stimulating efficacy: it intensifies the process of adaptation to darkness. A definite relationship exists between the functional condition of the central branches of visual analysor, during adaptation to darkness, and the symptoms indicative of initial inhibition caused by bromine. Nonperceptual illumination of eyes during adaptation to darkness hastens differentiation of experimental objects. Attempts to pinpoint the effect of various doses of luminal on adaptation to darkness were unsuccessful. The same was true for caffeine. Caffeine appeared to be less reliable than luminal; it retarded adaptation to darkness.

109. Changes in Nucleic Metabolism and Its Role in Cell Division

"The Role of Nucleic Metabolism in the Division of Normal and Tumor Cells," by I. A. Alov, Chair of Histology (head, I. A. Alov Prof of Medical Sciences, Khabarovsk Medical Institute; Moscow, Voprosy Onkologii, Vol 5, No 1, Jan/Feb 59, pp 7-13

The purpose of this research was to explain the significance of nucleic metabolism in cell division. A series of tests was conducted using dinitrophenol (which inhibits the inclusion of phosphorus into the nucleic acid molecule), tripaflavin (which disturbs the synthesis of nucleic acids), and adenine (7-8 mg, which disturbs the synthesis of desoxyribonucleic acid) to test the effect of changes in nucleic acid metabolism on the epithelial layers of cornea, intestine, and tongue.

In each case it was noted that the number of cells per unit area in the process of cell division was decreased, and cell division was arrested at the prophase stage. Similar results were obtained by using nucleotides, and purines, which are analogues of dinitrophenol and tripaflavin.

Changes in nucleic acids due to the effect of powerful antimitotic factors, such as cortisone and adrenalin were tested, and the results proved to be almost identical.

Tests in which dinitrophenol, tripaflavin, and adenine were administered to mice with grafted sarcomas indicate that disturbances in nucleic metabolism in the normal cells of these mice are similar to those of healthy animals. But, in the tumor cells, there was no disturbance in the relationship of the various mitotic phases and no evidence of arrest of cell division at the prophase.

Histochemical tests indicate that two types of cells may be distinguished in tumor tissue: one actively dividing cell type is rich in RNA, while the other type is poor in RNA, and processes of cell division gradually disappear in it. During the process of cell division of tumor cells, in contrast to that of normal cell division, the RNA content of the cytoplasm is either not changed or is slightly increased, and the intensity of reaction to RNA is maintained almost at the same level all through the various phases of cell division. Changes in the cells that are poor in RNA are similar to those in normal tissue. Changes in cell reaction to DNA during the process of cell division of tumor cells resemble those in normal cells, except that in tumor cells the content of DNA (which is concentrated in the chromosomes) is increased in the prophase and metaphase, and the various phases of cell division are so poorly expressed in tumor cells that it is not always easy to distinguish them.

Thus, both histochemical studies and experimental data prove that changes in nucleic metabolism which result in cell division are not identical for normal and tumor cells. However, on the whole, cell division in both normal and tumor cells is brought about by the same "spark" mechanism through various links of nucleic metabolism. Changes in nucleic metabolism of tumor cells may be explained as the result of a lack of or decrease in the response to the effect of various mitotic regulators.

The author concludes that nucleic metabolism which underlies cell division differs in normal and tumor cell division, and one of the basic characteristics of changes in nucleic metabolism in tumor cells in the capacity of these cells for unrestricted progressive proliferation.

110. New Enzyme Elastase Discovered by Hungarian Scientists

"Elastase" (unsigned article); Kiev, Nauka i Zhytta, No 1, Jan 59, p 60

Two Hungarian scientists, a husband and wife team, Jozhef and Ilona Balo, have discovered an enzyme which ensures the elasticity of blood vessel walls. They have named this enzyme "elastase." This enzyme is produced in the pancreas which possesses it in sufficient quantities in young organisms, but the enzyme is nearly absent in older organisms.

While investigating the properties of elastase the scientists determined two of its functions: depending on the conditions, this enzyme either builds the elastic fibers of the blood vessel walls or destroys them. In a healthy organism one can also detect a material which inhibits the destruction caused by the action of elastase; the balance of these two substances ensures a normal wall condition.

Arteriosclerosis, caused by the absence of elastase in the vessels, as a rule, is accompanied by another disease, atherosclerosis. In this disease, a pulp-like material is deposited on the blood vessel walls, due to which their internal diameters are constricted. This condition leads to disturbances in the blood circulation. Therefore, since atherosclerosis occurs at the same time as arteriosclerosis, in many cases they are investigated together. The Hungarian scientists did just this.

They began their investigations with animals. At first they were able to determine the action of elastase in the abdominal cavity. Artificially introduced enzyme facilitated the increased activity of the pancreas in experimental animals. Besides this, under the influence of elastase, the pancreas itself grew larger. The experiments conducted permitted the Balos to explain the relationship between the lowered activity of the pancreas and arteriosclerosis. As a result of the experiments, they uncovered new data on atherosclerosis.

After injecting cholesterin (a fatty-like substance in the blood) into rabbits, the Hungarian scientists caused an atherosclerotic condition in them.

Soon after this, when they injected elastase into the animals, it appears that this enzyme destroyed chylomicrons, fatty-like corpuscles which are deposited on the walls of blood vessels and cause atherosclerosis.

Further investigations with elastase, with which the Balos are now engaged, are directed toward discovering methods for the early diagnosis of atherosclerosis.

111. Chinese Study Methods for Prolonging Life in Cases of Hemorrhagic Shock

"A Study of Methods for Prolonging the Life of Animals in Experimental Hemorrhagic Shock in the Absence of Conditions for Blood and Other Fluid Transfusions," T'ang Tse-kuang (湯澤光) and others, Department of Morbid Physiology, Canton Medical College; Peiping, Chung-hua I-hsueh Tsa-chih (National Medical Journal of China), No 7, 1958, pp 629-639

This item presents details of experiments undertaken to investigate various methods for prolonging life in experimental dogs which have been bled to a state of fatal hemorrhagic shock. It was found that hypothermia, calcium chloride, a combination of calcium chloride and sodium bromide, and coramine were each effective in lengthening the survival time of the animals, whereas adrenalin, 30% ethyl alcohol, and vitamin-hormone compound, etc. were ineffective.

A formula is presented for calculating the approximate survival time of an animal in hemorrhagic shock.

Public Health, Hygiene, and Sanitation

112. Resistance of Polio Virus to Disinfectants

"A Comparative Study of the Resistance of Different Strains of Type II Poliomyelitis Virus to Disinfecting Agents," by O. P. Timonich, Tr. Tsentr. N.-I. Dezinfekts. In-ta (Works of the Central Scientific Research Disinfection Institute), No 10, 1957, pp 52-61 (from Referativnyy Zhurnal -- Biologiya, No 22, 25 Nov-58, Abstract No 99085, by E. R. Pille)

"The Teyler (T) strain of the virus of mouse encephalomyelitis and Lansing (L) and Ovchinnikov (O) strains of Type 2 poliomyelitis virus in the form of a brain suspension were inactivated by heat at 80° C for 30 minutes, by the action of a 0.5% solution of calcium hypochlorite for 30 minutes, and were not killed by a 2% solution of lactic acid. A 5% solution of phenol inactivated (O) in 15 minutes, (L) in 30 minutes, and (T) in 60 minutes; a 2% chloramine solution inactivated (L) in 30 minutes, and (O) and (T) in 60 minutes. Preparation KhB sodium parachlorbenzosulfochloramide) in the form of a 2% solution did not act on (O) after exposure for one hour, and inactivated (T) in 30 minutes and (L) in 60 minutes; a 3% solution of hexylresorcine destroyed (T) and (L) in one hour, but did not affect (O) even in the form of a 1% solution."

113. Betatron Radiation Injuries

"Pathological Anatomy of Animals Dying 'Under Rays' From a 25-Mev Betatron," by I. V. Toroptsev and N. V. Sokolova, Chair of Pathological Anatomy, Tomsk Medical Institute; Moscow, Meditsinskaya Radiologiya, Vol 4, No 2, Feb 59, pp 50-55

The purpose of this research was to find a true picture of morphological changes responsible for immediate radiation death under the effects of betatron rays and without the complications of infections or other external factors.

Tests were conducted on 20 guinea pigs irradiated by 25 Mev betatron rays with an intensity of 30-35 r/min, with a dose of 7,200 r, and a total does, after 15-20 minute intervals, of 21,600-25,000 r.

The authors discuss the general macroscopic and microscopic picture of the most acute radiation sickness in which the animals die "under rays." An initial short depression period is followed by increased excitation of skeletal muscles, convulsions, and respiratory disturbances. Essentially, there is extreme plethora of internal organs; very typical and constantly appearing symptoms in the abdominal cavity -- acute distension of the urinary bladder and of the gall bladder, irregular filling of the intestines, and irregularities of liver coloration, i.e., plethora of the hepatic parenchyma interspersed with dull and gray areas; and the bone marrow appears dark red.

The microscopic picture reveals a universal paretic dilatation of blood vessels filled with blood, necrotic changes in the cells (especially the cells of the hemopoietic tissue), in the vascular endothelium, in the liver parenchyma, and in the epithelial layer of the gastrointestinal tract. In addition, the authors discuss pathological changes occurring in the bone marrow, lymph glands, kidneys, etc.

The authors are of the opinion that both the macroscopic and microscopic picture of such extremely acute radiation sickness resemble the usual changes occurring as a result of traumatic shock, but with certain characteristics that are peculiar to radiation sickness, i.e., redistribution of blood resulting in anemia of brain tissue, extreme plethora of the remaining organs, necrobiotic changes in cellular elements, and increased size of cells and rupture of chromatin matter in the nucleus.

