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CENTRAL INTELLIGENCE AGENCY



# SCIENTIFIC INFORMATION REPORT



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PLEASE NOTE

The Scientific Information Report will be discontinued with this issue owing to the fact that similar information is being provided by numerous other publications.



NOTE

This report presents unevaluated information extracted from recently received publications of the USSR and Eastern Europe. The information selected is intended to indicate current scientific developments and activities and is disseminated as an aid to research in the United States.

SCIENTIFIC INFORMATION REPORT

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I. BIOLOGY

Microbiology

1. New Medium for Typhoid-Paratyphoid Culture

"A New Selective Medium for Isolating Typhoid-Paratyphoid Bacteria," by K. G. Yemel'yanchik, Materialy 16-y Itogovoy Nauchn. Konferentsii, Sev.-Osetinsk. Med Int (Data From the 16th Summary Scientific Conference, North Osetian Medical Institute), Ordzhonikidze, 1959, pp 122-124 (from Referativnyy Zhurnal -- Biologiya, No 20, 25 Oct 60 Abstract No 94067, by M. Boyarskaya)

"Seedings of 3,152 samples of water, feces, and food products were done on a solid bismuth-sulfite medium with tripaflavin and brilliant green (VSTB) and, at the same time, on other selective media. Solitary microorganisms of the typhoid-paratyphoid group were observed in 45 out of 54 samples of chlorinated water and in 50 out of 51 samples of non-chlorinated water infected naturally with these organisms and examined by the membrane filter method. Upon examination of feces from 2,792 persons on VSTB medium, carriers of typhoid-paratyphoid pathogens were detected  $1\frac{1}{2}$  times more often than on 'Zh bacteroagar,' twice as often as on Levin medium, and five times as often as on Endo medium. Similar results were obtained in investigations of food products. Bismuth-sulfite agar from TsIEM [Central Institute of Epidemiology and Microbiology] and Shustova medium were not found to be very effective."

CPYRGHT

Radiobiology

2. Treatment of Tuberculosis Combined With Radiation Sickness

"The Effect of Antibacterial Preparations on the Course of Experimental Tuberculosis Following Radiation Action," by V. A. Solov'yeva and T. A. Khudushina, Institute of Tuberculosis, Academy of Medical Sciences USSR; Moscow, Problemy Tuberkuleza, No 6, Nov/Dec 60, pp 98-104

Since research on the effect of ionizing radiations on the course of tuberculosis is scanty, the authors attempted to further clarify this problem.

Experiments were conducted on 40 irradiated rabbits infected with tuberculosis and treated by various means.

The authors present the following conclusions:

1. The tuberculous process in rabbits subjected to fractional X-irradiation by doses amounting to a total of 800 r assumes a more severe course and has an exudative-necrotic nature.
2. Treatment of experimental tuberculosis by ftivazid and streptomycin, especially ftivazid, against a background of radiation proved effective.  

Histological research indicates that the hemorrhagic syndrome remains more marked under treatment by ftivazid than by streptomycin.
3. Changes in the blood picture of the treated animals were distinguished by smaller shifts as compared with the changes in the group of infected and irradiated animals.
4. Sensitivity to tuberculin after X-ray action decreased more markedly (sometimes to complete anergy) in the group of untreated rabbits, while in the treated animals, sensitivity to tuberculin was restored, although it had decreased during the process of irradiation.

CPYRGHT

### 3. Treatment of Syphilis by Radiation Sickness Contraindicated

"Concerning the Curability of Experimental Syphilis in Rabbits Suffering From Radiation Sickness," by V. I. Samtsov, Chair of Dermatological and Venereal Diseases, Military-Medical Order of Lenin Academy imeni S. M. Kirov; Moscow, Vestnik Dermatologii i Venerologii, No 9, Sep 60, pp 41-43

With the understanding that penetrating radiation significantly changes the reactivity of organisms, the author studied the efficacy of certain drugs used in treating rabbits afflicted with syphilis and radiation sickness resulting from whole-body X-irradiation by 750 r.

The author concludes that acute radiation sickness of average severity does not affect the therapeutic effect of antisyphilis drugs (penicillin, novarsenol, mercuric cyanide, and bioxinol [Biochinolum -- an 8% suspension of iodobismuthate of quinine in neutral vegetable oil]).

Radiation sickness is an absolute contraindication for treating syphilis with salvarsan, mercury preparations, and bismuth oil suspensions.

4. Cortisone Treatment of Beta-Irradiated Skin

"The Effect of Cortisone on the Course of Experimental Injury of the Skin by Beta-Irradiation," by Prof M. V. Svyatukhin and N. I. Mudretsov; Moscow, Problemy Endokrinologii i Gormonoterapii, Vol 6, No 4, Jul/Aug 60, pp 3-7

Tests were conducted on rats in an effort to study the effect of cortisone on the course of radiation dermatitis.

The authors present the following conclusions:

1. Intramuscular injections of cortisone in doses of 1.25-3.75 mg daily per animal over a period of 10-15 days retard the development of the pathological process in the skin of rats subjected to the local action of beta-irradiation by a dose of 150,000 ergs/cm<sup>2</sup>.

2. Superficial injuries were more frequent, and ulcers healed more rapidly in the cortisone-treated animals.

CPYRGHT

5. Combined Use of Vitamin P and Vinilene Against Ionizing Radiation Sequelae

"The Protective Action of Vitamin P and Vinilene Against Radiation Effects," by V. A. Sondak and Ye. P. Gracheva, Vitamin. Resursy i ikh Ispol'zovaniye (Vitamin Resources and Their Use), No 4, M., Academy of Sciences USSR, 1959, pp 148-157 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 15, 10 Aug 60, Abstract No 21031, by I. El'man)

"The combined administration of vitamin P and vinilene [Schostakowsky Balsam] in experiments on rats had a decided protective effect against ionizing radiation."

CPYRGHT

6. X-Irradiation Effect on Coenzyme A Activity

"The Activity of Coenzyme A in Rat Endocrine Glands and Liver Following X-Irradiation," by Yu. A. Serebrovskaya, Radiation Laboratory of the All-Union Institute of Experimental Endocrinology; Moscow, Problemy Endokrinologii i Gormonoterapii, Vol 6, No 4, Jul/Aug 60, pp 28-36

In the research described, the author attempted to determine coenzyme A activity (CoA) in rat endocrine glands and liver during the post-irradiation period and also to study the capacity of the liver and the testes for in vitro sulfamilamide acetylation.

On the basis of the data obtained, the author presents the following conclusions:

1. The activity of CoA in the testes, thymus gland, and liver of rats is decreased under the effect of x-irradiation, and the greatest decrease occurs on the 3d-5th postirradiation day.
2. During the first and second postirradiation days, CoA activity was increased in the adrenals, which showed a weight gain both per gram of adrenal tissue and in the organ as a whole. During the next few days of the first postirradiation week, the CoA activity of the adrenals remained above normal, although in the majority of experiments, the CoA activity per gram of tissue was decreased.
3. Individual variations in the reaction of the adrenals and of the testes to irradiation both with regard to CoA and in relation to the weight of the adrenal glands were evident.
4. The capacity of the liver and the testes for sulfanilamide acetylation was decreased under the effect of irradiation (600-900 r).
5. Hypophysectomy leads to a decrease of total CoA activity and CoA activity per gram of adrenal tissue. ACTH administration boosts total CoA activity in the adrenals.

CPYRGHT

#### Seed Technology

#### 7. Improvement of Maize Seed Resistance to Cold

"Effect of Trace Elements on the Cold Resistance of Maize,"  
by M. Ya. Shkolnik, S. A. Abdurashitov, and V. P. Bozhenko,  
Botanical Institute im V. L. Komarov of the Academy of  
Sciences USSR (Leningrad); Moscow, Fiziologiya Rasteniy,  
Vol 7, No 5, 1960, pp 571-577

The germination rate and germinating ability of maize seeds are much higher in cold soils if the seeds are subjected to presowing treatment with zinc, molybdenum, aluminum, manganese, and especially copper salt solutions. Trace elements employed for presowing treatment of maize seeds enhanced the hydrolytic disintegration of the proteins of germinating maize seed embryos at low temperatures. The frost and cold resistance of maize shoots is increased after presowing treatment with zinc, molybdenum, copper, manganese, and especially aluminum salt solutions.

II. CHEMISTRY

Fuels and Propellants

8. Kinetics of Heat Evolution During the Thermal Decomposition of Tetryl

"The Kinetics of Heat Evolution During the Thermal Decomposition of Tetryl," by F. I. Dubovitskiy, Yu. I. Rubtsov, and G. B. Manelis, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSR - Otdeleniye Khimicheskikh Nauk, No 10, Oct 60, pp 1763-1766

Knowledge of the rate of heat evolution by explosives, in combination with data on the kinetics of decomposition based on measurements of gas evolution and losses of weight, makes it possible to establish what type of decomposition takes place, to decide what stages are involved in the process of decomposition, to determine the thermal stability of the explosive and the effects which different admixtures have on this stability, and to measure quantitatively the effects that substances added to the explosive have on its decomposition. Furthermore, it is of importance to have information on the heat evolution taking place in the course of thermal decomposition in order to be able to calculate the critical conditions of a heat explosion because evolution of heat during the slowly proceeding thermal decomposition finally leads to the increase of temperature which results in an explosion.

No experimental data on the heat evolved during the thermal decomposition of explosives were available hitherto. For this reason, an investigation of the heat of decomposition of explosives and of the kinetics of heat evolution by explosives during their decomposition was begun. Tetryl  $\sqrt{C_6H_2(NO_2)_3N(CH_3)NO_2}$  was chosen as the first object for this investigation. The kinetics of heat evolution by tetryl were determined by direct calorimetric measurement in the range of 130-155°. The mean heat effect due to the decomposition of tetryl in this temperature range was found to be equal to 341 calories per gram. It was established that the kinetics of the decomposition of tetryl can be described by an equation which corresponds to an autocatalytic reaction of the first order when changes of the volume during the course of the reaction are considered. The kinetic constants, the exponential factor, and the energy of activation of the reaction of tetryl decomposition in the temperature range investigated were determined. It was found that the values of kinetic constants determined on the basis of heat evolution correspond to values the determination of which was based on losses of weight.

9. Effect of Density on the Rate of Combustion of Explosives

"The Combustion Capacity of Safety Explosives," by K. K. Andreyev and P. P. Popova, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 134, No 5, 11 Oct 60, pp 1142-1145

The critical diameter at which combustion of ammonites (ammonium nitrate explosives) takes place was determined. Pressures of 100-120 at were employed in order to reduce the diameter of the charge (it was brought below 20 mm by this means). The changes of the critical diameter with the density of the explosive and the effect of the density on the rate of combustion were investigated. The behavior of the ammonites investigated which did not contain nitric acid esters was compared with that of "pobedit" explosives (ammonium nitrate explosives containing up to 9% of nitroglycerin + diglycolnitrate). It was found that the critical diameter of combustion of "pobedit" explosives is smaller than that of ammonites and their rate of combustion greater.

Contrary to expectation, it was found that an increase in the density of packing reduces the rate of combustion of all the ammonite and "pobedit" explosives tested. The critical diameter is also reduced. This is contrasted with the behavior of hexogen: according to the results of experiments carried out by the authors, the velocity of combustion of hexogen at atmospheric pressure does not change when the density is increased from 0.5 g/cm<sup>3</sup> to 0.9 g/cm<sup>3</sup>, while the critical diameter increases from 5.5 mm to 8.5 mm.

It was established that the differences with respect to combustion between ammonium nitrate explosives without nitric acid esters and ammonium nitrate explosives with nitric acid esters are more pronounced at low pressures; at high pressures, the differences in the kinetics of combustion tend to disappear. The authors recommend that in the investigation of explosives, both the critical diameter of combustion and that of explosion be determined.

To reduce the probability of the burning out of charges, which is undesirable in blasting in coal mines, a maximum detonation capacity and minimum combustion capacity of the explosive must be achieved. The detonation capacity of explosives of the ammonite type decreases with the density of the charge, while the combustion capacity increases. Dense packing of safety explosives of this type used in mines is undesirable for two reasons: on the one hand, it inhibits the propagation of the detonation, and, on the other hand, it facilitates burning.



Geochemistry

10. Comparative Geochemical Characteristics of Granitoids With Accessory Tantalum-Niobates

"Comparative Geochemical Characteristics of Granitoids With Accessory Tantalum-Niobates," by A. S. Pavlenko, Hsiao Chung-yang, and L. N. Morozov, Institute of Geochemistry and Analytical Chemistry Imeni V. I. Vernadskiy of the Academy of Sciences USSR; Moscow, Geokhimiya, No 2, 1960, pp 104-120

On the basis of the peculiarities of the petrographic composition and typomorphic characteristics of granitoid accessories found in the Soviet Union and Nigeria, the authors have shown that columbite and thorite, zircon-II, and xenotime, bearing syngenetic deposits with it, are connected with the process of autometasomatic albitization.

Euxenite, fergusonite, and columbite are formed in plumasite oversaturated with alumina, pyrochlore, and agpaitic rocks.

In normal granites of the sphenoid-orthite-type accessory, tantalum-niobates are lacking.

The mineral forms of the tantalum-niobates are determined by elements being "excessive" for the given petrochemical type: Ti, Fe, or Ca.

The article cites some features of the geochemistry of TR-Y, Zr-Hf, Nb-Ta in granitoids with accessory tantalum-niobates and the causes for the formation of accessory tantalum-niobates.

Inorganic Chemistry

11. New Methods for Recovery of Selenium and Tellurium

"A Ghost in Geology, a Magician in Electronics," by N. Greyvor, Doctor of Technical Sciences, Chief of Metallurgy Group at the Leningrad Mining Institute, Laureate of a Stalin Prize; and V. L. Melkonyan, Candidate of Technical Sciences, Chief of the Sector of Metallurgy, Scientific Research Mining and Metallurgical Institute of the Armenian SSR Sovmarkhoz; Moscow, Ekonomicheskaya Gazeta, No 91, 14 Sep 60, p 3

Because selenium and tellurium are typical dispersed elements, only very small quantities of which are present in copper, nickel, and lead ores, they are rather elusive and difficult to isolate or detect. A part of the selenium and tellurium contained in copper ores is concentrated in sludges that form during the electrolytic refining of copper anodes and also in the sludges of sulfuric acid production.

The presently used methods for recovering selenium and tellurium from these sludges are cumbersome and time-consuming and require excessive volumes of solutions and quantities of reagents. Furthermore, this type of production is rather dangerous from the standpoint of industrial hygiene.

The shortcomings characteristic for many methods of extracting selenium have been eliminated in a new procedure developed at the Leningrad Mining Institute. By applying this procedure, selenium can be separated directly in the form of a highly purified precipitate consisting of large crystals. These crystals can be easily filtered off and washed.

It is very important to produce selenium that contains only small quantities of impurities and is practically free of tellurium. By using selenium of this quality, one can reduce by a factor of three the cost of the conversion of this product into selenium of very high purity. Furthermore, the harmful aspects of this type of production are eliminated entirely.

Tellurium is produced principally from alkaline slag, and the degree of recovery of this element is very low. If the production of tellurium were to be increased by applying the present technological processes, many cumbersome operations would have to be carried out repeatedly. A new production method proposed by a scientist working at the Leningrad Mining Institute made it possible to produce a concentrate containing 40-50% of tellurium. The relatively small mass of this concentrate will

simplify the further production by any method that is selected. The most promising method is one similar to that applied for the production of selenium which was referred to above. The purified technical tellurium produced by this method can be employed directly for the synthesis of semiconductor materials used in refrigeration. Application of complex processes for the conversion of technical tellurium into products of high purity will thus be avoided.

The Scientific Research Mining and Metallurgical Institute of the Armenian SSR Sovnarkhoz is already testing the newly developed methods on the copper electrolysis sludges of the Alaverdi Copper and Chemical Combine. It was established that application of the newly developed methods is entirely feasible. The plants of the Alaverdi Combine will be expanded and reconstructed in such a manner that the methods developed at the Leningrad Mining Institute can be applied.

At present, the Alaverdi Affiliate of the Scientific Research Mining and Metallurgical Institute is also conducting intensive work on the extraction of selenium and tellurium from sulfuric acid and copper sulfate sludges.

12. Physical and Chemical Properties of Alloys in the Ternary System Titanium-Vanadium-Niobium

"Investigation of Physicochemical Properties of Alloys in the Ternary System Titanium-Vanadium-Niobium," by I. I. Kornilov and V. S. Vlasov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 9, Sep 60, pp 2017-2024

In earlier work done by the authors, the constitutional diagram of the system Ti-V-Nb and phase equilibria in this system were investigated. The authors also investigated the heat resistance of alloys in the systems titanium-vanadium, titanium-niobium, and titanium-vanadium-niobium. In the work reported in this instance, the following properties of the system Ti-V-Nb were investigated: electrical conductivity and its thermal coefficient, thermal expansion, and harness.

13. Hungarians Determine Fluorine in Kola Phosphate

"Fluorometric Determination of Fluorine. Use of the System in the Investigation of Substances Containing Phosphates," by Gyula Almaszy, Candidate of Chemical Sciences; Endre Kotsis; and Enoke Bordas, Research Laboratory of Budapest Sulfuric Acid Factory; Budapest, A Magyar Tudomanos Akademia Kemiai Osztalyanak Kozlemenyei, Vol 13, No 1, 1960, pp 45-49

The authors evolved a rapid process for investigating the quantity and quality of fluorine. The fluorine compound is fluxed with uranyl-nitrate and soda. Then the fluorescence of the mixture is compared under ultraviolet light with the fluorescence of standard samples having a known fluorine content. The method was used in determining the fluorine content of trisodiumphosphate and of Kola phosphate.

14. Hungarians Reduce Ammonium Tungstate and Tungsten Trioxide With Ammonia Gas

"Data on the Tungsten-Nitrogen System," by Jenő Neugebauer; Tivadar Millner, Corresponding Academician; and András Hegedus, Telecommunication Industry Research Institute, Budapest and United Incandescent Electrical Enterprise, Budapest; Budapest, A Magyar Tudományok Akadémia Kémiai Tudományok Osztályának Közleményei, Vol 12, No 1, 1959, pp 37-44

The authors investigated the thermal decomposition of ammonium tungstate in air, using thermoanalytical and X-ray methods. They investigated its reduction in a stream of hydrogen, in a mixture of hydrogen with nitrogen, and in both dry ammonia and ammonia containing water vapor. The authors also investigated the reduction of tungsten trioxide in a stream of dry ammonia and in ammonia containing water vapor, as well as the nitriding of beta- and alpha-W with various nitrogen-containing gases.

They established that the reduction of ammonium tungstate with ammonium results first in tungsten oxide nitride, then, after complete elimination of oxygen, in beta-tungsten nitride, and finally, at a temperature of about 900 degrees, in alpha-W. The authors called the above-listed intermediate products, which had never previously been subjected to X-ray analysis, "ammonium tungsten bronzes." These "ammonium tungsten bronzes" are also formed, although to a lesser extent, when ammonium tungstate is thermally decomposed in air or reduced with other hydrogen-containing gas mixtures.

A new tungsten nitride phase was discovered during the nitridation of beta-W with ammonia. This phase had the composition WN, but relatively broad lattice constants. The authors named this tungsten nitride, which represents a transitional phase between beta- and delta-tungsten nitride, epsilon nitride.

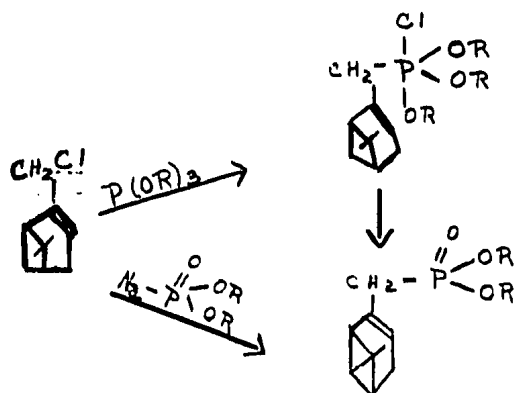
Insecticides

15. Organophosphorus Compounds Containing Myrtenyl Radicals as Possible Insecticides

"The Synthesis of Some Esters of Phosphinic, Monothio- and Dithiophosphoric Acids Containing the Myrtenyl Radical,"  
by A. R. Vil'chinskaya and V. A. Frinovskaya, Kazan State University and the Kazan State Medical Institute; Moscow, Zhurnal Obshchey Khimii, No 8, Aug 60, pp 2581-2585

Terpene derivatives of phosphinic, monothio-, and dithiophosphoric acid have not been studied to any great extent; however, they are of considerable interest since the products of the reaction of diesters of dithiophosphoric acids and terpenes possess insecticidal and other valuable properties.

Since there is no information on compounds of the acids mentioned above which contain the myrtenyl radical, the present work was dedicated to the study of the reaction of the interaction of myrtenyl chloride with trialkylphosphites which proceeds according to the Arbuzov reaction and leads to the formation of dialkyl esters of myrtenylphosphinic acids. Similar dialkyl esters of myrtenylphosphinic acid were obtained by reacting myrtenylchloride with dialkyl sodium phosphide.



$\text{R} = \text{CH}_3, \text{C}_2\text{H}_5, \text{H.-C}_3\text{H}_7; \text{H.-C}_4\text{H}_9$

The esters obtained were colorless, almost odorless, and easily distillable oily liquids, soluble in organic solvents and insoluble in water.

By reacting myrtenyl chloride with diethylmonothiosodiumphosphide myrtenyldiethyl esters of monothiophosphoric acid were obtained in the form of an oily, orange-colored liquid with a characteristic odor of fried onions. The reaction mixture decomposed during distillation, which explains the small yield. The pure product, however, can be burned without decomposition.

Better yields of myrtenyldiethyl esters of dithiophosphoric acid were obtained in the form of a light-yellow, oily liquid having an unpleasant odor.

#### Nuclear Fuels and Reactor Construction Materials

16. Formation of a Third Phase in the System Uranyl Nitrate-Nitric Acid-Water-Tri-n-butylphosphate -Kerosene

"Formation of a Third Phase in the System  $UO_2(NO_3)_2$  -  $HNO_3$  -  $H_2O$  - Tri-n-butylphosphate- Kerosene," by A. S. Solovkin, N. S. Povitskiy, and K. P. Lunichkina; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 9, Sep 60, pp 2115-2118

The conditions under which a third phase forms in the system  $UO_2(NO_3)_2$  -  $HNO_3$  -  $H_2O$  - TBP- kerosene were investigated. It was established that the composition of the complex compound that separates forming the third phase corresponds to the formula  $H[UO_2(NO_3)_3]$ . 2 TBP. Formation of three phases in the system described has not been reported previously in the literature.

17. Basic Principles of Classification of Industrially Applicable Uranium Ores

"Basic Principles of the Classification of Industrial Uranium Ores," by P. V. Pribytkov; Moscow, Atomnaya Energiya, Vol 9, No 3, Sep 60, pp 201-207

Principles are proposed that are to be used in the classification of industrially applicable uranium ores. A classification system is outlined which is based on characteristics of importance from the standpoint of technological procedures applied in the conversion of the ore, namely, the type of uranium mineralization, the composition of the rock, the uranium content, the presence of accompanying substances that are of value, texture, and structure and structural characteristics. It is assumed that practical use of the classification methods proposed will facilitate considerably the evaluation of uranium ores from the standpoint of their conversion and industrial application.

18. Effect of Salting-out Agents on Distribution of Uranyl Nitrate Between Aqueous Solutions and the Diisoamyl Ester of Methylphosphonic Acid

"The Effect of Salting-out Agents on the Distribution of Uranyl Nitrate Between Aqueous Solutions and the Diisoamyl Ester of Methylphosphonic Acid (DAMPA)," by A. S. Solovkin; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 9, Sep 60, pp 2119-2131

The effects of a great number of inorganic nitrates that have been used as salting-out agents on the distribution of uranyl nitrate between aqueous solutions and DAMPA diluted with carbon tetrachloride in different proportions were investigated. The salting-out action of inorganic nitrates is correlated with the surface density of molecules of water of hydration in the first coordination layer of ions. The results obtained are reported in detail.

19. Relief of Elastic Stresses As a Result of Action of Neutron Irradiation

"The Relief of Elastic Stresses As a Result of the Action of Neutron Irradiation," by S. T. Konobeyevskiy; Moscow, Atomnaya Energiya, Vol 9, No 3, Sep 60, pp 194-200

This article discusses the results of an investigation of the effect which irradiation with neutrons has on the relief of elastic stresses in flat springs consisting of alloys of uranium with molybdenum and also on the relief of microstresses which bring about a widening of lines in the X-ray diffraction picture of rolled uranium. Theoretical concepts are developed further which were advanced by the author in a report presented at the Second International Conference on Peaceful Uses of Atomic Energy (Geneva, 1958). Results of calculations that have been carried out are compared with experimental data.

20. Instruments for Measuring Pressure, Use, and Level of Liquid Alkali Metals

"Instruments for Measuring the Pressure, Use, and Level of Liquid Alkali Metals," by P. L. Kirillov, V. D. Kolesnikov, V. A. Kuznetsov, and N. M. Turchin; Moscow, Atomnaya Energiya, Vol 9, No 3, Sep 60, pp 173-181

This article describes the design, principles applied in calculations, and experience acquired in the operation of devices for measuring the pressure, rate and extent of use, and level of liquid metals. Instruments for the purposes mentioned are used in the operation of reactors with liquid metal heat-transfer agents. As a result of investigations which have been carried out by the authors of the article, it was established that the most reliable and simplest instruments for practical application which have an adequate degree of precision are a two-bellows pressure gauge with an intermediate liquid (oil) transmitting the pressure from the bellows, a magnetic recorder (equipped with a permanent magnet) for measuring the rate of use of the liquid metal, and ultrashort wave and potentiometric level indicators.

21. Thermal Stability of Potassium Fluorozirconate

"The Thermal Stability of Potassium Fluorozirconate," by G. A. Yagodin and V. I. Tarasov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 9, Sep 60, pp 1987-1999

Because potassium fluorozirconate is produced by high temperature processes and use in technological processes conducted at high temperatures, the thermal stability of this salt is of importance. The



transformations of this salt during heating to a temperature of 1,000° were investigated. It was found that five endothermic effects occur during this heating. The nature of these effects is described. It was found that calcining of potassium fluorozirconate in air that has not been dried results in the formation of zirconium dioxide in the samples when heating has been carried out for 4 hours at temperatures above 600°. Melting of potassium fluorozirconate and heating of this melt at 800° in dried argon or hydrogen does not result in any changes of the chemical or physical properties of this salt.

22. Deposition of Thin Layers of Yttrium Oxide by Electrophoresis

"Preparation of Thin Layers of Yttrium Oxide by the Electrophoresis Method," by Ya. S. Savitskaya and L. D. Orlovskaya; Leningrad, Zhurnal Prikladnoy Khimii, Vol 33, No 10, Oct 60, pp 2222-2225

On the basis of experimental research carried out, conditions to be observed in the electrophoretic deposition of thin layers (up to 80-100  $\mu$ ) of yttrium oxide ( $Y_2O_3$ ) from a suspension of this oxide in alcohol are recommended. No prior information the the electrophoresis of rare-earth metal oxides had been published either in the USSR or non-USSR literature.

23. Book on the Theory of the Separation of Isotopes

Teoriya Razdeleniya Izotopov v Kolonnakh (Theory of the Separation of Isotopes in Columns) by A. M. Rozen (unsigned review); Moscow, Atomnaya Energiya, Vol 9, No 4, Oct 60, p 349

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"Chapter 1-6 comprising the first part of this book (published by Atomizdat, Moscow, in 1960; 438 pp, price 16 r 50 k) are concerned with characteristics of individual methods of counter-current separation: distillation, isotope exchange, thermal diffusion, mass diffusion, and centrifuging. In the second part of the book (chapter 7-10), general methods for calculating columns and cascades are described. The theory of columns and of methods pertaining to columns is expounded. The general theory of separation is applied for determining the optimum values of the principal column parameters. Particular attention is paid to the determination of optimum conditions for separation by two-phase methods, when a part of the expenditure is not proportional to the work required for the separation, but to the flow in the streams being employed.

"In Chapter 11, relatively simple formulas are derived for calculating the rate at which equilibrium is reached in columns of different types.

"Chapter 12 gives examples of the calculation of separation equipment and to some extent compares different methods for the production of heavy water and of isotopes other than deuterium.

"The book will be of use to scientific workers, chemical engineers, and students who are occupied with problems pertaining to the separation of mixtures. It will also be of value in designing separation installations.

CPYRGHT

#### 24. Separation of Boron Isotopes

"Separation of Boron Isotopes," by O. V. Uvarov, N. M. Sevryugova, and N. M. Zhavoronkov, Scientific Research Physical Chemistry Institute imeni Karpov; Berlin, Kernenergie, Vol 3, No 9, Sep 60, pp 866-868

Different methods for the separation of boron isotopes are compared. It is stated that when the separation of  $B^{10}$  from  $B^{11}$  is carried out to completion or when a part of the  $B^{10}$  is separated and the rest of the material ( $BF_3$  or  $BCl_3$ ) can be returned [to the supplier] at the original cost, the most advantageous method of separation will be one that requires equipment of a minimum volume. Under the circumstances, it will be of the greatest advantage from the economic standpoint to distill  $BF_3$  or to employ the exchange reaction between  $BF_3$  and  $C_6H_5OCH_3 \cdot BF_3$ .

In cases in which the cost of the raw material is the most important factor, procedures employing  $BCl_3$  (which is the cheapest raw material) are indicated. Chemical exchange reactions between  $BCl_3$  and addition compounds formed by boron trichloride with organic substances have not been investigated to any great extent, and the results that have been obtained in the investigations which have been carried out do not appear very promising. Work on the subject has been conducted at the Laboratory for the Separation of Mixtures, Scientific Research Physical Chemistry Institute imeni L. Ya. Karpov (Moscow). On the basis of work which has been conducted there, recommendations are made on the types of equipment (distillation columns) to be used in the technical production of  $B^{10}$  by the distillation of  $BCl_3$ . It was found that a cascade consisting of 2-3 columns is capable of yielding a product containing 85-95% of  $B^{10}$ .

[SIR Note: This paper was presented at the First Conference on the Application of Stable Isotopes, which was held on 10-12 December 1959 at Leipzig.]

25. Photometric Determination of Thorium in Rocks With Arsenazo II

"Photometric Determination of Thorium in Rocks With Arsenazo II," by S. B. Savvin, M. P. Volynets, Yu. A. Balashov, and V. V. Bagreyev, Institute of Geochemistry and Analytical Chemistry, imeni V.I. Vernadskiy Academy of Sciences USSR; Moscow, Zhurnal Analiticheskoy Khimii, Vol 15, No 4, Jul-Aug 60, pp 446-451

A photometric method for the determination of thorium ( $10^{-2}$  to  $10^{-4}\%$ ) in rocks with arsenazo II has been developed.

Two methods recommended for the isolation of thorium are twofold fluoride and fluoride-oxalate precipitation.

The determination by the first method takes 6-8 hr; by the second 24 hr. In both cases, the total losses of thorium do not exceed 12-14%.

26. Determination of Thorium in Monazite Concentrates by Titration With a Chelating Agent After Isolation of This Element on KU-2 Cation-Exchange Resin

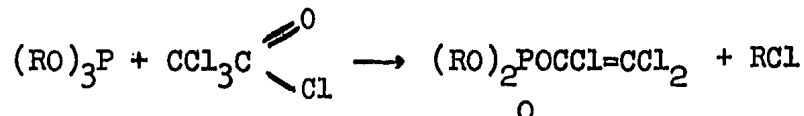
"Analytical Chemistry of Thorium; Part 2 - Complexometric Determination of Thorium in Monazite Concentrates After Its Isolation on the KU-2 Cationite," by Yu. A. Chernikhov, V. F. Luk'yanov, and A. B. Kozlova; Moscow, Zhurnal Analiticheskoy Khimii, Vol 15, No 4, Jul/Aug 60, pp 452-454

A method is proposed for the determination of thorium in monazite concentrates by titration with Complexon III in the presence of xylenol orange after separation of this element on the KU-2 cation-exchange resin.

Organic Chemistry27. New Group of Organophosphorus Compounds Synthesized

"The Interaction of Trivalent Phosphorus Compounds with Halogenated Acid Halides, No I, Reaction of Trialkylphosphites With Trichloroacetylchloride," by L. Z. Zoborovskiy, Yu. G. Galdobov, and V. V. Fedotova; Moscow, Zhurnal Obshchey Khimii, No 8, Aug 60, pp 2586-2590

The authors undertook a more detailed study of the transformation which occurs in the interaction of phosphites with trichloroacetylchlorides which results in the formation of previously unknown trichlorovinyl esters.



As a result of the investigation, it was shown that:

1. A new group of compounds -- trichlorovinyl dialkylphosphates were obtained as a result of reacting trialkylphosphites with trichloroacetylchlorides.
2. Corresponding pentachloroethyl dialkylphosphates were obtained by chlorinating trichlorovinyl dialkylphosphates.
3. Trichlorovinyl dialkylphosphates react with trialkylphosphites, analogous to the Arbuzov Rearrangement, with the formation of beta, beta-dichloro-alpha-dialkylphosphonovinyl dialkylphosphates.
4. Esters of trichloroacetylphosphinic acid were obtained by reacting dialkylphosphites with trichloroacetylchlorides.
5. Esters of trichloroacetylphosphinic acid react with trialkylphosphites to form beta, beta-dichloro-alpha-dialkylphosphonovinyl dialkylphosphates.

