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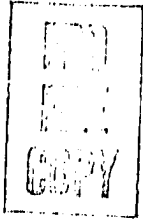
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REPORT

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CENTRAL INTELLIGENCE AGENCY

SCIENTIFIC  
INFORMATION REPORT



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PLEASE NOTE

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

SCIENTIFIC INFORMATION REPORT

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NOTE: Items in this report are numbered consecutively.

I. BIOLOGY

1. Effect of Two Organophosphorus Compounds on Physiological Process of Cotton

"The Effect of Organophosphorus Compounds (Octamethyl and Mercaptophos) on Certain Physiological Processes of Cotton," by T. V. Bobyreva, Izv. AN UzSSR Ser. Biol. N., (Herald of the Academy of Sciences Uzbek SSR, Biology Series), 57, No 3, 39-44 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 16, 25 Aug 58, Abstract No 20863, by M. Gagarina)

"The photosynthesis, respiration (exhalation of CO<sub>2</sub>), and catalytic activity of cotton leaves, treated with various concentrations of octamethyl and mercaptophos, were investigated. Spraying the leaves with a 0.2% solution of both compounds did not produce any change in plant metabolism. With a 0.4 and 0.6% solution of mercaptophos and especially octamethyl, a decrease in photosynthesis and an increase in respiration was observed within a few days. Determinations made 25 days and later after treatment indicated no variation differences; 48 hours after the administration of octamethyl through the root system, subsequent changes in catalytic activity and respiration intensity were observed."

## II. CHEMISTRY

### Chemistry and Technology of Nuclear Fuels and Reactor Construction Materials

#### 2. Heats of Formation of Uranium - Aluminum Intermetallic Compounds

"Heats of Formation of  $UAl_2$ ,  $UAl_3$ , and  $UAl_4$ ," by M. I. Ivanov, V. A. Tumbakov and N. S. Podol'skaya; Moscow, Atomnaya Energiya, Vol 5, No 2, Aug 58, pp 166-170

The intermetallic compounds  $UAl_2$ ,  $UAl_3$ , and  $UAl_4$  were prepared by inducing mutual diffusion of the two metals when aluminum and dispersed uranium were heated. The uranium was prepared by the decomposition of uranium hydride followed by disintegration of the product and second heating of the powder obtained. X-ray analysis according to Debye indicated that the products obtained are monophasic and that the structural parameters are close to those determined and published earlier. By determining the hydrogen evolved as a result of the solution of the products with that evolved as a result of the solution of the initial materials, it was established that the products obtained have the compositions  $UAl_{1.997}$ ,  $UAl_{2.994}$ , and  $UAl_{3.997}$ . A mixture of hydrochloric acid, phosphoric acid, sodium fluorosilicate, chloroplatinic acid, and copper sulfate was used to dissolve the metals for the purpose of the hydrogen determination.

On the basis of the differences between the heats of solution of the products and those of the initial metals, the heats of formation of the three intermetallic compounds were determined and found to be  $22.3 \pm 2.4$ ,  $25.2 \pm 2.2$  and  $31.2 \pm 3.1$  kilocalories per mol, respectively.

#### 3. Solubility Products of Plutonyl Oxalate

"Determination of the Solubility Product of Plutonyl Oxalate," by L. Ye. Drabkina, A. I. Moskvina, and A. D. Gel'man. Institute of Physical Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 8, Aug 58, pp 1934-1936

The solubility of plutonyl oxalate in 1.1, 2.0, and 3.08 mols of nitric acid was determined in  $HNO_3 - H_2C_2O_4$  mixed solutions. From the experimentally found values of the solubility of  $PuO_2 \cdot C_2O_4 \cdot 3H_2O$  in these solutions the solubility product was calculated. Its mean value was found to be  $6.8 \times 10^{-10}$ . An approximate value of the solubility product of plutonyl oxalate ( $1.4 \times 10^{-10}$ ) was also found by a graphic method on the basis of data pertaining to the solubility of plutonyl oxalate in  $HNO_3 - (NH_4)_2C_2O_4$  mixed solutions.