The authors are reminded of analogous changes, reported by Hofmann (1957), in malignant cells irradiated by fast electrons but not by X rays. It is postulated that this rapid reaction of the nucleus to high energy radiation is probably typical of a special type of pathology. Furthermore, the authors suppose that the formation of crystals from red blood elements is characteristic of radiation injuries from a betatron.

The authors conclude that these observations are a part of the complicated problem of the pathogenesis of the most acute radiation injury, and it is hoped that they will serve as an essential landmark for further research.

114. Decreased Bromosulfalein Excretion After Irradiation due to Indirect Injuries

"On the Excretion of Bromosulfalein After X-Ray Irradiation of the Upper Part of the Body of Mice," by M. Skalka, Institute of Biophysics of the Czechoslovak Academy of Sciences, Brno; Moscow, Meditsinskaya Radiologiya, Vol 4, No 3, Mar 59, pp 25-26

Liver function studies for bromosulfalein excretion were conducted on 150 mice for a period of about 2 weeks after the X-ray irradiation of the upper part of the body (head, greater portion of the chest, and upper extremities) by 1,000, 2,000, and 4,000 r. Results presented in graphs show that irradiation by 1,000 r (80% survival) changes the rate of bromosulfalein elimination as compared with the normal. However, after irradiation by 2,000 and 4,000 r, there was a rise in bromosulfalein retention.

Histological studies revealed that in the majority of cases, the degree of injury corresponded to the degree of disturbance in bromosulfalein elimination.

The author concludes that liver injuries, which are expressed by a rise in the bromosulfalein content, occur without the direct irradiation of the liver and are due to lesions in other parts of the body.

115. Thiourea in the Prophylaxis of Radiation Sickness

"Protective Action of Some Thiourea Derivatives Against Radiation Sickness," by G. V. Andreyenko, V. M. Fedoseyev, and N. P. Sytina; Moscow, Vestnik Moskovskovo Universiteta, Vol 13, No 4, Oct-Dec 58, pp 39-42

Experiments were made on rats to determine the effectiveness of some thiourea derivatives containing homogenous alkyl radicals when used as prophylactic agents against radiation sickness. The animals, weighing 150-200 grams, were exposed to a radiation dose of 650 r. The thiourea derivatives -- methyl isothiourea, ethyl isothiourea, n-propyl isothiourea, and n-butyl isothiourea -- were administered to the animals in doses of 10 milligrams about 15-30 minutes before exposure to radiation. The experiments established that some prophylactic action was exhibited by methyl isothiourea, ethyl isothiourea, and n-propyl isothiourea. The protective action of these preparations was expressed by the survival of a large number of the animals on the 30th day after exposure to the irradiation, and in some cases by the rapid restoration of the thromboplastic activity of the blood. However, the authors say in conclusion, the practical application of these preparations cannot be recommended yet, since further experiments and observations must be conducted.

116. Prolonged Studies of the Blood of Cats Suffering From Acute Radiation Sickness

"Prolonged Observations of Changes in the Composition of Peripheral Blood and Bone Marrow of Animals After a General Single X-Ray Irradiation," by T. V. Tkacheva, Physiology Laboratory (head, V. F. Cherkasov, Candidate of Medical Sciences) of Central Scientific Research Roentgeno-Radiological Institute; Moscow, Meditsinskaya Radiologiya, Vol 4, No 3, Mar 59, pp 14-21

The purpose of the research described was to conduct prolonged observations on changes in the peripheral blood and bone marrow and to describe the clinical picture of radiation sickness in cats subjected to acute radiation sickness following a single general X-ray irradiation of 300 r.

Tests were conducted on 17 cats for a period of up to 715 days, and blood studies included fluctuations in erythrocyte count, hemoglobin index, reticulocyte count, color index, leukocyte formula, lymphocytes, and nucleus-containing elements, as well as studies of the general clinical condition (loss of hair, flaccidity, decreased appetite, etc.). Three comprehensive tables accompany the article.

It was noted that during the first day after irradiation, several of the animals seemed flaccid, out of breath, lost appetite, and were passive; but during the 2d-3d day they seemed healthy; then again between the 3d and 4th days of the sickness, pronounced catarrhal symptoms of the nose, eyes, and upper respiratory passages, salivation, and decreased appetite or loss of appetite could be observed.

In general, however, results indicated that during the 1st to the 15th-18th-day period after irridiation, one could detect a sharp impoverishment of the bone marrow with regard to the nucleated elements, whose maximum decrease occurred during the 4th-5th day, calculated on the basis of the young forms of the leukoblastic elements, and to a lesser degree on the basis of the erythroblastic series. The restoration of the numbers of erythrocytic series occurred sooner and more intensely than the restoration of the elements of the leukoblastic series. Hyperplasia of the bone marrow during the 60th-80th-day period and through the 100th-120th-day period, in general, corresponded with the increased number of leukocytes and erythrocytes in the peripheral blood.

Surgery

117. New Surgical Procedure for Deafness

"Deaf Children Cured Through New Surgical Method" (unsigned article); Stockholm, Ny Dag, 5 May 59, p 4

Employing a new surgical technique he developed, Professor Malomush of the Dzershinskiy Children's Clinic in Moscow has given hearing to a total of nine children born deaf. In the operation, performed on children over 6 years of age, the auditory canal is opened, and the defective or undeveloped ear drum is replaced with an artificial one. To prevent the opened auditory canal from growing together, it is covered with transplanted skin tissue taken brom behind the patient's ear. The material for the artificial ear drum is also skin tissue, thinned before being put in place.

118. Sick and Healthy Animals Differentiated in Herds Vaccinated Against Brucellosis

"The Problem of Differentiating Healthy Animals From Brucellar Animals in Vaccinated Herds," by Ye. I. Butkin, Tr. Mosk. Vet. Akad. (Works of the Moscow Veterinary Academy), Vol 19, No 2, Part 1, 1957, pp 73-78 (from Referativnyy Zhurnal -- Biologiya, No 21, 10 Nov 58, Abstract No 96963, by A. D. Musin)

"Cows inoculated 6-12 months before the beginning of the experiments with dry vaccine from strain No 19 were examined. Cattle which had aborted after inoculation showed a positive ring test with milk and positive RA [agglutination reaction] and RSK [complement fixation reaction] reactions evaluated as plus 4-3. The RA and RSK were consistently positive in inoculated animals which had shown a positive ring test. Six months after inoculation, a considerable number of the cows with positive RA and RSK did not show positive ring reactions with milk. The author suggests that amimals which react positively to the ring test within 12 months after inoculation while positive RA and RSK are maintained in them should be considered brucellar."

119. Vaccination of Sheep and Cattle With Brucellosis Vaccine From Strain 19

"The Problem of Vaccinating Sheep and Cattle Against Brucellosis with Vaccine From Strain No 19," by M. M. Ivanov, and A. M. Romanov, Tr. Gos. Nauchno-Kontrol'n. In-ta Vet. Preparatov (Works of the State Scientific-Control Institute of Veterinary Preparations), No 7, 1957, pp 26-40 (from Referativnyy

Zhurnal -- Biologiya, No 21, 10 Nov 58, Abstract No 96969, by A. D. Musin)

"It was shown in laboratory and production experiments that dry live vaccine from strain No 19 is harmless and confers on sheep an immunity to subsequent infection with melitensis and bovis-type Brucella cultures; the immunity was maintained for 3, 5, and 7 months (the length of the test period). The intensity of immunity in the vaccinated sheep was found to depend directly on the dose and method of introduction. Subcutaneous introduction of a dose of 15-25 billion microbial bodies is best. Vaccination of ewes and lambs on farms threatened with brucellosis curtailed the epidemic and prevented the spread of brucellosis in inoculated, conditionally healthy herds, curtailed and then eradicated brucellar abortions, and facilitated an increase in the number of lambs produced. Immunity against brucellosis was maintained for at least 2 years in cattle after inoculation with dry live vaccine."

120. Experimental Infection With Newcastle Virus

"The Concentration of Newcastle Virus in the Tissues of Experimentally Infected Fowl," by V. N. Syurin, L. G. Afanas'yeva, and T. A. Perminov, Tr. Gos. Nauchno-Kontrol'n. In-ta Vet. Preparatov (Works of the State Scientific-Control Institute of Veterinary Preparations), No 7, 1957, pp 116-129 (from Referativnyy Zhurnal -- Biologiya, No 22, 25 Nov 58, Abstract No 99130, by N. S. Klyachko)

"Virulent (T; killed chicken brain) and adapted strains (killed guinea pig brain) of the virus of Newcastle's disease were studied. On intra-allantoic infection of chick embryos (KE), both strains caused the death of the KE within 40-64 hours; a large number of adapted viruses were observed in the cerebrum and liver in comparison with virulent strains; the titer of adapted viruses was 1.5-2.0 times lower than that of virulent viruses in the embryonal fluid. Differences in virus titers in the embryonal fluid were not established following chorioallantoic infection. After a single replication of virulent and adapted strains in KE, 4-month-old chicks were infected intramuscularly with allantoic-amniotic fluid. After 3-4 days of incubation, a virulent strain produced the characteristic disease, which terminated in the fowl's death after 12-24 hours, and was detected in a high concentration in their organs. The adapted strain caused asymptomatic infection in the chicks and was detected in their organs later and in lower concentrations."