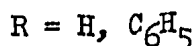
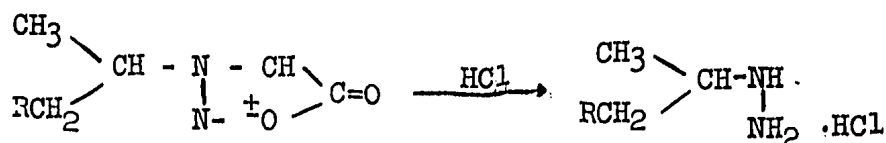
28. Some New Inhibitors of Monoamine Oxidase Synthesized

"The Synthesis of 3-Isopropyl- and 3-Phenylisopropylsydnones and Corresponding Substituted Hydrazines," by V. G. Yashunskiy and V. F. Vasil'yeva, All-Union Scientific Research Chemico-Pharmaceutical Institute imeni S. Ordzhonikidze; Moscow, Zhurnal Obshchey Khimii, No 8, Aug 60, pp 2745-2756

As was recently discovered, hydrazine derivatives, in particular phenylisopropylhydrazine and the isopropylhydrazide of isonicotinic acid, have an inhibitory effect on monoamine oxidase.

In connection with the investigations being carried out by the authors with regard to the synthesis and study of new unique heterocyclics -- sydnones, which contain hydrazine elements in the molecule and are, therefore, easily broken down with the formation of the corresponding mono-substituted hydrazines, the authors became interested in synthesizing some representatives of this class of compounds.

The present report describes the synthesis of previously undescribed 3-isopropyl- and 3-phenylisopropylsydnones, as well as the chlorohydrates of isopropyl- and phenylisopropylhydrazines, which were obtained by the decomposition of these sydnones:

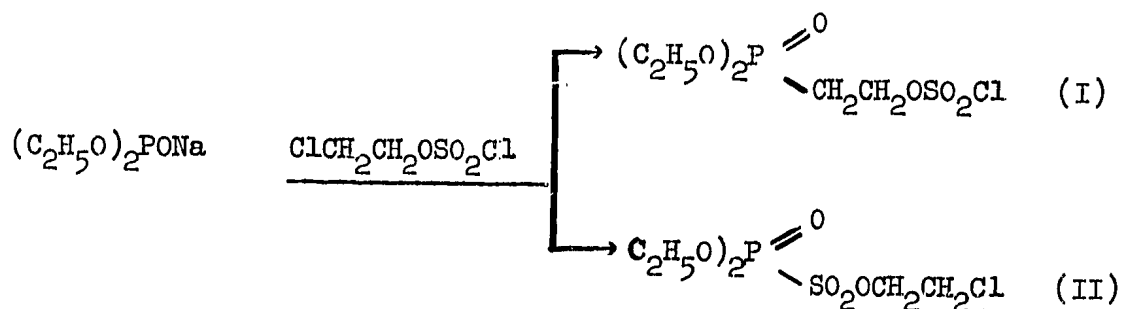


Since hydrazines with aliphatic and aliphatic-aromatic substituents are not easily obtainable, their synthesis through sydnones can have some preparative significance.

29. Interaction Between Sulfonates and Phosphoric Acid Investigated

"Concerning the Interaction of Beta-chloroethylchlorosulfonates With Esters of Phosphoric Acid," by M. S. Malinivskiy, Z. F. Solomko, and Ye. I. Yevtushenko, Dnepropetrovsk State University; Moscow, Zhurnal Obshchey Khimii, No 8, Aug 60, pp 2591-2593

It is well known that the esters of chlorosulfonic acid possess powerful bactericidal properties. The reaction of these compounds with phosphoric acid has never been described in the literature. Therefore, it was of interest, according to the authors, to study the interaction of beta-chloroethylchlorosulfonate with the sodium salts of phosphoric and thio- and dithiophosphoric acids. With the salts of these acids, for example, diethylsodiumphosphite, the reaction can proceed in two directions:



As a result of the study of the reaction of beta-chloroethylchlorosulfonate with diethyl-, dipropyl, and diisopropylphosphites, diethyl- and dipropylthiophosphates and diethyldithiophosphoric acids, it was determined that in these reactions beta-chloroethylchlorosulfonate reacts with the ClCH<sub>2</sub>CH<sub>2</sub> -- group and not with the -- SO<sub>2</sub>Cl.

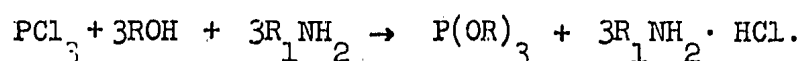
30. Production of Trialkylphosphites in High Yields

"Concerning the Production of Trialkylphosphites," by P. M. Zavlin and B. I. Ionin; Moscow, Zhurnal Prikladnoy Khimii, Vol 33, No 10, Oct 60, pp 2376-2378

Trialkylphosphites (general formula (RO)<sub>3</sub>P) are being widely used both in the laboratory and on an industrial scale for the production of various products via the Arbuzov Rearrangement.

Previously described methods for obtaining these compounds utilized phosphorus trichloride and the corresponding sodium alcoholates, phosphorus trichloride and the corresponding alcohols in the presence of tertiary amines, pyridine, dimethylaniline, and others. The use of primary amines to produce trialkylphosphites from phosphorus trichloride and alcohols has not been described.

The research performed by the authors on the interaction of aliphatic hydroxamines with phosphorus trichloride and other acid chlorides of phosphorus acids indicates that when the primary amino and the hydroxy groups are simultaneously present in one molecule, the esters of the corresponding phosphorus acids are formed with nearly quantitative yields. Thus it was expected, and demonstrated, that by reacting phosphorus trichloride with alcohols in the presence of primary amines, the trialkylphosphites would be formed according to the following general equation:



In actual experiments, aniline, one of the easily obtainable primary amines, was used. The range of the percentage yields ranged from 58% for trimethylphosphite to 79.5% for triisopropylphosphites. Other yields were 75% for triethylphosphites, 78% for tripropylphosphite, and 77% for tributylphosphite.

### 31. Synthesis of Fluoroolefins

"Fluorine-Containing  $\beta$ -Sulfones. Report 1. Addition of Sulfur Trioxide to Fluoroolefins," by M. A. Dmitriyev, G. A. Sokol'skiy and I. I. Knunyants; Moscow, Izvestiya Akademii Nauk SSR - Otdeleniye Khimicheskikh Nauk, No 5, 1960, pp 847-851

The authors examined the reactions between sulfur trioxide and tetrafluoroethylene, trifluorochloroethylene, trifluoroethylene, and hexafluoropropylene. Fluoroolefins react with sulfur trioxide (alpha-modification) in equimolecular ratios to form fluorine-containing  $\beta$ -sulfones. The addition of sulfur trioxide to fluoroolefins is made in accordance with the polarity of the interacting substances.

### 32. Research at Kazan State University on Esters of Ketophosphinic Acids

"Esters of  $\beta$ -Ketophosphinic Acids. Report 5. Concerning the Structure of the Reaction Products of Certain  $\alpha$ -Haloketones of the Carbocyclic Series With Sodium Triethylphosphite and Sodium

Diethylphosphide," by D. A. Arbuzov, V. S. Vinogradov, and N. A. Poloshayeva, Chemical Institute imeni A. M. Butlerov of Kazan State University; Moscow, Izvestiya Akademii Nauk SSSR - Otdeleniye Khimicheskikh Nauk, No 5, 1960, pp 832-841

On the basis of the chemical and spectroscopic data, the authors have shown that the reaction product between sodium diethyl phosphide and  $\alpha$ -chlorocyclopentanone is the ester of the epoxy-cyclopentanephosphinic acid. The product resulting from the reaction between sodium diethylphosphide and  $\alpha$ -bromocyclohexanone appears to be a mixture of the cyclohexenyldiethyl ester of phosphoric acid with the ester of epoxy-cyclohexanephosphinic acid.

The products of the reaction of sodium diethyl phosphide and triethyl phosphite with  $\alpha$ -chloro- $\alpha$ -methylcyclohexanone have the structure of 2-methylcyclohexane-1-yl-1 of the diethyl ester of phosphoric acid; isopropenyldiethyl ester of phosphoric acid is the reaction product from triethyl phosphite and  $\alpha$ -bromoisopropylmethylketone.

The reaction product of sodium diethylphosphide and  $\alpha$ -bromocamphor possesses the structure of the corresponding mixed ester of phosphoric acid.

### 33. Ultrasonic Polymerization Investigated

"Research in the Field of the Mechanochemistry of Polymers. X. The Initiation of Polymerization by Radicals Formed by the Ultrasonic Degradation of Macromolecules," by A. A. Berlin and A. M. Dubinskaya, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Vysokomolekulyarnyye Soyedinyeniya', No 9, Sep 60, pp 1426-1431

It was shown that polymerization of monomers is observed due to the action of ultrasonic radiation with an intensity of 7-48 Wt/cm<sup>3</sup> and a frequency of 1,500 kilocycles on moisture-free solutions of polymethylmethacrylate in styrene, methylmethacrylate, and acrylonitrile. The macromolecules form as the result of the ultrasonic degradation of polymers.

It was also determined that ultrasonic polymerization does not occur in the absence of carefully dried monomers. A block-grafter copolymer was obtained and isolated by the irradiation of solutions of polymethylmethacrylate in acrylonitrile and its properties investigated.



34. Effect of Monomers on Polymerization of Ethylene

"The Polymerization of Ethylene by a Combined Catalyst  $\alpha$ - $TiCl_3$ - $AlR_3$  in the presence of Various Monomers. I. The Effect of the Presence of Monomers on the Polymerization of Ethylene," by L. M. Lanovskaya, A. R. Gantmazher, and S. S. Medvedev, Physicochemical Institute imeni L. Ya. Karpov; Moscow, Vysokomolekulyarnyye Soyedinyeniya, No 9, Sep 60, pp 1391-1397

The polymerization of ethylene in the presence of a catalyst,  $TiCl_3$ -- $(iso-C_4H_9)_3 Al$ , and additions of alpha-methylstyrene, isobutylene, styrene, isoprene, and butadiene were investigated.

It was shown that the addition of these monomers lowers the polymerization rate of ethylene without affecting the weight of the polyethylene formed.

The ability of the monomers to decrease the ethylene polymerization rate occurs in the following order:

Butadiene, isoprene > styrene > isobutylene > alpha-methylstyrene

The sharpest decrease in the ethylene polymerization rate was observed in the presence of butadiene hydrocarbons.

35. Siloxane Structures Investigated

"The Synthesis and Investigation of the Structure of Polymers Containing Siloxane and Hydrocarbon Units in the Basic Chains of the Macromolecule. IV." by A. M. Polyakova, V. V. Korshak, M. M. Suchkova, V. M. Vdovin, and N. A. Shumayevskiy, Institute of Elemento-Organic Compounds, Academy of Sciences USSR and the Institute of Organic Chemistry imeni N. D. Zeliniski, Academy of Sciences USSR; Moscow, Vysokomolekulyarnyye Soyedinyeniya, No 9, Sep 60, pp 1360-1369

An investigation of the interaction of acetylene and its derivatives with dihydrodisiloxanes was conducted. Polymer products were obtained and their structures determined.

It was determined that these products have a linear structure, depending on the ration of the initial reagents, and contain various end groups in the molecules:  $-Si-H$  or  $-CH=CH_2$ .

Products with vinyl end groups in the chains were capable of further polymerization in the presence of a peroxide initiator with the formation of solid, insoluble products.

36. Effect of Incorporating Various Substances on Low Temperature Stability of Rubber

"Concerning the Effect of Ingredients on the Low Temperature Stability of Rubber Subjected to Repeated Deformations," by V. D. Zaytseva and G. M. Bartenev, Scientific Research Institute of the Rubber Industry; Vysokomolekulyarnyye Soyedinyeniya, No 9, Sep 60, pp 1301-1308

The effect of various low-molecular plasticizers on the low temperature stability of SKN-40, SKS-30, and methylpyridine rubbers during repeated deformation (with a range frequency of 0.1-1,000 oscillations/min) was investigated. The investigations were conducted in a temperature interval of from  $-100^{\circ}$  to  $+20^{\circ}$ .

It was shown that the action of plasticizers is more effective with polar rubbers than with nonpolar rubbers because of the difference in the mechanism of the action of the plasticizers in polar and nonpolar rubbers. The difference between the polar and nonpolar rubbers is also apparent in the difference in the action of the plasticizers during high and low deformation frequencies on the intermolecular structure and low temperature stability of the rubbers.

The addition of carbon black and chalk has practically no effect on the low temperature stability of the rubber; however, it expands the vitrification region in the higher temperature ranges. The simultaneous addition of a plasticizer and carbon black to the rubber mixture leads to a corresponding decrease in the low temperature stability of the rubber, the more so the greater the amount of carbon black added. With the addition of a filler, hardness (dynamic modulus) increases significantly. This is an additional factor which lowers the low temperature stability of the rubber.

37. Tautomerism of Nitrocompounds

"Tautomerism of Nitrocompounds; Part 1 - Investigation of the Tautomeric Transformations of Phenylnitromethane," by V. M. Belikov, S. G. Mayranovskiy, Ts. B. Korchemnaya, S. S. Novikov, and V. A. Klimova, Institute of Organic Chemistry, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSR - Otdeleniye Khimicheskikh Nauk, No 9, Sep 60, pp 1675-1680.

The tautomeric transformations of phenylnitromethane have been subjected to kinetic analysis. The results obtained confirm the simultaneous existence of two forms of anions, the aci-anion and the nitro-anion. It

was established on the example of phenylnitromethane that the stage which determines the velocity of isomerization of the aci-form into the nitro-form in an acidic medium is that of the dissociation of the aci-form.

(This paper was submitted on 24 March 1959 and supplemented as follows on 8 June 1960)

"Tautomerism of Nitrocompounds; Part 2 - Polarographic Investigation of the Kinetics of Tautomeric Transformations of Phenylnitromethane," by S. G. Mayranovskiy, V. M. Belikov, Ts. B. Korchemnaya, V. A. Klimova, and S. S. Novikov, Institute of Organic Chemistry, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSR - Otdeleniye Khimicheskikh Nauk, No 10, Oct 60, pp 1787-1795

The polarographic behavior of the aci-form of phenylnitromethane was found to be different from that of the nitro-form. The fact that the aci-form of phenylnitromethane exhibits polarographic activity was established for the first time. The kinetics of the dissociation of the nitro- and aci-forms of phenylnitromethane under the action of different bases and also the recombination of the phenylnitromethane anion with hydroxonium ions were investigated polarographically. The dissociation constants of the aci- and nitro-forms of phenylnitromethane were determined.

D. G. Knorre's participation in discussions in connection with this work and advice given by him are acknowledged.

38. Determination by Ultraviolet Spectrophotometry of the Number of Nitrogroups in Polynitroalkanes

"Determination of the Number of Nitrogroups in Polynitroalkanes," by V. I. Slovetkiy, V. A. Shlyapochnikov, K. K. Babiyevskiy, and S. S. Novikov, Institute of Organic Chemistry, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR - Otdeleniye Khimicheskikh Nauk, No 9, Sep 60, pp 1709-1710

It was reported in an earlier communication (V. I. Slovetkiy, V. A. Shlyapochnikov, A. A. Faynzil'berg, S. A. Shevelev, and S. S. Novikov, Izvestiya Akademii Nauk - Otdeleniye Khimicheskikh Nauk -- in print) that the extinction coefficient  $\epsilon$  of the maximum of absorption of the nitro-group ( $\sim 280 \text{ m}\mu$ ) in the ultraviolet absorption spectrum depends linearly on the number of nitrogroups in molecules of compounds containing a mononitro-, gem-dinitro-, or trinitromethyl group (literally, a "mononitro-gem-dinitro- and trinitromethyl group"). In the work described in this instance, a wider range of polynitroalkanes was investigated, including compounds with nitrogroups at several carbon atoms in the molecule. The ultraviolet absorption spectra of 14 polynitroalkanes containing 2, 3, or 4 nitrogroups

in different positions were investigated. It was found that it is possible to determine on the basis of ultraviolet spectra the number of nitro-groups in compounds in which these groups are located at more than one carbon atom of the molecule.

39. Interactions of  $N_2O_4$  With Organic Compounds

"Interactions of  $N_2O_4$  With Organic Compounds; Part 4 - Transformation of the Nitromethyl Group Into the Trinitromethyl Group," by S. S. Novikov, L. I. Khmel'nitskiy, and O. V. Lebedev, Institute of Organic Chemistry, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR - Otdeleniye Khimicheskikh Nauk, No 10, Oct 60, pp 1783-1786

It was established in experiments carried out with m-nitrophenylnitromethane and p-nitrophenylnitromethane that interaction of  $N_2O_4$  with salts of arylnitromethanes at elevated temperatures (50-70°) results in the formation of aryltrinitromethanes. The introduction of two nitro-groups into the side chain of arylnitromethanes, which was observed for the first time, proceeds over the intermediate formation of arylnitrolic acid.

40. Synthesis of Triallylboron

"A Simple Synthesis of Triallylboron and Some Transformations of This Compound," by L. I. Zakharkin and V. I. Stanko, Institute of Organoelemental Compounds, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR - Otdeleniye Khimicheskikh Nauk, No 10, Oct 60, pp 1896-1897

A simple method has been developed for the synthesis of triallylboron from allylaluminumsesquibromide and tributyl borate or allylaluminumsesquibromide and the ether addition compound of boron trifluoride. Some reactions of triallylboron were investigated.

41. New Polymers in the USSR

"Soviet Scientists Develop New Polymers" (unsigned article); Budapest, Technika, Vol 4, No 9, Sep 60, p 10

New polymers have been developed under the direction of A. Topchiyev, Academician, in one of the petrochemical research institutes of the Soviet Academy of Sciences. In physical, chemical, and mechanical properties,

these substances surpass those previously produced in many respects. Polybutylene, for instance, retains its flexibility and hardness in extreme cold. Synthetic fiber made from polyisoamylene is exceptionally strong and has a melting point of 150-170 degrees. Polyvinylcyclohexane retains its flexibility at temperatures up to 325 degrees.

The Soviet scientists have evolved the production technology for these new synthetic substances which will soon be mass-produced.

42. Hungarians Determine Stability Constants of Complexes of Ethylenediaminetetraacetic Acid

"The Amphoteric Quality of Ethylenediaminetetraacetic Acid and Its Effect on the Stability of Metal Complexes Formed by This Acid," by Mihaly Beck, Candidate of Chemical Sciences, and Sandor Gorog, Institute of Inorganic and Analytical Chemistry, Szeged University of Sciences; Budapest, A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyei, Vol 12, No 3, 1959, pp 265-277

The solubility of EDTE decreases with a decrease in pH. It is at a minimum at pH 1.8 and increases when the hydrogen ion concentration is increased. The solubility reaches a maximum in a solution containing 2.5 mols of perchloric acid per liter, after which it decreases rapidly with increasing concentrations of perchloric acid. The minimum solubility of EDTE at pH 1.8 is the result of the isoelectric state of the EDTE at this pH. From the value of the isoelectric point, the authors calculated the acid dissociation constants of the  $H_6Y^{2+}$  and  $H_5Y^-$  ions. The maximum, occurring at 2.5 mols of perchloric acid per liter, is caused by the formation of EDTE.  $2HClO_4$ .

All six of the acid dissociation constants of EDTE must be taken into consideration when determining the complex stability constants in a strongly acidic medium. The authors demonstrated that the great difference in the values of the complex stability constants as reported in the literature resulted from failure to take into account the existence of the  $H_6Y^{2+}$  and the  $H_5Y^-$  ions.

Using a new system of calculation, the authors determined the complex stability constants of  $FeY^-$ ,  $FeHY$ , and  $FeH_2$  on the basis of the measurement of the partial decomposition resulting from the acid corresponding to the  $FeY^-$  anion.

43. Radiation-Chemical Stability of KU-2 Ion-Exchange Resin

"The Radiation-Chemical Stability of KU-2 Resin in Different Ionic Forms," by A. M. Semushin and I. A. Kuzin, Leningrad Technological Institute imeni Lensovet; Leningrad, Zhurnal Prikladnoy Khimii, Vol 33, No 10, Oct 60, pp 2323-2329

Investigation of the action of gamma-radiation emitted by  $\text{Co}^{60}$  on KU-2 resin saturated with ions of different metals ( $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{NH}_4^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$ ,  $\text{Cs}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Co}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Fe}^{3+}$ , and  $\text{Tl}^{3+}$ ) established that within the range of total radiation doses amounting to  $0.76 \times 10^8$  -  $8.5 \times 10^8$  roentgens, the action of radiation brings about changes in the physicochemical properties of the resin. The nature of these changes depends on the ion which has been adsorbed. When KU-2 cation-exchange resins are irradiated in the hydrogen form, there is reduction of the exchange capacity, formation of new ionogenic groups, an increase in the degree of hydration, and an increase in the reducing capacity of the resin. This indicates that under these conditions, processes of decomposition of the polymer predominate. It was found that the radiation-chemical behavior of KU-2 resin which has been saturated with ions of alkali and alkaline earth metals does not differ significantly from the behavior of this resin in its hydrogen form.

It was found that ions with a changeable valency ( $\text{Co}^{2+}$ ,  $\text{Cu}^{2+}$ , and  $\text{Fe}^{3+}$ ), when adsorbed on KU-2-8 resin, exert a stabilizing effect on this resin.

The multiplicity of phenomena taking place in connection with the irradiation of KU-2 resin in the presence of different cations indicates that the conditions of ion exchange involving adsorption and desorption of radioactive isotopes may differ radically from the conditions encountered in the exchange of ions of stable isotopes. This circumstance must be considered when work on radioactive isotopes is being done.

In earlier papers, the authors reported results obtained in the investigation of the radiation stability of swollen cation-exchange resins in their hydrogen form. It was established that the radiation stability of ion-exchange materials depends on their constitution. It was found that sulfonated resins containing benzene rings are the most stable to the action of radiation.

44. Oxidation of Ethylene With Oxygen Under Effect of Irradiation With Fast Electrons

"Radiation-Chemical Transformations of Organic Substances; Part 4 Oxidation of Ethylene Under the Effect of Irradiation With Fast Electrons," by B. M. Mikhaylov, and V. G. Kiselev, Institute of Organic Chemistry, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR - Otdeleniye Khimicheskikh Nauk, No 9, Sep 60, pp 1619-1628

The oxidation of ethylene with oxygen under the effect of irradiation with fast electrons was investigated. The effects on the oxidation process of the total radiation dose, the temperature, the material of the reaction vessel, and the initial proportion of ethylene to oxygen were studied. It was found that as a result of radiolytic oxidation, ethylene is converted mainly to glycol aldehyde, formic acid, organic peroxides, carbon monoxide, and acetylene. It was established that the reaction does not depend greatly on the temperature. The oxidation proceeds in approximately the same manner when the gas mixture is in contact with a glass, aluminum, or steel wall surface. The nature of the reaction changes radically in a brass chamber: there is a sharp lowering of the yield of peroxides and glycol aldehyde and an increase in the yield of higher acids, carbon dioxide, formaldehyde, and butylene. It is assumed that brass has a catalytic effect on the conversion of primary reaction products, thus changing the course of secondary reactions.

It was established that the reaction chamber walls exert a catalytic effect on the oxidation of ethylene in the initial stage of the reaction. The lack of dependence of the reaction on the temperature and the reaction's low energy yield led to the conclusion that the radiolytic oxidation of ethylene does not proceed by a chain process. A reaction mechanism is proposed which is based on the formation and further transformations of ethylene peroxide.

A rather high yield of acetylene resulted under the conditions studied; this yield was nearly equal to that obtained in the radiolysis of ethylene in the absence of oxygen.

Investigation of the radiation-chemical oxidation of unsaturated hydrocarbons with oxygen is of interest because the reactions in question can be carried out at low temperatures (room temperature and temperatures which are still lower; the work described in this instance was carried out in the range from minus 40° to plus 80°). Under these conditions, it is possible to isolate unstable intermediate products which decompose at the high temperatures of thermal oxidation reactions. While there is a considerable difference between the conditions under which radiation-chemical oxidations and thermal oxidations take place, results obtained in the investigation of radiation-chemical oxidation reactions may be expected to help in clarifying the mechanism of thermal oxidation.

45. Irreversible and Reversible Diffusion Characteristics of Polymers Subjected to Irradiation

"The Investigation of Diffusion Processes in Some Polymers. III. Irreversible Changes in Diffusion Characteristics as a Result of the Action of  $\text{Co}^{60}$  Gamma Irradiation on the Polymer," by N. S. Tikhomirova, Yu. M. Malinskiy, and V. L. Karpov, Scientific Research Institute of Plastics and the Physico-chemical Institute imeni L. Ya. Karpov; Moscow, Vysokomolekulyarnyye Soyedinyeniya, No 9, Sep 60, pp 1335-1348

The action of gamma-radiation on the diffusion of helium and argon through irradiated polymers -- polyethylene, polyamide 54/10, methanolpolyamide 2/10, polytetrafluoroethylene, polyvinyl chloride, and SKS 30 -- was investigated.

With an increase in the absorbed energy (dose): (a) there is a decrease in the diffusion rate of gases through polyethylene, polyamides, and SKS-30 which is apparently connected with the formation of cross links between the molecules; (b) a sharp increase in the rate of the diffusion of the gases is observed in polytetrafluoroethylene and polyvinylchloride; (c) a decrease in the dissolution of the gases in polyethylene and an increase in polyvinyl chloride and especially polytetrafluoroethylene was observed; (d) the activation energy of diffusion, enthalpy, and entropy of gas dissolution increases with the polyamides and decreases with the polyethylene; (e) an increase in the magnitude of the activation energy of permeability depends on a decrease in the lowering of the enthalpy of dissolution with the dose.

The most sensitive index of structural changes arising in a polymer as a result of irradiation is  $D_0$ .

Investigation of the conditions for the appearance and existence of free radicals was not considered in this work. However, the solution of these problems is of both theoretical and practical importance.

"The Investigation of the Diffusion Processes in Some Polymers. IV. Reversible Changes in Diffusion Characteristics During Irradiation," by N. S. Tikhomirova, Yu. M. Malinskiy, and V. L. Karpov, Scientific Research Institute of Plastics and the Physicochemical Institute; Moscow, Vysokomolekulyarnyye Soyedinyeniya, No 9, Sep 60, pp 1349-1359

The diffusion of monoatomic gases, helium and xenon, through polyethylene and polytetrafluoroethylene during  $\text{Co}^{60}$  irradiation was investigated. The reversible effect of irradiation of the diffusion rate of gases in polymers has been established. During irradiation, the gaseous



permeability of the polymers increases sharply; after the irradiation source is removed, the permeability almost returns to its original value if the dose has not produced any irreversible changes in the polymer. The reversible effect of the diffusion of gases was observed both in structured (polyethylene) and destructurized (polytetrafluoroethylene) polymers. Observed increases in film temperature during irradiation do not explain the sharp increase in diffusion since these were responsible for only 1/6 of the measured effect.

The reversible radiation-diffusion effect, within the limits of the doses investigated, is linearly dependent on the intensity of the irradiation.

The magnitude of the increase in diffusion rate during irradiation differs with various polymers. For instance, the permeability of polyethylene increases 10-15 times, and polytetrafluoroethylene, 2 times.

The increase in the permeability of the polymers during irradiation is connected with an increase in the diffusion of the gases in the polymers and not with an increase in the solubility of the gases in the polymers.

An increase in gaseous diffusion in polyethylene during irradiation is greater for gases with large atomic diameters.

#### Radiochemistry

46. All-Union Conference on Introduction of Use of Radioactive Isotopes and Nuclear Radiation in USSR National Economy

"An All-Union Conference on the Introduction of the Use of Radioactive Isotopes and Nuclear Radiation into the USSR National Economy," by F. D. Alekseyev, P. L. Gruzin, Yu. F. Babikova, M. L. Gol'din, A. I. Yakovlev, A. N. Slatinskiy, S. V. Rummyantsev, V. M. Zezyulinskiy, V. I. Rogachev, F. M. Lyass, and Ye. Ye. Kulish; Moscow, Atomnaya Energiya, Vol 9, No 3, Sep 60, pp 221-242

A detailed account is given of the All-Union Conference on the Introduction of the Use of Radioactive Isotopes and Nuclear Radiation into the National Economy of the USSR. This conference was held on 12-16 April 1960 at Riga. A detailed account is given of the conference under the subject headings: Use of Radioactive Isotopes and Nuclear Radiation in Prospecting for and Production of Useful Minerals (pp 222-223); Radioactive Isotopes and Nuclear Radiation in Metallurgy (pp 223-225); Application of Radioactive Isotopes in the Mineral Enrichment and Ore Industries (pp 225-226); Application of Radioactive Isotopes and Nuclear Radiation in Building (pp 227-229); Application of Radioactive Isotopes in Light Industry (pp 229-231); Application of Radioactive Isotopes and

Nuclear Radiation in Machine Building (pp 231-233); Application of Radioactive Isotopes and Nuclear Radiation in Agriculture (pp 234-235); Application of Radioactive Isotopes and Nuclear Radiation in the Food Industry (pp 235-239); Application of Radioactive Isotopes and Nuclear Radiation in Medicine (pp 239-241); and Application of Sources of Alpha, Beta, and Gamma Radiation in the Control and Automation of Technical Processes (pp 241-242). The transactions of the conference will be published in 1960.

Miscellaneous

47. New Chemical Research Institutions in Hungary

"New Research Institutions of the Department of Chemical Sciences;" Budapest, A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlomenyei, Vol 14, No 2, 1960, p 249

In accordance with the resolution of the Presidium of the Hungarian Academy of Sciences, the following research institutions have been established within the Department of Chemical Sciences:

<u>Name</u>	<u>Director</u>	<u>Place of Operation</u>
Technical Chemical Research Institute	Mor Korach, Academician, U. Prof;	Budapest, 4 Gellert Pl
	Karoly Polinszky, Deputy Director, U Prof, Candidate	Veszprem Chemical Industry Univ-ersity
Academy Alkaloid Chemistry Research Group	Denes Beke, U Prof, Candidate of Chemical Sciences	Dept of Organic Chemistry, Budapest Technical U
Academy Antibiotics Chemistry Research Group	Rezo Bognar, Academician, U Prof	Dept of Organic Chemistry, L. Kossuth U of Science Debrecen
Academy Electrochemical Research Group	Sandor Lengyel, U Prof, Candidate of Chemical Sciences	Dept of Physical Chemistry, Lorand Eotvos U of Science, Budapest

<u>Name</u>	<u>Director</u>	<u>Place of Operation</u>
Academy Colloid Chemistry Research Group (as of 1/1/61)	Aladar Buzagh, Academician, U Prof	Dept of Colloid Chemistry, Lorand Eotvos U of Science
Academy Quantitative Analytical Chemistry Research Group	Elemer Schulek, Academician, U Prof	Dept of Inorganic and Analytical Chemistry, Lorand Eotvos U of Science
Academy Technical Analytical Chemistry Research Group	Laszlo Erdey, Academician, U Prof	Dept of General Chemistry, Technical U, Budapest
Academy Polypeptide Chemistry Research Group	Gyozo Bruckner, Academician, U Prof	Dept of Organic Chemistry, Lorand Eotvos U of Science
Academy Reaction Kinetics Research Group	Zoltan Szabo, Corr Academician, U Prof	Dept of Inorganic and Analytical Chemistry, Szeged U of Science
Academy Organic Chemical Technology Research Group	Zoltan Csuros, Academician, U Prof	Dept of Organic Chemical Technology, Technical U, Budapest
Academy Inorganic Chemistry Research Group	Bela Lengyel, U Prof, Doctor of Chemistry	Dept of General and Inorganic Chemistry, Lorand Eotvos U of Science

48. Hungary Stresses Research on Catalysts

"Establishment of the Catalysis Work Committee"; Budapest, A Magyar Tudományos Akademia Kemiai Tudományok Osztályának Közleményei, Vol 14, No 2, 1960, p 250

The Catalysis Work Committee was established in December 1959 with the approval and support of the Physical Chemistry Committee (of the Department of Chemical Sciences of the Academy of Sciences). Zoltan Szabo, corresponding member of the Academy, is president of the committee; Ferenc Nagy, Doctor of Chemical Sciences, is a member of its presidium; and Jozef Petro, assistant professor, is its secretary.

The goals of the Committee are the coordination of the work of chemists dealing with catalysis and the promotion of the development of catalytic research and those branches of science dealing with catalysis. To achieve this, the committee plans to arrange discussion groups at which researchers will present and debate their programs and achievements. Both local and foreign specialists will be invited to address the groups whenever possible.

Instruments and Equipment

49. New Film Strain Gauges for Ferrites Developed

"Film Strain Gauges for Measuring Ferrite Magnetostriction,"  
by V. A. Yugov and G. P. D'yakov; Moscow, Izmeritel'naya  
Tekhnika, No 10, Oct 60, pp 31-32

The successful use of film strain gauges for measuring the magnetostriction of nickel has led to the development of this method for application to ferrites. The characteristic properties of ferrites have made possible an improved and simplified design for the strain gauge.