4. Solvent Extraction of Protactinium

"Extraction of Protactinium With Alkylphosphoric Acids," by V. B. Shevchenko, V. A. Mikhaylov, and Yu. P. Zaval'skiy, Chemicotechnological Institute imeni D. I. Mendeleev; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 8, Aug 58, pp 1955-1958

It was found that alkylphosphoric acids, and particularly dialkylphosphoric acids, are effective extracting agents for protactinium. It was established that in the extraction with dialkylphosphoric acids the coefficients of the distribution of protactinium are proportional to the square of the concentration of the extracting agent in the organic phase. It was also found that the nature of the solvent with which the extracting agent is diluted does not exert a significant effect on the efficiency of the extraction of protactinium.

"Investigation of the Extraction of Protactinium with Mono- and Diisoamylphosphoric Acids," by V. A. Mikhaylov, V. B. Shevchenko, and V. A. Kolganov, Chemicotechnological Institute imeni D. I. Mendeleev; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 8, Aug 58, pp 1959-1964

The dependence of the coefficient of the distribution of pentavalent protactinium in its extraction with mono- and diisoamylphosphoric acids on the concentration of the extracting agent in the organic phase and the concentration of the  $H^+$  and  $NO_3^-$  ions in the aqueous phase was investigated. A probable mechanism of the extraction of protactinium with isoamylphosphoric acids (HK) is proposed which involves formation in the aqueous phase of strongly hydrolyzed complex compounds of protactinium with the extracting agent and transfer of protactinium into the organic phase in the form of  $PaK_5$ .

5. Compounds of Hafnium Tetrachloride With Phosphorus Oxychloride

"On the Compounds of Hafnium Tetrachloride With Phosphorus Oxychloride," by I. A. Sheka and V. A. Voytovich, Institute of General and Inorganic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 8, Aug 58, pp 1973-1976

The temperature-composition diagram of the system  $HfCl_4 - POCl_3$  was investigated. It was established that there are two dystetic maxima corresponding to the compounds  $HfCl_4 \cdot 2POCl_3$  and  $HfCl_4 \cdot POCl_3$  with the melting points of  $198.3^\circ$  and  $221.8^\circ$ , respectively. On the basis of the results obtained, one must regard as erroneous data on the formation of the compound  $3HfCl_4 \cdot 2POCl_3$  which occurs in the literature.

6. Relative Volatilities of Products of Addition of Zirconium Chloride and Hafnium Chloride to Phosphorus Oxychloride

"Determination of the Relative Volatilities of Products of the Interaction of Zirconium Tetrachloride and Hafnium Tetrachloride With Phosphorus Oxychloride," by G. A. Yagodin, G. S. Fomin, and L. A. Nisel'son, Moscow Chemicotechnological Institute imeni D. I. Mendeleev and Moscow Institute of Nonferrous Metal and Gold imeni N. I. Kalinin; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 8, Aug 58, pp 1971-1972

The relative volatilities of products of the addition of zirconium tetrachloride and hafnium tetrachloride to phosphorus oxychloride were determined with the use of the radioactive isotope  $Hf^{181}$ . It is stated that the data obtained are of importance because zirconium is separated from hafnium in a production process by the distillation of the addition products of the chlorides of these metals to phosphorus oxychloride.

7. Behavior of Chlorides of Rare-Earth Metals in Chloride Melts

"Interactions of Chlorides of Rare-Earth Metals with Chlorides of Alkali and Alkaline Earth Metals," by Sung Yin-chu and I. S. Morozov, Moscow Institute of Fine Chemical Technology imeni N. V. Lomonosov; Moscow, Zhurnal Neorganicheskoy Khimii Vol 3, No 8, Aug 58, pp 1914-1924