121. Properties of Adapted Newcastle Virus

"Hemagglutinating and Antigenic Characteristics of Adapted Newcastle Virus," by V. N. Syurin, Tr. Gos. Nauchno-Kontrol'n. In-ta Vet. Preparatov (Works of the State Scientific-Control Institute of Veterinary Preparations), No 7, 1957, pp 130-154 (from Referativnyy Zhurnal -- Biologiya, No 22, 25 Nov 58, Abstract No 99131, by N. S. Klyachko)

"Out of four test strains of the virus of Newcastle's disease, which were passed once in chick embryos (KE), only a reisolated strain (GNKI) caused an RGA [hemagglutination reaction] (1:80-1:160). Strain T, which did not cause a hemagglutination reaction after 11-20 passages on chick-embryos, acquired the capacity to agglutinate chick erythrocytes, and its hemagglutinating activity was increased in subsequent passages. Sera from roosters inoculated intramuscularly with avirulent strains of virus, gave a positive RTGA beginning with the 6th day; the antibody titer reached a maximum toward the 12th-20th day after inoculation (1:2,560-1:5,120), and gradually decreased to 1:40-1:80 toward the 90th-100th day. However, the decrease in the antibody titer was not accompanied by loss of immunity, and the roosters remained resistant to infection with virulent virus 5-6 months after inoculation. The similarity in the antigenic structure of virulent and adapted strains was demonstrated by the use of the RTGA."

Miscellaneous

122. Conference of Soviet Ministers of Health

"Conference of Ministers of Health of Union Republics" (unsigned article); Moscow, Meditsinskiy Rabotnik, 28 Apr 59

Recently, a conference of the Ministers of Health of the union republics was held in Moscow at the Ministry of Health USSR. The conference was attended by the following Ministers of Health:

N. A. Vinogradov, RSFSR; P. L. Shupik, Ukrainian SSR; I. A. Insarov, Belorussian SSR; R. A. Sagatov, Uzbek SSR; S. R. Karynbayev, Kazakh SSR; G. M. Maruashvili, Georgian SSR; B. M. Agayev, Azerbaydzhan SSR; A. I. Dirse, Lithuanian SSR; A. P. Diskalenko, Moldavian SSR; V. A. Ozolin'sh, Latvian SSR; Yu. Ye. Danilov, Kirgiz SSR; Ya. A. Rakhimov, Tadzhik SSR; A. I. Khrimlyan, Armenian SSR; and A. O. Gol'dberg, Estonian SSR. Also present were the president and vice-president of the Academy of Medical Sciences USSR, workers of the Central Apparatus of the Ministry of Health USSR, and representatives of the party and trade union organizations.

The conferees discussed at length the problem of controlling infectious diseases in the USSR. A. N. Bakulev, president, and V. D. Timakov, vice-president of the Academy of Medical Sciences USSR, reported on the scientific program for eliminating such infectious diseases as diptheria, malaria, typhoid fever, and trachoma during the current Seven-Year Plan, and also for lowering considerably the morbidity of other infectious diseases according to the directions given by the Ministry of Health USSR.

To improve the direction of scientific, organizational, and methodological work done by the Academy of Medical Sciences USSR, a special Coordinating Council (Koordinatsionnyy Sovet) is being established which will unite the efforts of scientists and practicing physicians; and it will actively encourage the development of research themes in all scientific research centers. The chairmen of all scientific councils of republic ministries of health will be permanent representatives of this new council.

It was pointed out at the conference that success in the control of infectious diseases depends largely on accurate and thorough organization of the sanitary-epidemiological service in the USSR, active participation in the prophylaxis and treatment of infectious diseases, and especially on conducting successful mass sanitary-educational work among the population by the entire therapeutic-prophylactic network.

The problem of hospital construction was also discussed at the conference. The conferees unanimously approved the principle of building in the future only large hospitals with built-in polyclinics. In the future, hospitals will be built with at least 100 beds in cities and large towns and with at least 25 beds in rural areas.

Of considerable importance was the discussion of the problem of sanitary service in the USSR. It was pointed out that sanitary-epidemiological stations should be so organized that all sanitary physicians would have the opportunity of working in bacteriological laboratories attached to the stations, and that in certain rural areas the sanitary-epidemiological stations should be united with rayon hospitals.

The conference ended with a discussion of the projected reorganization of the Ministry of Health USSR and of the general work of the ministry.

123. New Institute of Labor Hygiene and Occupational Diseases Established in Yerevan

"New Scientific Institution," by R. Grigoryan, director, Institute of Hygiene of Labor and Occupational Diseases; Moscow, Meditsinskiy Rabotnik, 12 May 59

On the basis of a sector of the Armenian Institute of Epidemiology, Microbiology and Hygiene, a new institute has been formed, the Institute of Labor Hygiene and Occupational Diseases (Institut Gigiyeny Truda i Professional'nykh Zabolevaniy) in Yerevan. The institute was formed by order of the Council of Ministers Armenian SSR. The institute will be the seventh medical institute in the republic and will contain a 40-bed clinic and a Sector of Labor Hygiene with laboratories for hygiene, research in industrial toxicology, industrial-sanitation chemistry, aerosols, and the physiology of labor.

124. Plans for Medical Construction in RSFSR for Next 7 Years

"Construction of Medical Institutions in the Seven-Year Plan," by I. Ushakov, Deputy Minister of Health RSFSR; Moscow, Meditsinskiy Rabotnik, 5 May 59

A major program for the construction of medical institutions in the RSFSR during the current Seven-Year Plan. Some 11 billion rubles has been allocated for this construction. Among the first medical institutions to be built are hospitals in cities, oblasts, and rayons. Building these hospitals will increase the available number of hospital beds by 144,000 and the number of spaces in nurseries by 375,000. Also of high priority is the construction of lying-in homes, specialized therapeutic establishments, and children's nurseries.

For the construction of rest homes, sanatoriums, and resorts, some 800 million rubles has been allocated. This will allow the number of available spaces to be increased by 22,000. New establishments will be primarily built in the northern and eastern regions of the RSFSR.

Some 450 million rubles has been allocated for the construction of new buildings, clinics, and housing units in the republic's medical vuzes (higher educational institutions). Some 29 new classroom buildings and more that 40 housing units are scheduled for construction.

Considerable construction is slated for the institutes of epidemiology, microbiology, and hygiene, and other scientific research medical institutes, and other institutes in Moscow, Leningrad, Sverdlovsk, Gor'kiy, Irkutsk, etc.

125. Organization of the Oncological Service

"On Certain Essential Problems of the Organization of the Oncological Service," by S. S. Mazel, Organizational and Methodological Office of Ivanovskaya Oblast Oncological Clinic; Moscow-Leningrad, Voprosy Onkologii, Vol 5, No 4, Apr 59, pp 489-493

The article calls for a more efficient organization of the oncological service for the population of the oblast. The four cardinal problems that must be solved in organizing such a servive are: (1) How to bring the oncological services as close to the people as possible. (2) To provide the rayon oncological centers with qualified personnel and modern equipment. (3) Systematically improve the qualifications of the physicians, feldshers, and nurses. (4) Early and exact diagnosis of the disease.

Nine polyclinics serve the oblast, which has a population of 318,000 people. But only four of these are equipped to handle cancer cases. Large areas of the oblast have no personnel and no facilities for providing the people with oncological services. The author advocates the establishment of oncological points throughout the oblast, the training of personnel qualified to handle and diagnose cancer cases; and providing the points with mobile facilities equipped with fluoroscopes.

126. Central Medical Library of the USSR

"Central Medical Library -- 40th Anniversary," by V. Mikhailov, director, Central Scientific Medical Library; Moscow, Meditsinskiy Rabotnik, 19 May 59

The Central Scientific Medical Library, established 40 years ago, is now one of the largest medical libraries of the world. The library increases its number of volumes by some 50,000 each year. The library was also instrumental in the organization and development of the medical library network in the USSR. It aided in the development of libraries in new medical institutes such as at Karaganda, Blagoveshensk, and Kustanaysk. A considerable number of books have been sent to the regions of the Far East and North. One of the important side functions of the library is to compile bibliographies; during the past 5 years the library has compiled more than 9,000 bibliographic sources.

In 1948, a special Abstract Bureau was organized in the library which translates foreign medical literature from 23 languages. The library also compiles bibliographies, organizes exhibits of new literature, and prepares for publication lists of source books on various diseases, such as those of the cardiovascular system. It also publishes indexes, many of which are slated for practicing physicians. In the near future, the library will publish a series of major thematic bibliographies for use by scientific institutes of the Academy of Medical Sciences. The library also offers courses for the advanced training of librarians. During the past few months, work has begun on microfilming individual articles and sections of medical books. The library also conducts an active exchange program with foreign countries. At present the library is exchanging midical books with 1,150 establishments in 75 foreign countries.

127. Soviets Will Publish Volumes on Completed Medical Research

"Annotated Scientific Works of Academy of Medical Sciences USSR" (unsigned article); Moscow, Meditsinskiy Rabotnik, 15 May 59

The Academy of Medical Sciences USSR will systematically publish annotated volumes on medical research completed by scientific research institutes of the academy.

A three-volume edition will be issued shortly; the volumes are edited by Academician A. N. Bakulev. The volumes will include short descriptions of the results of the research on the most important problems of medical science. Also included will be the names of the scientists responsible for the work and the directors of the research projects.

The volumes may be ordered from the Scientific Planning Commission (Nauchno-Planovaya Komissiya), Presidium of the Academy of Medical Sciences USSR, Moscow, Solyanka, D. 14. The price of the three volumes is 50 rubles.

128. Prof K. M. Bykov, Soviet Pavlovian Physiologist, Dies

"In Memory of K. M. Bykov" (unsigned article); Moscow, Meditsinskiy Rabotnik, 15 May 59

Prof Konstantin Mikhaylovich Bykov, Active Member of the Academy of Medical Sciences USSR, Honored Worker of Science, and an outstanding Pavlovian physiologist, died on 14 May 1959 in his 74th year.

At the time of his death, Bykov was director of the Institute of Physiology imeni I. P. Pavlov, Academy of Sciences USSR, which had merged with the Institute of the Physiology of the Central Nervous System, Academy of Medical Sciences USSR, which Bykov had organized.