Problems of selecting a material for the strain-sensitive layer, fabrication of leads from the strain-sensitive layer to the measuring instrument, and achieving good contact between the leads and the strain-sensitive layer are discussed.

The following data were obtained for two samples of ferrites:

Sample No 7 -- ferrite  $MgFe_2O_4$ ;  $\rho > 10^9$  ohm.cm; strain-sensitive films of Nichrome; gauge resistance = 828 ohms; striction =  $6.25 \cdot 10^{-6}$ ;  $I_s = 85$  gauss.

Sample No 73 -- ferrite  $NiFe_2O_4$ ;  $\rho_k > 2 \cdot 10^8$  ohm.cm; strain-sensitive films of Nichrome; gauge resistance = 285 ohms; striction =  $11.0 \cdot 10^{-6}$ ;  $I_s = 240$  gauss.

The film strain gauges studied showed stable operation even with comparatively large temperature fluctuations.

50. Organic Glass Used in Pressure Data Units

"Highly Sensitive Pressure Data Units of Organic Glass," by S. B. Stopskiy; Moscow, Izmeritel'naya Tekhnika, No 10, Oct 60, p 33

A pressure data unit is described in which the membrane and case of the unit are made of organic glass instead of metal as in the ordinary membrane-type unit. The low modulus of elasticity (210 kg/cm<sup>2</sup>) makes it possible to obtain the necessary bending of the membrane under a load ten times smaller than would be required with a metal membrane of the same thickness. Characteristics of the data units are linear.

The technology of manufacturing the data units and methods of their application are explained.

51. Electron-Optical Converters for Gamma Rays Described

"Electron Emission in an Electron-Optical Converter for Gamma Rays," by P. V. Timofeyev and V. V. Sorokina; Moscow, Radiotekhnika i Elektronika, Vol V, No 10, Oct 60, pp 1687-1691

A description is given of electron-optical converters for gamma rays used in defectoscopy and in medicine, and the design and properties of the cathodes used in the converter are examined.

The distinguishing feature of the converters is the use of only two electrodes. The cathode, having a spherical shape, is composed of a base of aluminum foil covered with a phosphor layer and a cesium antimonate photocathode. A luminescent screen for the visual observation of images is located in the anode cylinder. The surface of this screen is covered with a thin aluminum film.

The first type of converter described has a cathode diameter of 30 mm, an electron-optical reduction factor of 6, an operating voltage of 16-18 kv, a resolution of up to 5 lines/mm, and an image brightness 400-500 times greater than an ordinary X-ray screen. The second type of converter has a 100 mm cathode, a reduction factor of approximately 9, and an operating voltage of 22-25 kv. Resolution of the converter reaches 3 lines/mm, and it has a brightness increase of 1,000-1,500 times.

This report was presented at the Ninth All-Union Conference on Cathode Electronics held in Moscow in October 1959.

52. Improvements Made in Characteristics of Photoelectron Multipliers

"Properties of Photoelectron Multipliers With Cesium Oxide Photocathodes," by P. V. Timofeyev and Ye. G. Kormakova; Moscow, Radiotekhnika i Elektronika, Vol V, No 10, Oct 60, pp 1692-1697

The properties and parameters of photoelectron multipliers with cesium oxide photocathodes are described.

The two types of multipliers described -- the FEU-2 and FEU-3 -- have cylindrical emitters with control grids and differ only in size, shape, and anode lead-out. The number of emitters in both types is 13. The emitters are based on magnesium oxide surfaces obtained by activation of an ALMg alloy.

The semitransparent cesium oxide photocathodes are prepared according to a method developed at the All-Union Electrical Engineering Institute involving supplementary spraying of silver without sensitization with oxygen. This process makes it possible to obtain an average secondary-emission coefficient of 2.5-2.7 for the emitter at a primary electron velocity of 60 volts and a photocathode sensitivity of 20-35 microamperes/lumen and to maintain its limits within the infrared region under these conditions.

Maximum sensitivity of the photocathodes occurs at 740-780 millimicrons, and the infrared boundary reaches 1,100-1,200 millimicrons.

This report was presented at the Ninth All-Union Conference on Cathode Electronics held in Moscow in October 1959.

53. Thermal Compensation of Precision Quartz Oscillators

"The Problem of Increasing Thermal Stability of Precision Quartz Resonators," by A. F. Plonskiy, Chelyabinsk Polytechnic Institute; Kiev, Izvestiya Vysshikh Uchebnykh Zavedeniy, Radiotekhnika, No 3, May/June 60, pp 326-336

Variation in ambient temperature is the principal factor for the frequency fluctuation of high-precision quartz oscillators. The temperature coefficient of frequency fluctuation for a modern quartz oscillator is about  $0.5 \cdot 10^{-6}$  per °C.

The method of thermal compensation by incorporating thermistors into the quartz oscillator circuit and the method of thermal compensation by means of selecting proper operating point are described and compared. Experimental studies have shown that the proposed method of thermal compensation by means of proper selection of the operating point results in unusually high frequency stability up to  $2.7 \cdot 10^{-10}$ .

The author suggests that a combination method consisting of selection of optimum operating point by introducing variable capacitance to stabilize such a point be investigated.

54. Transformation of Coordinates With Electronic Device

"Electronic Function Converter," by Yu. Ya. Yurov, V. I. Vinokurov, and V. B. Ustinov, Leningrad Electrical Engineering Institute; Kiev, Izvestiya Vysshikh Uchebnykh Zavedeniy, Radiotekhnika, No 3, May/June 60, pp 376-385

In the solution of radio-electronics and automation problems, it is often necessary to transform functions with the aid of automatic devices; one type of such problem is the conversion of polar coordinates into

Cartesian coordinates. Devices generally used for such conversions are nonlinear potentiometers and rotating transformers; however, these are limited to certain types of functions.

The authors suggest a new electronic system which is free of the above-mentioned limitations. An experimental circuit for conversion of coordinate systems was devised which consisted of a dc-component unit, a harmonics unit, an amplitude-changing unit, a voltage oscillator, a saw-tooth oscillator, a comparison circuit, an add circuit, and a synchronous circuit. The device incorporates seven vacuum tubes. The frequency of the harmonic oscillations of the oscillator was set at 15 kc, and voltage phase-shift of  $1/2\text{-}\pi$  was accomplished with an RC circuit. The duration of positive pulses fed to the grid of No 1 tube from the comparison circuit was about  $6 \cdot 10^{-7}$  sec. The device drew power from a 200-volt dc source.

This function conversion system showed reliable performance and was able to carry out a number of mathematical operations such as division, multiplication, extraction of roots, raising to a power, and determination of number logarithm.

The article discusses several sources of error that can affect the accuracy of this type of function transformer.

55. Electron Injection Into Microtron

"Injection Into Microtron," by B. Z. Kanter, Tomsk Polytechnic Institute; Tomsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No 3, 1960, pp 138-141

The transfer of energy in a microtron takes place when the electrons pass through the gap of a high-frequency resonator while the voltage is such as to accelerate the electrons. These electrons are again returned to the resonator gap by means of a uniform dc magnetic field which makes the electrons move in a circular orbit. The electrons thus acquire a resonance acceleration by traveling each orbit in a time interval equal to the full period of the high-frequency voltage.

The examination of the phase-stability region of a microtron shows that a satisfactory system of injection will produce a short (less than  $30^\circ$ ) electron bunch with a narrow (about 8%) energy spectrum in the first orbit. The presently used system of injection, based on electrostatic emission from one of the resonator electrodes, does not fully meet the stipulated requirements. Satisfactory performance of a microtron can be obtained by utilizing an injector with preliminary bunching of electrons and the necessary provisions for adjustment to various operating conditions of the accelerator.



Materials

56. Possibilities of Synthesizing Polymers That Exhibit Semiconductor Properties and Desirable Thermal and Magnetic Characteristics

"Synthesis and Properties of Polymers With Systems of Conjugated Bonds," by A. A. Berlin; Moscow, Khimicheskaya Promyshlennost', No 5, Jul/Aug 60 (published in Sep 60), pp 375-382

It is brought out that in connection with current technological progress in the fields of electronics, jet-propelled aircraft, the construction of rockets, and nuclear technology, polymers must be developed which exhibit a high thermal stability, a high electrical conductivity, and pronounced semiconductor, magnetic, and electron- and ion-exchange properties for specific applications. Polymers which are resistant to the action of ionizing radiation are also required. The synthesis and investigation of the properties of polymers with systems of conjugated bonds represent a particularly promising approach to the development of materials with the characteristics mentioned. Such polymers may or may not contain heteroatoms (including metal atoms) in continuous conjugation conjugation chains. Because the  $\pi$ -electrons are delocalized to a considerable extent in polymers of this type, the internal energy of the system is greatly reduced. Lowering of the energy required for excitation to the triplet state results because of a reduction of the difference between the highest and lowest energy levels occupied by free electrons ( $\Delta w$ ).

To synthesize polymers exhibiting a high degree of thermal stability, one must endeavor to build up structures having a relatively high  $\Delta w$  or synthesize substances that have a low  $\Delta w$  but are incapable of forming hydroperoxy compounds. The synthesis of polyarylvinylenes (polyvinylacetylenes) and the properties of compounds of this class, which are substances with a high  $\Delta w$ , are discussed to a considerable extent on the basis of work done by the author and his associates.

Substances with conjugated bonds and a low value of  $\Delta w$  may be expected to exhibit semiconductor properties. Polymers of this type should also be investigated whenever it is desired to synthesize macromolecular compounds possessing magnetic properties, electron-exchange resins, photosensitive plastics, light polarizers, etc. The presence in conjugated systems of a sufficient number of centers with a reduced electronic density usually corresponds to low energies of activation of conduction ( $\Delta E = 0.2-1.5$  ev): substances possessing this characteristic can be regarded as semiconductors. This is illustrated with the example of polycondensed aromatic rings.

Work done recently by the author and his associates was concerned with the investigation of magnetic properties of macromolecular structures containing conjugated bonds and heteroatoms in the conjugation chain. It was established in this work that polymers with a sufficient degree of conjugation in the principal chain show rather pronounced antiferromagnetism and ferromagnetism. It is stated that this opens up extensive possibilities of the practical application of such polymers.

57. Electrical Conductivity of Polymers With Conjugated Bonds

"The Electrical Conductivity of Polymers With Conjugated Bonds," by Ye. I. Balabanov, A. A. Berlin, V. P. Parini, V. L. Tal'roze, Ye. L. Frankevich, and M. I. Cherkashin, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 134, No 5, 11 Oct 60, pp 1123-1126

The problem of synthesizing organic polymers with diverse electro-physical properties, including polymers with semiconductor properties, involves investigation of electrical characteristics of different types of polymers with conjugated bonds and heteroatoms in the conjugation chains. The authors have synthesized polymers of the types mentioned below. They investigated their electrical conductivity and the dependence of this conductivity on the temperature. Compounds of the following types were synthesized:

a. polymers with a noncyclic conjugation chain, viz., polyphenylacetylene (1), copolymers of polyphenylacetylene with hexyne (2) and with p-diethynylbenzene (3);

b. polymers with benzene nuclei in the conjugation chain including a polyphenylene (4); a polyphenyleneazocompound (5), containing  $\text{CH}_3$  groups (6), and (5) containing  $\text{COOH}$  groups (7); polymeric aromatic and fatty-aromatic compounds containing quinoid and amino-groups, among them a polyphenyleneaminoquinone (8), (8) substituted with Cl (9), and (8) substituted with  $\text{COOH}$  (10); a poly-p-phenylenediaminoquinone (11); a poly-hexamethylenediaminoquinone (12); a polyphenyleneazoquinone (13) and (13) substituted with  $\text{COOH}$  (14); a polymeric triazene (15); a substance containing quinoneimine groupings (16); polymeric chelates formed by a polydiphenylaminoquinone with metals, e. g., Cu (17); addition compounds of acenaphthene with chloranil (18); addition compounds of acenaphthene with a polyphenyleneaminoquinone pyridonium derivative (19);

c. compounds with rings other than benzene rings in the conjugation chain including tetrasalicylferrocene (20) and the chelates of (20) with  $\text{Fe}^{2+}$  (21) and  $\text{Be}^{2+}$  (22); polymeric chelates formed by pericyanoethylene with  $\text{Cu}^{2+}$  (23) and  $\text{Fe}^{2+}$ .

The synthesis and properties of some of the compounds mentioned above (e.g., 8, 10, 11, 13, and 14) have not yet been described in the literature. Special communications describing their properties will be published soon. It is stated that compounds containing quinoid rings (10, 14), particularly those in which the quinoid rings are joined to the conjugation chain over nitrogen atoms (16), are of particular interest because in such compounds, the energy of excitation to the triplet state must be greatly lowered, and in some cases formation of ion-radical structures takes place.

The general relationships that have been established in regard to the dependence of the conductivity of the compounds enumerated above on the temperatures are outlined briefly. It was established that some of the compounds investigated have a conductivity which exceeds considerably that of organic dielectrics. This refers particularly to compounds 16, 21, and 22, which exhibit an electrical conductivity approaching that of organic semiconductors of the type described by A. V. Topchiyev, M. A. Geydrikh, et al. The electrical conductivity of polyphenylacetylenes (compounds which act as typical insulators at room temperature) was found to increase greatly with the temperature.

58. Preparation of Polymers With Semiconductor Properties

"Preparation of Polymers With Semiconductor Properties,"  
by M. A. Guyderikh and others; Weinheim (FRG), Angewandte  
Chemie, Vol 72, No 18, 21 Sep 60, p 710

CPYRGHT

"By subjecting to heat treatment polyacrylonitrile that had formed by ionic or radical polymerization, polymers could be obtained which exhibit semiconductor characteristics (A. V. Topchiyev and others). On the basis of electronic paramagnetic resonance spectra, it was established that these polymers contain  $1 \times 10^{18}$ - $5 \times 10^{19}$  unpaired electrons per gram. The thermal EMF was determined and the occurrence of a Hall-effect proven. Addition of copper, iron, or chromium ions to the initial polymer broadens out the electron spin resonance signal. Dehydrobromination of brominated rubber and dehydrochlorination of polyvinyl chloride result in unsaturated polymers [which exhibit semiconductor properties]. Furthermore, it was established that products of the condensation of phthalic acid anhydride with hydroquinone exhibit semiconductor properties."

[SIR Note: This is an abstract of a USSR paper presented at the International Symposium on Macromolecular Chemistry, Moscow, 14-18 June 1960.]

59. Temperature Dependence of the Magnetization of Hexagonal Ferrites in Weak Fields

"The Temperature Dependence of the Magnetization of Hexagonal Ferrites in Weak Fields," by Ye. S. Borovik and Yu. A. Mamaluy, Khar'kov State University imeni A. M. Gor'kiy; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 9, No 6, Jun 60, pp 828-831

The temperature dependence of the magnetization of barium, lead, and strontium ferrites and also of cobalt was investigated at low degrees of magnetization. It was established that a Hopkinson effect (raised initial susceptibility in the vicinity of the Curie point) is not shown by the ferrites. Cobalt, in addition to a Hopkinson effect, exhibits a susceptibility maximum in the region where the constant of anisotropy changes its sign.

60. Photoelectric Characteristics of Fused P-N Junctions in Silicon Carbide

"Photoelectric Characteristics of Fused P-N Junctions in Silicon Carbide," by G. F. Kholuyanov, Leningrad Electro-technical Institute imeni V. I. Ul'yanov-Lenin; Leningrad, Fizika Tverdogo Tela, Vol 2, No 8, Aug 60, pp 1909-1914

The results of an investigation of the spectral and integral characteristics of fused P-N junctions in alpha-silicon carbide are reported briefly. Notwithstanding the fact that the semiconductor properties of silicon carbide had been studied for a long time, its photoelectric properties were not yet investigated. Further research along this line is expected to result in the application of silicon carbide as a sensitive material in photocells for the recording of ultraviolet radiation. Such cells can operate at elevated temperatures. The technique of producing fused P-N junctions in silicon carbide was described by T. Ye. Kharlamova and G. F. Kholuyanov in Fizika Tverdogo Tela, (Vol 2, No 3, Mar 60, pp 426-433).

61. Electric Properties of Fused P-N Junctions in Silicon Carbide

"The Electric Properties of Fused P-N Junctions in Silicon Carbide," by T. Ye. Kharlamova and G. F. Kholuyanov, Leningrad Electrotechnical Institute imeni V. I. Ul'yanov-Lenin; Leningrad, Fizika Tverdogo Tela, Vol 2, No 3, Mar 60, pp 426-433

At present, attempts are being made to develop semiconductor devices with P-N junctions using single crystals of silicon carbide. The width of the forbidden zone in silicon carbide amounts to 2.86 ev at room temperature; for this reason, the rectifying properties of silicon carbide are preserved up to much higher temperatures than those at which germanium, silicon, or selenium can still be used. In the work described in this instance, the volt-ampere curves of P-N junctions produced in single crystal alpha-SiC with electronic conductivity and a specific resistance of 2-2.5 ohms were determined in the temperature range of 20-500°C. The junctions were produced by fusing in an Al-Si alloy in a hydrogen atmosphere.

On the basis of the relation between the intensity of recombination radiation and the potential, the regularities have been found which interrelate the increase of the diffusion component of the current with the growth of potential in the straight-line direction. By employing the constants of the time of damping of recombination radiation, the length of the diffusion path of holes has been estimated. The effect of leakages on the volt-ampere curves of P-N junctions was demonstrated. Over the whole range of potentials that have been investigated, the increase of reverse current with potential was found to take place at a rate greater than that which would correspond to a linear law. In the region of high reverse potentials, phenomena were observed which indicate that there is an avalanche type of breakdown along the periphery of a P-N junction and also in the region of defects. The capacities of P-N junctions and the dependence of these capacities on the potential and temperature were determined. The possibilities of the application of P-N junctions in SiC as nonlinear capacitors are discussed.

62. Dynamic Volt-Ampere Characteristics of Silicon Carbide Resistances

"The Dynamic Volt-Ampere Characteristics of Silicon Carbide Resistances," by V. V. Pasynkov, G. F. Kholuyanov, and L. K. Chirkin, Leningrad Electrotechnical Institute imeni V. I. Ul'yanov-Lenin; Leningrad, Fizika Tverdogo Tela, Vol 2, No 3, Mar 60, pp 434-437

The dynamic volt-ampere curves of low-voltage nonlinear silicon carbide resistances at low current densities have been determined and are discussed. These curves differ significantly from the dynamic volt-ampere curves of resistances that operate as vilite (tirite) dischargers. The hysteresis of the volt-ampere curve is due to processes of charging and discharging of the capacity of the nonlinear resistance; it is not related to microheating at contacts between silicon carbide crystals. It was established that the inherent capacity of resistances consisting of green or black silicon carbide does not depend on the frequency within the range from 50 kilocycles to 25 megacycles or on the magnitude of the direct current bias.

Low-voltage nonlinear silicon carbide resistances have been developed within recent years and are now being used extensively both in the USSR and outside of the USSR.

63. Diffusion of Boron Into Carbon

"Diffusion of Boron Into Carbon," by P. S. Kislyy and G. V. Samsonov, Institute of Powder Metallurgy, Cermets, and Special Alloys, Academy of Sciences Ukrainian SSR; Leningrad, Fizika Tverdogo Tela, Vol 2, No 8, Aug 60, pp 1729-1732

The original experiments on the diffusion of boron into graphite, carried out with the participation of G. V. Samsonov, had the purpose of producing a material for tools to be used in dressing [adjusting the shape of] grinding wheels. These experiments showed that on diffusion of boron into the graphite, hard alloys are formed which are stronger and less brittle than boron carbide pressure-molded at high temperatures. It was found in subsequent work that the alloys which are formed have semiconductor properties; they were used as material for a high-temperature semiconductor thermocouple. Furthermore, treatment of graphite products by diffusing boron into their surface will undoubtedly increase the erosion resistance of these products, as well as their stability toward the action of various chemicals, particularly at high temperatures. Because of the possible applications mentioned above, the diffusion of boron into graphite was investigated more thoroughly. The results obtained are reported.

64. Thermoelectric Properties of the  $MnAl_3$  Intermetallic Compound

"The Thermoelectric Properties of the  $MnAl_3$  Intermetallic Compound," by N. V. Kolomojets and Ye. A. Popova, Institute of Semiconductors (Leningrad), Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 2, No 8, Aug 60, pp 1951-1955

The results obtained in the investigation of  $MnAl_3$  indicated that this compound is of interest from the standpoint of its practical application because it has a sufficiently high thermal EMF, a higher mobility of electrons than of holes (the latter amounting to  $200 \frac{cm^2}{v \cdot sec}$ ), and a width of the forbidden zone which is within the optimum range for most semiconductors ( $\Delta E_3 = 0.58$  ev).  $MnAl_3$  is one of the few intermetallic compounds known which exhibit semiconductor properties. Investigation of its characteristics will aid in the discovery of other intermetallic compounds with semiconductor properties.  $MnAl_3$  may be assumed to have a considerable heat stability because its melting point lies at approximately  $900^\circ C$ .

65. Photodielectric Properties of Polycrystalline Cadmium Selenide

"Photodielectric Properties of Polycrystalline Cadmium Selenide; Part 1-High Temperatures," by Ya. A. Oksman and A. V. Burlakov; Leningrad, Fizika Tverdogo Tela, Vol 2, No 8, Aug 60, pp 1884-1888.

The photodielectric properties of powdered cadmium selenide that has been dispersed in a dielectric medium (polyester resin FN-1) are considered. Measurements were carried out at temperatures in the range of  $20-108^\circ C$  at frequencies not exceeding 200 kilocycles. It was found that under these conditions, the photodielectric effect is due to uncomplicated photoconduction. By using methods of analysis that have been developed earlier, the photoelectric properties of cadmium selenide are defined and compared with data published in the literature.

66. Reactions Taking Place During Interaction Between Dry ZnS and SeO<sub>2</sub> Powders

"Reactions Taking Place During Interaction Between Dry ZnS and SeO<sub>2</sub> Powders," by Ya. Markovskiy and R. I. Smirnova, State Institute of Applied Chemistry; Moscow, Zhurnal Neorganicheskoy Khimi; Vol 5, No 9, Sep 60, pp 2042-2047

The reaction between dry powders of zinc sulfide and selenium dioxide taking place according to the equation  $ZnS + SeO_2 \longrightarrow ZnSe + SO_2$  was investigated. It was found that this reaction is complicated by a number of side reactions which are due to the strong oxidative effect of SeO<sub>2</sub>. Because of this effect, it is impossible to prepare by the method described (without additional purification) zinc selenide that is free of zinc oxide. The reaction subjected to investigation is of importance from the standpoint of the preparation of sulfide-selenide phosphors.

67. Introsopes for the Examination of Materials

"Universal Vision Rather Than Examination by Light Transmission," by A. Presnyakov; Moscow, Ekonomicheskaya Gazeta, No 122, 20 Oct 60, p 4

Different types of introsopes for the examination of materials by transmitting radiation through them have been developed in the USSR. One of them uses infrared radiation. This type of instrument was demonstrated in the following manner. Pieces of a saw blade were placed into a glass filled with a dark opaque liquid. After infrared rays had been passed through the contents of the glass, an image could be picked up by a transducer device and projected onto a television screen. The pieces of saw blade were clearly visible on the television screen.

By using ultrasound introsopes, one can examine the quality of joints formed in the electric welding of metals. Using the same type of instrument, one can observe the distribution of alloying metals in steel, examine carefully parts of metal that have been subjected to heat treatment, determine the degree of metal fatigue, etc.

By using infrared introsopes, one can subject to visual examination layers of semiconductor materials such as silicon and germanium and also carbolite and ebonite. By examining materials such as these with an introscope, one can clearly see inhomogeneities of structure and detect the presence of impurities, as well as crystal defects. An introscope which operates on gamma rays has also been developed. The gamma rays generated by a betatron, on being passed through the object under examination, impinge on a special crystal which converts the gamma radiation into light signals. An image of the material through which



the radiation is passed arises on the crystal and is reflected by a mirror onto a television chamber which picks it up. The image can be seen on a television screen placed at a distance. The quality of the image is so good and the contrast so perfect that on passing radiation through a casting mold, one can see clearly the boundary between the liquid and solid layers of metal.

By using introsopes which employ gamma rays, one can achieve stereoscopic vision. This is very important for medical applications. Instead of shadow images, as in X-ray pictures, it will be possible to see human organs in three dimensions.

### Ultrasonics

#### 68. Application of Ultrasonics

"The Wonders of Ultrasonics -- All-Union Conference of Scientists and Engineers in Moscow," by N. Petrov, Moscow, Pravda, 23 Nov 60

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"About 1,600 representatives from various enterprises and sovnarkhozes, scientific-research institutes, and design bureaus from all the union republics gathered yesterday [22 Nov 60] at Column Hall of the House of the Trade Unions to attend the All-Union Scientific-Technical Conference on the subject of introduction of ultrasonics into industrial processes. A special section began work today to summarize up-to-date achievements and will outline further steps for more extensive application of ultrasonics in industrial processes."

#### 69. Absorption of Ultrasound

"Theory of Absorption of Ultrasound by Metals in a Strong Magnetic Field. II.," by Ye. A Kaner, Institute of Radio-physics and Electronics, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct 60, pp 1071-1077

The asymptotic absorption of ultrasound by open Fermi surface metals located in a strong magnetic field is investigated. It is shown that irrespective of the presence of open trajectories, the deformation absorption coefficient becomes saturated. A pronounced anisotropy of the saturation exists, depending on the position of the sound wave vector relative to the magnetic field and the direction of the open trajectory. Peculiarities of inductive absorption of ultrasound in the case of open Fermi surfaces are studied. The asymptotic value of the conductivity tensor in a magnetic field is calculated by taking into account space dispersion.

Wave Propagation

70. Award Presented for "Kabanov Effect"

"The Kabanov Effect," by N. Lazarev; Moscow, Ekonomicheskaya Gazeta, 16 Nov 60, p 1

CPYRGHT

On 15 November 1960, candidate of technical sciences N. I. Kabanov was presented an award for the following discovery: "Radiowaves reflected from the ionosphere are, upon reaching the earth, partially reflected by its surface, whereupon a certain portion of the scattered energy returns to the source of radiation where it may be recorded."

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Kabanov's work lays the basis for the method of "return-oblique ionospheric sounding" (VNZ), which is a new method for studying the ionosphere and radio wave propagation. It will make possible an increase in the stability of radio communications and radio broadcasting by short waves and facilitate rapid and positive communication between all continents.

At the meeting during which Kabanov received his award, it was pointed out that the Committee on Inventions and Discoveries under the Council of Ministers USSR had recorded, on 15 November 1960, a discovery by a group of scientists at the Institute of Atomic Energy -- L. Dobrokhotoy, S. Luk'yanov, I. Podgoranny, V. Sinitsin, and N. Filippov. In the study of high-temperature plasma, they detected a phenomenon of neutron radiation which has been hitherto unknown. This radiation originates in a plasma formed by passing powerful current pulses through deuterium.

71. Wave Propagation in Plasma-Filled Waveguide Examined

"Wave Propagation in an Isotropic Plasma Wave Guide," by G. A. Postnov; Moscow, Radiotekhnika i Elektronika, Vol V, No 10, Oct 60, pp 1598-1602

The article examines the question of propagation of electromagnetic energy in a wave guide filled with an isotropic plasma, assuming that the concentration of electrons changes through the cross-section of the wave guide. A rigorous solution is obtained for the case of a flat wave guide; for a cylindrical wave guide, an approximate solution is obtained by two different methods, and results are tabulated.

Results show that for a certain value of electron concentration along the axis, the central region in the wave guide becomes completely reflecting, corresponding to a change from wave guide mode H<sub>11</sub> wave to a coaxial mode wave. Propagation of electromagnetic waves in a plasma wave guide continues even at very high electron concentration and when the plasma column completely reflects waves laterally incidental to it.

IV. ENGINEERING

Atomic Power

72. Progress of Beloyarskoye Nuclear Power Plant

"The Ural Atomic Giant" (unsigned item); Moscow, Izvestiya,  
7 Nov 60

The brief article reads as follows:

"Sverdlovsk, 6 November (by telephone).

"The last few concrete blocks have been installed at the Beloyarskoye nuclear power plant for the support of the roof of the reactor room, which the builders of the nuclear plant call the heart of the station. The power-engineering workers have begun the installation of roof trusses.

"The walls of the reactor room, which are equal in height to that of a 13-story building, were erected in record short time -- less than one year. This was achieved through the use of huge, prefabricated, reinforced-concrete blocks up to 15 tons each.

"The construction of other sections of the Ural atomic giant is also progressing satisfactorily. The turbogenerator foundations are now being laid in the machine room. Work has been completed on the construction of the dam which will create a reservoir to satisfy the needs of the station. The reservoir will cover 40 square kilometers. Amidst the venerable Ural forests will appear a modern city to house the builders of the atomic power plant."

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Automatic Control Engineering

73. Application of Cybernetics to Electrical Power Systems

"Cybernetics of Electrical Power Systems," by V. A. Venikov,  
Moscow Power Engineering Institute; Minsk, Izvestiya Vyssh-  
ikh Uchebnykh Zavedeniy, Energetika, No 9, Sep 60, pp 1-8

Electrical power systems are becoming more and more complicated due to increased application of automated control devices, which in turn calls for special cybernetics methods to solve problems arising in the course of the design and exploitation of the power systems. Since electrical power systems have their own specific peculiarities, introduction of a new concept of "cybernetics of electrical power systems" is necessary.

The author suggests that this new subject, the cybernetics of electrical power systems, should be incorporated into the regular curriculum of electrical engineering colleges. The cybernetics of electrical power systems is not concerned with problems of electrical equipment design, nor with the problem of network calculations.

It is proposed that the subject be broken into three main subdivisions, as follows: the study of interaction of all components comprising the electrical power system, the theory of obtaining and transmitting information, and the development of the theory of electrical power systems in line with the basic principles of cybernetics.

74. Effect of Fluctuations on Extremum Relay Systems Examined

"The Effect of Fluctuations on Extremum Relay Systems in a Self-Oscillating Regime," by I. S. Mrosanov; Moscow, Avtomatika i Telemekhanika, Vol XXI, No 9, Sep 60, pp 1254-1263

A study is made of extremum control relay systems in a self-oscillating regime with fluctuations acting on the input of the controller. A method of statistical linearization, based on the reduction of an external random action to a parametric action on the controller, is proposed for these systems, making it possible, in accordance with the method of harmonic balance, to obtain an expression for the equivalent amplification factor in the form of a step random time function. The average value of this function is taken as the statistically equivalent transfer coefficient of the nonlinear element.

The method is applied to ordinary nonlinear self-oscillating systems.

75. Random Scanning Proposed for Extremum Control

"Extremum Control by a Method of Random Scanning," by L. A. Rastrigin; Moscow, Avtomatika i Telemekhanika, Vol 21, No 9, Sep 60, pp 1264-1271

A method of random scanning is proposed for use in problems of extremum control of multiparameter objects. In principle, three oscillators provide conditions for random sampling from a source of all possible conditions and effect the rate of change of the parameters of the control system. Then the changed value  $Q$  (the quality function) is continuously compared with a certain signal  $\eta$  which is produced by comparison signal oscillators. The result of the comparison determines the operating regimes of the circuit, which are set by the control unit.

The advantages of the circuit are seen particularly in the case of control of a large number of independent or dependent parameters of an object. Since the circuit does not require computers, optimization of the object may be accomplished with minimum efforts. The increased noise-stability, due to the use of a comparison signal as the memory, may be used in other systems of extremum control.

76. Period Equations for Arbitrary Piece-Wise Systems Derived

"On the Accurate Determination of Periodic Regimes in Piece-Wise Automatic Control Systems," by Ye. N. Rozenbasser; Moscow, Avtomatika i Telemekhanika, Vol 21, No 9, Sep 60, pp 1279-1292

"A precise method of determining the periodic regimes in arbitrary piece-wise systems is examined. Solution of the problem involves the determination of forced oscillations of a linear system with periodically changing parameters. These forced oscillations are accurately determined with the aid of a new procedure based on the solution of a certain auxiliary Fredholm second-order integral equation. The periodic solution obtained in this manner is seen to be dependent upon unknown times of movement along sectors of the nonlinear characteristics. Using this solution and the conditions of change from one sector of the nonlinear characteristic to another, it is possible to arrive at the desired transcendental equations for the periods."

The basic results of this work were presented at the Seminar on Nonlinear Problems of the Theory of Automatic Control in the Institute of Automatics and Telemekhanics of the Academy of Sciences on 2 December 1959.

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77. Frequency Characteristics of Hydraulic Couplings Examined

"On the Dynamic Characteristics of Hydraulic Couplings," by A. M. Smirnov; Moscow, Avtomatika i Telemekhanika, Vol 21, No 9, Sep 60, pp 1306-1310

A method is given for computing and experimentally determining the dynamic frequency characteristics of hydraulic couplings. A special device is used to create pressure oscillations in a hydraulic line which are recorded by a two-beam piezoelectric quartz pressure indicator type 2780-S "Orion" (of Hungarian make). Results of an experimental determination of the characteristics of some couplings are given.