The interactions of the chlorides of lanthanum, cerium, and neodymium with the chlorides of potassium, cesium, and magnesium in melts were investigated. The temperature-composition diagrams of the binary systems  $LaCl_3$ -KCl,  $CeCl_3$  - KCl,  $NdCl_3$  - KCl,  $LaCl_3$  - CsCl,  $CeCl_3$  - CsCl, and  $NdCl_3$  - CsCl were constructed. The existence of congruently melting compounds of the type  $M_3RCl_6$  and  $K_2RCl_5$  was established, where R = rare-earth elements and M = K, Rb, or Cs. It was found that the stability of the compound  $M_3RCl_6$  increases in a regular manner from potassium to cesium and from lanthanum to neodymium. A temperature-composition diagram of the system  $CeCl_3$  -  $MgCl_2$  was constructed. It was shown that the chlorides of rare-earth elements and alkaline earth elements form systems with simple eutectics. A constitutional diagram of the ternary system  $CeCl_3$  -  $MgCl_2$  was constructed. The boundaries of the fields of primary crystallization of  $CeCl_3$ ,  $MgCl_2$ , KCl,  $K_2CeCl_5$ ,  $K_3CeCl_6$ , KCl.  $MgCl_2$  and 2KCl.  $MgCl_2$  were determined, as well as the triple invariant points  $E_1$ ,  $E_2$ , and  $E_3$ .



8. Analytical Analysis for Tantalum

"The Utilization of Organic Reagents in Analytical Chemistry. Tantalum Determination With Rhodamine B in Ethyl Acetate Solutions," by N. L. Vasil'yeva, Ural Affiliate of the Academy of Sciences USSR; Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No 4, 1958, pp 56-61

As a result of the experiments conducted, a method was developed for photocolometrically determining tantalum with rhodamine B.

According to the author, this is the first time that the use of rhodamine B has been recommended for tantalum determination. As a reagent for determining tantalum, rhodamine B has an advantage over pyrogallol in relation to specificity and sensitivity. The determination of tantalum with rhodamine B is possible in the presence of tungsten and moderate amounts of titanium and niobium. The sensitivity of the reaction amounts to 1:500,000.

Industrial Chemistry

9. USSR Work on Polymers

"At General Conferences of the Departments" (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, Vol 28, No 8, Aug 58, pp 57-68

The Academy of Sciences USSR is faced with very important tasks pertaining to the development of theoretical and research work on the chemistry and physics of polymers. The decision of the May 1958 Plenary Session of the Central Committee CPSU predetermines the program of investigations to be done in this field during a long period of time. To facilitate the implementation of this program, the Presidium of the Academy of Sciences USSR organized at the Department of Chemical Sciences a commission which will draw up plans of work to be done in this field by the department in collaboration with the Departments of Physicomathematical, Technical, and Biological Sciences.

At the General Conference of the Department of Chemical Sciences held 16-17 June 1958, Academician A. D. Kargin presented a report entitled "The Tasks and Principal Directions of Work To Be Done by the Scientific Council on Polymers." This council has the task of coordinating and directing all work on polymers to be conducted within the Department of Chemical Sciences. The council is also supposed to act in a consulting capacity in connection with the development of work in this field at institutes of the Academy of Sciences USSR and of academies of sciences of union republics, as well as at the leading industrial institutes.

The council consists of the following six sections: sections of the synthesis of monomers, sections of the synthesis of polymers and kinetics of reactions by which polymers are obtained (a section on stereopolymers and another on linear polymers other than stereopolymers); a section on special polymers used in aviation and other fields, a section on synthetic fibers; and a section on the application and treatment of polymers. The council consists of more than 100 persons. It unites in effect all leading scientists and specialists of the branch of chemical industry in question and scientists active in this field at higher educational institutions, in this manner being representative to a sufficient extent of both science and the industry of polymers and products made of polymers.

Kargin mentioned that it is proposed to open several additional sections (for instance, one on lacquers, varnishes, and protective coatings).

The most important work done by the council hitherto consisted in consideration of the status of the principal scientific investigations being conducted on heat-resistant fibers, laminated plastics reinforced with glass and wood-laminated plastics, leather substitutes made of polymers, high-strength polymers, etc. The council organized a conference on biologically active polymers, at which the principal trends of research to be conducted in this field were formulated. The great interest evinced toward this conference testifies to the correctness of the idea underlying its organization and of the program formulated by it.

In speaking of plans for the future work to be done by the council, Kargin indicated that its immediate problem will be discussion of the principal directions along which work should be pursued in the field of polymers in order to implement the decisions of the May 1958 Plenary Session of the Central Committee CPSU.