During World War II, Bykov held several important posts and was active in organizational work. He held the rank of Lt Gen Med Serv. He was elected deputy chairman of the Supreme Soviet RSFSR. His awards include the Order of Lenin, two Orders of Labor Red Banner, and other orders and medals of the Soviet Union.

Bykov's principal work concerned the study of the cortical control of internal organs which was an extention of Pavlov's research. His famous monograph, Kora Golovnogo Mozga i Vnutrenniye Organy (Cerbral Cortex and Internal Organs) earned him a Stalin Prize.

129. Maj Gen Med Serv (Ret) V. P. Kalashnikov, Soviet Pharmacologist, Dies

"In Memory of V. P. Kalashnikov" (unsigned article); Moscow, Meditsinskiy Rabotnik, 19 May 59

Prof Viktor Petrovich Kalashnikov, Maj Gen Med Serv (Ret), chief, Chair of Pharmacology, Military Medical Academy imeni S. M. Kirov, died recently after a long serious illness.

Kalashnikov had been chief of the Chair of Pharmacology since 1945, and had been associated with the chair since 1925. He is the author of over 70 scientific works on pharmacology and was a past member of the editorial board of Aptechnoye Delo.

130. Diffusion of Silicon Into Titanium, Tantalum, Molybdenum and Iron

"Diffusion of Silicon Into Titanium, Tantalum, Molybdenum and Iron," by G. V. Samsonov, M. S. Koval'chenko, and T. S. Verkhoglyadova, Institute of Powder Metallurgy and Special Alloys, Academy of Sciences Ukrainian SSR; Kiev, Dopovidi Akademii Nauk Ukrains'koi RSR, No 1, Jan 59, pp 32-36

Specimens of titanium (99.98%), tantalum (99.6% Ta; 0.4% Nb), molybdenum (99.98%) and iron (Armco iron) were saturated with silicon from a solid phase bath consisting of 97% Si and 3% NH_4Cl in an argon atmosphere. Saturation was performed at temperatures from 600 to 1,200°C in 100-degree intervals for a 4-hour period for all specimens with supplementary different saturation periods at temperatures of 900, 1,000 and 1,200°C for titanium, tantalum, molybdenum and iron. It was established that the relative change of the weight, diameter and height $\frac{\Delta p}{p}$ of the specimens depends on the absolute temperature T and the duration of saturation τ as expressed by the equation:

$$\frac{p}{p} = \sqrt{A\tau}\, e^{-\frac{B}{T}},$$

where A and B are experimentally determined constants.

From given tabulated results, it was noted that the voltage breakdown in the silicide layers on the metals depends on the content of silicon in the layers and on the degree of imperfection of the nonsaturated α-sublevels of atoms of the transitional metal. The following energies of activation of the diffusion of silicon were determined: Ti = 5,216.4 cal/mole; Ta = 21,513.2 cal/mole; Mo = 13,387.5 cal/mole, α-Fe = 1,553.8 cal/mole; and γ-Fe = 21,513 cal/mole.

131. Ultrasonic Aging of a Nickel-Chromium-Titanium Alloy

"Effect of Ultrasound on the Aging of a Nickel-Chromium-Titanium Alloy," by E. A. Al'fman and V. S. Yermakov, Military-Air Engineering Academy imeni Mozhayskiy, Leningrad; Moscow, Akusticheskiy Zhurnal, Vol 4, No 4, Oct-Dec 1958, pp 307-314

One group of specimens of the KhN80T type high-temperature alloy was subjected to elastic ultrasonic vibrations in the 23-26 kc range at temperatures of 700, 750, and 800°C for different durations and another to vibrations in the 20-21 kc range at a temperature of 700°C. The amplitude of displacements of the ends of the specimens in the first group was 5 microns, and 8 microns for those in the second, which corresponded to acoustic energies of 2.3-2.7 kg/mm^2 and 3.3-3.7 kg/mm^2, respectively. The approximate two-fold increase in the acoustic energy for the second group of specimens made it possible to obtain a hardness of 98-100 (Rockwell) in 20-25 minutes, as compared to the 16 hours required in standard aging conditions at 700°C. Approximately the same quantity of intermetalloid phase (8.62-8.91 percent by weight) was precipitated from the solid solution in 15 to 20 minutes under conditions employed for the second group of specimens that was precipitated in 16 hours under standard conditions (8-9 percent by weight at the equal temperature of 700°C.

The authors feel that ultrasound would be of considerable importance in the field of heat treatment and that the results warrant future research for theoretical substantiation of the processes involved and establishment of optimum parameters for ultrasonic processes in the accelerated aging of industrial alloys.

132. New Powder Method for High-Temperature Tubing and Rods

"New Method for Preparing Tubing and Rods From Powders of High-Melting Metals and Their Compounds," by G. V. Samsonov and P. S. Kyslyy, Institute of Powder Metallurgy and Special Alloys, Academy of Sciences Ukrainian SSR; Kiev, Dopovidi Akademii Nauk Ukrains'koi RSR, No 1 Jan 59, pp 46-48

Mixtures of the high-melting powders and plasticizer are preliminarily compacted at a pressure of 1 ton/cm^2 and then extruded from a special dye. Specially coated, semi-finished extrusions are heated to a temperature of 600-700°C for 30 minutes and then heated to the sintering temperature (1,950°C for $MoSi_2$; 2,000°C for Mo; 2,250°C for TiC; 2,300°C for TiB_2; and 2,200°C for ZrB_2). Sintering temperatures are maintained for 5-10 minutes and then the furnace is slowly cooled to 900-1,000°C. Shrinkage for extrusions from metal powders and their high-melting compounds is 12-20% (16% for $MoSi_2$ and 20% for Mo). Porosity ranges from 5 to 12%. The porosity gradient along a tube 400-500 mm in length does not vary more than 1%.

133. Corrosion Resistance of Some Metal Borides

"The Resistance of Borides of Transitional Metals to the Action of Acids and Alkalis," by K. D. Modylevskaya and G. V. Samsonov, Institute of Powder Metallurgy, Cermets, and Special Alloys, Academy of Sciences USSR; Kiev, Ukrainskiy Khimicheskiy Zhurnal, Vol 25, No 1, Jan-Feb 59 (published in March 59), pp 55-61

A semiquantitative investigation has been made of the behavior of borides of metals of transitional elements of the IV, V, and VI groups of the periodic system (TiB_2, ZrB_2, VB_2, NbB_2, TaB_2, CrB_2, Mo_2B_5, and W_2B_5) in acids, acidic mixtures, and solutions of alkalis at room temperature and at boiling temperatures. It was established that: the borides of niobium and tantalum are highly resistant to the action of acids; tungsten boride is relatively stable when exposed to the action of acids; and a number of the borides investigated are resistant to the action of solutions of sodium hydroxide. Certain acids and mixtures of acids are suggested for the decomposition of borides in analytical work, so that melting with alkali metal carbonates (which necessitates the application of platinum crucibles) will be avoided.

134. Oxidation of Recrystallized and Cold-Worked Rhenium

"Kinetics and Mechanism of the High-Temperature Oxidation of Rhenium in Recrystallized and Cold-Hardened States," by V. A. Lavrenko, Institute of Powder Metallurgy, Cermets, and Special Alloys, Academy of Sciences USSR; Kiev, Dopovidi Akademii Nauk Ukrains'koy Radyans'koy Sotsialistichnoy Respubliki, No 11, Nov 58, pp 1216-1220.

The temperature dependence equation of the linear oxidation constant is calculated for recrystallized and cold-hardened (cold-worked) states in the range of 400-725°. The slowest stages of the process are the kinetically indivisible stages of the electrochemical formation of rhenium oxides and their subsequent vaporization.

135. Work on Heat-Resistant Alloys Under the Seven-Year Plan

"The Seven-Year Plan: Heat-Resistant Alloys," by Prof N. Sklyarov, Doctor of Technical Sciences; Moscow, Sovetskaya Aviatsiya, Vol 18, No 104 (3274), 6 May 59, p 3, columns 1-6

In a general review which emphasizes fundamental aspects of the subject and points out the significance of heat-resistant alloys for aviation, the following statements are made:

Definite limits exist as far as improvement of the heat-resistance of iron and nickel alloys is concerned. Further raising of the temperature level at which heat-resistant alloys can be used is possible only by employing metals with higher melting points, i. e., chromium, niobium, molybdenum, tantalum, and tungsten. To obtain these high-melting metals in the form of castings, one must melt them in vacuum, using special arc furnaces to which air should not be admitted. Under the current Seven-Year Plan, a great deal of attention will be paid to the improvement and development of methods for melting metals in vacuum.

The methods of powder metallurgy are of value, because by using them, one may produce "synthetic" materials of the cermet type, i. e., materials in which metals are combined with their high-melting oxides. For instance, aluminum oxide has a melting point of 2050° C.: by using aluminum oxide, it will be possible to develop a meterial which will withstand temperatures twice as high as those to which ordinary aluminum alloys can be safely exposed. Under the Seven-Year Plan, extensive work will be done on "synthetic" heat-resistant materials.