Electrical Engineering

78. New Thermal Power Plant Near Baku

"The 'Severnaya' State Regional Electric Station Has Produced Current" (unsigned); Moscow, Ekonomicheskaya Gazeta, 13 Nov 60

The Severnaya state regional electric station [near Baku] has been placed in operation. The power generating unit, consisting of a high-pressure boiler and a turbogenerator, was installed in the open air. Control of the power generating unit is fully automatized and is carried out from a remote control desk serviced by only two persons.

79. Construction of Largest Central Asia Hydroelectric Power Plant

"Vakhsh, the Light-Bearer," by V. Surikov; Moscow, Izvestiya, 3 Nov 60

The article contains the following passages:

"The 'Puli Sangin' gorge resembles a giant bag set on its edge between the rocks.

"Together with chief engineer Yuriy Sosnovskiy and chief geologist Evgeniy Skripko, we are standing on a suspension bridge built across the powerful Vakhsh river.

"Here, the water depth is up to 25 meters. Up to 3,200 cubic meters of water is discharged each second by the Vakhsh river.

"Several days ago, the plan was approved for construction of Central Asia's largest, the Nurek(skaya) hydroelectric power plant, and a water reservoir on the Vakhsh river.

...The builders...will begin construction...of a dam such as cannot be found anywhere in the world. Its height will be 300 meters; the huge Nurek reservoir will be 80 kilometers long and 25 kilometers wide. Ten billion cubic meters of water will be gathered in this high-altitude sea.

"The Vakhsh will flow in tunnels cut through the rocks to the Danga-rinskaya, Yavanskaya, Beshkentskaya, and other sun-parched valleys. The capital investment for this irrigation project will pay for itself in 2-3 years, and the USSR state treasury will have additional annual revenue of about 20 billion rubles from the new cotton fields.

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"The water of the Vakhsh river will drive the turbines of the world's largest mountain hydraulic electric station, which will exceed considerably in capacity the Kuybyshev hydroelectric station on the Volga river.

"Electric-power transmission lines will connect Tadzhikistan, Turkmenia, Uzbekistan, Kirgiziya, and Southern Kazakhstan with the Nurek hyroelectric power plant.

"Right now, 400 courageous surveyers are conducting peaceful blasting and hole drilling and driving new tunnels in order to facilitate the future work of the builders."

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80. Selection of Optimum Pressure for Large Steam Extraction Turbines

"The Problem of Selection of Initial Steam Parameters for Large Electric Station Supplying Steam for Industrial Uses," by A. I. Andryushchenko and Yu. M. Khlebalin, Saratov Polytechnic Institute; Minsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No 9, Sep 60, pp 53-60

Of the 450 million, kw electric power plant capacity planned for installation during the next 20 years, a substantial portion will be assigned to regional and local electric power plants supplying steam for industrial and heating purposes. The new electric power stations supplying industrial steam will be built, to a great extent, in conjunction with new, huge petrochemical synthesis plants requiring large quantities of steam at pressures from 7 to 30 atm.

Determination of optimal initial parameters of steam for electric power plants supplying industrial steam may actually be reduced to finding the proper balance between the initial pressure and the temperature of the steam. An experiment was conducted for various steam pressures from 90 to 350 atm, and for each pressure selected, the steam temperature was varied at either 535, 560, or 580°C. The exhaust pressure of steam was varied from 1.5 to 30 atm.

This experiment revealed that the initial steam parameters for most advantageous operation of power plants supplying industrial steam differ considerably from the generally accepted steam parameters of the conventional condenser-type electric power plants.

It was shown that the optimum steam pressure for large power plants supplying process steam is from 270 to 300 atm at a temperature of 535 to 560°C.

81. Control of Corona Discharge

"Some Peculiarities of High Frequency Emission of Corona Discharge," by N. B. Bogdanova and V. I. Popov, Power Engineering Institute imeni Krzhizhanovskiy, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 134, No 6, Oct 60, pp 1331-1333

A relation between frequency emission level and shape of the corona discharge was traced. Experiments were carried out for establishing the existence and the character of this relation, and the possibility was studied of decreasing the corona emission level by an artificial change in the electric field near the surface of the conductor with the corona and by influencing the shape of the corona. Experimental results indicated new ways for decreasing the emission level by control of the corona shape, attained by changing the corona streamer shape to a positive voltage half-wave.

High-Speed Photography

82. Stereophotography at 1,250,000 Frames per Second

"High-Speed Stereoscopic Photography and Motion-Picture Projection," by V. V. Garnov and A. S. Dubovik, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 5, No 5, Sep/Oct 60, pp 356-360

The Institute of Chemical Physics of the Academy of Sciences USSR devised a method of high-speed stereoscopic photography using the SFR high-speed camera (described in Shnirman, G. L., Dubovik, A. S., and Kevlishvili, P. V., Vysokoskorostnaya Fotoregistriruyushchaya Ustanovka SFR [The High-Speed Photographic Device SFR], Moscow 1957) with a special stereoscopic attachment designed by Ye. A. Zaytseva. The use of the new method with stereophotography at up to 1,250,000 frames per second affords the possibility of greater analysis of high-speed processes. Two pairs of stereophotos of a detonation process are shown.



Miscellaneous

83. New Construction Engineering Periodical

"On the Construction Sites of Russia" (unsigned); Moscow,  
Izvestiya, 11 Nov 60

The first issue of the new monthly periodical Na Stroykakh Rossii (On the Construction Sites of Russia) has just been released. This periodical is an official publication of the State Committee on the matters of construction, which is attached to the Council of Ministers of RSFSR. The periodical will deal with large-scale construction projects on the vast territory of the RSFSR.

V. MATHEMATICS

84. Hardy-Littlewood Problem

"All Large Numbers Are the Sums of a Prime and Two Squares (On the Hardy-Littlewood Problem)," by Yu. V. Linnik; Moscow, Matematicheskiiy Sbornik Novaya Seriya, Vol 52(94), No 2, Oct 60, pp 661-700

In the work, by the author, "Concerning Certain Additive Problems" (Matem. Sb, Vol 51(93), 1960, pp 129-154), application of the "dispersion method" to certain additive problems of the Hardy-Littlewood type of problems is considered. After introduction of the concept of a zonal dispersion equation, a certain modification of the fundamental ideas of the known I. M. Vinogradov method arises on the basis of the "dispersion method" apparatus.

In the present work, the known Hardy-Littlewood equation is solved for all large numbers.

85. Triangular Representation of Operators

"Concerning Triangular Representation of Several Operators Having a Completely Continuous Imaginary Part," by M. S. Brodskiy, Odessa State Pedagogical Institute imeni K. D. Ushinsky; Moscow, Doklady Akademii Nauk SSSR, Vol 133, No 6, Aug 60, pp 1271-1274

Let  $A$  be a bounded operator having a pure real spectrum operating in the Hilbert space  $H$ . If  $P$  is a certain projection in  $H$ , we will denote the operator  $PAP$  considered in the Subspace  $PH$  by  $A_P$ , and the spectrum of the operator  $A_P$  by  $\sigma(A_P)$ . It is agreed to say that the projection dissects the spectrum of the operator  $A$  at the point  $t$  if a subspace of  $PH$  is invariant with respect to  $A$  and if  $\sigma(A_P) \subset (-\infty, \underline{t}]$ ,  $\sigma(A_{E-P}) \subset [\overline{t}, \infty)$ .

We assign the operator  $A$  to the class  $\Omega$ , if

1. the imaginary part  $K = \frac{A - A^*}{2i}$  of the operator  $A$  is completely continuous,
2. the complete spectrum of the operator  $A$  lies on the real axis,
3. there exists such a system of projections  $P_t (-\infty < t < \infty)$ , that  $P_{t_1} \leq P_{t_2}$  for  $t_1 < t_2$  and each projection  $P_t$  dissects the spectrum of operator  $A$  at the point  $t$ .

From the results of Yu. I. Lyubich and V. I. Matsayev, DAN, Vol 131, No 1, 1960, it follows that each operator A satisfying conditions I and II, as well as the condition

$$\int_0^\epsilon \ln^+ \ln^+ M(\delta) d\delta < \infty \quad (M(\delta) = \sup_{|\operatorname{Im} \lambda| \geq \delta} \|(\Lambda - \lambda E)^{-1}\|) \quad (1)$$

belongs to the  $\Omega$  class. In particular, as was proven by V. I. Matsayev, condition (1) will be fulfilled when the series  $\sum_{n=1}^{\infty} \frac{\omega_n}{n}$  converges,

$$\sum_{n=1}^{\infty} \frac{\omega_n}{n}$$

where  $\omega_n$  are the eigen numbers of operator K indexed with calculation of the multiplicity in the order of decrease of their absolute values.

In the present work, the problem concerning reduction of the operators of class  $\Omega$  to triangular form is solved.

#### 86. Additions to General Theory

"On the Theory of Multidimensional Singular Integral Equations," by I. Ts. Gokhberg, Moldavian Affiliate, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR Vol 133, No 6, Aug 60, pp 1279-1282

The work contains several additions to the general theory of multidimensional singular equations in the  $L_2(E_m)$  space constructed by S. G. Mikhlin. These additions are obtained with the help of the results and methods of the theory of normalized commutative rings of I. M. Gel'fand.

#### 87. Probabilities for Sums of Random Variables

"On Probabilities for Extreme Values of Sums of Random Variables Defined on a Homogeneous Markov Chain With a Finite Number of States," by I. S. Volkov; Moscow, Teoriya Veroyatnostey i yeye Primeneniya, Vol 5, No 3, Aug 60, pp 338-352

The paper examines the probabilities for values of sums of random variables defined on a homogeneous Markov chain with a finite number of states. These values are such that their deviations from the smallest or largest possible value for each instant of time "n" are bounded in their sum. By separating trajectories in the random walk into classes defined by a proper method, regular components are picked out from the probabilities under consideration, and exact and asymptotic formulas are found (for  $n \rightarrow \infty$ ) for each of these components.

88. Limit Functions of Series

"Concerning Limit Functions of Series in Terms of Bases of the  $L_p$  Space," by A. A. Talalyan, Institute of Mathematics and Mechanics, Academy of Sciences Armenian SSR; Yerevan, Doklady Akademii Nauk Armyanskoy SSR, Vol. 30, No 3, Jun 60, pp 129-134

Several theorems are formulated concerning the limits of indefiniteness and concerning the limit functions of the series

$$\sum_{n=1}^{\infty} c_n \varphi_n(x) \quad (1)$$

where  $\{\varphi_n(x)\}$  is any normalized basis of the  $L_p[0, 1]$  space with  $p > 1$ .

The theorems are generalizations of the theorems of D. Ye. Men'shov proved in the partial case when the basis  $\{\varphi_n(x)\}$  coincides with an orthogonal and normalized basis of the trigonometric system

$$\frac{1}{\sqrt{2\pi}}, \quad \frac{\cos x}{\sqrt{\pi}}, \quad \frac{\sin x}{\sqrt{\pi}}, \quad \dots, \quad \frac{\cos nx}{\sqrt{\pi}}, \quad \frac{\sin nx}{\sqrt{\pi}}, \quad \dots$$

89. Motor Diad of Infinitesimal Transformations

"Motor Diad of Infinitesimal Transformations," by P. M. Osipov, Kiev Technological Institute of the Food Industry; Kiev, Dopovidi Akademiy Nauk Ukrains'koy RSR, No 7, Aug 60, pp 863-868

The problem of the continuous transformation of coordinates is of extreme importance in solving problems of theoretical and applied mechanics, as well as of the theory of spatial mechanisms and machines.

In the present work, the author gives a motor diad of infinitesimal transformations containing scalar components half as large as the respective motor diad of Prof R. Mises. Formulas are given for the derivative of the motor diad  $D$  and for the derivatives of the components of this diad. Applications of these formulas to the inertial diad are also given.

90. Generalization of Derivative Numbers

"Concerning a Certain Generalization of Derivative Numbers,"  
by G. Kh. Sindalovskiy; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Matematicheskaya, Vol 24, No 5, Sep/Oct 60, pp 707-720

The notion of  $\Psi$ -derivative numbers is introduced, and theorems are proved generalizing several earlier published results of the author, as well as the results of A. Danzhua and Yu. Germeyer concerning ordinary (one-sided) and symmetrical derivative numbers of measurable functions.

91. Averaging in Systems of Ordinary Differential Equations

"Averaging in Systems of Ordinary Differential Equations With Quick-Fluctuating Solutions," by D. V. Anosov; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Matematicheskaya, Vol 24, No 5, Sep/Oct 60, pp 721-742

A system of ordinary differential equations is considered in which the derivatives of the quick-fluctuating variables contain a small parameter  $\epsilon$ . "Averaged" equations approximately describing the change of the slowly varying variables are introduced. It is proved that as  $\epsilon$  approaches zero, those variables calculated from the initial system of differential equations actually converge in a certain sense to the solutions of the "averaged" system. This convergence may be characterized as "convergence in accordance with the initial values."

92. Summing Fourier Series

"On Linear Methods of Summing Fourier Series," by A. V. Yefimov; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Matematicheskaya, Vol 24, No 5, Sep/Oct 60, pp 743-756

In the work are given the conditions imposed on a triangular matrix for which a method of approximation sums to a function  $f(x)$  of period  $2\pi$  at any of its Lebesgue points or at any point of the interval of continuity.

Aerospace Medicine

93. Space Flight Data Discussed

"Man Will Fly To the Stars," by Prof V. V. Parin, Active Member of Academy of Sciences USSR; Moscow, Zdorov'ye, No 11 (71), Nov 60, pp 2-3

This article says that the conquest of space has become a real objective of a large army of scientists, engineers, and specialists in other fields who are alert to man's future space travel.

K. E. Tsiolkovskiy, who foresaw attempts by humans to explore outer space, wrote that the earth is the cradle of humanity in which humans cannot stay forever.

Vast objectives have been formulated by Soviet scientists. Orderly and systematic research in outer space has been conducted in the USSR. Rockets were first launched vertically; the next step consisted of launching the first artificial earth satellite. Only then, the article continues, did the entire world realized that the USSR was ahead of all other countries in space research. The second artificial earth satellite and its passenger and instruments are mentioned.

Soviet science took another step forward when a vehicle of unprecedented size was successfully launched into outer space in May 1960. Another vehicle was propelled into outer space 3 months later. This latter vehicle was successfully returned to earth; thus the stage was set for solving the re-entry problem.

All investigations in the peaceful conquest of outer space have involved studies of how to protect a living organism against physical factors, and have had the purpose of establishing a scientific and technical basis for a man-in-space project. And now, "on the eve" of a man-in-space program, medical specialists and biologists must shoulder the responsibility equally with physicists and engineers.

Sensationalism, according to this author, is alien to Soviet science; humanitarianism is the dominant pattern of Soviet science and it is inherent in the Soviet way of life. Consequently, prior to sending a man flying through outer space, scientists must find a way to reduce to a minimum any risk involved in his re-entry.

Weightlessness is a phenomenon inherent in space travel. Radiation hazards increase considerably beyond the earth's atmosphere. A spaceman will have to live in the hermetically sealed cabin of a space vehicle during the entire period of its flight through space. The human astronaut must be shielded against radiation. The chemical composition and pressure of the air in the cabin must be maintained, and its humidity must not exceed certain limits. The temperature within the cabin must remain within the so-called comfort zone. A sufficient amount of proper food and water must be stored in the cabin. This suggests that the cabin of a space vehicle must house many reliable instruments and devices which are capable of recording accurately all information necessary for medical researchers to examine the peculiarities of the functions of the living experimental organism, and to devise measures to protect future astronauts from factors which appear to be harmful.

The results of medical research have shown that not all living organisms react in exactly the same manner to influences of physical factors of the environment. It is impossible to find answers to a multitude of questions by conducting experiments on only one species of animal. For this reason, the second Soviet space vehicle contained 2 dogs (Strelka and Belka), 2 white laboratory rats, 40 mice belonging to two different genera, and test tubes containing several hundred prolific flies (*Drosophila*). The following plant organisms were also aboard the second Soviet space vehicle: *Tradescantia*, seeds of *Allium*, seeds of *Pisum sativum*, seeds of *Triticum*, seeds of *Zea mays*, seeds of *Nigella*, single-cell algae *Chlorella*, and fungi of the genus *Actinomyces*, which produce antibiotics. The following objects were also aboard the same vehicle: cultures of two types of intestinal bacilli, *B. acidifiliformis*, staphylococci, cultures of two varieties of bacteriophage, cancer cells obtained from a human tumor, and preserved pieces of skin from a rabbit and from a human being. The vehicle also contained ampules of desoxyribonucleic acid, which plays an important role in transmitting hereditary characteristics from one generation to another.

The second Soviet space vehicle was returned to earth with all its animals and plants, which were placed at the disposal of scientists. This made it possible to study carefully all the biological objects aboard, and to determine whether the trip in outer space caused any changes in them. A number of instruments in the vehicle transmitted information about the condition of the animals from the moment the vehicle took off until the time of its re-entry. The information transmitted concerned the arterial blood pressure in the dogs, their electrocardiogram, the heart tonus, the depth of respiratory movements of the thorax, and the body temperature and movements. The television transmitter aboard the vehicle made it possible to observe the behavior of the dogs during the flight, and gave other valuable information for physiologists. This achievement of Soviet radioelectronics alone has no equal in the world of technology.

Observatories on earth recorded a large number of graphs. Deciphering and study of these graphs will consume considerable time and effort. Even this early, it is possible to evaluate some results of this remarkable experiment.

First, this experiment demonstrated that the re-entry system devised by Soviet engineers provides complete safety to living creatures. It was also found that the noise of the rocket engines, vibration of the vehicle's frame, and G-forces and weightlessness act on the nervous system of animals during flight and cause substantial changes in their behavior. It is extremely important that the nature and the duration of such changes and possible ways of compensating for them be determined because a human aboard a space vehicle will not be a passive passenger, but will have to observe constantly what is going on, and will have to maintain communication with earth, manage the instruments, and make adjustments where and when necessary.

How conditions in outer space affect higher nervous activity will be answered only after a study of all available data has been completed. This data covers not only the dogs, but also the laboratory rats whose type of higher nervous activity was determined prior to take-off into outer space, and in which definite conditioned reflexes were developed.

The effect of cosmic radiation on the human organism is such that it may not be manifested immediately. Therefore, the importance of placing an animal returning from outer space under observation for a long period is understandable. It is obvious also that the more available such animals become, the more statistically authentic the conclusions will be.

Mice are very prolific and attain sexual maturity very rapidly. For this reason it is possible to obtain information concerning the effects of cosmic flight on heredity in a relatively short period. The bone marrow of mice manufactures blood cells. A determination of how the blood manufacturing system of a mouse reacts during space flight is of paramount importance.

A study of the effects of cosmic radiation on the progeny of *Drosophila* is also being carried on. *Drosophila* is a classic specimen for such a study, because the hereditary characteristics of the species are easily altered in response to various environmental factors. A number of microorganisms were also placed aboard the second Soviet space vehicle to observe this phenomenon.

Scientists who have been studying the development of malignant tumors in humans have been attempting to cultivate tumor cells outside the living organism. One such culture was placed in the cabin of the



second Soviet space vehicle. Studies are being conducted now to determine whether any change has taken place in the metabolism and in the morphological and genetic properties of this culture.

The two dogs and other animals in the second Soviet space vehicle were carefully examined prior to take-off. Biochemical methods of examination were used. Peculiarities of their metabolism and the functional condition of the liver and some other organs were recorded. These data are being checked now with the results of an examination of their condition after re-entry to determine what minute changes have taken place as result of their flight in outer space.

The natural and acquired resistance of a human organism to the harmful action of microorganisms and infections plays an important part in the preservation of its health. When the protective properties of an organism become weak, even saprophytes, which live on the surface of the skin and mucous membranes and are ordinarily harmless, are capable of causing severe illness. For this reason, the phagocytic activity of the blood and its bacteriocytic properties were examined. The bacteriocytic properties and natural microflora of the skin of the animals were also examined. Repetition of such examinations will help determine the possible effects of flight through outer space on the natural protective functions of a living organism.

The article concludes by noting that preliminary evaluation of all available data obtained as a result of this biological-medical experiment has confirmed the fact that the Soviet Union is leading the rest of the world in space exploration. A number of questions remain to be answered before a human astronaut can be sent flying through space. However, the re-entry of the second Soviet space vehicle has brought us very close to that long-awaited day when humans will be able to leave the cradle of the human race and travel beyond the earth's atmosphere.

94. High Altitude Effects on Human Heart

"The Effect of Hypoxic Hypoxia and Low Barometric Pressure on the Human Electrocardiogram (Vectorometric Analysis)," by V. N. Alifanov, Central Clinical Hospital of Civil Air Fleet USSR; Moscow, Bulleten' Eksperimental'noy Biologii i Meditsiny, Vol 50, No 10, Oct 60, pp 29-34

The author discusses the results of vectorometric and other methods of analyzing electrocardiograms of healthy men between the ages of 20 and 30, who were exposed briefly to rarefied atmospheric pressure in an altitude chamber. Of 120 observations recorded, 25 were during moderate hypoxic hypoxia, and 95, during the effect of low barometric pressure. The effect of low partial oxygen pressure was noted when the barometric

pressure of the air in the altitude chamber approximated that found at an altitude of 5,000 meters. The men remained in the altitude chamber for 30 minutes at that altitude, breathing the ambient air. Observations of the effect of conditions prevailing at an altitude of 10,000-11,000 meters were also made. The men exposed to the low barometric pressure encountered at that altitude breathed oxygen for about 20-25 minutes. A swing of the cardiac vectors to the right, observed during moderate hypoxia, seemed to be persistent enough to indicate increased strain on the right side of the heart. When tolerance of the low barometric pressure was good, a swing of the cardiac vectors to the left and signs of intensified activity of the left ventricle were observed. Thus, the appearance of signs of stress of the right heart atmospheric pressure in an altitude chamber serves as a rather objective symptom of deterioration of the condition of the human organism.

95. Sarajevo University Students Form Section for Space Biology.

"First Section for Space Biology in Yugoslavia Formed in Sarajevo," by Ramo Arnautovic; Zagreb, Priroda, Vol 47, No 6, Jun 60

The biology students of the Faculty of Philosophy of Sarajevo University have formed an extracurricular section for space biology, the first in Yugoslavia. The section will have seminars and lectures. Groups of students are already assembling and translating foreign literature on space biology. To obtain information, contacts have been made with certain universities in the USSR and the US which have departments of space biology. The section was formed at the suggestion and with the help of professor of Physiology Dr Vojislav Pancic.

The purpose of the section will be to assemble and study literature on the possibility of existence of life in the universe and on the influence of cosmic radiation and other factors on animal and human organisms on earth. It will also follow research in such fields as high-altitude physiology.

Antibiotics

96. New Antibiotics in USSR

"Friendly Socialist Countries" (unsigned article); Bucharest, Muncitorul Sanitar, Vol 11, No 36, 10 Sep 60, p 4

On the occasion of the 14th session of the Academy of Medical Sciences USSR, the House of Men of Science at Moscow opened an interesting exhibit of medical preparations. One of these preparations was the crystals of a

new antibiotic. Preparation No 6,270. This antibiotic proved effective in experiments on animals infected with myeloleukosis and chronic lympholeukosis, and also acute leukosis. Antibiotic No 6,270 has an inhibiting effect on tissue culture of pathological blood cells in doses which do not damage the normal cells of the hematopoietic organs.

The new antibiotic was produced by scientific researchers at a special institute under the Academy of Medical Sciences. The committee for antibiotics of the academy has reported carrying out clinical research with the preparation on a few patients at the Institute of Hematology and Blood Transfusion.

The institute, which prepares new antibiotics, also tests each year the antagonistic properties of about 15,000 strains of microorganisms and also actinomycetes obtained from soils of the different geographic zones. Approximately 100 samples of antibiotics are finally selected. The effects are tested on animals and the most promising are then tested clinically.

#### Cardiovascular Diseases

##### 97. Pulseless Disease

"Takayasi Disease," by N. P. Kazanskiy, Therapeutic Division of First Michurin City Hospital; Moscow, Sovetskaya Meditsina, Vol 24, No 9, Sep 60, p 122

"The number of cases of pulseless disease (Takayasi Disease) described in Soviet and foreign literature is comparatively small. We therefore deem it advisable to describe our experiences with a case of the disease which came under our observation.

"Patient Sh-va was recieved at the division on 27 September 1958; she complained of dizziness and acute general debility, particularly of both upper extremities. These symptoms were apparent for a number of months, but she received no treatment. On 27 September, while at work, she suffered an attack of dizziness, fainted, and acute general asthenia set in. After reaching the health center, her physician sent her to the hospital. The case was diagnosed as cardiac insufficiency.

"Anamnesis: frequent anginas and typhoid fever. Has been menstruating since the age of 18, normal menstruation every 28 days lasting about 3 days. Married at the age of 21. Had three pregnancies, two with normal births and one miscarriage. The patient was well-built; nutrition satisfactory. The skin and visible mucosa pale in color. No increase in the size of the lymphatic nodes was noted. Clear percussion sound in the

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lungs, vesicular respiration, no hoarseness. Cardiac size normal, clear but muffled tones. Pulse and arterial pressure in both upper extremities not perceptible. No deviation from normal noted in the organs of the abdominal cavity and urinary system. A temperature of 37.2-38 degrees was registered in the patient during the first 5 days; the temperature was normal during the patients other 2 days in the division.

"A blood analysis was made on 27 September with the following results. Hb --- 61 percent; erythrocytes -- 3,870,000; color indicator --- 0.8; leukocytes -- 8,700; eosinophils -- 3 percent; platelets -- 8 percent; segs -- 67 percent; lymphocytes -- 20 percent; monocytes -- 2 percent; sedimentation rate -- 58 millimeters an hour. The specific weight of the urine was 1025; no pathological modifications in the precipitate were noted. Wasserman test -- negative. An electrocardiogram revealed sinus tachicardia. Roentgenoscopy of the thorax on 27 September revealed no changes in the lungs, heart, and aorta. A Roentgenogram of the ribs (3X) revealed no changes in the bones. An oscillogram of the shoulders and forearms showed no oscillations. Weak oscillations noted in the lower extremities, 80 millimeters. No discernible pathology in the ocular fundus found; acuteness of vision -- 1.0 in both eyes. The patient was administered adrenocorticotropic hormone, butadione, and vitamins. Her condition improved, somewhat, but the pulse and arterial pressure in the upper extremities remained imperceptible.

"On the basis of the above data, the diagnosis was 'Pulseless Disease.' The pathological process apparently spread to the carotid sinus, with chronic tonsillitis potentiating the process."

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Contagious Diseases

98. Preliminary Report on Nature of Plague Toxin Presented

"Concerning the Study of the Enzymatic Nature of the Toxin of the Plague Pathogen (Preliminary Report)," by S. I. Zaplatina, Tr. Rostovsk-n/D. N.-I. Protivochumn. In-ta. (Works of the Rostov-na-Donu Scientific Research Antiplague Institute), 1959, 15, No 1, 127-135 (from Referativnyy Zhurnal Khimiya --- Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 24203)

"While investigating a pure concentration of a toxic B and C fraction obtained from virulent and avirulent strains of the plague pathogen with the aid of the protein fractionation method, a lecithinazo-like enzyme was discovered which was more active in the fraction taken from the virulent strain. The lecithinazo activity can be neutralized by a specific serum (antiplague). The toxic B and C fractions of the plague pathogen possess lethal and hemolytic action."

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99. Ornithosis Outbreak in Rumania

"The Clinical and Pathomorphological Aspects of an Epidemic of Ornithosis," by V. T. Busila, R. Alexandrescu, and D. Bacaloglu with the collaboration of D. Sarateanu and Elena Oprescu-Lisievici; Bucharest, Studii si Cercetari de Inframicrobiologic, Vol 9, No 2, 1960, pp 187-194

The authors studied an epidemic caused by ornithosis virus on a duck farm, which affected the four persons working on the farm (three women caring for the ducks and a guard). Another case, not on the farm, was that of the mother of one of the sick women; this case can be explained by interhuman contagion. The clinical diagnosis was confirmed by the complement-fixation reaction (positive in all the sick persons), and also by isolation of the virus. The epidemiological investigation established that the epidemic had been preceded by widespread disease among the ducklings and ducks on the farm. One of the human cases was fatal. The authors give the most interesting morphological aspects observed at the postmortem examination and in the microscopic examination.

100. Research on Ornithosis in Rumania

"Comparative Study of the Histological Changes Noted in White Mice Inoculated With Various Rumanian Strains of Ornithosis," by G. Marinescu, D. Sarateanu, and T. Hung; Bucharest, Studii si Cercetari de Inframicrobiologic, Vol 9, No 2, 1960, pp 201-210

The authors studied the evolutionary aspects of the histological picture following the inoculation of adult white mice, by different routes, with three different strains of ornithosis virus, isolated in Rumania.

The intranasal inoculation of these strains brought about the appearance of characteristic pneumonic foci. With the TC (turkey) strain, the appearance of interstitial and alveolar phenomena is much earlier (3-7 hours) than with the other strains, CR<sub>1</sub> (duck) and TG (goose).

The strains studied are only slightly pathogenic for white mice when inoculated intraperitoneally. Stasis, some degenerative lesions, and the hyperplasia of the reticular-endothelial system are noted in the liver and spleen.

Intracerebral inoculation produces a fatal meningeal encephalitis. The TC strain produces a serous or lymphocytic meningeal encephalitis, even with intranasal inoculation.

"Laboratory Study of an Epizootic of Ornithosis, Followed by an Epidemic," by R. Sarateanu and E. Nastac in collaboration V. T. Busila and A. Alexandrescu; Bucharest, Studii si Cercetari de Inframicrobiologie, Vol 9, No 2, 1960, pp 195-200

The authors report an epizooty of ornithosis followed by five cases in humans. This again shows the possibility of transmitting ornithosis from fowls to humans, as well as interhuman contagion.

The established presence of agglutinating, antiornithosis antibodies in sick, convalescent, or apparently healthy ducks and of complement-fixation antibodies in human serum, as well as the strains of virus isolated in the fowl and in the one human mortality upon postmortem, permitted the authors to establish ornithosis as the common cause of the epizootic and epidemic studied.

101. Research on Native Tick-Borne Encephalitis in Rumania

"Morphological Study of Experimental Lesions Brought About in White Mice by Tick-Borne Encephalitis Virus Isolated in Rumania," by N. Draganescu; Bucharest, Comunicarile Academiei Republicii Populare Romine, Vol X, No 9, Sep 60, pp 785-790

The morphological study carried out on 84 white mice inoculated inter-cerebrally and subcutaneously with tick-borne encephalitis isolated in Rumania showed that: (1). The tick-borne encephalitis virus causes more or less marked disturbances in all organs of animals of this species; these lesions appear as perivascular and parenchymatous inflammatory processes, vascular lesions (due to hemodynamic disturbances), and degenerative lesions; and (2) the nervous system, the lungs, the liver, the kidneys, and the heart are most damaged.

The results show the pantotropic nature of this microorganism which appears in the blood of the animals beginning with the first hour after intercerebral or subcutaneous inoculation and persists until the death of the animal.

102. Rumanian Research on Tick-Borne Encephalitis

"Concerning the Susceptibility of the Syrian Hamster to Infection by Tick-Borne Encephalitis Virus Isolated in Rumania; A Study of the Pathological-Morphological Changes," by N. Dragulescu; Bucharest, Studii si Cercetari de Inframicrobiologie, Vol 9, No 2, 1960, pp 287-290

The author shows that the intracerebral inoculation of the young or adult hamster with the virus of tick-borne encephalitis, isolated in Rumania, produces clinical phenomena of meningeal encephalitis, characterized by paralysis of the posterior extremities, without tonoclonic convulsions or muscular fibrillations. The anatomical lesions are much more intense than in white mice inoculated with the same virus. The meningeal encephalitic lesions are characterized by an intense perivasular inflammation.

Geriatrics

103. Plans for Studying Problems of Gerontology

"Actual Problems of Gerontology (Basic Trends of the Work of the Institute of Gerontology and Experimental Pathology, Academy of Medical Sciences USSR)," by P. D. Marchuk; Moscow, Vestnik Akadmii Meditsinskikh Nauk SSSR, Vol 15, No 10, Oct 60, pp 55-59

The problems of prolonging human life and the processes of aging have long been in the forefront of human research. Several hypotheses on the causes of the aging process have been advanced: N. I. Mechnikov thinks that the cause of aging is the intoxication of the organism by poisonous substances which are generated by intestinal bacteria; O. Byuchli claims that old age is caused by the gradual expenditure of the enzymes; it is M. Rubner's theory that aging is due to a decline in the vital functions and a gradual slow down of metabolism; G. Spencer regards the aging process as being due to the failure of the organism to assimilate food and oxygen. Other authors ascribed the aging process as the loss of the capacity of regeneration by the cells and tissues. The Institute of Gerontology and Experimental Pathology of the Academy of Medical Sciences is now investigating the problem of aging.