Academician A. V. Topchiyev presented a report entitled "The Results of Work of the Commission of the Development of Prospective Plans of Scientific Research To Be Carried Out at Institutes of the Academy of Sciences USSR in the Field of the Production and Application of High-Molecular Compounds."

Topchiyev pointed out that, to assure the most rapid action on decisions made by the May 1958 Plenary Session and make certain that the most important problems in the field of the chemistry of polymers will be covered by the prospective plan, groups of scientists have been organized who will determine the principal lines of research to be followed and will designate the teams or organizations which will do the research. These groups are headed by a special commission which coordinates their activity. Although it was not possible for Topchiyev to discuss in detail the plans of work to be done on all problems (about 40 plans), he showed by individual examples how progress of work on some of them will be assured. In connection with this, Topchiyev indicated the principal directions along which work will be conducted and mentioned the leading scientific groups participating in this work.

Topchiyev emphasized first of all the necessity of assuring progress in work on the synthesis of monomers, because the development of the industry of polymers depends primarily on progress in this field. Petrochemistry is destined to play the principal role in the production of monomers. Research on the most advantageous methods for utilizing natural gas and petroleum gases as well as petroleum products with the purpose of converting them into initial substances for the synthesis of polymers is involved here.

Furthermore, work on a number of problems pertaining to the synthesis of monomers containing oxygen and organoelemental monomers, including those containing silicon, is provided for.

Starting with synthetic and naturally occurring polymers, materials with predetermined chemical and physicochemical characteristics will be synthesized. To develop new types of polymers, not only the methods of polymerization and polycondensation, but also the methods of mechanochemistry and radiation chemistry will be applied.

Extensive work will have to be done with the purpose of investigating the structure and properties of polymers. The cycle of investigations in question comprises the general theory of structure and of the properties of crystalline and amorphous polymers in isotropic and oriented states, as well as formulation of principles and development of methods for the production of elastomers, fibers, and plastics. A number of problems pertains to the kinetics and mechanism of polycondensation, polymerization, and copolymerization reactions, as well as to the development of the theory of initiation of the formation of radicals in processes leading to the synthesis of polymer compounds.

An independent subdivision of the plan concerns research on naturally occurring polymers, viz, polysaccharides, proteins, and nucleotides. Work in this particular field progresses at an insufficient rate at present.

Topchiyev pointed out that the plan reported by him is not exhaustive: For instance, it does not provide for work in important fields such as investigation of theoretical problems pertaining to the phenomenon of high adhesion, the correlation between adhesive forces and the structure of metals, and the development of [adhesive] compounds. Insufficient attention is paid in the plan to the synthesis of high-molecular surface-active substances and the investigation of their properties, problems pertaining to the development of control appliances for processes employed in the conversion of polymer materials, etc.

In concluding his report, Topchiyev emphasized that the Central Committee CPSU and the Council of Ministers USSR had opened up extensive possibilities for the development of the science and industry of high-polymer compounds. The Presidium of the Academy of Sciences USSR and the Department of Chemical Sciences, Academy of Sciences USSR, have already developed a considerable activity in this field. However, more remains to be done: further work must be conducted on the drawing up of a prospective plan, and the implementation of this plan must be assured. In view of the fact that the principal work on the subject will be done by large groups of scientific workers including those active at institutes outside the academy, it is of particular importance to assure thorough-going coordination.

Representatives of the leading fields of chemical science participated in the discussion of Topchiyev's report. They defined more precisely the role which various institutions will have to play in the development of various aspects of the research involved and outlined a number of problems not mentioned by the author of the report.

In summarizing the results of the discussion, Topchiyev pointed out that all wishes expressed during the discussion will be considered in drawing up the final version of the plan.