136. Investigation of a Heat-Resistant Alloy by the Electric Transfer Method

"On the Electric Transfer of Tungsten in a Nickel-Tungsten Alloy," by I. N. Frantsevich, Ye. F. Kalinovich, I. I. Kovenskiy, and M. D. Smolin, Institute of Powder Metallurgy, Metal Ceramics, and Special Alloys, Academy of Sciences Ukrainian SSR, Kiev; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 2, No 4, Apr 59, pp 46-51

In the evaluation of the effect of admixtures on the atomic bond strength in metal alloys (particularly heat-resistant alloys), the method of determining the transfer of components of an alloy in a constant electric field is the most effective. By using this method, the capacity of individual components of the alloy to act as donors or acceptors of electrons can be determined. The transfer of tungsten through the action of an electric field was investigated in nickel-tungsten alloys at temperatures of 850, 900, 950, 1,000, 1,050, and 1,100°, using the radioactive isotope W^{185}. It was established in the experiments described, that in a constant electric field, tungsten atoms migrate to the cathode, which means that in the alloy investigated in this instance they are donors of electrons. Using formulas given in the paper, the charges of tungsten ions and the transfer numbers of electrons were calculated. It is shown that the magnitude of the electric transfer of tungsten atoms increases with rise in temperature within the range from 850 to 950° and then drops, reaching zero at 1,100°. The electron transfer numbers also conform to this rule. The charge of the ions remains constant in the temperature range from 850 to 950° and then decreases, reaching zero at 1,100°.

Data obtained on the transfer of tungsten in an iron-tungsten alloy are compared with those determined for a nickel-tungsten alloy. It is brought out that the acceptor capacity of nickel atoms is lower than that of iron atoms. It is furthermore shown that, on the basis of the electronic configuration of atoms, it is to be expected that in cobalt-tungsten alloys, the electric transfer of tungsten must be on a level intermediate between those observed in alloys of tungsten with nickel and iron.

137. Forthcoming Conference of the Cold Stamping Industry

"Concerning the Future Scientific-Technical Conference on Progressive Technology in the Cold Stamping Industry," by V. P. Romanovskiy; Moscow, Kuznechno-Shtampovochnoye Proizvodstvo, No 2, Feb 59, p 48

 The complete article by V. P. Romanovskiy, Chairman of the Conference Organization Committee reads as follows:

"The Section for Pressure Working Metals of the Central Administration and the Leningrad Oblast' Administration of the Scientific-Technical Society of the Machine Building Industry is calling an All-Union scientific-technical conference for October-November 1959 in Leningrad on progressive technology in the cold stamping industry. The conference is designed for a wide circle of innovators in the industry and engineering-technical and scientific workers.

"Goals of the conference are the presentation and generalization of results of works in industry and scientific research institutes in the field of cold stamping technology, the establishment of basic aims and problems in the future development of this field of technology and also a wide exchange of experience.

"It is proposed that reports on the following themes be heard and discussed at the conference:

(1) progressive technology in cold stamping

(2) new developments in designing and manufacturing cold stamping dies;

(3) automation and mechanization in cold stamping production.

"The Conference Organization Committee appeals to workers of cold stamping shops to take an active part in the work of this conference.

"Persons wishing to present reports or information at the conference should submit the report topic and abstract to: Orgkomitet po sozyvu soveshchaniya, Leningrad, Nevskiy pr., d. 60, NTO Mashproma, for approval by the organization committee and inclusion in the program of the conference."

Atomic and Molecular Physics

138. Particle Ionization

"Balanced Particle Ionization," by A. A. Arshinov and A. K. Musin; Moscow, Doklady Akademii Nauk SSSR, Vol 120, No 4, Jun 58, pp 747-750

A general solution of the problem of a balanced ionization of particles is presented, comprising all cases from multiple atom ionization to ionization of macroscopic particles. The equations derived make it possible to deduce previously known formulas (H. Einbinder, J. Chem. Phys., 26, 948 [1957].

139. Scattering of Light

"Contribution of the Theory of Scattering of Light Near Phase Transition Points of the Second Kind," by A. P. Levanyuk, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 810-818

Formulas for the intensity of scattered light near transition points have been derived on the basis of the exact Gibbs expression for fluctuations of the parameter characterizing the phase transition of the second kind. The formulas are employed to estimate the minimal width of the temperature region near a transition point at which the usual macroscopic theory of phase transitions of the second kind becomes meaningless. The formulas are also used to substantiate the validity of the calculations of the scattered light intensity presented by the author and V. L. Ginzburg in J. Phys. Chem. Solids, 6, 51 (1958).

140. Group Velocity of Light

On the Role of Group Velocity of Light Emitted in a Refractive Medium," by I. M. Frank, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 823-831

The emission of light by a system of particles possessing an arbitrary characteristic frequency is considered for the case when the system uniformly moves in a refractive medium which is transparent for the emitted light. The role of the group velocity of the light emitted by such a source is investigated.

Cosmic Ray Physics

141. Extensive Atmospheric Showers

"Investigation of the Core of Extensive Atmospheric Showers," by S. N. Vernov, N. N. Goryunov, G. T. Zatsepin, G. V. Kulikov, Yu. A. Nechin, Z. S. Strugal'skiy, and G. B. Khristiansen, Moscow State University and Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 668-681

A new method for individual study of extensive atmospheric showers is described. The method is applied to study the core of extensive atmospheric showers. Some preliminary experimental data are presented which indicate the existence of sharp fluctuations in the energy flux of the electron-photon and nuclear-active components of the core of extensive atmospheric showers.

142. Energy of μ-Mesons

"Underground μ-Meson Spectrum at a Depth of $\sim$40 m. Water Equivalent," by M. I. Dayon and L. I. Potapov, Physics Insitute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 697-706

A magnetic spectrometer was employed to measure the momentum spectrum of μ-mesons at a depth of $\sim$40 m water equivalent in the $2 \cdot 10^8$ to $5 \cdot 10^{10}$ ev/c momentum range.

143. Electron Positron Tracks

"Ionization Along the Tracks of High Energy Electron-Positron Pairs," by A. A. Varfolomeyev, R. I. Gerasimova, L. A. Makar'ina, A. S. Romantseva, and S. A. Chuyeva; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 707-716

Experimental data are presented on the track densities of five high energy electron-positron pairs in nuclear emulsions. The measurements were performed for the first pairs of electron-photon showers. The pair energy was estimated from the energy spectrum of the cascade electrons at a distance of 2.5-3 radiation lengths from the vertex of the first pair. In three cases, the pair energy was close to 10^{12} ev, and in two cases, approximately $3 \cdot 10^{11}$ ev. The track density was determined by two methods: from the grain density in the track and from the gap length distribution coefficient. Compared to a particle for which the specific energy loss is twice as large as the ionization loss of the electron, the track density of the pair near the vertex was found to be smaller. This decrease of the pair track density can be explained by the mutual screening of the electron and positron during ionization. The results are compared with the theoretical ionization curves for pairs calculated by Chudakov.

144. Neutrons in Cosmic Rays

"High Energy Neutrons in Cosmic Rays," by G. N. Flerov, V. I. Kalashnikova, A. V. Podgurskaya, Ye. D. Vorob'yev, and G. A. Stolyarov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 727-734

Multilayered ionization chambers were employed to detect the effect of heavy nuclei fission in cosmic rays. The altitude dependence of fission was investigated, as well as the angular distribution of the fission producing particles. The energy and momentum of the latter have been estimated. It is shown that in the overwhelming majority of cases, fission of heavy nuclei is caused by the nucleon component of the cosmic radiation.

145. Nuclear Active Component in Air Showers

"High Energy Nuclear Active Component in Extensive Air Showers at Sea Level," by A. T. Abrosimov, V. A. Dmitryev, G. V. Kulikov, Ye. I. Massal'skiy, K. I. Solov'yev, and G. B. Khristiansen, Insitute of Nuclear Physics, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 751-761

Data are presented on the number of high energy nuclear-active particles in showers containing a total number of particles between $1 \cdot 10^4$ and $2 \cdot 10^6$ and also on the spatial distribution of the energy flux of the nuclear-active component. It is noted that the energy of the nuclear-active component in individual showers with an equal number of particles may widely differ. On basis of the shape of the spectrum of the nuclear-active particles and the shape of the spatial distribution of the energy flux of the nuclear-active component, some conclusions are drawn regarding the nature of the elementary act underlying the nuclear-cascade process.

146. Cosmic-Ray Masses

"Measurement of Masses of Cosmic Ray Particles Underground," by M. I. Dayon and L. I. Potapov, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 921-922

Results of cosmic ray mass measurements underground at a depth equivalent to 40 meters of water were carried out with a magnetic spectrometer which simultaneously recorded the pulse spectrum and the positive μ-meson excess. The equipment used was described on page 697 of this periodical. The possible number of protons in a pulse range of $6 \cdot 10^8 < P < 10^9$ ev/c was estimated as 0.6% in the upper limit.

Nuclear Physics

147. Bismuth Fission

"Peculiarities of Bi Fission at Very High Excitation Energies," by V. F. Darovskikh and N. A. Perfilov, Radium Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 652-657

Nuclear emulsions were used to study the relative yields for Bi fission induced by 660 mev protons and also their dependence on the ratio of the ranges of light and heavy fission fragments, l_l / l_h for various nuclear groups involving different excitation eneergies. The dependence of the fission yields on the range ratio was not found to vary monotonously for some nuclei. The dependence of the mean total range of the fragment on l_l / l_h has been obtained. An explanation of the experimental facts is suggested on basis of the shell structure of the product nuclei.

148. Proton Flight in Copper

"Energy-Flight Relation of 660 Mev Protons," by V. P. Zrelov and G. D. Stoletov, Joint Institute of Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 658-668

The mean range of protons in copper was determined by the method of slowing down protons in copper. The proton energy was computed from the measured angle of emission of Vavilov-Cherenkov radiation by protons in plexiglas. With account of relevant corrections, the range of (658 $\pm$ 2) Mev protons in copper was found to equal (257.6 $\pm$ 1.2) g/cm^2. Assuming the ionization potential to be independent of the velocity, the calculated value of I_{Cu} is found to be (305 $\pm$ 10) ev. The stopping power with respect to copper was also measured for H, Be, C, Fe, Cd, and W.