Its work is proceeding in the following directions: (1) study of the biological bases and indexes of natural aging; (2) statistics of longevity in the USSR; (3) study of the physiological characteristics of people in the mature period and transition to the old-age period; (4) effect of living and working conditions occupation, nutrition, rest, and physical culture on the aging process; (5) characteristics of the

course, therapy, and outcome of diseases in people of different ages; and (6) study of premature aging of the organism (mechanism of the development of aging, prophylaxis, and therapy). The problems of gerontology will be discussed at a scientific conference which will be held at the end of 1960.

Hematology

104. Studies Reveal Some New Properties of Fibrinogen

"The Microheterogeneity of Fibrinogen. Cryofibrinogen," by Varetskaya, Ukr. Biokhim. Zh. (Ukrainian Biochemical Journal), 1960, 32, No 1, 13-24 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 23792, by F. Martynenko)

"It was determined that highly purified fibrinogen from cows' blood consists of two fractions: cold-soluble and cold-insoluble (cryofibrinogen). Cryofibrinogen will precipitate only from dilute solutions of fibrinogen at low temperatures. The amount of cryofibrinogen varies from 4 to 20% of the total quantity of fibrinogen. Both forms are practically similar in their ability to be transformed into fibrin by the action of thrombine, viscosity, optical rotation, and carbohydrate content. Cryofibrinogen differs in its low solubility at low temperature, its noticeable turbidity in solutions, and its marked capacity for precipitation. The solubility of cryofibrinogen increases with an increase in ionic strength. In solution, both forms interact with each other. The reason for the microheterogeneity of fibrinogen, the author believes, is the variation in the distribution of electrical charges resulting in a dissimilar configuration in the chains of the protein molecule."

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"The Photo-Oxidation of Fibrinogen and the Fibrin-Monomer," by V. A. Belitser and K. I. Kotkova, Ukr. Biokhim. Zh. (Ukrainian Biochemical Journal), 1960, 32, No 1, 3-12 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 23793, by V. Matrynyenko)

"With the aim of deciphering the reactive centers of fibrinogen and the fibrin-monomer of bulls' serum, an oxidation method in the presence of a photosensitizer was used. It was demonstrated that in the presence of the sensitizing action of methylene blue in a weak alkaline medium, pH 8.2-8.6 fibrinogen and fibrinogen-monomer loses its capacity for forming fibrin after only 12.5 minutes of photo oxidation by the absorption of 28.8 moles of oxygen on 1 mole of protein. During this period, of the 56 histidine groups in the protein molecule, 8 undergo oxidation, and of

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the 56 tryptophan groups, 7 undergo oxidation. In a weak acid medium -- pH 5.1 -- tryptophan alone undergoes oxidation, whereupon the fibrinogen retains its capacity for transforming into fibrin; however, the conversion time increases from 25-40 sec for natural fibrinogen and to 150-180 sec for oxidized fibrinogen. The authors confirm earlier propositions they had set forth about the participation of histidine in the mechanism of transforming fibrinogen into fibrin."

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105. Blood Donations in Poland

"More Voluntary and Private Blood Donors," by J. K. Rozmawial;  
Warsaw, Zdrowia, Oct 60, p 3

Docent Andrzej Trojanowski, MD, director of the Institute of Hematology in Warsaw and a member of the Main Administration of the Polish Red Cross, stated that more than 100,000 liters of blood are collected annually in the Polish Red Cross blood donation stations. Because of new developments in medicine and an ever-increasing need for blood, this amount covers only about 70 percent of the actual needs.

In 1959, voluntary and private donors made up only 5 percent of the total number of donors. In the first quarter of 1960, 30,000 liters of blood was collected, only 3,500 of this being collected from voluntary and private donors.

Immunology and Therapy

106. Aerosol Immunization Against Four Diseases Studied

"Aerosol Immunization With Dry Live Vaccines and Anatoxins; Report III: An Experimental Study of the Effectiveness of Aerosol Immunization With Dry Powdered Vaccines (Anthrax, Brucellosis, Tularemia, and Plague)," by N. I. Aleksandrov, N. Ye. Gefen, N. S. Garin and K. G. Gapochko; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 31, No 10, Oct 60, pp 44-50

The following live vaccine strains were used to prepare powder-form vaccines by the usual method for aerosol immunization: anthrax STI and No 3, brucellosis Br. abortus bovis No 19/BA, tularemia No 15 (restored), and plague 1 and 17. The effectiveness of these vaccines was studied in guinea pigs, rabbits, sheep, and monkeys. Small laboratory animals were vaccinated in chambers with a volume of 1.5-5 m<sup>3</sup>; and sheep and monkeys, in chambers of 5-20 m<sup>3</sup>. Immunization, which lasted for 15-6 minutes, was effected by the dispersal of a determined quantity of the dry vaccines containing up to 1,000-2,500 billion living organisms per gram. The dose of vaccine inhaled by the animals was calculated by determining the number of live microorganisms contained in one liter of air in the chamber in which the immunization was carried out.

Inhalation doses of the vaccine were determined according to the formula  $AD=CTVt$ , in which AD is the inhaled number of live microorganisms of the vaccine strain, C is the number of microorganisms in one liter of aerosol, T is the time of aerosol vaccination in minutes, Vt is the respiratory capacity of the animal in one minute. The results of the study of the effectiveness of aerosol immunization with these vaccines are presented separately for each vaccine.

The results of all experiments are given in eight tables which show methods of vaccination and infection, and dose of vaccine and culture; the following conclusions are given:

Aerosol immunization with powder-form vaccines against anthrax and brucellosis guaranteed the development of immunity in the animals, which protected them from death (disease) on challenge with massive doses of virulent cultures of the corresponding pathogens. The immunity following aerosol vaccination was not inferior in intensity and duration to the immunity established by subcutaneous introduction of the corresponding live vaccines.

In principle, the possibility of successfully immunizing animals against tularemia and plague by the aerosol method with corresponding powder-form vaccines in the optimum dose was established.

107. Aerosol Experiments

"An Experimental Model of the Dust Phase of a Bacterial Aerosol," by V. V. Vlodavets, Central Institute for the Advanced Training of Physicians; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immuncbiologii, Vol 31, No 10, Oct 60, pp 56-61

The objective of the research reported in this article was the production of a stable model of the dust phase of a bacterial aerosol in a static aerosol chamber for various investigations of air-borne infections. A recently published work by A. Yu. Vershigora, who used lycopodium as a dust source, is referenced. The author used blanket dust in his own research.

After various stages of processing which included passage through a sieve and sterilization by dry heat, a determined amount of blanket dust was contaminated with *Staphylococcus albicans* in saline solution (40-50 billion microorganisms per ml) and dispersed in an experimental chamber. Other details concerning dispersal and subsequent analyses are given. The size of the particles in the bacterial dust after dispersal was found to vary between one and 250 microns, with most falling between 3 and 40 microns.

Examination of the results of the experiments led to the following conclusions:

A methodology for experiments with the dust phase of an aerosol was developed. For this purpose, blanket dust was contaminated with a dense suspension of *Staphylococcus albicans* in physiological solution and was dried. A rather stable aerosol which could be observed for 6-8 hours was produced upon dispersal of 20 or 30 mg of bacterial dust in a chamber with a volume of 250 liters.

One disadvantage of the method is the rapid expiration of *Staphylococcus* in artificially infected bacterial dust, as a result of which it becomes unsuitable for experiments in 5-7 days, and sometimes within 7-9 days.

Bacterial dust can be used in experiments for a long time after lyophilization. After preservation of lyophilized dust at 2-4° C, it is suitable for serial experiments for 35 days, and for over 20 days after being kept at room temperature or at 37° C.

108. Ultrasonic Aerosol Sprayer Developed

"The Study of Aerosols; Report III: An Ultrasonic Aerosol Sprayer," by S. N. Muromtsev and V. P. Nenashev, Institute of Epidemiology, and Microbiology imeni Gamaleya; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 31, No 10, Oct 60, pp 50-55

The widespread practical use of inhalation therapy and expanding investigations in the field of inhalation vaccination necessitated the development of high-output aerosol generators which would assure delivery of uniform particles. The authors of this article describe a portable, ultrasonic sprayer developed at the Institute of Epidemiology and Microbiology imeni Gamaleya, and the characteristics of the particles delivered by it.

The principles of the design and operation of the apparatus are shown in a schematic diagram. A current passes from a high-frequency generator into a "special biological bath" containing a coolant, on the bottom of which a piezoelement (barium titanate) is mounted; the ultrasonic oscillations are focused by a lens and create a focus of ultrasonic waves on the surface of the coolant. The liquid dispersed as a result of these waves enters a glass column immersed in the coolant; the bottom of the column is covered with a nylon film. Two small tubes are connected to the column--one for air intake, the other, for aerosol output. The apparatus operates on two frequencies: 800 and 2400 KC with a current of 150-200 mA or more.

Physiological solution, a suspension of saprophytic species of bacteria in physiological solution, diphtheria anatoxin, and whooping cough vaccine were used in tests of the apparatus. Results of these tests are shown in tables and graphs and are discussed. A picture of the apparatus and three illustrations of particles dispersed by it are included. The following conclusions are given:

1. Spraying of various preparations with the aid of ultrasound is one of the most economical methods of preparing biological aerosols.
2. The productivity of the ultrasonic sprayer is ten times that of pneumatic apparatuses. The aerosol particles are practically monodispersed and are distributed within the limits of sizes which penetrate most deeply into all branches of the respiratory tract.
3. Ultrasonic irradiation of biological preparations for 30 minutes (*B. prodigiosum* suspension) did not destroy them, and the concentration of the aerosol remained constant.

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4. The apparatus and the method of dispersal which we used can be employed for experimental investigation of aerosols and study of problems connected with their administration.

109. Tetanus in Children

"Tetanus in Children and Its Therapy (From Data of the Children's Clinical Hospital imeni N. Narimanov in Baku)," by M. A. Kuliyeva; Baku, Azerbaidzhanskiy Meditsinskiy Zhurnal, No 10, Oct 60, p 43

"The author shares his own experience on the treatment of tetanus in children according to data from the Children's clinical Hospital imeni N. Narimanov in Baku.

"Therapy of tetanus must be oriented toward neutralizing the free toxin in the organism, toward diminishing disturbances of the nervous system, and toward reducing convulsions. For these purposes, we administered antitetanus serum independent of the age of the child, but took into account the day of illness and the severity of the disease. Proceeding from this, we administered 75,000, 100,000 and 200,000 AE of antitetanus serum daily with combinations of 1.0 [sic] of tetanus anatoxin twice a week.

"Antitetanus serum was also administered, locally in the form of compresses if there was an open wound.

"During therapy, the dosage of antitetanus serum was gradually decreased depending on the condition of the patient.

"Besides the serum, the children received 25% magnesium sulfate intramuscularly, hot baths and symptomatic therapy.

"Analysis of our data showed that the incidence of fatalities from tetanus has diminished sharply in recent years and that therapy with massive doses of antitetanus serum in combination with anatoxin and other symptomatic therapy should be considered."

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110. New Rumanian Vaccines

"New Vaccines Produced" (unsigned article); Bucharest, Rominia Libera, Vol 18, No 4, 980, 1960, p 3

Researchers in the Institute of Inframicrobiology have prepared some new, successful vaccines; one is against measles and will soon be widely used. This institute has also studied and prepared a vaccine for ornithosis. Intensive research is under way for a vaccine against rubella.

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The problem of "metallized" vaccines is also interesting. These are vaccines with attenuated live viruses obtained with the help of ions of heavy metals (silver, copper, etc.). The vaccines have been used successfully against encephalitis, herpes, and other diseases.

Under the Pasteur Institute of Serums and Vaccines, new vaccines to combat animal diseases have been produced. One of these vaccines is for foot-and-mouth disease. This is the first time it has been produced in Rumania and is of very high quality. Production on an industrial scale started recently. A special, well-equipped section for producing vaccines will be in operation at the Pasteur Institute early in 1961.

Leptospirosis is the most widespread disease among hogs, cattle, and horses. A laboratory to prepare a vaccine to combat this disease was recently established at the Pasteur Institute.

The Pasteur Institute recently began to use lyophilization in preparing some serums and vaccines. The resulting preparations are in the form of powder or flakes and retain their effectiveness for a much longer time. For example, the liquid form of vaccine for hog cholera is good for only 7 days, but the lyophilized form is good for 12 months; H vaccine for fowl plague is good for 30 days in liquid form and up to 6 months in the lyophilized form. The use of lyophilization has also been extended to the diphtheria-smallpox vaccine for chickens and pigeons, and to serums for the positive diagnosis of diseases. In 1961 it is planned to employ lyophilization in the production of a vaccine against ovinia.

111. New Center for Therapy of Burns

"Therapy of Burns" (unsigned article); Moscow, Meditsinskiy Rabotnik, 11 Oct 60, p 2

"The pathogenesis and therapy of deep and large area burns and their complications have not yet been sufficiently studied, and require further investigation. The study of this problem is complicated by the fact that experiments carried out on animals do not provide a satisfactory answer. Burns are traumas which are specific to man, and man's reactions to burns differ considerably from corresponding reactions by animals. The therapy of deep, multiple burns accompanied by disturbed coordinating and trophic functions of the nervous system presents particular difficulties. To cope successfully with this complex problem, the Academy of Medical Sciences USSR has established a special section for the therapy of burns, a 'Burn' center at the Institute of Surgery imeni A. V. Vishnevskiy.

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"Our correspondent approached Prof. A. A. Vishnevskiy, the director of the Institute and an Active Member of the Academy of Medical Sciences USSR, with a request that he elaborate on the principles of the functions, future, and purposes of the newly established section.

"Vishnevskiy said, that the opening of a special center for the therapy of burns is an achievement of great importance. Necessary conditions for fruitful scientific research by experienced specialists working with the latest equipment, as well as for the development of new diagnostic and therapeutic methods will be created here. Patients with burns of different localizations are received here from all parts of the Soviet Union. The maximal realization of the principles of nervism is of primary importance in the therapy of patients afflicted with burns. In severe burns, when the nervous system is subjected to severe shock, methods of alleviating the shock condition are a vital matter.

"What are the concrete measures which we are applying? To reduce the pain reactions of the patient, the usual primary traumatic measures, such as breaking the blisters, and others are not applied. With the same purpose in view a warm bath is given the patient before each dressing. This is done in order to soak off the lower layers of the bandages. In addition, the systematic washing of the wounds hastens their cleansing and healing.

"A two-sided paranephric novocain blockade applied in cases with large area burns is of particular importance. It considerably reduces the permeability of the capillaries decreasing the loss of blood plasma, has a beneficial effect on edemas, and alleviates the disturbed water and protein metabolism. The blockade also has a beneficial effect on the nervous system and helps the organism to mobilize its compensatory capacities.

"The therapy of deep and large burns is not possible without skin transplantation. Cadaver skin preserved by deep freezing is used in addition to the transplants of the patient's own skin. In addition to the well-known method of preparation of normal lyophilized homogenous skin, our special laboratory uses a new method of skin preparation. With the help of a special apparatus which was designed at the Scientific Research Institute of Experimental Surgical Apparatuses and Instruments, skin taken from a body during the first hours after death is frozen in liquid nitrogen at a very low temperature (to minus 170 degrees). The advantage of this apparatus is that it makes it possible to regulate the temperature regimen and secures a high quality of processed skin. The apparatus is now being tested in our institute.

"It is known, however, that the use of conserved homologous skin is only an auxiliary measure, for its accretion is only of a temporary nature. In large areas, however, homoplastic surgery is a matter of necessity.

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"Our surgeons are widely utilizing what is called the stamp method of plastic surgery. The burned area is covered in chess-board form by small pieces (size of a postage stamp) of the patient's own skin alternating it with pieces of conserved skin. The value of this type of treatment is clearly apparent, for the patient's own skin begins to grow rapidly, replacing the conserved skin.

"A powder prepared from conserved skin is also being utilized by the workers of the section. The conversion of the pieces of skin into a powder form is difficult. Because of its elasticity, the skin remained whole even after being passed through a grinding machine. When the technical institutes to which we applied for help were unable to pulverize the skin, the thought of utilizing a machine which resembles an ordinary meat grinder occurred to us. Such a machine was assembled for us at the institute supervised by M. G. Anan'yev, and we are now successfully preparing a skin powder. The importance of this powder is that it contains substances which hasten the process of regeneration. Highly promising is the method of burn therapy in which plastics saturated with medicinal substances are utilized. Soon the section expects to receive an 'artificial kidney' which will be of great help in alleviating disturbed renal functions. A method for the objective determination of the degree of disturbance of capillary permeability in burn cases has been developed by us jointly with the research workers of the Institute of Vitaminology. Research workers of the Biological Laboratory supervised by N. N. Zhukov-Verezhnikov are assisting us in the investigation of immunological reactions which develop in the course of skin transplantations.

"In conclusion, a few words should be said about our medical personnel. The nature of burn traumas is such that a great deal of patience is required and long care must be given to the patients, even in cases which occasionally seem hopeless. Therapy must be continued in some cases for years. Great enthusiasm has been displayed by the Supervisor of the section, Doctor of Medical Sciences M. I. Shrayber; Physicians M. I. Dolgina and Yu. I. Panova; Senior Nurse A. P. Beglova; nurses A. S. Rakova, N. K. Grin', and A. S. Kryuchikova; and many others.

"The main task of the newly established section is to continuously search for new methods of burn therapy, and at the same time investigate the pathogenesis and characteristics of burn sickness."

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112. Thermal Burns

"Problem of Thermal Burns Discussed at the 27th All-Union Conference of Surgeons," by M. I. Shrayber and M. I. Dolgina; Moscow, Vestnik Akademii Meditsinskikh Nauk SSR, Vol 15, No 10, Oct 60, pp 82-85

The therapy of thermal burns was the main topic of discussion at an All-Union Conference of Surgeons. Fifteen papers dealing with the pathogenesis of burn sickness, the basic principles of present-day therapy of thermal burns, and an analysis of the more important complications of burn sickness were presented. Among them was a paper entitled "Thermal Burns," prepared by Prof A. A. Vishnevskiy, Prof G. D. Vilyavin, and Doctor of Medical Sciences M. I. Shrayber. A novocain blockade, the authors claimed, reduces the permeability of the capillaries and helps mobilize the compensatory mechanism of the organism. Another paper entitled "Functional Disturbances and Morphological Modifications of the Internal Organs in Burn Sickness," was prepared by Prof N. S. Molchanov, V. P. Kuznetsov, I. N. Katrushenko, L. M. Klyachkin, P. V. Pilyushin, and V. P. Pinchuk. The authors called attention to the fact that an early diagnosis of the pathological modifications which take place in the organism due to the influence of thermal burns, and their therapy may serve to reduce the high mortality of patients suffering from severe burns.

Other papers dealt with various aspects of burn sickness, its complications, and proposed methods of therapy. The concluding talk at the conference was made by Prof B. A. Petrov, who noted that all methods of therapy now utilized were analyzed in the papers read; the hesitation of some of the surgeons to use blood transfusions in cases of burn shock is unfounded, although such transfusions should be limited to small quantities of the fluids; the organization of burn centers is of great importance, although all surgeons should study and be prepared to cope with the problem of severe burns. A resolution was adopted urging further research on the problem of thermal burns.

113. Chemotherapy

"Attainments and Future of Soviet Chemotherapy," by Prof A. M. Chernukh, and Candidate of Medical Sciences G. Ya. Kivman, Institute of Pharmacology and Chemotherapy, Academy of Medical Sciences USSR; Moscow, Sovetskaya Meditsina, Vol 25, No 8, Aug 60, pp 39-46

Although considerable successes have already been achieved by Soviet chemotherapy, the search for new chemotherapeutic agents which will be effective against bacterial infections, parasitic diseases, virus infections,

and malignant growths is continuing with ever greater energy. With the discovery of antibiotics, the control of a number of infectious diseases is now a matter of record. The Soviet medicinal industry is engaged in the mass production of antibiotics which are effective against bacterial infections. Among them are polymyxin-M which differs from polymyxins manufactured abroad in its chemical structure; mycerin, an antibiotic of the neomycin group; colimycin; monomycin; and many others.

Considerable research work is being done in the search for anti-tubercular preparations. The work is channeled into three directions: (1) a study of the properties and of methods of effective application of such preparations as streptomycin, phtivazid, tubazid, and PAS; (2) development of preparations which will supplement the above drugs; and (3) development of new preparations which will be effective against resistant forms of tubercular mycobacteria. The search for drugs which will be effective against virus infections may be considered to be in its initial stage. However, a number of antibiotics are now effectively being used against some virus infections. Among them are penicillin, the novocain salt of penicillin, emonovocillin, streptomycin, chlor-tetracycline, oxytetracycline; heliomycin and violarin, new antibiotics are being tested for their effectiveness against influenza infection experimentally induced in albino mice. Of great importance is the search for chemotherapeutic preparations which will be effective in the control of malignant growths. A number of preparations are now being tested, among them actinoxanthine, mutomycin, and the antibiotic 6270. The cooperation of scientists in all fields of biological sciences is essential for the successful solution of the problems. Biochemical and physicochemical methods of investigation should be utilized.

114. Antidote for Fluorine Intoxication

"Magnesium Sulfate as an Antidote Against Fluorine Intoxication," by V. G. Loshchilova, Veterinariya, 1959, No 12, 48-59 (from Referativnyy Zhurnal Khimiyi--Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 25106, by V. Volaksaya)

"Experiments with animals have shown that magnesium sulfate possesses antidotal activity in fluorine intoxication. In investigating the biochemical indexes in the blood of animals suffering NaF intoxication, a sharp increase in blood sugar (from 77 to 102 mg %), a decrease in the amount of Ca (from 13.1 to 8 mg %) and an increase in the glutathion content was found. With the administration of magnesium sulfate at the threshold of fluorine intoxication, a more moderate increase in the blood sugar (from 63.5 to 72 mg %), an insignificant decrease in the Ca content (from 11.4 to 10 mg %) and an unusual type of shift in the glutathion content were observed."

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115. Therapy of Parathion Intoxication

"Therapeutic Action of Benactyzine, Thiospasmine, Oxythiospasmine, and a Combination of Benactyzine With Pyridine-2-aldoximethyliodide (PAM) and Atropine in Experimental Parathion Intoxication," by Josef Marhold, Pracovni Lekar (Czechoslovakia), 1959, 11, No 6, 308-309 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Kimiya, No 12, 25 Jun 60, Abstract No 17670, by the author)

"In mice intoxicated by parathion, benactyzine was therapeutically less effective than atropine; thiospasmine and oxythiospasmine were completely ineffective; PAM in combination with benactyzine was somewhat less effective than the combination of PAM and atropine; the combination of PAM with benactyzine and atropine was considerably less effective than the combination of PAM and atropine."

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116. Reserpine Therapy of Pulmonary Hypertension

"On the Effect of Reserpine in Hypertension of the Pulmonary Artery," by Prof I. A. Chernogorov, Yu. A. Kozhevnikov, and Candidate of Medical Sciences V. F. Kozlovskaya, Chair of Internal Diseases, Moscow Medical Stomatological Institute; Moscow, Terapevticheskiy Arkhiv, Vol 32, No 9, Sep 60, pp 15-19

Reserpine was administered to 44 patients suffering from different forms of cardiovascular diseases accompanied by pulmonary hypertension. The observations established that reserpine exhibited an expressed activity in the presence of a syndrome of pulmonary hypertension. When regularly administered in doses of 0.25 milligram three or four times a day in combination with other cardiac drugs, it improved circulation in the lesser and larger circulation systems. Indirect indexes determined by such means as dynamic pirometry, tests in which the breath is held, and others bear out the effectiveness of reserpine when used in cases of pulmonary hypertension.

117. Pyrabutol Therapy of Nervous Diseases

"On the Therapy of Some Diseases of the Peripheral Nervous System With Pyrabutol," by B. G. Budashevskiy, Medico-Sanitary Section of the Cotton Kombinat "Krengol'mskaya Manufaktura," and the Neurological Division of the Narva Municipal Hospital; Moscow, Sovetskaya Meditsina, Vol 25, No 8, Aug 60, pp 113-117

Pyrabutol, a combination of butadion and pyramidon, a new drug developed in Czechoslovakia, was administered to a number of patients suffering from diseases of the peripheral nervous system, mainly

is an effective analgesic and anti-inflammation drug; it is particularly effective in acute forms of the affections; beneficial results were obtained in cases of radiculitis of traumatic origin; it is particularly effective when intramuscularly administered; five to seven injections of the drug in doses of 3 milliliters in 24 hours are recommended; the prolonged administration of pyrabutol is not advisable because of possible side effects.

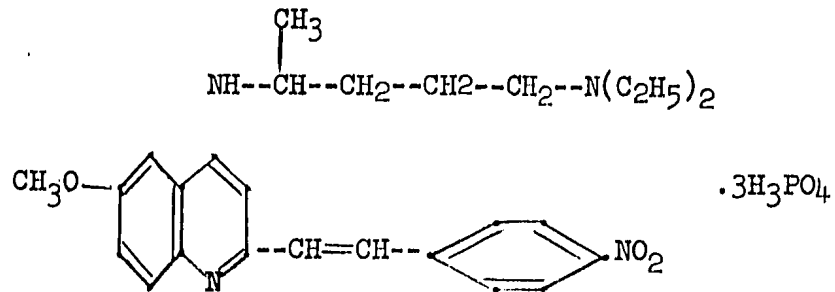
118. Therapy of Otitis Media Suppurativa

"Prophylaxis and Therapy of Acute Otitis Media Suppurativa with Bicillin-3," by A. A. Eyvazov, Chair of Ear, Throat, and Nose, Azerbaydzhan State Institute for the Advanced Training of Physicians; Baku, Azerbaydzhanskiy Meditsinskiy Zhurnal, No 7, Jul 60, pp 27-31

One of the important problems of otorhinolaryngology is the prophylaxis and therapy of otitis media suppurativa which frequently develops as a complication of such infectious diseases as scarlet fever, measles, typhoid fever, influenza, and others. In seeking a means of prophylaxis and therapy of the disease, the authors experimented with bicillin-3. The experiments were carried out on rabbits which were infected with staphylococcus aureus in the tympanum. Acute otitis developed on the third day. The experiments revealed that the preliminary intramuscular administration of bicillin-3 prevented the development of otitis media; the intramuscular administration of the drug arrested the otitis which already began to develop; the therapeutic effect of bicillin-3 when used in cases of acute otitis media suppurativa may be explained by the fact that the drug is an antimicrobial and anti-inflammation agent. The use of bicillin-3 in cases of chronic suppurative otitis which do not respond to penicillin therapy is recommended.

"Trichomonacid," by N. A. Novitskaya, All-Union Scientific Research Chemicopharmaceutical Institute imeni S. Ordzhonikidze; Moscow, Meditsinskaya Promyshlennost' SSSR, Vol 14, No 10, Oct 60, pp 41-42

Trichomonacid is a preparation found to be effective in the therapy of diseases caused by *Trichomonas vaginalis*. Chemically it is the triphosphate 6-methoxy-2-(4' - (alpha-methyl-delta-diethylamino)-butylamino)quinolone. Its structural formula is as follows:



Trichomonacid is a yellow powder, with a bitter taste; it is readily soluble in water and alcohol. It is an effective bactericidal and arrests the growth of *Staphylococci aureus* when used in a concentration of 1:16,000; *heolytic streptococcus*, in a concentration of 1:32,000; and human and fowl tubercular bacillus, in a concentration of 1:128,000. It is well tolerated by the organism and there are no contraindications to its use.

### Oncology

#### 120. Etiology of Pulmonary Cancer

"Experimental Investigation of the Connection Between Air Pollution and Pulmonary Cancer," by Prof L. M. Shabad (Moscow); Moscow, Sovetskaya Meditsina, Vol 24, No 9, Sep 60, pp 19-25

The results of investigations which were conducted to establish the connection between air pollution and pulmonary cancer are reported. The main sources of air pollution with cancerogenic substances are discharges from house heating systems, discharges from industrial enterprises, exhaust gases from auto transport facilities, and dust from asphalt covered roads. All of these discharges contain 3,4-benzopyrene;

the latter is also a decomposition product in tobacco smoke. It is the author's opinion that although conclusive evidence is not yet available, it is safe to assume that the continuous inhalation of air polluted with blastomogenic substances could be a cause of lung cancer. Further research, however, is necessary to determine the etiological significance of polluted air in the development of lung cancer.

121. Nasal Smears in Diagnosis of Malignancies

"Cytological Investigation of Smears Taken from the Nasal Cavity as a Method of Diagnosis of Malignant Tumors of the Maxillary Sinus and the Ethmoidal Labyrinth," by K. P. Chikovani, Ministry of Health Georgian SSR, Medical-Sanitary Division of the Auto Plant in Kutaisi; Tbilisi, Soobshcheniya Akademii Nauk Gruzinskoy SSR, Vol 24, No 5, May 60, pp 619-623

On the basis of observations conducted on a number of patients and literary data available, the author comes to the conclusion that the cytological investigation of smears obtained from the nasal cavity situated on the side of a localized affection is a dependable method of diagnosing malignant tumors in the maxillary sinus and the ethmoidal labyrinth. The method advocated by the author is painless, simple, and can be easily carried out by most of the physicians.

122. Oncostatic Properties of Actinomycetes

"Oncostatic Properties of Actinomycetes," by Marian Mordarski, Department of Antibiotics, Institute of Immunology and Experimental Therapy, Polish Academy of Sciences, Wroclaw; Warsaw, Archiwum Immunologii i Terapii Doswiadczalnej, Vol 8, No 2, 1960, pp 305-326

The author gives results of experiments on the oncostatic action in vivo of Actinomyces strains, which in previous experiments performed in vitro had exhibited the ability to produce a substance with an inhibitory effect on the enzymatic activity of neoplastic cells.

Of 621 strains examined in vitro, 10 were selected for experiments in animals. Each of these strains was subjected to two to four fermentations in submerged cultures on the proper medium, and the activity of the obtained culture fluid was determined in vitro and in vivo.

An attempt was made to determine the LD<sub>50</sub> of culture fluids under examination; the majority of them proved to be highly toxic for white mice, but only in one case was the LD<sub>50</sub> of the culture fluid above one milliliter (with a single subcutaneous dose). The oncostatic activity in vivo was evaluated as follows: white mice (males) weighing 20-22 grams were inoculated subcutaneously with a suspension of Ehrlich's ascitic carcinoma or amytal ascitic sarcoma cells. Each mouse was subcutaneously given 10<sup>6</sup> cells obtained from the exudative fluid of mice used for passaging of tumors. Two weeks after transplantation, the animals were examined for the development of tumors: those which showed no tumors or highly developed ones were discarded. Mice under treatment were given the culture fluid in subcutaneous injections six times a week for a total of 12 injections. The doses depended on the acute toxicity of the fluid, mostly amounting to [from] 0.01 ml in some cases to 0.05 ml, 0.1 ml, 0.2 ml pro dosi. After the treatment, the animals were killed with chloroform and the tumors removed and weighed. The results obtained were evaluated statistically according to the "Student's" method.

It was found that all strains under examination produced oncostatic substances against standard tumors during fermentation. The oncostatic activity of the culture fluids obtained is not uniform. Some strains produce oncostatic substances in 60-70 percent of the cases, while others are much weaker. The action of culture fluids on the development of both standard tumors is noticeably selective: they may exert a strong inhibitory action against Ehrlich's carcinoma and may fail to act against the sarcoma growth.

Results in vitro and in vivo were compared. The high degree of consistency was striking. There was no case in which an oncostatic action in vivo was not paralleled by the same behavior in vitro. There was even a certain correlation between the activity of culture fluids in vivo and in vitro: the greater the activity in vitro, the higher the efficacy in vivo. The culture fluids with slight activity in vitro may fail to act on the standard animal tumors used. Some culture fluids with high activity in vitro gave no statistically significant difference in the inhibition rate in vivo.

Several charts and formulas are given, and the experiments are related in detail. The bibliography contains nine references.

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"Effect of Sodium Lactate on the Growth of Ehrlich's Mouse Carcinoma," by V. L. Kuz'menko, V. sb. Fiziol. Mekhanizmy Kompensatorn. Reaktsiy u Vosstanov. Protssessov (Collected Work on the Physiological Mechanisms of Compensatory Reactions and Restoration Processes), Part 2, L'vov, 1958, 123-124 (from Referativnyy Zhurnal-Biologiya, No 16, 25 Aug 60, Abstract No 78706, by A. Tsetlin)

"Some 155 mice were used in experiments in which the effect of sodium lactate on the growth of Ehrlich's carcinoma and the longevity of animals inoculated with the carcinoma was studied. The mice were subcutaneously administered about 2 million cells of Ehrlich's ascitic carcinoma. One to 3 percent solutions of sodium lactate were administered to the animals with their drinking water. On the 10th day following the administration of the sodium lactate, the weight of the tumors in the experimental animals was 365 milligrams; the weight of the tumors in the control animals was 310 milligrams. On the 20th day after the administration of the drug, the tumors in the animals which received a one-percent solution of sodium lactate weighed 1,660 milligrams; the average longevity of these mice was 32 days. The tumors in the animals which were administered a 3-percent solution of sodium lactate weighed 1,775 milligrams on the 20th day; their longevity was 27 days. The weight of the tumors in the control animals on the 20th day was 1,246 milligrams; their longevity was about 40 days. It was, thus, found that the daily administration of sodium lactate stimulated the growth of Ehrlich's ascitic carcinoma and decreased the longevity of the animals inoculated with the carcinoma cells."