CPYRGHT

"Acceleration of the Development of the Chemical Industry, Particularly as Far as Production of Synthetic Materials and Products Derived From Them Is Concerned, for the Satisfaction of the Needs of the Population and of the Requirements of the National Economy, as Well as Tasks of the Academy of Sciences USSR Connected With This -- Report by the President of the Academy of Sciences USSR at the General Meeting of the Academy of 10-20 June 1958," by A. N. Nesmeyanov, president of the Academy of Sciences USSR; Moscow, Vestnik Akademii Nauk SSSR, Vol 28, No 8, Aug 58, pp 4-18

CPYRGHT

The USSR chemical industry has reached a substantial degree of development, particularly during recent years. The volume of production in 1957 was five times greater than in 1940. As far as tonnage of the goods produced is concerned, the chemical industry of the USSR is in the second place after

In 1965 the USSR will have made a huge step forward in the production and application of high-molecular materials and consequently in the development of the chemical industry as a whole. After overtaking all other countries, it will then be approximately on the same level as the US at present.

The manufacture of synthetic products, specifically synthetic high-polymer compounds, is much cheaper and requires less extensive production facilities than manufacturing based on natural products. However, synthetic products are of advantage not only because of the low cost of their production and the relatively low volume of the production facilities required: they have ceased to be mere substitutes and have become irreplaceable materials exhibiting unusual properties.

Vulcanized rubber derived from natural crude rubber has a number of shortcomings. Vulcanized natural rubber swells in gasoline and oil and cannot be used at temperatures above 120°. Now a whole assortment of gasoline- and oil-resistant synthetic elastomers is available; some of these elastomers can be used at temperatures up to 300°. A new polyurethane elastomer exhibits an unusual resistance to abrasion: tires made of this elastomer last as long as the automobile itself. A synthetic fiber which is not even the best, i. e., capron, has a tensile strength twice as great as silk and four times as great as wool. Its tensile strength exceeds that of all ordinary nonferrous metals and is not much lower than that of steel. A fiber derived from aminopelargonic acid withstands 40,000 double bendings at a load amounting to 15% of the breaking load, i. e., 30 times more bendings than capron, 100 times more than viscose, and many more than natural fibers. Natural fibers have a much smaller abrasion strength than synthetic polyamides.

Foam plastics which are impermeable to water and gas and are applied as heat-insulating materials and for purposes of sound insulation weigh one 700th as much as steel, one 100th as much as water, and one 25th as much as cork. Laminated plastics, for instance, plastics reinforced with glass fabric, are two ninths the weight of steel and two thirds the weight of duraluminum. As far as tensile strength is concerned, they are superior to nonferrous metals: their tensile strength is close to that of steel.

Plastics containing fluorine are exceptionally stable toward chemical action, including the action of any acids, caustics, and oxidants, which makes them irreplaceable in the chemical industry.

Organosilicon plastics withstand heating to 400°.

Many of these characteristics make synthetic materials irreplaceable in the new technology, i. e., the technology of reaction engines and nuclear power.

Ion-exchange resins have acquired a very great importance in the chemical and food industries: by using them water is purified from salts, sugar concentrates are purified, industrial wastes are recovered for useful purposes, and elements are concentrated and separated.

As far as the stereochemistry of high polymers is concerned, macromolecules in isotactic polymers are closer to each other and for that reason the so-called isotactic polymers are much stronger and have a higher melting point than atactic analogs of the same constitution. Thus, isotactic polystyrene softens at a temperature as high as 220°, while ordinary polystyrene has a softening point of 80°. Ordinary polypropylene is liquid, while isotactic polymers of propylene have a melting point higher than 160° and are suitable for the production of high-quality fibers. Polymerization may be described as chemical multiplication complicated by the addition of end groups. When the quotient is within the range from unity to a low multiple of ten, the end groups are not submerged in the total mass of atoms, but exert an effect which determines the chemical nature of the new compound. Under these conditions, a process called telomerization takes place.

A remarkable new way of synthesis or rather of the chemical combination of macromolecules is that leading to the formation of grafted polymers or so-called block polymers. In the synthesis of grafted polymers, the polymerization of the monomer is not initiated by any free radical introduced for that purpose, but by a radical derived from a completed macromolecule which has been stripped of certain atoms (usually hydrogen atoms) for this purpose. Then monomers polymerize forming branches at positions freed in this manner on the macromolecular radical. The formerly linear molecule acquires branches of a different composition and the substance is endowed with new characteristics.