149. Generation of π^{o}-Mesons

"Generation of π^{o} Mesons in the Interaction Between ~ 9Bev Protons and Nuclei of the Photographic Emulsion," by G. L. Bayatyan, I. M. Gramenitskiy, A. A. Nomofilov, M. I. Podgoretskiy, and E. S. Skrzypczah, Joint Institute of Nuclear Physics; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 690-693

The mean energy of π^{o}-mesons produced in collisions between ~ 9 BeV protons and photographic emulsion nuclei was determined. The value $\bar{E}_{\pi} = 750 \pm 180$ MeV has been obtained for the mean π-meson energy. The fraction of energy carried off by π-mesons in such interaction lies between 0.33 ± 0.08 and 0.27 ± 0.07.

150. Internal Conversion Coefficients

"Accurate Measuring of the Ratios of the Internal Conversion Coefficients for 411.8 kev Gamma Quanta in Hg-198," by V. M. Kelman and R. Ya. Metskhvarishvili, Leningrad Physico-Technical Insitute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 694-696

The following internal conversion coefficient ratios have been obtained for 411.8 kev γ-rays in the shells and subshells of Hg-198 $K/L = 2.69 \pm 0.02$ $L_{I} : L_{II} : L_{III} = 1 : (1.05 \pm 0.02) : (0.45 \pm 0.01)$; L : M; N; O = 1 : (0.252 ± 0.004) : (0.077 ± 0.004) : (0.018 ± 0.002). Within the accuracy of the measurements, the experimental ratios agree with the theoretical ones presented in the tables of Sliv and Band.

151. Photodisingtegration of Au-197

"Ratio of Deuteron to Proton Yield in the Photodisintegration of Au-197," by Ye. D. Makhnovskiy, Leningrad Physico-Technical Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 735-743

The ratio of the photodeuteron yield to the photoproton yield has been measured for gold irradiated with 70 Mev maximum energy bremsstrahlung. The ratio found to equal 0.14 ± 0.07. The protons and deuterons were identified by grain counting over the last 90 μ of the particle range in the emulsion.

152. Fission of Heavy Nuclides

"Fission of Nuclei of Heavy Elements Produced by Impinging Carbon, Nitrogen, and Oxygen Nuclei," by S. M. Polikanov and V. A. Druin; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 744-747

The energy dependences of the cross sections for Bi and U fission induced by accelerated C^{12}, N^{14} and O^{16} nuclei and also the dependences of the Au, Re and Yb fission cross sections on the N^{14} ion energy are presented. The measurements were performed with an ionization chamber and monochromatic beam from a 150-cm cyclotron.

Experimental results pertaining to the measurement of the ranges and angular anisotropy of the U^{238} and Au fission fragments produced by accelerated C^{12} ions are also presented.

153. Two Neutron Capture Reaction

"Two Neutron Capture Reaction in the Interaction Between N-14 and Nuclei of Some Elements," by V. A. Karnaukhov, G. M. Ter-Akop'yan, and V. I. Khalizev; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 748-750

Targets from LiF, Al, and Cu were irradiated with ~92 MeV N^{14} ions. Among the reaction products, the radioactive isotope N^{16} was detected on basis of its decay period and β-particle energy. It is concluded that N^{16} is formed as a result of "capture" of two neutrons from the target by the bombarding particle.

154. Production of Californium Isotope

"The Cross Section for Californium Isotope Production by Irradiating U-238 With Accelerated Carbon Ions," by V. V. Volkov, L. I. Guseva, A. S. Pasyuk, N. I. Tarantin, and K. V. Filippova; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 762-765

The energy dependence of the reactions U^{238} (C^{14}, 4 n - 5 n) $Cf^{246-245}$ and U^{238} (C^{13}, 5n - 6n) $Cf^{246-245}$ was investigated. Stacks of foils and radiochemical analysis of the reaction products were employed in the work. The results obtained indicate that the investigated reactions involved the formation of a compound nucleus with subsequent evaporation of the neutrons. The reaction cross sections are employed to estimate the competition between neutron evaporation from the compound nucleus and fission.

155. Fission of Nonspherical Nuclei

"Fission of Nonspherical Nuclei," by A. G. Sitenko, Kharkov State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 793-797

Direct fission of a nonspherical nucleus arising as a result of the transfer of a large angular momentum to the nucleus by the absorbed particle is analyzed.

156. Spontaneous Radiation

"Contribution to the Theory of Coherent Spontaneous Radiation," by V. M. Fayn, Radiophysical Institute of the Gorkiy State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 798-802

Some problems relating to the theory of coherent spontaneous radiation are considered. It is shown that the interaction of the particles via the common radiation field leads to a shift in the proper frequencies of the system.

157. Oscillations of Deformed Nuclei

"Quadrupole Oscillations of Deformed Nuclei," by B. L. Birbrair, L. K. Peker, and L. A. Sliv, Leningrad Physico-technical Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 803-809.

Formulas are derived for quadrupole oscillations of deformed nuclei. The interaction between the rotation and vibrations is considered, and a general formula is given for the corrections to the level energy of the ground rotational band. Presently available experimental data for nuclei in the rare earth regions are discussed, and the difficulties encountered in their analysis are mentioned.

158. Nonuniqueness of Phase Shift

"Nonuniqueness of Phase Shift Analysis of Proton-Proton Collisions," by V. S. Barashenkov and Huang Nen-Ning, Joint Institute of Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 832-834

A method based on the optical model is proposed for phase analysis of (pp)-collisions at energies E $\leq$ 10 Bev. At energies E $\sim$ 1 Bev, the refractive and absorption coefficients are found to be of the same order of magnitude. The calculated differential cross sections for elastic scattering and also the total corss section and cross section for inelastic processes agree with the experiments.

159. Stripping Reactions

"The Role of Exchange Effects in Stripping Reactions," by V. G. Neudachin, I. B. Teplov, and O. P. Shevchenko, Institute of Nuclear Phsics, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 850-853

A general expression has been obtained for the cross section for "heavy particle stripping" as one of the exchange effects in stripping theory. Some results of numerical computations of exchange effects in stripping reactions are presented for some of the simplest cases.

160. Nuclear Magnetic Moments

"The Theory of Nuclear Magnetic Moments," by D. F. Zaretskiy; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 869-873

Due to a strong spin-orbit coupling, an additional interaction between nucleons in the nucleus and the electromagnetic field arises. The effect of this additional factor on nuclear magnetic moments is considered for spherical, as well as nonspherical, nuclei. It is shown, in particular, that about half of the anomalous deviation of the magnetic moment of Bi^{209} from the Schmidt line may be due to this effect.

161. Electromagnetic Radii of Light Nuclei

"Electromagnetic Radii of the Lightest Nuclei in the Ground and Lowest Excited States," by A. K. Kaminskiy and Yu. M. Shirokov, Moscow, State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 874-878

The radii of nuclei with mass numbers 5-8 are calculated for the ground and excited states from experimental data on isotopic multiplets and scattering of high energy electrons on nuclei. It is shown that, excluding the He^5 - Li^5 doublet, the radii monotonically increase with the energy for all nuclei. One of the levels of Be^8 is identified with greater precision.

162. Stability of Nuclei

"The Stability of Nuclei," by P E. Nemirovskiy; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, Mar 59, pp 889-895

The dependence of the interaction between a nucleon and the nucleus on N/Z was investigated. An estimation of the maximum A/Z is given; this ratio is found to vary between 3 and 3.8.

It is shown that when N equals the number of neutrons in a closed shell, the minimum Z discontinuously changes by several units. It is suggested that these jumps in the values of Z_{min} upon closure of the neutron shell may be responsible for the considerable abundance of certain isotopes, provided that the synthesis of atomic nuclei occurred in brief neutron bursts.

163. Fok Expansion of Wave Functions

"Fok Expansion for the Wave Functions of a System of Charged Particles," Yu. N. Demkov and A. M. Yermolayev, Leningrad State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 896-899

The method applied by Fok (Izv. AN SSSR, seriya fizicheskaya, 18, 161, [1954] for analysis of the wave function of the ^1S-state of helium is generalized for arbitrary systems of charged particles and for states of any symmetry.

164. Zero Rest Mass Particles

"Reactions Involving Polarized Zero Rest Mass Particles," by Chou Kuang-chao, Joint Institute of Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 909-918

The group-theory viewpoint is employed in the present work to describe the spin states of particles possessing zero rest masses. Complete sets of operators and their eigenfunctions in momentum and spin representations are obtained for a two-particle system. Statistical tensors for particles produced in reactions of the $a + b \rightarrow c + d$ or $a \rightarrow c + d$ types have been obtained in the case when one of the particles does not possess a rest mass. The most general selection rules for the $a + b \rightarrow c + d$ reaction are derived in the form of a relation between statistical tensors under the condition of conservation of space and time parity. The wave functions of a system consisting of two identical particles with zero mass are calculated.

165. Fission Fragments of Am-241

"Angular Anisotropy of Fragment Flights at Am-241 Fission Induced by 14.7 Mev Neutrons," by A. N. Protopopov, I. A. Baranov, and V. P. Eysmont; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 920-921

The angular distribution of fission fragments of Am-241 induced by 14.7 Mev neutrons was studied to provide information on the effect of nuclear structure on the angular anisotropy of the fission process. By using the method described this periodical, Volume, 34, 1958, page, 250, the relative amount of fragments was determined in directions parallel and perpendicular to the neutron beam. The degree of angular anisotropy of Am-241 was found to be 1.08 ± 0.06. It was noticed that the anisotropy decreases with an increase in the parameter Z^2/A, which may be explained within the framework of the statistical theory of V. M. Strutinskiy (Atomnaya Energiya, 6, 508 [1957]).