124. Incurable Cancer Patients Treated by Administration of Y<sup>90</sup> Into the Hypophysis

"The Treatment of Generalized Forms of Malignant Tumors by the Administration of Y<sup>90</sup> Into the Hypophysis," by Bela Val'd (deceased), Paslo Zoltan, Tibor Polyanski, Sabolch Tot, and Mikhay Berintsey, State Institute of Oncology and State Institute of Surgery of the Nervous System Budapest; Moscow, Voprosy Onkologii, Vol 6, No 10, Oct 60, pp 9-18

In view of the significance of hormones and the interrelationships between certain hormones and tumor formations, the authors have treated, since 1958, 32 incurable cancer patients with various generalized metastasizing malignancies (breast 21, uterus 3, ovary 3, melanoblastoma 4, and rectum one) by introducing radioactive yttrium oxide into the hypophysis. The surgical procedure was as follows:



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The orbit was pierced with a trocar and the sella turcica was reached through the ethmoid bone. After withdrawal of the mandrin, 4-6 sticks (3-4 mm long by 1.2 - 1.4 mm in diameter) of yttrium -90, equivalent to 6-10 millicuries, were introduced through a cannula into the hypophysis.

Results indicate that subjective improvements (the patients felt better, their appetite improved, and some even went back to work) were noted in 23 and objective improvement in four others, five did not react to the treatment. Four complications resulted from the surgical procedure.

On the basis of the data obtained, the authors conclude that the introduction of  $Y^{90}$  into the hypophysis is a significant and effective method for palliative therapy of incurable metastasizing tumors. The authors consider that this method should be used in treating oncological patients, and that it may, at the same time, be one of the significant and promising clinical research methods which will make it possible to better understand more the problem of hormonal interrelationships in human tumors. It is hoped that the compilation of complete case histories of patients who react positively to the administration of this radioactive preparation into the hypophysis will enrich the clinical understanding of hormone-dependent tumors.

125. Lumbar Novocain Block Recommended Following Radical Mastectomy

"The Effect of Novocain Block on the Process of Metastasis of Breast Cancer," by P. Ye. Dmitriyeva, Candidate of Medical Sciences; Kazan', Kazanskiy Meditsinskiy Zhurnal, No 5, Sep/Oct 60, pp 115-116

"Clinical observations of the results of treating patients with cancer of the breast by means of surgical intervention in combination with other types of supplementary therapy are presented. All surgery was performed under local anesthesia using a 0.25% novocain solution.

"Of the 271 patients subjected to radical surgery due to the behavior of breast cancer, 66 received X-ray therapy, and of this group 5 were first stage, 33 second stage, and 28 third stage patients. A total of 72 patients at various periods after radical mastectomy were subjected to lumbar novocain block, and this number included 26 first stage and 46 second stage cancer patients.

The remaining 133 patients, who received no further treatment after their radical mastectomy, included 55 first stage and 78 second stage cancer patients.

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The group of patients subjected to lumbar novocain block after radical mastectomy showed results of stable cure more often than the patients treated by surgery only. At the end of a 3-year period, all of the 26 first stage cancer patients treated by lumbar novocain block were living, and 42 out of the 46 second stage patients similarly treated were living. A follow-up of the patients that were subjected to surgery only showed that at the end of the 3-year period there were 50 patients surviving from a total of 55 with first stage cancer, and only four from a total of 78 second stage cancer patients.

"The frequency of cancer metastasis in patients of second sickness who were subjected after surgery to lumbar novocain block was much lower than in patients subjected to postoperative X-ray therapy and in patients treated by surgery alone."

126. Effect of Tryptophan on the Organism

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"Effect of the Administration of Tryptophan and Vitamin B<sub>6</sub> on the content of Indol Derivatives in the Blood and Urine of Patients Suffering From Leukemia," by V. D. Ivanova and O. D. Ramonova-Tskhovrebova, Central Order of Lenin of the Institute of Hematology and Blood Transfusion, Ministry of Health USSR; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 5, No 10, Oct 60, pp 34-37

The results of the investigations which were conducted to determine the effect of tryptophan and tryptophan in combination with vitamin B<sub>6</sub> on the content of indol derivatives in the blood and urine of leukemic patients are reported. The investigations were carried out on five patients afflicted with the disease. Tryptophan alone when administered in doses of 40 grams restored the serotonin content in the blood in two patients to normal, and increased it in one patient. The administration of tryptophan in combination with vitamin B<sub>6</sub> restored the blood content of indol derivatives in three of the five patients. On the basis of these investigations it may be assumed that a temporary restoration to normal of tryptophan metabolism is possible; such restoration is usually accompanied by an improvement in the general course of the disease.

"The inhibition of Carbohydrate Metabolism of Tumor Tissues in Rats During the Process of Treating Them With Sarcocysine," by E. G. Gorozhanskaya, Yglevody i Yglevodn. Obmen v Zhivotn. i Rastitel'n. Organizmakh (Carbohydrate and Hydrocarbon Metabolism in Animal and Plant Organisms), Academy of Sciences USSR, 1959, 196-202 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 25068)

"Sarcocysine, D,L-n-di-(chloroethyl)-aminophenylalanine, was administered to rats with a sarcoma sensitive to sarcocysine (group I) and resistant to sarcocysine (group 2) every 72 hr for a period of 10 days. In group I animals, sarcocysine produced a decrease in tumor cell respiration (R) and glycolysis (G). Within 72 hr after the administration of sarcocysine, R was decreased to 70% and G to 43%. After the second administration of sarcocysine, R was decreased to 80% and G to 71.2%. After the third administration, the tumor began to be resorbed. In group 2 animals, the first administration of sarcocysine enhanced R, and the second administration decreased it. This lowering in R reached 23% by the end of the treatment, and G reached 43%. In all animals, sarcocysine decreased codehydrase activity. A connection between the activity of codehydrase and the intensity of G was observed. A sharper decrease in the concentration of codehydrase after the administration of sarcocysine was noted in the animals of group I in which a sharp decrease in G was observed. The addition of codehydrase increased the intensity of aerobic G in both variants of the untreated sarcoma. The problem concerning the status of apo enzymes of the respiratory system of the tumors remains unclear.

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128. Bactericidals

"Monoesters of Phenols and Dibasic Acids as Bactericidal Agents," by T. I. Istomina and V. V. Shavyrina, Tr. Tsentr. N.-I., Dezinfekts. In-ta (Works of the Central Scientific Research Disinfection Institute), 1959, No 12, 51-52 (from Referativnyy Zhurnal -- Khimiya, No 17, 10 Sep 60, Abstract No 70592, by A. Vavilova)

"Studies of the bactericidal action of synthesized phenyl and chlorophenyl esters of succinic acid, and phenyl, chlorophenyl, dichlorophenyl, and trichlorophenyl esters of adipic acid were conducted. The disinfecting solutions were prepared by dissolving the esters in a solution of NaHCO<sub>3</sub> with a slight excess of the latter, and diluting the solutions with water until the required concentrations were obtained. It was established that the chlorophenyl ester of succinic acid in a concentration of 0.25-1 percent kills staphylococci aureus and the coli bacillus within 5-30 minutes; a one-percent solution and a 15-minute exposure is required to kill fungi. It is as effective as chloramine. The acid esters of adipic acid are not as effective as the esters of succinic acid; their effectiveness, however, increases with the increase in the Cl content of the phenol nucleus."

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129. Effect of Histidine on the Organism

"Effect of Histidine on Conditioned Reflex Activity of Animals in a Normal State and in Cholesterol Induced Atherosclerosis," by G. S. Gvishiani, Pharmacological Division of the Institute of Clinical and Experimental Cardiology imeni M. D. Tsinamdzgvarishvili, Academy of Sciences Georgian SSR, Tbilisi; Moscow, Farmakologiya i Toksikologiya, Vol 23, No 5, Sep-Oct 60, pp 379-384

A report on the effect of histidine on conditioned reflex activity and cholesterol induced atherosclerosis is given. The experiments carried out on dogs and rabbits established that histidine has a beneficial effect on conditioned reflex activity by improving the differentiation process, and hastening the development of extinguishing inhibition; it also intensifies the process of cortical inhibition. It is highly effective in the therapy of endarteritis obliterans and cholesterol-induced atherosclerosis.

"New Source of Derivation of Galenic Preparations Containing Alkaloids of the Tropane Group," by Ye. S. Gritsayeva and A. S. Prozorovskiy, Chair of the Technology of Drugs and Galenic Preparations, Moscow Pharmacy Institute; Moscow, Aptechnoye Delo, Vol 9, No 5, Sep-Oct 60, pp 6-8

Drugs containing alkaloids of the tropane groups are widely used as antispasmodic and pain-relieving agents. Investigations were conducted to determine the possibility of deriving preparations which contain alkaloids of the tropane group from the leaves of Himalayan scopolia -- Anisodus luridus Link et Otto, family Solanaceae. The investigations established that the leaves of Himalayan scopolia contain alkaloids of the tropane group to the amount of one percent; 40-70-degree alcohol is the best solvent for the extraction of the alkaloids from the leaves of the plant; alcohol infusions of the preparations are stable and may be stored for a long time.

131. Styrol Found to Disrupt Menstrual Cycle

"The Effect of Styrol on the Female Menstrual Cycle Under Industrial and Experimental Conditions," by Ye. P. Bondaryevskaya, Tr. Voronezhsk. Med. In-ta. (Works of the Voronezh Medical Institute) 1957, 29, 11-13 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 25089, by V. Volskaya)

"A temporary disruption of menstrual function was observed in women suffering from chronic styrol intoxication (0.02-0.128 mg of styrol vapor per liter of air). The sex cycle was always disrupted in white rats suffering acute styrol intoxication. With chronic intoxications, slight disruptions in the sex cycle were observed in more than half the rats 12 weeks after the beginning of the feedings. In all instances, the disruptions in the sex cycle were temporary and reversible."

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132. Pharmacology of Sulfur-Containing Derivatives of Caffeine and Theobromine

"Pharmacological Properties of Sulfur-Containing Derivatives of Caffeine and Theobromine," by R. S. Tsirkin, Sb. Tr. Omskiy Fil. Vses. Ob-va Fiziologiv, Biokhimikov, i Farmakologov (Collection of Works of the All-Union Society of Physiologists, Biochemists, and Pharmacologists), 1958, No 1, 391-404 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 19, 10 Oct 60, Abstract No 27888, by O. Kholezova)

"Frogs, rabbits, and mice were used in experiments in which the effect on the organism of caffeine (I), the sodium salt of mercaptocaffeine (II), the hydrochloride of mercaptocaffeineethylamine (III), mercaptocaffeineethanol (IV), sodium salt of mercaptotheobromine (V), the hydrochloride of mercaptotheobromineethylamine (VI), and mercaptotheobromine ethanol (VII) was tested. The LD<sub>50</sub> for white mice (intraperitoneally administered) for (II), (III), (IV), (V), (VI), and (VII) were respectively 1,222, 470, 392, 3,000, 693, and about 400 milligrams per kilogram body weight. (II) and in part (III) had a stimulating effect on the central nervous system of rabbits when administered in doses of 10 and 20 milligrams per kilogram body weight. When tested on white mice afflicted with Ehrlich's ascitic carcinoma, the preparations were ineffective when administered in doses of 200 milligrams per kilogram body weight; (III) stimulated the growth of the tumors. (III) and (VI) when administered to cats anesthetized by urethan (optimal doses 20 and 50 milligrams per kilogram body weight) acted as hypotensive agents; this action may be explained by the effect of the drugs on the vascular walls and partial depression of the automatic regulation of the vascular tonus."

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133. Colorimetric Test for Determining Panthocaine Described

"Colorimetric Method of Determining Panthocaine as Well as Mixtures of Panthocaine and Atropine or Novocain," by Stanyanova, Farmatsiya (Bulgaria), 1959, 9, No 5, 16-19 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 23732)

"A modified colorimetric Vitali-Morine reaction for atropine which is specific for panthocaine is described. In the analysis of a mixture of atropine and panthocaine in an acetone medium, a violet coloration appeared which is characteristic for atropine; with the addition of methyl alcohol, the violet color disappeared and in its place a persistent ruby red coloration appeared. In analyzing pure panthocaine by this method, a similar coloration of methyl alcohol is observed. It was determined that this coloration is specific for panthocaine;

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pylocarpine, psycaine, cocaine, percaline, and anesteziine do not give a coloration. The coloration obtained is in conformity with the Lambert-Beer Law and can be used for the quantitative determination of panthocaine. The reaction is sensitive to 1.0 gamma of panthocaine. The reaction presents the possibility of detecting panthocaine in all combinations with novocain and to determine the quantity of panthocaine in cases where the amount of panthocaine comprises at least 50% of the ratio to novocain."

134. Test for Determining Microquantities of Strychnine Described

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"A New Colorimetric Method for Detecting Microquantities of Strychnine," by Stamyenova, Farmatsiya (Bulgaria), 1959, 9, No 5, 19-24 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 17, 10 Sep 60, Abstract No 23733)

"A new colorimetric reaction for the qualitative analysis of strychnine is described. In analyzing a mixture of strychnine and atropine with the aid of the Vitali-Morine reaction in an acetone medium, a violet coloring which is characteristic of atropine appeared, which, with the addition of water, disappears and in place of it a gold-yellowish coloring appears. When utilizing this method, pure strychnine produces a similar color in an aqueous solution. This color is specific for strychnine. Brucine gives a similar coloring; however, it produces a bloody-red phase of coloration after nitration which strychnine does not do. The described method can be used for detecting strychnine in the presence of morphine, atropine, scopolamine, chioctamine, quinine, veratrine, dionine, cocaine, and brucine. The reaction is sensitive. It is possible to detect 5 gamma of strychnine."

135. Effect of Vitamins on Action of Local Anesthetics

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"Investigation of Local Anesthetics With Prolonged Action, VII. Effect of Water-Soluble Vitamins on the Duration of the Action and Toxicity of Local Anesthetics," by Z. Horakova, V. Hach, J. Secka, H. Smolkova, and Z. Roth (Czechoslovakia), 1959, 8, No 5, 193-199 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 11, 10 June 60, Abstract No 16043, by the authors)

"Guinea pigs were used in experiments which were conducted to determine the effect of vitamins B<sub>1</sub>, B<sub>6</sub>, PP, C, inozitol, and p-aminobenzoic acid on the local anesthetizing action of procaine, mezocaine, and cocaine. It was found that vitamin C intensifies the action of procaine and mezocaine but diminishes the action of cocaine. Vitamine B<sub>1</sub> decreases the effect of mezocaine, intensifies the action of procaine, and has no effect on the action of cocaine. It was found also that vitamin B<sub>6</sub> intensifies the effect of procaine and mezocaine, but blocks the action of cocaine."

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Para-aminobenzoic acid intensifies the action of procaine and cocaine, but vitamin PP has no effect on their action. Inozitol diminishes the action of procaine and mezocaine, but intensifies the effect of cocaine. For report VI, see Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, 1958, No 16, 20167."

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136. Toxicity of Certain Aromatic Nitro Compounds

"Toxicological Investigation of Certain Aromatic Nitro Compounds Used in Hungarian Industry," by Mario Sziza and Laszlo Margos, Munkavedelem, 1959, 5, No 4-6, 45-48 (from Referativnyy Zhurnal -- Khimiya, No 15, 10 Aug 60, Abstract No 61936, by D. Pyushpeki)

Research data are presented for the toxicity (LD<sub>50</sub> in g/kg) for nitrobenzene, p-nitrochlorobenzene, 2,4-dinitrochlorobenzene, p-nitrophenetole, and nitroanisole on white rats following intraperitoneal administration (correspondingly 0.64, 0.42, 0.28, 1.4, and 2.1), intragastric administration (correspondingly 0.64, 0.42, 0.64, 4.7 and >16.0), and subcutaneous administration (correspondingly 2.10, 16.0, -, >16.0, and > 16.0). The effect of these substances on the formation of methemoglobin, Heinz globules etc. was studied.

137. Hungarians Conduct Synthetic Investigations in Connection With Chloramphenicol

"Synthetic Investigations in Connection With Chloramphenicol. Preparation of p-Nitroacetophenone, p-Nitrobenzaldehyde, and Related Compounds Through Oxidative Oxime Splitting" (1)  
"Experiments in the O-Methyl-beta-p-Nitrophenylserine Series" (2), by Andor Hajos, Pharmaceutical Industry Research Institute, Budapest; Budapest, A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyci, Vol 12, No 2 and 4, 1959, pp 219-222 and 383-393

p-Nitroacetophenone, p-nitrobenzaldehyde, and other substituted benzaldehydes can be prepared if the appropriate oximers are treated with oxidants in aqueous sulfuric acid solution or suspension. Best yields were obtained (80 percent in the case of p-nitroacetophenone, and 90 percent in the case of p-nitrobenzaldehyde) when nitrous acid was used. However, the reaction also took place when other oxidants, such as chromic acid, potassium permanganate, isoamyl nitrite, nitrous gases, nitric acid, bromine, and ferric chloride, were used. It seems probable that, under the conditions described above, the oxime first hydrolyzes and the hydroxylamine formed is then oxidized. The fact that only the initial oxime or substituted benzoic acid can be isolated in some cases also points to this probability.

O-methyl-treo and erythro-beta-p-nitrophenylserine can be prepared by nitrating the proper N-acetyl-O-methyl-treo and erythro-beta-phenylserines or phenylesters and hydrolyzing the resulting nitro products. When the O-methyl-N-acetyl-erythro-beta-p-nitrophenylserine and the nitrophenylserine-ethyl ester were hydrolyzed in aqueous hydrochloric acid, a modification of the O-methyl-N-acetyl-erythro-beta-p-nitrophenylserine that had a high melting point and was practically insoluble in water was formed. The O-methyl-treo- and erythro-beta-p-nitrophenylserines could be demethylated with good yields into the suitable beta-p-nitrophenylserines. The treo-beta-p-nitrophenylserine-n-butylester could be separated into its optical isomers with d-camphor sulfonic acid. It was possible to prepare L (+) erythro-beta-p-nitrophenylserine from the methyl ester of N-acetyl-L<sub>3</sub> (+)-treo-beta-p-nitrophenylserine by treating it with thionylchloride.

138. Hungarians Investigate Properties of Coagulant-Type Enzyme

"The Chemical, Biological, and Pharmacological Properties of Elastase, and Its Uses in Therapy," by Candidate of Medicine, Daniel Bagdy, Pal Tolnay, Jozsef Borsy, Kalman Kovacs, Department of Biochemistry, Pharmaceutical Industry Research Institute, Budapest; Budapest, A Magyar Tudomanyos Akademia Biologiai es Orvosi Tudomanyok Osztalyanak Kozlemenyei, Vol II, No 2-3, 1960, pp 277-291

In 1949, J. Baló and I. Banga discovered a new enzyme in the mammalian pancreas. They named the enzyme elastase because it dissolves elastin. In 1952, Banga isolated elastase in crystallized form. In 1955, the authors were asked to participate in elastase research to make large quantities of elastase available for the extension of research.

The authors evolved a new adsorptive process for the preparation of elastase, which permits economical production and yields a product of high purity. Investigation of the enzyme has revealed the following: elastase is capable of breaking down other proteins, such as prothrombin and fibrinogen, as well as elastin; the addition of iodine and formalin, or desamination of the enzyme destroys its elastin-decomposing properties, and decreases its protein-decomposing properties. The authors found that the specific elastolytic action and the nonspecific proteolytic action of the elastase molecule do not originate from the same center; the section responsible for the elastin-decomposing properties is more sensitive to chemical influences.

The authors have been unable to confirm the presumed role of elastase in arteriosclerosis therapy to date. They found that in certain concentrations elastase would coagulate whole blood or plasma. This effect results from the fact that it converts prothrombin into thrombin. It also curdles milk. The elastase-inhibiting effect of normal blood serums is

due primarily to a large-molecule, protein-type inhibitor which is part of the pseudo-globulin fraction. Rabbit immune serums inhibit the effect of the enzyme even more strongly than do normal serums used as controls.

Elastase causes hypotension in cats when administered intravenously. The reduction of blood pressure is due to the expansion of the peripheral arteries. The enzyme causes an amplitude increase of a frog's heart contractions; tonus improvement of smooth muscle organs, and contraction of the uterus of rats in oestrus. The toxicity of elastase preparations given intravenously is proportional to their elastolytic activity. Toxicity can be greatly reduced by the administration of antirheumatic drugs having an antiphlogistic effect. Elastase, applied locally to the healthy pancreas, causes no tissue damage.

The authors found elastase very effective in the treatment of ulceration of the lungs and pleura. In most cases, the enzyme by itself cures the condition and makes lung resection unnecessary. It acts more quickly and is less irritating than trypsin preparations, and its toxicity, in controlled doses, is negligible. It is also beneficial in the treatment of skin ulcers and second- and third-degree burns, and can be used for the preparation and maintenance of cell cultures.

139. Hungarians Develop New Tranquilizers and Antispasmodics

"New Tranquilizing and Antispasmodic Beta-Aminoketones," by Jozsef Knoll, Candidate of Medical Sciences, Karoly Nador, Candidate of Chemical Sciences, and Berta Knoll, Janos Heidt, Janos G. Nieval, Institute of Pharmacology of Budapest Medical University, and Department of Pharmaceutical Research of Experimental Medical Research Institute, Budapest; Budapest, A Magyar Tudomanyos Akademia Biologiai es Orvosi Tudomanyok Osztalyanak Kozlemenyei, Vol II, No 2-3, 1969, pp 329-340

The authors prepared new beta-aminoketones and demonstrated that by starting with 2-piperidinomethyltetralone-1 HCl (NA-86) and substituting at the 4-position, a powerful antispasmodic can be prepared, while substitutions at the 7-position or at the 6- and 7-positions result in powerful tranquilizers.

Of the derivatives prepared to date, the greatest tranquilizing activity was exhibited by 6,7-dimethyl-2-piperidinomethyltetralone-1 HCl (N 702), and by 7-ethyl-2-piperidinomethyltetralone-1 HCl (N 664). N-702 is roughly equivalent to largactil in its inhibiting effects on conditioned reflexes and on the action of psychomotor stimulants in mice and rats.

In the case of tranquilizer derivatives considerably more potent than NA-86, no parallel was noted between this effect and their narcotic-potentiating capacity. However, there is a parallel between the inhibiting effects on conditioned reflexes and on the action of psychomotor stimulants.

NA-86 has an adrenolytic effect. A potentiating type of synergism exists between the blood-pressure-reducing effects of reserpine and NA-86. The adrenolytic and tranquilizing effects are separate, so that N 702, the most potent tranquilizer, exhibits virtually no adrenolytic effect.

When the drug contains a morpholine or piperazine ring instead of a piperidine ring, both the antispasmodic and tranquilizing effects are reduced. The newly developed aminoketones proved to be highly toxic when substituted in the 4-position. Toxicity can be greatly reduced by substitution in the 7-position, as well as by having a morpholine or piperazine ring instead of a piperidine ring.

140. Effect of Antidepressants on the Organism Investigated in Poland

"First Personal Clinical Observations on the Application of Antidepressant Drugs (Tofranil and Nozinan)." by Adam Bilikiewicz, Neurol. Neurochirurg. i Psychiatr. Polska, (Poland), 1959, 9, No 1, 73-83 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 12, 25 Jun 60, Abstract No 17523)

"The initial results of the clinical observations of cases in which nozinan [levo-methoxy-3-(methyl-2'-dimethylamine-3'-propyl)-10-phenothiazine] and tofranil (the hydrochloride of dibenzylimino-N-gamma-dimethylaminopropyl) were used are reported. No significant side effects of the drugs were noted; the preparations are slightly toxic. The course of treatment and the dosages are the same as those for chlorpromazine."

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141. Acetylcholine in Tetanus Toxin Poisoning

"The Role of Acetylcholine in Poisoning With Tetanus Toxin," by Janina Wartenberg; Warsaw, Archiwum Immunologii i Terapii Doswiadczalnej, Vol 8, No 2, 1960, pp 269-296

The studies described in this article are based on the theory of a cholinergic mechanism in tetanus toxin poisoning. Literature on the subject gives two concepts of this theory: one attributes to tetanus toxin the ability to sensitize cholinergic synapses to the action of acetylcholine; the second postulates that tetanus toxin stimulates cholinergic mechanisms by increasing the amount of acetylcholine produced, since the

nervous tissue and muscles have been found to contain increased levels of acetylcholine in the course of tetanus. On the other hand, the reduction of the acetylcholine content in the iris of the eye inoculated with tetanus toxin has been demonstrated. This finding contrasts with the opinion that an increase of the acetylcholine content plays a role in the pathogenesis of tetanus.

This article is concerned with the content and especially the synthesis of acetylcholine in various organs under the effect of tetanus toxin. The content of acetylcholine extracted with acidified saline solution from organs of rats and rabbits was determined. The results of synthesis of acetylcholine in vitro under aerobic and anaerobic conditions, with or without the addition of ATP, are compared.

It has been found that under aerobic conditions, acetylcholine is synthesized only by the nervous tissue and in small amounts, whereas under anaerobic conditions, it is synthesized by all the organs under examination. The advantage of the anaerobic method is not only that of ATP is added to the reacting system, but that all organs synthesize acetylcholine regardless of the presence of ATP. The addition of ATP merely enhances the synthesis in the spinal cord and brain by 32-42 percent.

In rats poisoned with tetanus toxin, the content and biosynthesis of acetylcholine were determined in the cerebral cortex, spinal cord, skeletal muscles, uterus, spleen, and heart. In rabbits poisoned with tetanus toxin, the examinations for the level and biosynthesis of acetylcholine involved the cerebral cortex, skeletal muscles, uterus, spleen, adrenals, ovaries, testes, and iris. The content and biosynthesis of acetylcholine were also studied in the iris of rabbits in which tetanus toxin had been injected into the anterior chamber of the eye.

The content and biosynthesis of acetylcholine were always measured simultaneously in two animals, one poisoned with tetanus toxin and the other serving as a control. It was confirmed that the content of acetylcholine in the central nervous system and skeletal muscles is higher in animals with tetanus. It has been found that the synthesis of acetylcholine in the central nervous system and skeletal muscles is markedly increased. It follows, therefore, that in tetanus there is not only an increased level of acetylcholine in the central nervous system and skeletal muscles, but also a markedly enhanced activity of cholineacetylase. The principle that tetanus toxin induces an increase in the acetylcholine level and in cholineacetylase activity is true in both rats and rabbits.

The studies of acetylcholine synthesis were performed in organs with cholinergic innervation: heart, adrenals, uterus, and spleen. The acetylcholine content of the heart, uterus, and spleen is not

affected by tetanus toxin. In tetanus toxin poisoning, all these organs show a different behavior from that of the central nervous system and skeletal muscles. None of these organs exhibited different activity of cholineacetylase in tetanus. The synthesis of acetylcholine is equally intense in organs of healthy animals. The same result was obtained in experiments carried out with the uterus and spleen of rabbits.

The ovaries and testes of rabbits did not show changes in the content or synthesis of acetylcholine under the effect of tetanus toxin. However, the findings were different in the adrenals, where tetanus toxin induced an increase in the acetylcholine content, similar to the activity in muscles and the central nervous system. The adrenals also show an increase in the activity of choline-acetylase which, though lying within the limits of error established according to the dispersion of results, is undoubtedly enhanced in its mean value and in separate tests against the control.

The acetylcholine level was determined in the iris muscle of rabbits with generalized tetanus as well as in rabbits with tetanus toxin injected into the anterior chamber of the right eye. In the first case, the control consisted of acetylcholine determination in a healthy rabbit; in the second, control measurements were taken in the noninoculated left eye of the same rabbit.

Rabbits with generalized tetanus which had received toxin intramuscularly exhibited no changes in the reaction of the pupils to light. The animals in which the toxin was administered into the anterior chamber of the right eye showed a dilation of the pupil in the inoculated eye and a lack of reaction to light 24 hours later. The rabbit in which the toxin was injected into the anterior chamber of the right eye also showed 2 normal acetylcholine level in the iris of the left (noninoculated) eye, whereas the iris of the right eye, injected with toxin, showed a slight reduction in acetylcholine level in all experiments.

The activity of cholineacetylase was studied in the iris of rabbits with generalized tetanus and in those injected intraocularly (anterior chamber) with tetanus toxin. The iris muscle, like all other organs examined, synthesizes acetylcholine under anaerobic conditions. In generalized tetanus, the activity of cholineacetylase in the iris shows no deviation from that of healthy animals. The iris of the eye of which the anterior chamber was injected with tetanus toxin and which thus remained in close contact with it showed a higher activity of cholineacetylase than normal.

The conclusion prompted by these results is that the iris, like other organs (e.g., the uterus) does not respond to changes in acetylcholine content and activity of cholineacetylase in general tetanus, whereas it does react when exposed to direct contact with toxin

administered into the anterior chamber. However, this reaction is different from that occurring in the muscles and central nervous system; while in the muscles and central nervous system the increase in the activity of cholineacetylase is paralleled by an enhanced content of acetylcholine, the iris shows a reduction in the acetylcholine level in addition to increased activity of cholineacetylase.

The studies were carried out at the Pathological Laboratory of the Institute of Immunology and Experimental Therapy of the Polish Academy of Sciences, in Wroclaw. A bibliography of 40 items is given.

### Physiology

#### 142. Blood Protein Content Affected by High Altitude

"The Effect of High Altitudes on the Protein Composition of Human Blood," by Ye. P. Smolichev, Chair of Pathological Physiology, Stalinabad Medical Institute imeni Avitsenna; Moscow, Bulleten' Eksperimental'noy Biologii i Meditsiny, Vol 50, No 10, Oct 60, pp 78-82

This article presents the results of studies conducted by a scientific expedition sponsored by the Stalingrad Medical Institute, which showed that a systematic rise in the protein composition of the blood of humans takes place during their stay in an area with a higher altitude than that to which they have been accustomed. The rise in the total protein content of human blood was characterized by a decrease in the concentration of albumin and an increase in the concentration of globulin fractions. Results of these studies also showed that the total concentration of protein increased during the first month at high altitude; toward the end of the 4-month period, the total concentration of protein dropped somewhat, but remained above the initial level. The relative and the absolute albumin content in the blood serum dropped immediately after the ascent and remained low for a month after descent. The figures for  $\alpha_1$ ,  $\beta$ , and  $\gamma$  globulins rose immediately after ascent. Toward the end of the 4-month stay at high altitude, the  $\alpha_1$  and  $\gamma$  globulins went back to normal. During the first month after descent, figures for  $\alpha_1$ ,  $\beta$ , and  $\gamma$  globulins were higher than the initial levels. The concentration of  $\alpha_2$  globulins did not change any during ascent and at high altitude. The content of  $\alpha_2$  globulins increased only after descent.

The scientific expedition of the Stalingrad Medical Institute included 12 healthy young people of both sexes. The protein composition of their blood was determined in Stalinabad (850 meters above sea level) and during their sojourn in a highly elevated region of East Pamir (4,200 meters above sea level) between May and October 1958.

143. Relationship Between Physical Exertion and Eye Diseases

"Changes in the Intraocular Pressure in Adolescents Caused by Measured Stress and a Prolonged Period of Physical Exercise," by M. Ye. Nachkepiya, Tbilisi State Institute for Advanced Training of Physicians; Tbilisi, Soobshcheniya Akademii Nauk Gruzinskoy SSR, Vol 24, No 4, Apr 60, pp 493-500

This report concerns studies carried out at the Tbilisi Institute for the Advanced Training of Physicians to determine the effect of a prolonged period of physical exercise on intraocular pressure and on the field of vision, and also to determine the effect of measured stress on intraocular pressure. Results of studies of the eyes of 116 adolescents showed that participation in sports which require physical exertion caused a decrease in the intraocular pressure in the majority of cases (65.5%). Physical exercise caused an increase in intraocular pressure in 6.1% of the total number of adolescents examined; in 28.3% of the cases the intraocular pressure remained the same.

In the majority of cases, it was observed, that intraocular pressure becomes stabilized immediately if a prolonged period of physical training is followed by a period of normal work-out. A correlation between the fluctuation of intraocular pressure obtained after normal stress and the results of functional tests of the cardiovascular system was noted. It can be assumed that this correlation may be used to determine both the limitations of physical training and the extent of overexertion and overtraining.

The information obtained as a result of these studies demonstrates the need for medical supervision of people who take part in sports. Data collected as a result of medical supervision of athletes can serve as a basis for the integrated treatment of some eye diseases that may be caused by physical stress.

144. Functional Disturbance of Nervous System Linked to Decreased Cholinesterase Activity

"Cholinesterase Activity and Blood Sugar Level in Dogs Following the Removal of Parathyroid Glands," by N. F. Baranova, Nauchn. Soobshch. In-t Fiziol. AN SSSR (Scientific Reports of the Institutes of Physiology, Academy



of Sciences USSR), No 1, 1959, pp 89-91; (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 15, 10 Aug 60, Abstract No 20961, by S. Krivobokova)

"Cholinesterase activity of the blood of dogs was determined at various periods (one year and 4 months, and 3 years) after parathyroid-ectomy. To prevent the onset of parathyroid tetany, the dogs received  $\text{CaCO}_3$  with their ration. It was established that at remote periods after the operation when conditions of intoxication set in, the changes in the activity of cholinesterase were significant and remission was protracted. The administration of glucose led to a decrease in the activity of this enzyme, the restoration of which occurred much slower than at an earlier period after the operations. The author concludes that there is a link between functional disturbances of the nervous system and the decrease in cholinesterase activity."