An interesting instance is the polymer obtained by grafting styrene on starch. In this case a polymer is obtained in which hydrophobic polystyrene branches are grafted on a hydrophilic starch molecule. In this manner polymers are obtained which exhibit all intermediate characteristics between the hydrophilic starch and the hydrophobic polystyrene.

Analogous polymers were obtained by grafting styrene on cellulose; a graft polymerization of this type opens up the possibilities of endowing cellulose fibers with hydrophobic properties, which is important for textile applications.

The grafting of acrylonitrile on cellulose (for instance, cotton) makes it possible to produce textile fabrics which do not crease and do not require ironing. The grafting of vinyl chloride and also of styrene onto butadiene rubber leads to the formation of materials with unusual properties, specifically materials which have a high impact strength.

To produce block polymers, one uses the method of mechanical disintegration of macromolecules to form residues which constitute free radicals. Disintegration of macromolecules can be achieved, for instance, by grinding rubber together with other macromolecular substances very energetically. If this grinding is done in the presence of oxygen or other chemically active agents, these agents are added to the ends of the residues and the disintegration becomes permanent. However, if the grinding is done in an inert atmosphere, the loose ends grow together again. If two different high-molecular substances are ground together in an inert atmosphere, the residues of the different species of molecules grow together and a hybridized polymer results. In macromolecules of this type, there is irregular alternation of blocks of one polymer with those of another polymer.

Block polymers derived from synthetic rubber (for instance, butadiene rubber) and phenol-formaldehyde resin yield at a high rubber content elastomers resistant to abrasion and at a high content of the phenol-formaldehyde resin, phenolic plastics which have a high impact strength. Block polymers derived from elastomers and epoxy resins are very resistant to abrasion. Of interest are block polymers of natural rubber with polychloroprene rubber. These polymers have the properties of natural rubber combined with the resistance of chloroprene rubber to organic solvents. Block polymers of natural rubber with polymethylmethacrylate are also known. The most thoroughly investigated and promising field of high-polymer chemistry at present is that dealing with organosilicon polymers. On the basis of silicones containing organic radicals, heat-resistant and chemically stable high-molecular lubricating oils, insulating resins, and elastomers have been developed. At present successful work is being done on the development of high-molecular organic materials with an aluminosilicate skeleton. On this basis, resins which have a still higher heat resistance can be synthesized. There are reports to the effect that linking of bifunctional systems with a continuous system of conjugated double bonds by means of paramagnetic cations has resulted in the formation of ferromagnetic plastics and elastomers. The possibilities of synthesizing high-molecular substances of this type containing cations of complex-forming metals are truly inexhaustible and promise the development of plastics with entirely new physical properties.

Very important from the standpoint of developments in the field of polymers is the purity of the initial substances, which is of extreme importance for present-day chemistry in general. The problem of the purity of chemical substances originally became of importance in connection with the development of atomic physics and then of the physics of semiconductors. At present this problem must be considered from the standpoint of effects

produced by small quantities of substances in the chemistry of high polymers. An insignificant quantity of a chemically active impurity may have a cross-linking effect and interfere with the fluidity and solubility of a polymer. Another instance of the great effect of small quantities of impurities on the properties of polymers is the lowering of the stability of the polymer. Finally, impurities may terminate the growth of chains, so that substances of high molecular weight cannot be synthesized. An example is the synthesis of polyformaldehyde of high molecular weight, which did not succeed until formaldehyde was purified from insignificant traces of water and alcohol. At present, a very valuable synthetic fiber is produced by the polymerization of formaldehyde.

To organize all efforts made in the field of high polymers in the USSR, a competent and representative Council on Polymers has been created at the Department of Chemical Sciences of the Academy of Sciences USSR. This council will direct and coordinate scientific work on polymers and collaborate in this activity with councils on adjacent problems. The Department of Chemical Sciences has just considered at its conference a collated plan for future research on polymers. This plan has been outlined in a report by A. V. Topchiyev [see article above in Item No 9].