166. Strange Particles

"Production of Strange Particles in (p,p)-Collisions at 3 Bev Energies," by V. S. Barashenkov and V. M. Mal'tsev, Joint Institute of Nuclear Research; Moscow Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 933-934

The statistical theory of multiple strange particle production was previously analyzed by the authors: (Nucl. Phys. 5, 17, [1957]; Nuovo Cim., Suppl. 1, 7, 177 [1958]; Acta Phys. Polon., 17, 177 [1958]). Recent experimental data made it possible to test theoretical data on (p,p) collisions. The results of the comparison are given.

167. Gamma Rays of As-74

"Gamma Rays of As-74," by Yu. Ye. Loginov and K. I. Yakovlev, Radium Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, p 940

The gamma spectrum of As-74 was studied by means of a scintillation gamma spectrometer operating on a NaJ(Ta) crystal with a FEU-S photomultiplier. The existence of Gamma lines of 1190 and 2220 kev was established; two others, of 960 and 1600 kev, it is stated, require further study.

168. Gamma Rays Accompanying U-238 Fission

"Gamma Rays Accompanying U-238 Fission Induced by 2.8 and 14.7 Mev Neutrons," by A. N. Protopopov and B. M. Shiryayev, Radium Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 954-955

It was attempted to obtain data on the energy release in the form of gamma radiation during U-238 fission by fast neutrons. The obtained gamma-ray spectra were compared with the spectra of gamma-rays emitted during U-235 fission by thermal neutrons. The method and equipment used were previously described by the authors in this periodical, Volume 34, 1958, page 331. It was found that in the case of all studied nuclei (U-235, U-238, Cf-252), the average total energies of gamma quanta for one fission event have close laying values and that the gamma-quanta energy depends little on the excitation energy of the compound nucleus before fission.

169. Numerical Calculation of the Equations of Hydrodynamics

"Difference Method for the Numerical Calculation of the Discontinuous Solutions of the Equations of Hydrodynamics," by S. K. Godunov; Moscow, Matematicheskiy Sbornik, Vol 47 (89), No 3, Mar 59, pp 271-306

The method of characteristics used for the numerical solution of the equations of hydromechanics is highly nonstandardized. The method is, therefore, inconvenient for automatic calculations on electronic computers, especially in problems involving a large number of shock waves and contact discontinuities.

Difference equations were proposed by J. Neumann and R. Richtmyer ("A Method for the Numerical Calculation of Hydrodynamic Shocks," Journ. Appl. Physics, Vol 21, No 3, 1950, pp 232-237) for the solution of equations of hydromechanics in which viscosity was synthetically interpolated, thus spreading the shock waves over several calculation points. In addition to this, the calculation is assumed to go through the shock waves in unbroken form.

P. D. Lax, in his work "Weak Solutions of Nonlinear Hyperbolic Equations and Their Numerical Computation" (Communic. on pure and appl. Math., Vol 7, No 1, 1954, pp 159-193), described a useful arrangement of "triangles" for calculation over shock waves. The deficiency of this arrangement is the fact that it does not admit calculation with too fine an interval of time (in comparison with the space interval divided by the velocity of sound), converting in this case any initial data into linear functions. In addition, this arrangement spreads contact discontinuities.

The present work has as its goal the finding of the best arrangement, in a certain sense, permitting calculation over shock waves. This choice is made for linear equations, and, thereafter, an analogous arrangement is carried over for the general equations of hydrodynamics. A great number of calculations have been performed on Soviet computers according to the proposed arrangement. For control, some of these calculations were compared with calculations according to the method of characteristics. Comparison of these results has been completely satisfactory.

170 Plasma Pinch in Gas Discharge

"Investigation of High Current Pulse Discharges in Conical Chambers," by N. A. Borzunov, D. V. Orlinskiy, and S. M. Osovets; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 717-726

Some general considerations are presented concerning the possibility of formation of a cumulative jet upon contraction of a conical plasma envelope. Preliminary results of some experiments performed with so-called single and double conical systems are presented. Photographs of the discharge in conical chambers are presented and also the results of other measurements.

171. Current Carrying Ring Moving in a Plasma

"Investigation of a Current Carrying Ring Uniformly Moving in a Plasma Located in a Magnetic Field," by L. S. Bogdankevich, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 835-838

Energy losses due to Vavilov-Cherenkov radiation are computed for a current-carrying ring uniformly moving in a plasma perpendicular to its plane and parallel to the external magnetic field.

172. Oscillations of a Cavity in Plasma

"Oscillations of a Cylindrical Cavity in a Completely Ionized Plasma," by L. M. Kovrizhnikh, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 839-840

Oscillations of a cylindrical cavity in a completely ionized plasma located in a magnetic field are investigated within the framework of magnetohydrodynamics under the assumption of ideal conductivity. It is shown that such a system is stable and that, under definite conditions, the waves cannot propagate along the cavity.

173. Electron Action on Crystals

"The Law of Reciprocal Substitution for the Disorder Process of Some Crystalline Specimens by the Action of Moderate-Speed Electrons," by Ye M. Belavtseva, Laboratory of Electron Microscopy, Department of Biological Sciences, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 125, No 5, Apr 59, pp 1005-1006

The checking of the law of reciprocity upon medium energy electron interaction with a dielectric was carried out by an electrographic method. The electronograms permitted the determination of the transit time of natural organic compounds from the crystalline to the amorphous state at various radiation intensity. The time of irradiation was measured by a secondometer from the start of irradiation to the disappearance of the last sharp interference maximum, which was recorded visually, as well as photographically. A deviation from the law of reciprocal substitution is noticed within the range of weak radiation intensity.

174. Ferromagnetic Resonance in Ferrites

"Some Peculiarities of Multiplet Ferromagnetic Resonance in Ferrites," by V. N. Lazukin, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 682-689

Preliminary results of observation of the multiplet ferromagnetic resonance in inhomogeneously magnetized single and polycrystalline ferrite samples are presented. The inhomogeneous magnetizations required for observation of the effect were mainly produced by the inhomogeneity of the demagnetizing fields of the investigated samples. Some peculiarities of the absorption spectra measured under various conditions are indicated.

175. Ferromagnetism of $MnCO_3$ Single Crystal

"Investigation of Weak Ferromagnetism in the $MnCO_3$ Single Crystal," by A. S. Borovik-Romanov, Institute of Physical Problems, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 766-781

The magnetic properties of a very pure natural $MnCO_3$ single crystal have been studied in the temperature range from 1.3 to 300°K. In accord with the predictions of the theory of I. Ye. Dzyaloshinskiy (presented

in this periodical, Volume 32, 1957, page 1547), it has been found that the ferromagnetic moment σ is observed only in the basis plane. Along the triple axis, the crystal is paramagnetic. The temperature dependence of σ, $\chi_\perp$ and $\chi_\parallel$ has been investigated in detail throughout the complete region of existence of antiferromagnetic ordering. It is shown that, in accord with the theory of phase transitions of the second kind near the transition point, one has $\sigma/\chi_\perp \sim \sqrt{T_N - T}$.

At low temperatures, σ is proportional to T^2 in a broad range from 1.5 to 23°K (0.7 T_N). The dispersion law and temperature dependences of the thermodynamical quantities for antiferromagnetics with a magnetic structure of the $MnCO_3$ type have been obtained by the spin wave theory method. In this case, the spontaneous magnetization vector is directed perpendicular to the crystal axis. A result of this is the absence in the energy spectrum of a gap related to the anisotropy field. The theoretical formulas obtained qualitatively agree with the experimental results. Possible causes of the large quantitative descrepancy between the magnitudes of the coefficients which determine the temperature dependence of σ and $\chi_\perp$ are discussed.

176. Conductivity Electrons in Ferromagnetics

"The Interaction Between Conductivity Electrons in Ferromagnetics," by A. I. Akhiyzer and I. Ya. Pomeranchuk. Physico-Technical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 859-862

It is shown that, in ferromagnetics, there is an additional attraction between conductivity electrons, which is due to exchange of the spin waves.

177. d-Electron Interactions in Transition Metals

"Indirect Interaction Between d-Electrons of Transition Metals," by A. A. Berdyshev and B. V. Karpenko, Ural State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 819-822

The second approximation of the perturbation theory for the s-d-model of the transition metals yields an indirect interaction between d-electrons in which the conductivity electrons are involved. As a consequence, ferromagnetism may arise when s - d-coupling is completely absent or even when the d - d-exchange integral is negative.

178. Nonlinear Oscillations

"Transition of a Nonlinear Oscillatory System Through Resonance," by B. V. Chirikov, Doklady Akademii Nauk SSSR, Vol 125, No 5, Apr 59, pp 1015-1018

A simple method for finding the solution directly from Hamiltonian of the problem of a nonlinear oscillator with one degree of freedom passing through resonance has been devised. The peculiarity of nonlinear effects passing slowly through resonance was their independence of the initial phase of oscillations. It shows the reversibility of the process, even in the case of a diffused phase.

179. Analysis of a Detonation Wave

"Converging Cylindrical Detonation Wave," by Ya. B. Zel'dovich; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 782-792

The properties of detonation waves close to the normal detonation wave are considered. A theory of amplification of a cylindrical converging detonation wave is proposed which exactly describes the amplification during the start of the process. By comparison with numerical computations, it is shown that the theory remains satisfactory for small radii and appreciable amplification of the wave.

180. Nonlinear Field

"Theory of the Nonlinear Field $(\Box - \lambda\varphi^2)\varphi = 0$," by D. F. Kurdgelaidze, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 842-849

A nonlinear field described by the equation $(\Box - \lambda\varphi^2)\varphi = 0$ is considered. A spectral expansion of the energy of the nonlinear field is given on the basis of the exact solution of the field equation. A mass spectrum of the type $M\left(\frac{n}{0}\right) = (2n+1)M\left(\frac{0}{0}\right)$, $n = 0, 1, 2, \ldots$ has been obtained. An exact radially-symmetric solution of the field equation has been derived. A general method for integrating the nonlinear Dirac equation is presented and it is shown that, in some cases, one can pass to a two-component spinor equation of the second order.