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145. Effect of Cadmium Ions on Conditioned Reflex Activity Studied

"The Mechanism of Action of Cadmium on Conditioned Reflex Activity in Animals," by A. A. Galoyan, Biochemistry Sector, Academy of Sciences Armenian SSR; Yerevan, Izvestiya Akademii Nauk Arnyanskoy SSR, Biologicheskkiye Nauki Vol 13, No 8, Aug 60, pp 61-69

Previous data had led the author to assume that cadmium ions have a pathogenic effect not only on the testes but also on other organs which participate importantly in animal conditioned reflex activity. The research reported in this article was performed to determine whether the testosterone type of preparation has a favorable effect on extinction of conditioned reflex activity by cadmium ions in male rats.

Positive and motor-digestive conditioned reflexes were set up in 12 rats in a modified Kotlyarevskiy chamber by the alternate use of sound and red light as stimuli. After the reflex system had been developed, the animals were subjected to extinction of these reflexes by  $\text{CdCl}_2$  administered daily for 6 days, together with an oil solution of testosterone propionate. The  $\text{CdCl}_2$  was given subcutaneously, and the testosterone solution, intramuscularly. Methyltestosterone was also used, in the form of 10-mg tablets implanted under the skin; the implants were absorbed into the animal organism within a few days.

After discussion and tabulation of the results of these experiments, the following conclusion is presented:

"Testosterone propionate in doses of 0.5-1 mg and 10-20 mg per 100 kg weight, and also methyltestosterone in the form of subcutaneous implants, did not diminish the extinguishing effect of cadmium ions on

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conditioned reflexes. The data obtained substantiate our assumption that affection of the hypothalamus-hypophysis system plays an important part in the extinguishing effect of cadmium ions on conditioned reflexes."

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146. Possible Participation of SH-Groups in Transfer of Stimulation From Environment to Skin Receptor Apparatus

"Concerning the Histochemistry of the SH-Groups of the Skin and Its Appendages," by I. N. Mironchik, Nauchn. Rabot. Belorussk. N.-I. Kozhno-Venerol. In-t. (Scientific Reports of the Belorussian Scientific Research Dermato-Venerological Institutes), No 6, 1959, pp 222-227; (from Moscow, Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 15, 10 Aug 60, Abstract No 21590, by I. El'man)

"A substantial difference was detected in the content of SH-groups in the medullary substance of vibrissae and bristle hairs of cats. In the medullary layer of the bristle hairs, the SH-groups are present close to the lower third of the hair roots, while in the medullary layer of the vibrissae, the SH-groups, as shown by nitroprusside and ferricyanide methods, extend over a significant distance along the hair shaft. In connection with this finding, and considering the high reactivity of the SH-groups and their high SH-group content in the epidermis of the hair covering the skin, the author proposes the possibility of SH-group participation in the transfer of stimulation from the external environment to the receptor apparatus of the skin."

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147. Neural Responses in Transplanted Tissue Investigated

"Do the Cells of the Human Organism Have the Ability to Remember?" by V. Petrovic; Belgrade, Borba, No 248, 17 Oct 60, p 5

Two Belgrade physicians, Dr Miroslav Poznic (a surgeon and Docent of the Faculty of Stomatology in Belgrade) and Dr Veselin Savic (chief of Section B of the Neuropsychiatric Clinic in Belgrade), reported to the recent Congress of Neuropsychiatrists in Sarajevo on their 3 years of study of cases of patients who, after recovering from tissue transplants, felt strange sensations in the affected areas. One of Dr Poznic's patients had undergone plastic surgery in which tissue was removed from his neck to form a new ear. After he recovered, when touched on the new ear, he felt the sensation not in the ear but at the point on his neck from which the tissue had come. Likewise, when he shaved that part of his neck, he felt the sensation in his ear.

Dr Savic, when consulted, cited the theory that the body is divided into segments, each of which is dominated by a certain network of nerve cells. According to this theory, the patient could feel reversed reflexes because the two affected areas were in the same segment. However, this explanation was refuted by the case of a woman who had had a tissue transplant from her leg to her head. When touched on the transplanted tissue on her head, she felt the sensation in the leg. Another patient felt similarly reversed sensations after plastic surgery in which tissue was removed from his scalp to his nose.

The two doctors deduced that cells have the ability to "remember." They suggested that the psychological integration remains untouched and unchanged for a long time after, and regardless of physical changes in the body. They predicted that, with greater understanding of the laws of psychic integration, it may be possible to cure or help neuropsychic illnesses, ulcers, etc. without surgery or medicine.

Public Health, Hygiene, and Sanitation

148. Three Cases of Industrial Cadmium Oxide Intoxication Described

"Acute Occupational Intoxications Caused by Cadmium Oxide and Their Prophylaxis," by R. S. Vorob'yeva, First Moscow Order of Lenin Medical Institute imeni I. M. Sechenov; Moscow, Gigiyena Truda i Professional'nyye Zabolevaniya, No 7, Jul 60, pp 44-45

The author has had the opportunity to treat cases of cadmium oxide intoxication and presents three of the typical case histories. On the basis of her observations she has concluded that the clinical picture of the light form of acute intoxication is specific for this metal and that it is characterized by a latent period (2-13 hr) and appears in the form of a disorder in the gastrointestinal tract and the lungs and changes in the blood picture. Cadmium fever, which has been described by a number of authors, was not observed.

149. Toxicological Tests for Furfurol

"The Problem Concerning the Content and Method of Determining Furfurol in the Blood and Urine," by G. N. Nazyrov and Kh. Ya. Vengerskaya, Uzbek Scientific Research Sanitary Institute; Moscow, Gigiyena Truda i Professional'nyye Zabolevaniya, No 7, Jul 60, pp 40-41.

Because of the widespread use of furfurol in the national economy, especially in the chemical, aviation, and oil refining industries, the authors developed methods for determining this chemical in the blood and urine of workers engaged in its manufacture.

In developing a method, extensive use was made of T. A. Anisimov's works which were conducted on animals. The principle involved in the determination of furfurol is based on the interaction of furfurol with aniline in the presence of acetic acid, which in turn forms a red solution. The solution is then compared colorematically with standard solutions and the concentration thus determined. Utilizing this method the authors ran tests on 316 urine and 173 blood samples taken from workers employed by factories engaged in the hydrolysis of furfurol. The investigation determined that the amount of furfurol in the worker's blood increases the longer he has been on the job. In workers with less than 5 years of service the furfurol content in the blood was equal to one mg% in 29.2-60% of the cases, and in those with more than 5 years of service, it was true in 72-80% of the cases. The amount of furfurol found in the urine ranged from traces to 8mg/liter, and was found in 40% of the cases investigated.

Radiology

150. Blood and Sera of Cured Burn Patients Effective in Treating Victims of Radiation Sickness Combined With Burns

"Concerning the Treatment of Burn-Radiation Sickness by Means of Sera From Cured Burn Patients in Conjunction With Early Nectomy," by M. A. Tsukerman, Ye. I. Veksler, P. S. Sizyakin, D. N. Runovskiy, and A. R. Sheyngerts (Rostov on Don); Moscow, Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, Vol 4, No 5, Sep/Oct 60, pp 3-7

Although scientific literature is rich in experimental and clinical observations indicating the high therapeutic efficacy of serum from cured burn patients in warding off intoxications when used to treat extensive burns, references to the use of this method for treating combined radiation injuries (burns in conjunction with radiation sickness) are scarce. To fill this gap, the authors conducted experiments on 99 rabbits by subjecting them to burns and X irradiation which produced radiation sickness of a moderate degree, and then treating these animals.

The following conclusions are presented:

Blood and serum taken from cured burn victims and used in treating patients with combined radiation sickness (third and fourth degree burns plus radiation sickness) exert a marked therapeutic action, decrease intoxication, prolong the life span of the burned animals, and shorten the period of wound healing. The therapeutic efficacy of immunotherapy is significantly augmented when combined with early necrectomy.

In animals treated by the transfusion of blood taken from cured burn patients, the dystrophic changes of parenchymatous organs are less marked, and hepatic necrosis, which is often encountered in cases in which immunotherapy was used, is rarely observed. In animals which received blood transfusions from cured burn patients, the process of the limitation of necrotic tissue after burns was accelerated and more distinct.

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151. New Model of Protective Shield With Attached Seat for Gynecological Treatment by Radium Designed

"Protective Shield Used in Gynecology for Radium Therapy," by Engr A. F. Rimman and Ye. P. Ivanitskaya, Roentgenotherapeutic Division and the Laboratory of Apparatuses and Tubes, State Scientific Research Roentgeno-Radiological Institute, Ministry of Health RSFSR; Moscow, Vestnik Rentgenologii i Radiologii, No 5, 1960, pp 66-67

A new and original protective shield attached to a seat has been designed by the State Scientific Research Roentgeno-Radiological Institute, of the Ministry of Health RSFSR, for the radium treatment of gynecological patients.

The apparatus consists of a T-shaped tubular base with swivel casters, the middle part of which holds the support for the seat and the shield. The shield is made of heavy lead lined with steel, and is attached at the top to a transparent visor and a 12-volt illumination source, and at the bottom, to an instrument tray. The height of the shield and of the seat is adjustable.

Although this equipment weighs approximately 200 kg, a person can move it on a smooth surface with comparative ease.

This equipment makes it possible to protect the physician from the harmful effects of radiation, shortens the time for the introduction and withdrawal of radioactive substances, and almost completely eliminates the need for assistants.

152. Shielded Machine for Washing and Drying Radioactive Preparations

"Shielded Machine for the Washing and Drying of Radioactive Preparations," by A. A. Stankevich, Radium Laboratory, Institute of Oncology, Academy of Medical Sciences USSR; Moscow, Voprosy Onkologii, Vol 6, No 10, Oct 60, pp 112-114

To reduce to a minimum the dose of radiation energy to personnel engaged in handling radioactive preparations, the author proposed and designed, at the Experimental Workshops of GIDUV (Gosudarstvennyy Institut Dlya Usovershenstvovaniy Vrachov, State Institute for the Advanced Training of Physicians), a special shielded machine for washing and drying radioactive preparations.

The shielded washing-drying machine consists of a lead jacket 10 cm thick, the upper part of which has a sliding lid of the same thickness for loading and unloading the preparations. Inside the jacket is a cylindrical drum made of a thin mesh of stainless steel. As the drum revolves, the radioactive preparations are washed in a jet of running water; they are then dried in the same place by means of hot air.

When  $\text{Co}^{60}$  preparations with a total radioactivity of 300 mg equivalents of radium are placed at a distance of 0.5 meter, the radiation hazard is equal to 3 mr per hour.

153. Reorganization of Health Care in Czechoslovak Nuclear Facilities

"Note: Instruction No 58, Ministry of Health"; Prague, Vestnik Ministerstva Zdravotnictvi, No 19-20, 1 Oct 60, p 205

The Czechoslovak Minister of Health issued instructions for the following measures to become effective on 1 July 1960:

Responsibility for health measures at establishments of the Central Administration for Research and Extraction of Radioactive Raw Materials (Ustredni sprava vyzkumu a tezby radioaktivnich surovin) is to be transferred from the jurisdiction of kraj and okres health officers to the direct jurisdiction of the Chief Health Officer for Czechoslovakia.

Within the Jachymov Mines Enterprise Institute of National Health there is to be established the Institute for Labor Hygiene and Prevention of Occupational Disease in the Extraction and Processing of Radioactive Raw Materials (Ustav pro hygienu prace a prevenci chorob z povolani pri tezbe a uprave radioaktivnich surovin), with headquarters temporarily located in Jachymov and later, permanently at Pribram.

A position of deputy chief health officer for Czechoslovakia is to be created for direction of health protection work in establishments of the Central Administration for Research and Extraction of Radioactive Raw Materials. At the same time this officer is to serve as chief physician of the Institute [for Labor Hygiene and Prevention of Occupational Disease in the Extraction and Processing of Radioactive Raw Materials].

The full text of the aforementioned instruction has been mailed to kraj health officers and to all organizations concerned; therefore it will not be repeated in the Vestnik Ministerstva Zdravotnictvi.

Surgery

154. Effect of Hypothermia on Vital Functions of the Organism

"Restoration of the Vital Functions of the Organism After a Two-Hour Period of Clinical Death Under Conditions of Deep Hypothermia," by V. A. Negovskiy, V. I. Soboleva, N. L. Gurvich, and K. S. Kiseleva, Laboratory of Experimental Physiology for the Revivification of the Organism, Academy of Medical Sciences USSR; Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, Vol 15, No 10, 1960, pp 40-44

In experiments, on six dogs it was found that with the help of deep hypothermia it was possible to prolong the clinical death of the animals for a period of 2 hours without impairing the vital functions of the organism. Prior to the experiment the dogs were administered subcutaneously a 2-percent solution of pantopon on a basis of 0.1 milligram per kilogram body weight, and a 0.1-percent solution of atropine on a basis of 0.1 milligram per kilogram body weight. Heparine in the form 0.8-percent solution was administered in a dose of 0.75-1 milligram per kilogram body weight to stabilize the blood. The animals were then placed in an ice bath. Artificial respiration and cardiac electrostimulation were resorted to as the need arose. When the rectal temperature reached 21.5-20 degrees, blood was taken from the femoral artery until clinical death set in. The clinical death continued for a period of 2 hours. The vital functions were restored by blood infusion, artificial respiration, and cardiac electrostimulation. The experiments also established that the 2-hour period of clinical death can be exceeded with further cooling. The utilization of the cooling method of the organism may be expedient in carrying out thoracic surgery in the future.

155. Modification of Burn Injury to Gastrointestinal Nerve Apparatus by Novocain Block

"In Vivo Morphological Study of the Nervous System of Internal Organs Following Extensive Burns," by S. I. Itkin; Kazan, Kazanskiy Meditsinskiy Zhurnal, No 5, Sep/Oct 60, p 114

"Following extensive burns, the flow of pain impulses leads to a disturbance of the function of the whole organism, including the function of the autonomic nervous system of the internal organs.

"By, the in vivo microscopy method, studies were conducted on the reactive and structural changes in the nervous apparatus of the gastrointestinal tract subjected to burns; studies were conducted also on the action of novocain block, which is successfully used in treating burns, on the nervous apparatus of the gastrointestinal tract.



"Subserous and Auerbach's plexuses of the small intestine and of the sigmoid were investigated according to the method of A. A. Vishnevskiy and B. I. Lavrent'yev.

"Burns of second and third degree were inflicted by pouring water at 90° for about 20 seconds over a portion of the intestinal wall of rabbits. The area of the burned surface was 20-24% of the body surface. Bilateral lumbar novocain block was produced by 0.25% novocain solution calculated at 10 ml per kg body weight and administered 5-10 minutes after the infliction of burns. Reactive changes in the nervous system (nonuniformity of staining) were evident immediately after burn infliction at the periphery of the burn center, and extended for quite a distance from it. As a result of the reactive changes in the nervous system, and depending on the time which elapsed after the infliction of the burn, destructive changes increase constantly in the nerve elements of the subserous and Auerbach's plexuses. Significant injuries to the intramural nerve plexuses of the gastrointestinal tract which are accompanied by the burn of the abdominal wall affect both the nerve cells and the nerve fibers, but the process of destruction of the various nerve elements at different periods after burns is dissimilar.

"However, the action of novocain block following thermal burns is manifested by a reduction in the degree of injury of the nervous apparatus of the gastrointestinal tract."

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Veterinary Medicine

156. Foot-and-Mouth Disease Control

"Vaccination and Veterinary-Sanitary Measures in the Control of Foot-and-Mouth Disease," by N. B. Yezovitov and I. I. Brudkov, Sb. Nauchn. Tr. Kuybyshevsk. N.-I. Vet. St. (Collection of Scientific Works of the Kuybyshev Scientific Research Veterinary Station), No 3, 1959, pp 16-31 (from Referativnyy Zhurnal -- Biologiya, No 19, 10 Oct 60, Abstract No 91640, by Ye. Andreyev)

"VIEV [Vsesoyuznyy Institut Eksperimental'noy Veterinarii; All Union Institute of Veterinary Medicine] vaccine was successfully used for the control of foot-and-mouth disease in 1953-1956 in unsanitary areas and areas threatened with the disease. In all, 376,183 animals were vaccinated, including 267,199 cattle, 73,183 sheep, and 35,256 swine. The vaccine was introduced subcutaneously. Of 112,027 vaccinated animals concentrated in 392 threatened areas (96,226 cattle, 8,394 sheep, and 7,704 swine), 4,034 cattle, 382 sheep, and 303 swine in 111 areas contracted foot-and-mouth disease during the 4-5 months following vaccination; 91 unsanitary areas were reported within 14 days after vaccination, and the rest later. Group disease was noted 30-45 days

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after vaccination on individual farms. The authors explain these postvaccinal outbreaks of the disease by the fact that the cattle were vaccinated during the incubation period of the disease. The authors connect the low dispersibility of the foot-and-mouth virus in points which became unsanitary after vaccination with the high immunogenicity of the VIEV vaccine. Epizootiological observations showed that the VIEV vaccine confers immunity in cattle for 8-11 months. The vaccine is effective after both subcutaneous and intracutaneous administration (17,663 cattle were inoculated intracutaneously in threatened areas, and 11,599, in unsanitary areas)."

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157. Preservation of Foot-and-Mouth Disease Virus in Soil and Water

"The Preservability of Foot-and-Mouth Disease Virus in Water, Soil, and on the Plant Covering of the Cis-Tundra Zone of the Komi ASSR," by V. I. Shil'nikov, Tr. Vses. In-ta Eksperim. Veterinarii (Works of the All-Union Institute of Veterinary Medicine), No 22, 1959, pp 112-119 (from Referativnyy Zhurnal -- Biologiya, No 19, 10 Oct 60, Abstract No 91645)

"The duration of preservation of foot-and-mouth disease virus in the cis-tundra zone of the Komi ASSR in water, soil, and on the plant covering in July was 2-15 days. The resistance of the virus on the plant covering, in the soil, and in water at the end of August and the beginning of September at a temperature of 3,2° C did not exceed 22-30 days. Plants, soil, and water containing the virus in the second half of September produced disease in guinea pigs infected with them for more than 30 days (further observations are not given)."

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158. Eradication of Fowl Plague in Belorussia

"Asiatic Fowl Plague and Measures for Eradicating It in the Belorussian SSR," by M. Ye. Antonova and A. I. Gavrichenkov, Byul. Nauchno-Tekhn. Inform. N.-I. Vet. In-t Akad. S.-Kh. Nauk. BSSR (Bulletin of Scientific-Technical Information, Veterinary Institute, Academy of Agricultural Sciences Belorussian SSR), No 2, 1958, pp 26-27 (from Referativnyy Zhurnal -- Biologiya, No 19, 10 Oct 60, Abstract No 91685)

"Dry vaccine from strain B<sub>1</sub> was used to control Asiatic fowl plague on threatened and unsanitary farms. Chicks were vaccinated with it on unsanitary farms, and all birds, on threatened farms. The vaccine was introduced intranasally in a dose of one or two drops. Vaccine from strain H was introduced intramuscularly to grown chickens on unsanitary farms. No reaction was noted after the introduction of vaccine from strain B<sub>1</sub>; complications in the form of food rejection, cessation of egg laying, paresis of the extremities were noted after the introduction of vaccine from strain H in 5-10% of the birds. Disease was curtailed 6-8 days after the use of vaccines on unsanitary farms, and plague did not appear on threatened farms after vaccination."

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159. New Fowl Plague Vaccination Methods

"New Methods of Vaccination Against Fowl Plague," by M. T. Prokof'yeva, I. N. Doroshko, and I. A. Bukharin, Nauchn. Tr. Ukr. N.-I. In-t Eksperim. Vet. (Scientific Works of the Ukrainian Scientific Research Institute of Experimental Veterinary Medicine), No 25, 1959, pp 161-173 (from Referativnyy Zhurnal -- Biologiya, No 19, 10 Oct 60, Abstract No 91683)

"Enteral, aerogenic, and intranasal methods of vaccination with live virus vaccine from strain 'H' were tested for fowl plague control. The vaccine conferred immunity in chicks over 2 months old after all three methods of vaccination were used. The enteral method of vaccination with drinking water is the most promising. The aerogenic method requires a special apparatus for dispersing the preparation and tight sealing of the chamber. Dispersal of a dry, powder-form vaccine is more convenient than dispersal of an aqueous solution of a preparation. The latter remains in the air for 5 minutes, whereas the powder-form preparation is completely deposited only after 15-20 minutes. There was no systemic reaction after all three methods were used in normally developed, inoculated chicks older than 2 months, or it was observed in only a few birds (about one % of those inoculated).

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160. Electronoscopy of Hog Cholera Virus

"Electron Microscope Study of the Hog Cholera Virus in the Blood and the Significance of This Method for Diagnosis of the Disease," by I. I. Kulesko and I. Ya Ageyev, Nauchn. Tr. Ukr. N.-I. In-t Eksperim. Vet. (Scientific Works of the Ukrainian Scientific Research Institute of Experimental Veterinary Medicine), No 25, 1959, pp 111-125 (from Referativnyy Zhurnal -- Biologiya, No 19, 19 Oct 60, Abstract No 91657, by L. Kirichenko)

"The results of electron microscope investigations of the blood of 44 healthy swine and 75 swine suffering from hog cholera are presented. On examination of hemolyzed erythrocytes taken from healthy swine, the surface of the stroma appeared smooth or slightly rough. Flat ring formations or multisided forms with a diameter of 150-700 microns, which had low electrono-optic density, were noted on some erythrocytes. Spherical bodies 20-44 microns in size were observed on the surface of the erythrocyte stroma in blood from swine with cholera. The same spherical bodies as seen on the erythrocyte stroma in diseased swine were observed in precipitates of blood serum filtrate from swine infected with hog cholera virus. The size of the bodies in serum filtered through a Seitz filter varied between 20 and 33 microns."

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161. Hog Cholera Therapy

"The Use of Hyperimmune Anti-Hog Cholera Serum in Combination With Oxytetracycline for Therapy of Hog Cholera (Report II)," P. D. Yevdokimov, G. F. Pogonyaylo, and A. B. Teryukhanov, Byul. Nauchno-Tekhn. Inform. Leningr. N.-I. Vet. In-ta (Bulletin of Scientific-Technical Information, Leningrad Scientific Research Veterinary Institute), No 6, 1958, pp 13-15 (from Referativnyy Zhurnal -- Biologiya, No 19, 10 Oct 60, Abstract No 91660)

"The intramuscular introduction of terramycin and its combination with anti-hog cholera serum were tested for therapy of spontaneous and experimental hog cholera. Therapy with terramycin and anti-hog cholera serum during the first 2 days of the naturally occurring disease afforded 100% recovery; the use of this combination on the third to the fifth day was not very effective. In therapy of swine artificially infected, terramycin alone produced 69% recovery."

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162. Foot-and-Mouth Disease in Rumania

"Observations on a Strain of Virus Isolated During an Epidemic of Foot-and-Mouth Disease in Rumania," by V. Tomescu, M. Popa, and V. Dohotaru; Bucharest, Studii si Cercetari de Inframicrobiologie, Vol 9, No 3, 1960, pp 381-389

The authors studied an O<sub>2</sub> strain of foot-and-mouth disease virus, isolated during an epidemic in Rumania, for the purpose of preparing a vaccine.

The adaptation of the virus strain to the lingual epithelium of cows to produce virus-containing material for the preparation of the vaccine (25 grams per cow with an established 24-hour incubation period) was successful only after three passages, when the virus isolated from the ground was passed directly through the cows and was maintained in the fourth passage, or if it was first passed through and then kept in newborn mice.

The intensity of the reactions (determined by the amount of virulent lingual epithelium obtained) is much greater in young animals, females, and improved breeds, especially the Simmental.

The virulence of the strain for cows, titrated by the W. Henderson method, is given at 10<sup>-6.7</sup> at the sixth passage and then increases to 10<sup>-7</sup>.

The immunizing properties of the strain have been tested through an experimental preparation of a vaccine with a high immunogenic value.

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"The Use of Hyperimmune Anti-Hog Cholera Serum in Combination With Oxytetracycline for Therapy of Hog Cholera (Report II)," P. D. Yevdokimov, G. F. Pogonyaylo, and A. B. Teryukhanov, Byul. Nauchno-Tekhn. Inform. Leningr. N.-I. Vet. In-ta (Bulletin of Scientific-Technical Information, Leningrad Scientific Research Veterinary Institute), No 6, 1958, pp 13-15 (from Referativnyy Zhurnal -- Biologiya, No 19, 10 Oct 60, Abstract No 91660)

"The intramuscular introduction of terramycin and its combination with anti-hog cholera serum were tested for therapy of spontaneous and experimental hog cholera. Therapy with terramycin and anti-hog cholera serum during the first 2 days of the naturally occurring disease afforded 100% recovery; the use of this combination on the third to the fifth day was not very effective. In therapy of swine artificially infected, terramycin alone produced 69% recovery."

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Miscellaneous

163. Need for Improvement of Czechoslovak Pharmacy Service Cited

"Systematization of Pharmacy Service," by J. Turecek; Bratislava, Farmacia, Vol 29, No 8, Aug 60, pp 244-246

According to the author, the number of pharmacists in Czechoslovakia increased from 3,400 in 1948 to 4,600 in 1958, while in the same period the number of physicians increased from 11,000 to 22,000. The pharmacy profession is clearly feeling the consequences of the great difference in manpower between the two professions; furthermore, the situation is aggravated by the uneven distribution of pharmacy personnel between the cities (Prague, Brno, Ostrava, and Bratislava) and the rural areas, particularly the border areas and the East Slovakia Kraj.

Numerous suggestions have been offered for streamlining the nation's pharmacy service, Turecek states. The establishment of standards regarding the number of persons and the size of the area to be served by one pharmacist has greatly improved the quality of the service, but much remains to be done to achieve proper distribution of pharmacy personnel and to provide really systematic operation of the pharmacy service; the author makes some suggestions for achieving this end.

164. New Medical Positions Created in Poland

"Orders From Ministry of Health and Social Welfare, No 325 and 326"; Warsaw, Monitor Polski, No 69, 1960, pp 633-634

Orders 325 and 326 of the Polish Ministry of Health and Social Welfare created some new positions for doctors, dentists, and other highly qualified personnel employed by health service installations.

Order 325 of 31 May 1960 authorized the following posts and salaries, effective 1 April 1960: chief doctor of the Central Cooperative of Rescue Aircraft, 300 zloty per month; section leader of a wojewodztwo school health clinic, 250 zloty per month; and inspector of a wojewodztwo school health clinic, 200 zloty per month.

Order 326 of 7 July 1960 authorized the following posts and salaries, effective 1 April 1960: senior instructor for nurses in a wojewodztwo school health clinic, 200 zloty per month; and instructor of a wojewodztwo school health clinic, 150 zloty per month.

165. Compensation for Members of Commission on Alcoholism in Poland

"Decree of Ministry of Finances, No 217"; Warsaw, Dziennik Ustaw, No 37, 6 Aug 60, p 366

On the basis of Article 19, Paragraph 3, of the Polish law of 10 December 1959 concerned with combating alcoholism. (Dziennik Ustaw, No 69, p 434), the following provisions are made.

Members of the social-medical commission for curing alcoholics serving in organs for health matters in presidiums of powiat people's councils or in installations for confinement of patients will receive compensation for participating in the meetings of the commission. The compensation amounts to 38 zloty for the chairman of the commission and 25 zloty for a member or recorder (secretary) of the commission. Compensation can be raised in deserving cases, but not to more than 38 zloty. The compensation for the recorder (secretary) of the commission can in some cases be set at a level not exceeding 400 zloty a month. Compensation, as defined above, is paid only for participation in a commission meeting held outside regular office hours.

A member of a social-medical commission who attends a meeting during work hours and thus loses regular pay is entitled to reimbursement for the lost pay. The amount of lost pay is determined by the amount of time devoted to work of the commission, including travel time, and the average daily or hourly wage, as applied in calculation of vacation pay.

A member of the commission who takes advantage of the right of reimbursement of lost pay is not then eligible for the compensation of 25-38 zloty as provided above.

Nonresident members of the social-medical commission receive, independently of the compensation and reimbursement of lost pay, a reimbursement for travel costs and food as well as lodging according to standards set for state workers on official trips.

The department of health of the presidium of the powiat (town, district) people's council grants and pays for these claims of the members of the social-medical commissions.

This decree goes into effect as of the day of publication.

166. Three-Phase Construction Project for Medical Academy in Warsaw

"Phase-Type Construction Decided on for Medical Academy in Warsaw," and "Greatest Investment of Health Department in 15 Years," by M. Czesninowa; Warsaw, Sluzba Zdrowia, Vol 12, No 39 and 40, 25 Sep and 2 Oct 60, pp 4 and 1-2

The committee to make decisions concerning construction under the new investment program at the Medical Academy in Warsaw consists of the Deputy Minister of Health, Dr J. Rutkiewicz; Chairman of Section VI of Medical Sciences of PAN (Polish Academy of Sciences), Prof J. Zawadowski; Docent Dr F. Widy-Wirski; B. Gostman; St. Grajdka; H. Chrostkiewicz, PAN member; Prorector of Medical Academy, Prof Dr P. Kubikowski; Magister A. Puszek; and Dr T. Radwanski; and the architects, Engr A. Ciborowski (chief architect of Warsaw city), W. Piotrowski, Z. Skibniewski, and R. Szymborski.

The new buildings will be constructed near Zwirki and Wigury avenues. Only part of the academy buildings will be concentrated in this area, however; the clinical laboratories of the Department of Medicine will still be located in the area of ulice Oczki, Karowej, and Litewskiej. The facilities are now scattered in 22 points in Warsaw and nearby suburbs.

The following information was compiled from an interview with Professor Secomski, the general director of the Ministry of Health and Social Welfare.

The construction will be done on Pol Mokotowski, Warsaw, on about 25 hectares of land. Total internal space available will be about 350,000 cubic meters, to be shared by the Medical Academy and by the Institute of Experimental Medicine of the Polish Academy of Sciences.

Actual construction is to begin in 1963. The first phase is to be completed in 1966. This will include the theoretical laboratories for the Pharmacy Department of the Medical Academy. During the same time, the PAN intends to complete the first phase of construction for the Institute of Experimental Medicine.

The second phase of construction, including the clinical building, some administrative offices, schools for intermediate medical personnel and interns, and the nurses home, is to be completed in the next 5-year plan.

The third phase is to include the remaining investment facilities [not further specified].



VII. METALLURGY

Patents

167. Recent Soviet Patents in the Field of Metallurgy

Byulleten' Izobreteniy; Moscow, No 15, Aug 60

Class 18c, 6<sub>10</sub>. No 13058; B. I. Lazarev and F. I. Pashukanis; Method for Increasing the Strength of Welded Joints of Forged Austenitic Steels.

Class 31c, 18<sub>02</sub>. No 130638; B. G. Sokolov, S. G. Glazunov, G. F. Zaboronok, Ye. I. Morozov, A. I. Ivanov, and A. M. Khromov; Method for Casting Tubing and Hollow Blanks Made of Refractory Alloys.

Class 40a, 9<sub>01</sub>. No 130675; V. S. Sassa, K. D. Nekrasov, A. A. Gaylit, N. I. Grafas, A. S. Tsyganov, and B. Yu. Shagalova; Furnace for Melting Light Nonferrous Metals and Alloys.

Class 40b, 2. No 130680; I. P. Karamyshev and N. A. Nedumov, Method for Sintering Powdered Materials.

Class 40b, 21. No 13081; V. F. Funke, L. P. Usol'tseva, and P. P. Kalitin; A Mineral-Ceramic Alloy Made of Alumina.

Class 48a, 6<sub>05</sub>. No 130760; M. A. Krokhnina, An Acid Solution for Chemical Nickel-Plating of Aluminum and Its Alloys.

Byulleten' Izobreteniy; Moscow, No 16, Aug 60

Class 12a, 10. No 130879; V. N. Parusnikov; Method for Separating Molybdenum From Solutions Containing Nitric and Sulfuric Acids.

Byulleten' Izobreteniy; Moscow, No 17, Sep 60

Class 7a, 8. No 131320; A. I. Dorokhov and P. I. Orro; Method for Making Heat-Resistant Thin-Walled Tubing From Difficultly Formed (at Room Temperatures) Metals and Alloys.

Class 40a, 46<sub>50</sub>. No 131506; V. K. Ustinov, G. S. Pavlenko, V. N. Kozhevnikov, A. I. Dedkov, and N. S. Koshkin; A Magnesium-Reduction Method for Producing Titanium.