There will be a decisive turn of research toward high-molecular compounds at all chemical institutes of the Academy of Sciences USSR. First of all, it is necessary to expand and reinforce the Institute of High-Molecular Compounds. In view of the fact that the raw material for the synthesis of high-molecular substances will be petroleum, it is necessary to organize at the academy on the basis of the Petroleum Institute an Institute of Petrochemical Synthesis, the principal activities of which will be concerned with the use of petroleum for the synthesis of monomers and polymers. There should be considerable expansion of work in organic chemistry at the Kazan' Affiliate of the Academy of Sciences USSR and, after this, expansion of work in this field at Ufa. The Institute of Organoelemental Compounds will greatly increase the scope of its work on organoelemental high-molecular compounds. The Institute of Silicate Chemistry is planning new research on the synthesis of inorganic polymers. The Physico-technical Institute will direct a large part of its scientific effort toward the investigation of the strength and physical characteristics of polymers from both the theoretical and experimental standpoint. The Institute of Physical Chemistry will organize a Division of Polymers and Dispersed Systems and will reinforce work on the catalytic synthesis of monomers, the macrokinetics of catalytic processes, the use of radiation in polymerization processes and vulcanization, and the action of radiation on polymers. The Institute of Organic Chemistry will concentrate on the synthesis of monomers by catalytic processes and with the application of radiation. The greatest amount of reorientation is expected of the Institute of Chemical Physics. There should be extensive participation of the Siberian Department (Otdeleniye) of the Academy of Sciences USSR in this work, as soon as activities there have properly started. A greater participation of physicists in work along these lines will be necessary.



"Discussion of Nesmeyanov's Report" (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, Vol 28, No 8, Aug 58, pp 19-26

Representatives of the principal academic institutions and affiliates of the academy, who participated in the discussion of A. N. Nesmeyanov's report, considered a number of important problems connected with the implementation of the decisions of the May 1958 Plenary Session of the Central Committee CPSU.

Academician N. N. Semenov:

Chemists in collaboration with biologists must investigate the fundamental principles on the basis of which chemical processes take place in nature. By doing this, one can find much that will be of use to chemistry in one form or another and will substantially modify our chemical industry.

Physicists must also come to the aid of chemists. It is known that polymers are superior to metals in all their characteristics with the exception of resistance to heat. It is entirely possible that with the aid of physicists polymers may be developed which, in addition to being readily workable and convenient materials, will exhibit a high heat resistance.

Yu. G. Mamedaliyev, Corresponding Member Academy of Sciences USSR:

In the measures planned in the Azerbaydzhan SSR in connection with the implementation of the decisions of the May 1958 Plenary Session of the Central Committee CPSU, considerable attention is paid to the Karadag occurrence of condensed gas. By the thermal and catalytic conversion of the butane, propane, and low-octane-number gasoline of the Karadag deposit and of other available raw materials of the petroleum industry of Azerbaydzhan, it is proposed to expand considerably the production of synthetic rubber and of synthetic alcohol, thus organizing the manufacture of an extensive line of petrochemicals, including plastics of the polyethylene, polypropylene, oxyalkylene, and vinyl chloride types, polyester fibers of the Lavsan [dacron] type, phenol, acetone, glycerine, isopropylalcohol, and many others.

Academician V. A. Kargin:

Polymers possess a number of important advantages from the technical and economic standpoint. The rate of growth of the industries using polymer materials exceeds that of the growth in any other industrial field with the possible exception of the nuclear energy industry. We are apparently on the threshold of a technological era in which high-polymer materials will not only serve as substitutes for metals, but will replace them. However, many years usually elapse between the appearance of a new polymer and the production of polymer products from it, because a new approach and

development of new ways and fields of application are required in the case of materials of this type, which differ significantly from silicates and from metals. To shorten the time required for development work, it is advisable to familiarize scientists who work on technological applications with the properties and nature of polymer materials. Many of these scientists do not yet have a sufficient knowledge of polymers as materials which can be used extensively for the most diverse applications.