181 Electromagnetic Field Theory

"A Certain Variant of Nonlocal Electromagnetic Field Theory," by A. A. Komar and M. A. Markov, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 854-858

A nonlocal theory is considered which corresponds to a modification of the Lienard - Wiechert potential. It is demonstrated that if an equation of the usual type is assumed to hold for potential in the theory under consideration one finds in a consistent relativistic treatment (many-time formalism) that contradictions appear already within the framework of the classical theory.

182. Field Theory Model

"Field Theory Model with a Nonvanishing Renormalized Charge," by A. A. Anselm, Physico-Technical Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 863-868

Two fermion fields are considered in a unidimensional space (and time), each of these fields interacting with each other and with themselves. The first term in the expansion of the vertex part in an asymptotic series of a well known form has been obtained. It is shown that, under certain conditions, the renormalized charge may possess an arbitrary (nonvanishing) value.

183. Group Theory in Relativistic Quantum Mechanics

"Group-Theoretic Treatment of the Foundations of Relativistic Quantum Mechanics. V," by Yu. M. Shirokov, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 879-888

A complete classification has been obtained for all irreducible representations of the inhomogeneous Lorentz group, including space and time reflections. It is shown that the concept of time parity cannot be introduced for particles with a nonvanishing rest mass; for particles with a nonvanishing rest mass two nonequivalent concepts which differ in respect to space-time parity properties exist for a given spin. With aid of the concept of a universal covering group it is shown that, for particles with half-integer spins, the number of possible representations with various reflection laws is larger than has hitherto been assumed.

184. Quantum Field Theory

"Application of Quantum Field Theory Methods to Problems of Quantum Statistics at Finite Temperatures," by A. A. Abrikosov, L. P. Gor'kov, and I. Ye. Dzyalovshinskiy, Institute of Physical Problems, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 3, Mar 59, pp 900-908

A formulation of the thermodynamic perturbation theory is proposed which permits one in full measure to apply the quantum field theory methods to quantum statistics at finite temperatures. The method is an extension of the Matsubara technique and is based on expansion of the Green's functions in Fourier series in an "imaginary time" variable. The technique thus arrived at differs from the usual diagram technique for T = 0, in that summation over discrete values of the imaginary frequency is substituted for integration over the frequencies. The analytical properties of the Fourier components of the Green's functions are investigated. It is shown that, due to the possibility of analytic continuation for solution of various kinetic and nonstationary problems, it is sufficient to know the corresponding equilibrium Green's functions.

IX. MISCELLANEOUS

185. Moscow University Holding Seminars on Cybernetics

"Seminars on Cybernetics at Moscow University" (unsigned article); Moscow, Problemy Kibernetiki, No 1, 1958, pp 265-266

A Seminar on Allied Problems in Cybernetics and Physiology functioned at Moscow University under the Chair of Computer Mathematics during the 1955/1956 school year.

The basic task of the first year of work of the seminar was the establishment of general viewpoints and the stating of problems which engaged representatives of various specialties who were participating in the work of the seminar. Thirteen sessions were held during the year at which the following papers were read:

A. P. Yershov -- "On simulating the Process of Producing Conditioned Reflexes on the EDSAC computer" (14 November 1955).

L. V. Krushinskiy -- "On Certain Experiments in the Study of Conditioned Reflexes in Dogs" (14 November 1955); "Supraliminal (Parabiotic) Inhibition" (13 February 1956).

A. A. Lyapunov -- "On the Fundamental Problems of Cybernetics" (10 October 1955); "Algorithmic Scheme of the Elementary Mechanism of Thinking" (14 November 1955); "The Concept of Probabilist Processes. Simulation of the Production of Conditioned Reflexes in the Form of a Markov Process" (12 December 1955); "Relationships Between Discrete and Continuous Processes in Biological Processes" (13 February 1956); "Cubernetic Problems of Genetics" (12 March 1956); "Directed and Random Component Motion of Living Beings (on the Works of N. I. Kobzev)" (2 April 1956); "Random Occurrences, Values, and Processes and Certain Biological Processes Connected With Them" (16 April 1956); "On Some Statistical Problems of Cybernetics and Biology" (7 May 1956).

I. A. Poletayev -- "On the Possibility of Simulating Processes of Supraliminal Inhibition With the Aid of Elementary Electronic Circuits" (20 February 1956).

Feygenberg -- "Future Development of Experiments in the Study of the More Complex Conditioned Reflexes. Complicated Logical Structure of a Conditioned Reflex. Kuparov's Experiments." (19 December 1955).

A Seminar on Cybernetics functioned under the Chair of Computer Mathematics at Moscow University during the 1956'1957 school year. Representatives of various specialities (mathematicians, physicists, physiologists, psychologists, engineers, geneticists, philologists, and economists) working in different organizations took part in this seminar.

Some of the most interesting recent works pertaining to cybernetics were reviewed and a number of original scientific papers were delivered. In the future, the work of this seminar will be reported in Problemy Kibernetiki (Problems in Cybernetics). The following list of papers were delivered during the 1956/1957 school year:

A. A. Lyapunov, "On Cybernetics" (21 September 1956).

I. A. Poletayev, "Review of Morse and Kimball's book Operations Research Methods" (28 September 1956).

Yu. A. Shreyder, "On Certain Questions of Learning" (5 October 1956).

Yu. T. Medvedev, "On Representation of Occurrances in Automata" (12 October 1956).

N. P. Buslenko, "Review of Ashby's article 'Amplifier Circuit of Intellectual Capabilities'" (in the collection Avtomaty (Automata)) (19 October 1956).

Yemel'yanov-Yaroslavskiy, "On Simulating the Work of the Nervous System" (26 October 1956).

O. Zavil'del'skiy, "Review of Blackwell and Girshik's book Theory of Games" (2 November 1956).

N. Ye. Kobrinskiy, "Logical Networks" (9 November 1956).

N. V. Timofeyev-Ressovskiy, "Principle of Amplification" (16 November 1956).

S. V. Yablonskiy, "Review of Culbertson's article 'Certain Uneconomical Works" (in collection Avtomaty (Automata)) (30 November 1956).

M. L. Tsetlin, "Review of von Neumann's Article 'Probabilist Logic and Synthesis of Reliable Organisms From Unreliable Components'" (in the collection Avtomaty (Automata)) (7 December 1956).

R. R. Vasil'yev, "Turtle Models" (14 December 1956).

V. Ya. Barlas, "Review of the book Mathematical Thinking in the Social Sciences" (21 December 1956).

V. S. Gurfinkel', "Controlling Elements of the Nervous System" (8 February 1957).

A. A. Malinovskiy, "Controlling Systems in Living Organisms" (15 February 1957).

I. A. Poletayev, "Report on the Material in the Second Part of His Book Signal (Signal)" (22 February 1957).

Yu. A. Shreyder, "Programming Certain Games With Incomplete Information (Dominoes, Cards)." Coauthor with Pervin (1 March 1957).

N. I. Zhinkin, "Self-Regulation of the Mechanism of Speech" (15 March 1957).

L. G. Chlenov, "On Certain Disturbances of the Activity of the Nervous System in Examples of Visual Agnosia" (22 March 1957).

A. A. Lyapunov, "On a Theoretical-Information Approach to the Fundamentals of Genetics" (29 February 1957).

S. V. Yablonskiy, "Review of Works on the Algebra of Logic and Its Application" (5 April 1957).

N. V. Timofeyev-Ressovskiy, "On Evolution Factors" (12 April 1957).

N. A. Bernshteyn, "Mechanism of Regulating Human Movements". (19 April 1957).

Discussion of N. A. Bernshteyn's paper (26 April 1957).

L. V. Kantorovich, "Mathematical Methods in Economic Planning Tasks" (10 May 1957).

S. V. Yablonskiy, "Application of Multivalued Logic to the Synthesis of Electronic Circuits" (17 May 1957).

N. Ye. Kobrinskiy, "High-Speed Computer for Economic Analysis" (24 May 1957).

186. New Scientific Institutes Established in USSR

It has been reported that the following new scientific institutes have been established in the USSR:

Moscow, Sovetskaya Rossiya, 9 Jan 59

The All-Union Scientific Research Institute of Synthetic Fibers (Vsesoyuznyy Nauchno-Issledovatel-skiy Institut Sinteticheskikh Volokon) in Kalinin, RSFSR.

Moscow, Sovetskaya Rossiya, 19 Mar 59

The Central Scientific Research Institute of Mechanical Processing of Wood (Tsentral'nyy Nauchno-Issledovatel'skiy Institut Mekhanicheskoy Obrabotki Dereva) in Arkhangel'sk, RSFSR.

Yerevan, Kommunist, 3 Jan 59

The Scientific Experimental Institute of Inventions and Discoveries of Universal Significance (Nauchno-Eksperimental'nyy Institut Izobreteniy i Otkrytiy Universal'nogo Profilya) in Yerevan, Armenian SSR. This institute will have a special Design Bureau and an Experimental Shop in addition to its regular laboratories.

Frunze, Sovetskaya Kirgiziya, 6 Mar 59

The Scientific Research Institute of Oncology and Radiology (Nauchno-Issledovatel'skiy Institut Onkologii i Radiologii) in Kirgiz SSR.

The Scientific Research Institute of Endocrinology (Nauchno-Issledovatel'-skiy Institut Endokrinologii) in Kirgiz SSR.

The Scientific Research Institute of Blood Transfusions (Nauchno-Issledovatel'skiy Institut Perelivaniya Krovi) in the Kirgiz SSR.

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