Physical Metallurgy

168. Electrical Conductivity of Two-Component Powder Metallurgy Alloys

"Calculation of the Electrical Conductivity of Two-Component Powder Metallurgy Alloys," by A. I. Raychenko and I. M. Fedorchenko, Institute of Powder Metallurgy, Cermets, and Special Alloys, Academy of Sciences Ukrainian SSR; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 9, No 6, Jun 60, pp 815-822

By solving the diffusion equation for the model of a two-component and concentration distributions as indicated by A. I. Raychenko in Ukrainskiy Fizicheskiy Zhurnal, 3, 1958, p 408, it is possible to estimate the electrical conductivity of a powder metallurgy alloy consisting of two metals completely soluble in each other. The results of calculations that have been carried out were found to be in agreement with experimental data pertaining to Cu-Ni alloys of different compositions. The concepts that have been formulated make it possible to investigate the effects of surface and volume phenomena in sintering, to evaluate the correctness of the concentration distributions that are assumed, and to study the influence which the origin of the powders has on increasing the coefficients of diffusion.

169. Application of Carbonyl Process in Analysis of High-Purity Nickel

"Analysis of High-Purity Nickel With Application of the Carbonyl Process for Concentration of Trace Impurities," by D. M. Shvarts, State Institute for the Design and Planning of the Nickel Industry; Moscow, Zavodskaya Laboratoriya, No 8, 1960, pp 966-971

Descriptions are given of the apparatus and operation of the carbonyl process for concentrating trace impurities in a high-purity nickel sample (containing 14 impurities in the range of  $1 \times 10^{-4}$  -  $3 \times 10^{-4}\%$ ) under high pressure. Results from spectral analysis of the concentrate showed that this method is a satisfactory solution to the problem of control of particularly pure grades of nickel and may also be used in the analysis of other pure metals of the iron group which form volatile carbonyl compounds.

170. Electrochemical Separation of Titanium From Ti-Al Alloy Scrap

"Investigations on the Electrochemical Separation of Titanium Alloys," by V. I. Lukashin, V. A. Reznichenko, and A. D. Khromov; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Metallurgiya i Toplivo, No 4, Jul/Aug 1960, pp 29-32

Investigations on the electrochemical refining of Ti-Al scrap established the possibility of obtaining pure titanium from an anode product containing up to 40% Al. A cathode product of sufficiently high quality was also obtained from an anode product consisting of semifinished titanium containing up to 30% Al and beta-phase stabilizers. It is recommended that silicon not be used as the reducing agent in the metallothermic reduction of titanium slags since a large quantity of iron is deposited along with the titanium in the refining process.

171. Corrosion Resistance Tests of Titanium Alloys

"Corrosion Resistance of Titanium Alloys," by V. V. Zholobov and A. S. Kudukis; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Metallurgiya i Toplivo, No 4, Jul/Aug 60, pp 77-80

Results are presented of corrosion tests performed on various titanium alloys to determine their applicability in chemical machine building. Alloys VT-5, VT-3, and VT3-1 exhibited low resistance in sulfuric and hydrochloric acids, decreased resistance in phosphoric acid and high resistance in acetic acid. Alloys TiMo30 and TiSi1 exhibited higher resistance to boiling sulfuric acid than commercially pure titanium.

172. Effect of Rapid Cooling on Structure and Properties of Aluminum Alloys

"Effect of a High Rate of Cooling on the Structure and Properties of Aluminum Alloys," by N. I. Varich and K. Ye. Kolesnichenko, Chair of Metal Physics, Dnepropetrovsk State University; Ordzhonikidze, Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya, No 4, 1960, pp 131-136

Results from investigations on the effect of rapid cooling on binary alloys of aluminum with chromium (up to 6% Cr by weight) and aluminum with manganese (up to 11% Mn by weight) showed that it is possible to obtain a number of solid solutions on an aluminum base in a much wider interval of concentrations of certain elements than had been predicted from equilibrium diagrams. At a cooling rate of 50,000 deg/sec, the quantity of chromium in solid solution reaches 5.7% by weight and that of manganese, over 10% by weight. Alloys obtained by this method exhibit higher tensile strength

without any substantial loss of ductility; an aluminum alloy with 5.7% Cr has a tensile strength of 60 kg/mm<sup>2</sup>. Alloys of aluminum with up to 5% Mn form a homogeneous solid solution but a small quantity of the metastable Al<sub>14</sub>Mn is observed with increase of the manganese content to 10%. Alloys containing up to 1.8% Cr form a homogeneous solid solution. With increase of the chromium content, the metastable Al<sub>14</sub>Cr phase appears and the solid solution continues to be supersaturated up to 5.7% Cr. Supersaturated chromium solid solutions retain their structure up to 450-500°C.

173. Effects of Secondary Quenching on Properties of Alloy EI617

"Investigation of the Effect of Secondary Quenching on the Structure and Properties of Alloy EI617," by I. S. Belyat-skaya and B. G. Livshits, Moscow Institute of Steel; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy, Chernaya Metallurgiya, No 7, 1960, pp 156-162

Investigations conducted on the effect of heat treatment on alloy EI617 revealed that a carbide phase of the type Ni<sub>n</sub>Me<sub>m</sub>C separates along grain boundaries during secondary quenching. Results from long-time tests show that the maximum temperature for secondary quenching is 1,000°C. It is considered that the improvement in the properties of the alloy after this treatment is due in part to facilitation of formation of the K-state with transition of carbon from solution into the carbide phase.

174. Properties of Nickel-Base Alloys for Use in Stationary Gas Turbines

"Nickel-Base Alloys for Stationary Gas Turbines," by Ye. Ye. Levin, Ye. M. Pivnik, V. S. Kultygin, and B. E. Lyubinskiy; Moscow, Energomashinostroyeniye, No 8, Aug 60, pp 30-35

The results are given of tests of high-strength materials for components of stationary gas turbines. Data are given on heat resistance, stability, and certain other characteristics of alloys. The alloys include EI437, EI437B (with added boron), EI607, and EI607A. The turbines parts considered operate for 10,000-100,000 hours at 700-750 degrees centigrade.

1.75. New Scientific Research Works of Moscow Power Engineering Institute  
in Field of Metallurgy

"New Scientific Research Works of the Moscow Power Engineering  
Institute" (Abstracts); Moscow, Теплоэнергетика, No 10, Oct 60,  
pp 95-96

Following are four metallurgical abstracts which appeared among the  
35 abstracts presented of new scientific research works which have been  
completed by the Moscow Power Engineering Institute:

1. "Investigation of the Corrosion Resistance of Welded Joints of  
Austenitic Steels (at Low Pressures)," by P. A. Akol'zin and L. V. Korneyeva.  
Results are presented of tests of welded joints of austenitic steels (at low  
pressures) and of weldments made of steel 1Kh18N9T under the joint effect of  
high mechanical stresses and an aqueous medium containing increased concen-  
trations of chloride ions and at a working pressure of 2.5 gauge atmospheres.

2. "Corrosion Resistance of Zirconium Alloys in Water at Elevated  
Temperatures," by M. A. Tolstaya, G. N. Gradusov, and S. V. Bogatyreva.  
Tubular specimens were tested at temperatures of 263°C (50 gauge atmospheres)  
and 310°C (100 gauge atmospheres) in pure water and in water containing  
chloride ions (10 mg/liter) over a period of 2,300 hr. It was established  
that the surface quality of specimens and contact with teflon have a con-  
siderable effect on the rate of corrosion, whereas other investigated factors  
had no effect.

3. "Investigation of the Effect of Electric Polishing on the Stability  
of Steel 1Kh18N10T in Water at High Temperatures," by M. A. Tolstaya, G. N.  
Gradusov, and S. V. Bogatyreva. Tubular specimens of austenitic steel with  
electropolished surfaces were tested under normal conditions and in autoclaves  
at a pressure of 100 gauge atmospheres and temperature of 310°C over a period  
of 1,500 hr in a medium of superheated steam. It was shown that surface  
corrosion rates drop considerably with the application of electric polishing.

4. "Investigation of Stress Corrosion of Specimens Made of Steel 1Kh18N9T  
at High Pressures," by T. Kh. Margulova, P. A. Akol'zin, L. V. Korneyeva,  
A. A. Lipanina, and V. Ye. Khlupnov. Results are presented of investigations  
of austenitic steel 1Kh18N9T in aqueous media containing chloride ions  
(100-1,600 mg/liter) at a pressure of 200 atmospheres and temperature of 364°C.  
Work-hardened and non-work-hardened specimens were tested in deoxidized solu-  
tions after austenitization for a period of 400 hr.

CPYRGHT

Production Metallurgy

176. Shaped Cast Components of High-Temperature Steel

"High-Temperature Steel Castings in the Design of Power Assemblies," by V. P. Desnitskiy; Moscow, Energomashinostroyeniye, No 6, Jun 60, pp 29-32

Design and technological aspects are considered for shaped castings of high-temperature steel for modern heavy-duty steam and stationary gas turbines. The superiority of the method of welding cast and/or forged parts into unique turbine components is demonstrated. The steels used in the process include LA-1, LA-3, Kh25N13T-L, EI-405, and EI-680.

177. Nitrided Steels 15Kh11MF and 15Kh12VMF

"Inspection of Nitrided Steels 15Kh11MF and 15Kh12VMF After a Long Period of Holding at 570 Degrees," by A. V. Kostenko, T. M. Pogrebetskaya, and A. A. Yurgenson; Moscow, Energomashinostroyeniye, No 6, Jun 60, pp 33-36

Data are given on the changes of the nitrided layer of 15Kh11MF and 15Kh12VMF steels as a result of holding for 6,000 hours at 570 degrees. Steel 15Kh12VMF exhibited a somewhat greater stability of the nitrided layer than did 15 Kh11MF.

The article reports on a continuation of earlier investigations (Gitel'zon, Pogrebetskaya, and Yurgenson, "Nitrided Steels EI723 and 15Kh11MF for Operation at Elevated Temperatures," Energomashinostroyeniye, No 7, 1958)

The best procedures for obtaining a satisfactory nitrided layer (0.2-0.4-millimeter depth, surface hardness not under 89<sub>HRN</sub>) were found to be; heating up to 530 degrees and holding 12 hours, ammonia gas dissociation up to 35 percent; and heating up to 580 degrees and holding 18 hours, ammonia gas dissociation up to 65 percent.

VIII. PHYSICS

Astrophysics

178. Gorbatskiy's Second Article on Brightness of Novae From Envelope Collisions

"On the Brightness of Novae. II," by V. G. Gorbatskiy; Leningrad, Vestnik Leningradskogo Universiteta No 13, Seriya Matematiki, Mekhaniki i Astronomii, No 3, 1960, pp 131-140

It is assumed that kinetic energy ejected from novae is partially converted into thermal energy after colliding with the envelope. The amount of emission produced as a result of this process has already been computed (Gorbatskiy, Vestnik LGU, No 1, 1960), and makes up a considerable part of the over-all emission of the star at light-maximum and immediately thereafter.

This work considers the process of transformation of kinetic energy into thermal energy and the spectroscopic phenomena associated with it. The thickness of the layer in which the energy transformation takes place is estimated, the temperature of the layer is established, and a study is made of the spectral peculiarities of novae resulting from the emission of this layer.

Cryogenics

179. Helium Liquifier of Ukrainian Institute

"Helium Liquifier of the Cryogenic Laboratory of the Physico-technical Institute of the Academy of Sciences Ukrainian SSR," by A. I. Sudovtsov; Kiev, Ukrains'kiy Fizichnyi Zhurnal, Vol 5, No 4, Jul/Aug 60, pp 560-567

The described helium liquifier, with an output of about 9 liters per hour and an output ratio of about 0.19, utilizes the Joule-Thompson effect, with liquid hydrogen, boiling under low pressure, used for the preliminary cooling of the compressed helium. The design is similar to that of the Leyden liquifier.

The liquifier has two main parts, the Dewar metal casing and a block of heat exchangers; a new design is being used in the heat exchanger for the helium flow above the hydrogen bath.

After 5 years of operation, the results are good; one hour is required for the initiation of liquification, and about 20 liters of liquid nitrogen and 12 liters of liquid hydrogen are used in the preliminary cooling. After that, about 1.3 liters of liquid hydrogen is used to liquify one liter of helium.

Mechanics

180. Arrangement of Reinforcing Ribs in Cylindrical Shell

"Study of the Stability of a Ribbed Cylindrical Shell Under Longitudinal Compression," by I. Ya. Amiro, Institute of Mechanics, Academy of Sciences Ukrainian SSR; Kiev, Prikladna Mekhanika, Vol 6, No 3, 1960, pp 272-280

If the discrete arrangement of the reinforcing ribs is taken into account in the consideration of the critical longitudinal stresses of the shell, it is possible to account for buckling from either bending or twisting of the ribs in addition to the general case of deformation as simultaneous bending and twisting of the ribs. The solution here is obtained by an energy method based on the theory of small perturbations.

Although critical stresses for general buckling are close to the upper values of critical stresses obtained with the formula for orthotropically designed shells, lesser stresses (tabulated in the article) may correspond to special cases of loss of stability of the shell. Hence, considering a ribbed cylindrical shell to be orthotropic is not sufficient for a thorough investigation of its stability. The formulas given allow for discrete arrangement of ribs, and thus permit fuller study of the stability by elucidating those forms of buckling connected with subcritical stresses.

181. Thermoelasticity of Extremely Shallow Shell of Rotation

"Shallow Shells of Rotation With Variable Thickness in a Three-Dimensional Temperature Field," by A. D. Kovalenko, Institute of Mechanics, Academy of Sciences Ukrainian SSR; Kiev, Prikladna Mekhanika, Vol 6, No 3, 1960, pp 241-249

The article considers the thermoelastic problem of an extremely shallow shell of rotation (distorted round plate) of variable thickness and axisymmetrically heterogeneous material in a three-dimensional temperature field. The problem is described by a system of two partial differential equations of the fourth order, wherein, instead of the mean surface of



the shell, the so-called initial surface is considered, the location of which is determined on the basis of a calculation of the change of the modulus of elasticity with thickness of the shell. Generalized tensile strengths and bending strengths, as well as purely thermal forces and moments, are introduced.

By an expansion of the purely thermal deformation along the circumference into a Fourier series and by solution with the method of successive approximations, the problem is reduced, for a wide range of meridionally variable shell strengths, to an integration of ordinary differential equations with polynomial coefficients. In individual cases, the corresponding homogeneous equations are transformed into hypergeometric equations of the fourth order.

182. Two Creep Ranges for Prismatic Rods

"The Bending of Prismatic Rods Under Conditions of Nonsteady Creep," by Wu Jui-feng, Institute of Mathematics and Mechanics, Academy of Sciences Armenian SSR; Yerevan, Doklady Akademii Nauk Armyanskoy SSR, Vol. 30, No 3, 1960, pp 139-148

According to experiments of K. S. Karapetyan (Izv. AN Arm SSR, Seriya Fiz.-Mat. Nauk, Vol 12, No 4, 1959), the nonlinear connection between the stresses and creep deformations can be expressed by two straight lines, called here the first and second creep ranges, rather than by a single curve. In the majority of cases, according to the same experiments, beyond these two ranges  $\sigma_{R_0} \leq 0.6 R$  (where  $R_0$  is the rupture point of an equivalent round concrete specimen).

This article considers the direct and converse problems of bending of a prismatic rod. The direct problem is reduced to the solution of a nonlinear integral equation of the Volterra type by means of linear equations, while the converse problem is reduced to the solution of two algebraic equations.

183. Combined Disk and Blade Vibrations

"Accounting for the In-Plane Vibrations of the Disk in the Tangential Vibrations of Turbine Blades," by A. P. Filippov, Hydraulic Machines Laboratory, Academy of Sciences Ukrainian SSR; Kiev, Priladna Mekhanika, Vol 6, No 3, 1960, pp 251-261

A solution is given of the problem of combined in-phase blade vibrations and torsional disk vibrations; peripheral influence is accounted for by the inclusion of the mass at the end of the blade and of the peripheral moment in the derived transcendental frequency equation. A similar solution is also given for the case when a longitudinal tensile force is applied to the blades. Calculations are made for hyperbolic disks of constant thickness.

The results show a considerable decrease of vibration frequencies when the blades are shortened and stiffened. The manner of seating in the key slots is of considerable importance, and the influence of the rim and of the ratio of blade length to disc radius is apparent. The influence of a longitudinal force on the shifting of the frequency range is also demonstrated.

184. Laminar Boundary Layer on a Porous Surface

"Laminar Boundary Layer on a Porous Surface," by G. A. Kulonen; Leningrad, Vestnik Leningradskogo Universiteta, No 13, Seriya Matematiki, Mekhaniki i Astronomii, No 3, 1960, pp 115-130

The article is devoted to the problem of reducing surface friction and temperature by injecting into the boundary layer, according to a definite rule, a small quantity of gaseous matter, the physical properties of which are close to those of the gas in the main flow. It is assumed that the injection of a coolant has a considerable influence only on the flow of gas in a thin layer at the wall and does not produce turbulences in the outer potential flow. The problem can thus be approached within the framework of boundary layer theory.

Here the problem is considered for cases of both the presence and absence of a pressure gradient on the porous surface. Crocco's variables (Monogr. Sci. Aeronautica, 3, 1946) are used for the case of a flat plate (zero pressure gradient). The obtained equations are solved by linearization.

185. Adiabatic Wall Temperature in Heat Exchange Calculations

"Heat Exchange in Tubes in the Presence of Internal Heat Sources in a Liquid Flow," by B. S. Petukhov, L. G. Genin, and V. L. Mal'ter; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 3, No 9, Sep 60, pp 3-9

It is shown that heat transfer in a stabilized liquid flow with constant physical properties and an internal heat source can be computed with the ordinary formulas for heat transfer in a flow without an internal heat source if the coefficient of heat transfer refers to the difference between the temperature of the wall and the adiabatic temperature of the wall.

On the basis of data obtained by Reichardt (Z. f. Angew. Math. u. Mech., No 7, 1951), numerical values of adiabatic wall temperatures are given for Reynolds moduli of  $10^4$ - $10^6$  and Prandtl moduli of 0-100. Interpolative formulas are given for computing adiabatic wall temperature with an accuracy of plus-minus 10 percent with respect to theory. Values obtained for adiabatic wall temperature are compared with those obtained by Poppendiek (Chem. Engr. Prog., Symposium Series, Vol 50, No 11, 1954, p 93) and are in good agreement with data obtained by Muller (Papers Amer. Soc. Mech. Engrs., No HT-17, 1958, p 17).

186. Kinetics of Chemical Reaction and Shock Wave Structure

"The Structure of a Shock Wave in Air on the Basis of the Kinetics of Chemical Reactions," by N. M. Kuznetsov; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 3, No 9, Sep 60, pp 17-24

It is shown that, within the limits of accuracy of presently known rate constants for chemical reactions, the problem of temperature distribution and component concentrations in the dissociating air in the nonequilibrium region beyond the steep leading edge of a shock wave in rarified air can be simplified considerably. The temperature in the nonequilibrium region can be determined with sufficient accuracy solely on the basis of the concentration of oxygen and nitrogen molecules. The time for equilibrium to be reached is determined by the rate of dissociation of oxygen at low initial temperatures, by the rate of dissociation of oxygen and nitrogen oxide, and by the rate of the reaction  $\text{NO} + \text{O} \rightarrow \text{N} + \text{O}_2$  at high initial temperatures. For reaction rates assumed here, the dissociation of nitrogen is a chain mechanism in which the formation of nitrogen oxide is an intermediate linkage. Once the temperature profile has been determined, the distribution of concentrations of nitrogen oxide beyond the wave front can be found. The dependence of wave structure on velocity and density of gas in front of the wave is represented graphically as a single-parameter family of curves.

Nuclear Physics

187. Mus Captured by O-16

"Capture of  $\mu$ -Mesons by the O-16 Nucleus," by I. S. Shapiro and L. D. Blokhintsev; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct. 60, pp 1112-1114

The ratio of the probabilities for  $\mu^-$  capture by the  $\text{O}^{16}$  nucleus with formation of  $\text{N}^{16}$  in the  $0^-$  and  $1^-$  states is calculated. It is found to be strongly dependent on the effective pseudoscalar constant and can be used for its measurement.

188. Gamma Radiation Yield of Kr-85

"Production of the Radioactive Isotope Kr-85 and Measurement of Its Gamma Radiation," by I. Ye. Nakhutin, V. V. Ovechkin, D. V. Ochkin, A. S. Polyakov, and Z. K. Khodulyeva; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct 60, pp 991-992

The radioactive isotope Kr<sup>85</sup> was obtained from neutron-irradiated uranium by frontal chromatography of the gases evolved during solution of the uranium in nitric acid. The Kr<sup>85</sup> thus obtained was used to determine the  $\gamma$ -radiation yield. The  $\gamma$ -ray quantum yield is  $(0.41 \pm 0.06)$  % per decay which is much smaller than the value given by Zeldes et. al. (Phys. Rev. 79, 901, 1950).

189. Nuclear Proton Decay

"Possibility of Proton Decay of Nuclei," by V. A. Karnaukhov and N. I. Tarantin; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct 60, pp 1106-1110

The possible existence of proton radioactivity is considered. The nuclear region in which it seems most feasible to seek proton radioactive isotopes is determined. The expected life-times of p-active nuclei are estimated and the role of competing processes ( $\alpha$ ,  $\beta^+$  -decay, K-capture) is discussed. Possible reactions leading to the formation of p-active isotopes are indicated and their cross sections are estimated.

190. Cold Neutron Bottles

"Magnetic Mirrors, Channels and Bottles for Cold Neutrons," by V. V. Vladimirovskiy; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct 60, pp 1062-1070

As is well known, neutrons with spins oriented along the magnetic field are repulsed from high field regions. This permits use of magnetic mirrors and channels to obtain focused beams of polarized neutrons. The cold neutrons can be confined by restricting the vacuum cavity by magnetic mirrors. The adiabaticity conditions required for conserving the orientation of the spin relative to the field are considered. Possible magnetic field configurations are presented and estimations of the polarized beam intensities and neutron densities in the magnetic bottle are presented.

191. Five New Isomers

"Five New Millisecond Isomers Produced in Nuclear Reactions Involving 19.2 Mev Protons," by A. M. Morozov, V. V. Remayev, and P. A. Yampolskiy, Institute of Chemical Physics, Academy of Sciences USSR, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct 60, pp 973-985

Five new short-lived isomers produced by irradiating  $Sc_2O_3$ , Nb,  $La_2O_3$ ,  $Nd_2O_3$ , and Os specimens with 19.2-mev protons have been detected and investigated. The final products of the nuclear reactions yielding isomers from Sc and La are identified as  $Tl^{145m}$  and  $Ce^{138m}$  respectively. For the first time the previously known isomer  $In^{114m}$  has been found to appear in proton reactions on In. More detailed information is obtained on the characteristics of the  $In^{114m}$  isomer previously detected by us in irradiated Cd samples. The excitation function and cross section of the reaction at an energy of 19.2 Mev have been determined for this isomer. The gamma ray energy, half-lives, and relative yields from thick targets have been determined for all of the short-lived isomers.

192. Monoenergetic Positrons

"Production of Monoenergetic Positrons in the Decay of  $Eu^{152}$ ," S. S. Vasilenko, M. G. Kaganskiy, D. L. Kamin-skiy, and S. F. Koksharova, Leningrad Physicotechnical Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct 60, pp 970-972

The production of monoenergetic positrons may occur in the de-excitation of 1531-Kev excited state of  $Sm^{152}$  which is formed in the decay of  $Eu^{152}$ . Our measurements show that the probability for this process is less than  $10^{-8}$  positron per decay. In accordance with the calculations of L. A. Sliv this yields for the 1531-Kev excited state of  $Sm^{152}$  a lifetime exceeding  $10^{-14}$  sec, which points to the collective character of this level.

193. Charge Distribution in an Ion Beam

"Investigation of the Equilibrium Charge Distribution in a Fast Ion Beam," by V. S. Nikolayev, I. S. Dmitriyev, L. N. Fateyeva, and Ya. A. Teplova, Institute of Nuclear Physics, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 39, No 4, Oct 60, pp 905-914

The equilibrium distribution of charges in an ion beam of light elements ( $Z=2 \div 18$ ) and in a krypton ion beam after their passage through He, N<sub>2</sub>, Ar, Kr, and a celluloid film has been measured for velocities  $v \sim 2.6 \cdot 10^8$  cm/sec and higher. Some new information has been obtained on the dependence of the mean charge  $\bar{i}$  and distribution width  $\sigma$  on the ion velocity, charge of their nucleus and on the medium. Significant differences in the magnitude of  $\bar{i}$  in various gases have been found for all types of ions. Thus for ions with  $Z > 10$  the value of  $\bar{i}$  in a celluloid film exceeds that in gases by 1.6-2.3 times. Appreciable deviations from smooth dependence of  $\bar{i}$  and  $\sigma$  on  $Z$  have been detected in the region  $Z \sim 10-12$ .

194. Undiscovered Isotopes

"Undiscovered Isotopes of Light Nuclei," by A. I. Baz', V. I. Goldanskiy, and Ya. B. Zel'dovich; Moscow, Uspekhi Fizicheskikh Nauk, Vol 72, No 2, Oct 60, pp 211-234

It is assumed that hundreds of still undiscovered isotopes of light nuclei ( $Z \leq 36$ ) should exist, besides the 300 isotopes already known. The assumption is based on analysis of neutron-deficient isotopes ( $Z > N$ ). By using known properties of experimentally studied nuclei with  $N > Z$ , new physical phenomena are deduced for neutron deficient nuclei, like proton or double proton radioactivity. The limits of nuclear stability are discussed. A tentative line for stability is drawn along  $Z^2/A \leq 40$ .

195. Plasma Energy Losses

"The Problem of Recording Plasma Energy Losses," by Yu. G. Prokhorov; Moscow, Doklady Akademii Nauk SSSR, Vol 134, No 5, Oct 60, pp 1058-1060

A radiation meter was used to evaluate the effectiveness of thermo-isolation of plasma in a toroidal chamber with a strong magnetic field by reading the energy transferred into the chamber wall. The meter consisted of platinum foil  $6 \mu$  thick, heated to 1,500°C by direct current. The radiation of the foil was directed through a light guide to a photomultiplier FEU-22 with a photocathode having maximum sensitivity in the

region of 9000 Å. The signal of the photomultiplier, after passing an amplifier, reached an oscillograph. For absolute calibration of the meter a condenser of several tens of microfarads was discharged on the foil. By knowing the energy emitted in the foil from the start of the process up to a given instant, the relation may be found between the energy applied to the foil and the magnitude of the current from the photomultiplier.

### Spectroscopy and Optics

#### 196. Polarization of Electroluminophors

"Polarization Phenomena in Electroluminophors," by A. M. Bonch-Bruyevich and O. S. Marenkov; Leningrad, Optika i Spektroskopiya, Vol 8, No 6, Jun 60, pp 855-860

The results from studying fast polarization processes and glowing flares at pulse excitation of electroluminophors ZnS-CuAl are presented. It is shown that the polarization field is established in 10-20 microsec, during a time several orders shorter than the time of glow extinction. By analyzing the glow extinction kinetics at pulse excitation a conclusion is made as to electroluminescence extinction by a field inverse to the exciting field.

#### 197. Light Modulator

"Amplitude and Phase Characteristics of an Interference Light Modulator," by I. I. Adrianova and Yu. B. Popov; Moscow, Optika i Spektroskopiya, Vol 9, No 4, Oct 60, pp 501-504.

Results of theoretical and experimental research on a light flux modulator by means of interference modulation are presented. Good agreement of the experimental amplitude characteristics with theoretical data was obtained. The phase characteristics of the interference modulator are more monotonous than those of other types of modulators.

198. Atoms in an Electric Arc

"Spectroscopic Study of the Diffusion of Atoms in an Electric Arc," by Ya. D. Raykhbaum and V. D. Maykh; Moscow, Optika i Spektroskopiya, Vol 9, No 4, Oct 60, pp 425-427

A method of determining the mean time of an atom's stay in an electric discharge  $\tau$ , based on measurement of intensities of spectral lines after the atoms have stopped entering the discharge is described. The introduction of the studied elements into the arc column was done by means of probes. The measurements of the  $\tau$  values for various elements in an arc of direct current are presented and used for the computation of effective values of the diffusion coefficients.

199. Study of SrS Phosphors

"Use of the Electron Paramagnetic Resonance for the Study of SrS Phosphors Activated by Eu," by V. G. Dubinin and Z. A. Trapeznikova; Moscow, Optika i Spektroskopiya, Vol 9, No 4, Oct 60, pp 472-477

A comparison is made of values stored at excitation and yielded at light emission to determine the proportion of attenuating processes in phosphors after ionization of the activator. It was found that in phosphors without a fusing agent only half of the recombinations lead to emission, while in phosphors with a fusing agent nearly all recombinations are accompanied by glowing.

200. Shifts in Neodymium Spectrum

"Isotopic Shift in the Spectrum of Neodymium," by Yu. P. Dontsov and V. A. Morozov; Leningrad, Optika i Spektroskopiya, Vol 8, No 6, Jun 60, pp 741-745

New experimental results of isotopic spectral line shift of neodymium were obtained by studying separated isotopes. The interferometer of Fabry-Perot and a discharge tube were used. The isotopic shift was measured between components of even-even isotopes on 16 lines. It was found that no essential difference exists between the relative shift of lines NdI and NdII and that the relative anomalous shift does not vary with the wave length. The absence of equidistance in the position of components of neodymium isotopes, the nuclei of which do not possess static deformation may be explained by an uneven variation of the amplitude of zero oscillations of the quadruple nuclear moment.



201. Measurement of Focal Lengths for Near-Plane Optical Surfaces

"Autocollimation Method for Measuring Focal Lengths of Optical Components Having Near-Plane Surfaces," by S. Ye. Yevlasov, Optiko-mekhanicheskaya Promyshlennost', No 2, 1960, pp 37-40 (from Tekhnika Kino i Televideniya, No 9, Sep 60, p 81

An autocollimation method for measuring large focal lengths is discussed. The principle of the method consists in determination of the focal length of the optical component by measuring the distance between the images of an infinitely far object as reflected from the first and second surfaces of the optical component.

This method becomes highly accurate if the reflecting surfaces can be determined with a precision of one hundredth of an interference band.

IX. MISCELLANEOUS

202. Yugoslav Computer Engineer

"Dr Ing. Rajko Tomovic," by J. S. P.; Belgrade, Rad, No 38, Sep 60, p 11

Doctor of Engineering Rajko Tomovic, Higher Scientific Associate of the "Boris Kidric" Institute in Vinca, Yugoslavia, describes the design and operation of electric computers as his greatest interest in the field of automation. He was born in Baja [Hungary?] in 1919 and attended school in Sombor and Belgrade. After finishing gymnasium he enrolled in the Faculty of Electrical Engineering in Belgrade, in 1938. During the occupation he was arrested as a member of the SKOJ (Association of Communist Youth of Yugoslavia) and imprisoned in Banjica, then transferred to prisons in Zemun and Trepca. He escaped from Trepca and joined the Jablanacki Odred (Unit). He completed his education in 1946, after the liberation, and immediately went to work in scientific research.

He worked for a while as an associate in the "Nikola Tesla" Institute in Belgrade, and since 1951 has been an associate of the "Boris Kidric" Institute in Vinca. He received his doctorate in 1952 in Belgrade. His dissertation was on a special type of electronic generator of functions.

At the "Boris Kidric" Institute he has been working on the design and application of electronic computers. He has collaborated in developing several types of Yugoslav computers and has made a number of improvements in them. He has also worked on new applications for these machines. He has published about 20 scientific papers in Yugoslavia and abroad, including "Experience in the Use of Repetitive Differential Analyzers" and "The Electronic Generator of Functions." For his monograph Repetitivni diferencijalni analizatori (Repetitive Differential Analyzers) and for his designing, he was awarded the City of Belgrade prize for 1960.

203. Yugoslav Meteorologist

"Dr Pavle Vujevic," by M. P. D.; Belgrade, Rad, No 40, Oct 60, p 11

Dr Pavle Vujevic is internationally known for his work of more than a half century on Yugoslav climatic and hydrological conditions. He is a regular member of the Serbian Academy of Arts and Sciences, Director of the Geographic Institute of the Serbian Academy of Sciences (SAN), member of the Technical Council of the Federal Administration of the Yugoslav Hydrometeorological Service, and corresponding member of several foreign geographic societies. He holds an honorary doctorate from the University of Vienna.

He was born in 1881 in Ruma, but grew up and went to school in Novi Sad. He studied at the University of Vienna from 1899 to 1904, and the next year at Berlin and Potsdam. He received a doctor's degree in Vienna in 1904, where he studied with the distinguished University of Vienna professor, Alberth Penk. Dr Vujevic's doctoral dissertation was on the river Tisa. He was made a docent at the university at the age of 26, in 1907, a special professor in 1919, and a regular professor in 1921. He remained there until he retired, 1 April 1955.

He has written three text books which are now in use. He has published more than 150 scientific and technical works. His latest work, Prilozi za bioklimatologiju oblasti Kopaonika (Contributions to the Bioclimatology of Kopaonik Oblast), will soon be published by the Geographic Institute of the Serbian Academy of Sciences. He is currently working on a new textbook Opsta klimatologija (General Climatology).

Before the war he worked for more than 20 years as the director of the Observatory.

He has been awarded the Albanian Medal, the Order of Sveti Sava, and the Order of Labor First Class. In July 1960 he received a cash prize in recognition of his lifetime of scientific work.

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