In connection with the production of any polymer, the problem of giving to the material a definite type of structure is of considerable importance. This is demonstrated by the fact that during the past 15-20 years the tensile strength of commonly used fibers has been increased by a factor of 5, solely by improving the structure of these fibers. However, the formation of structure in polymers proceeds in a complex and unique way. The problem of endowing polymers with the desired structure depends substantially on the development of the theory of structure and of a skill to arrange molecules in different ways. This problem is apparently also of importance from the standpoint of work in biology, because the majority of biologically active substances of which the organism consists are high polymers.

To master the process of the creation of complex structures one must know how the chains are disposed, when the structures are regular and when they are irregular, what structure the chain must have, etc. For instance, we cannot predict what will happen when equivalent quantities of a polymer acid and a polymer base are mixed together, because we must know for this the geometry of two very long chains having a complex configuration. To create polymer materials one must study the problem of the formation of structures. This study is just as necessary as research in the field of the synthesis of polymerized products.

N. G. Titov, Doctor of Chemical Sciences:

In his report at the May 1958 Plenary Session of the Central Committee of the CPSU, N. S. Khrushchev indicated that petroleum, natural and synthetic gas, and products of the thermochemical conversion of solid fuels must serve as a raw material basis for the development of a powerful industry of synthetic materials and products derived from them. It will hardly be an error to say that the Academy of Science USSR underestimates the role of solid fuel in the program for performing this national task. A. V. Topchiyev's report of 16 June 1958 does not make any reference to the significance of the conversion of solid fuel for the development of the chemical industry. Nesmeyanov's report also indicates a very obvious undervaluation of solid fuels. Not a single specialist in the field of the thermochemical conversion of solid fuels has been asked to participate in the drawing up of plans for scientific research to be done by institutes of the academy.

R. D. Obolentsev, Doctor of Chemical Sciences:

As far as the extent and rate of growth of the petrochemical industry in 1959-1960 are concerned, the Bashkirskaia ASSR occupies the foremost place in the Soviet Union according to the plan. In connection with this, the demand is justified that the Presidium of the academy expedite the organization at the Bashkir Affiliate of an institute at which scientific problems pertaining to petrochemistry will be investigated. There is frequent criticism in regard to excessive centralization of scientific activities. Apparently, this criticism must also be leveled at the Academy of Sciences USSR. The needs of the Bashkir Economic Region are disregarded: the management of the academy must pay increased attention to the local requirements of that region.

In the statement concluding the discussion, A. N. Nesmeyanov replied to the criticism in regard to insufficient attention paid to the coke-chemical industry. He agreed that the coke-chemical industry supplies and will supply in the future a considerable amount of raw materials for polymers. He said, however, that principal attention must be paid to the petroleum industry, which supplies organic raw materials at a lower expenditure of means and labor than the coke-chemical industry. Nesmeyanov stated: "I regard it as my duty to emphasize petrochemistry as far as the range of scientific problems to be solved is concerned rather than the more or less established coke-chemical industry, where the only existing problem is increase of capacity and partial improvement of methods of production. Petroleum rather than coal is the raw material of the future."

In answering the reproach concerning insufficient attention paid to the Bashkir Affiliate, A. N. Nesmeyanov admitted that the leading workers of the academy do not visit this affiliate and other affiliates often enough. He announced a number of measures taken with a view of advancing the development of chemistry at affiliates, including the Bashkir Affiliate.

Inorganic Chemistry

10. Ukrainian Conference on Inorganic Chemistry

"Third Ukrainian Republic Conference on Inorganic Chemistry,"  
by N. K. Davidenko; Moscow, Zhurnal Neorganicheskoy Khimii,  
Vol 3, No 8, Aug 58, pp 1986-1989

[SIR Note: This report supplements the information given in "Third Ukrainian Republic Conference on Inorganic Chemistry," by O. I. Shor, Ukrainskiy Khimicheskiy Zhurnal, Vol 24, No 3, May-June 1958, pp 419-421; cf. Scientific Information Report, PB 131891T-7.]

About 200 persons, among whom were workers from scientific research institutes, instructors at higher educational institutions, and representatives of sovnarkhozes and chemical enterprises located at Kiev, Khar'kov, L'vov, Dnepropetrovsk, Stalino, Odessa, Simferopol', and other Ukrainian cities, as well as Moscow and Leningrad, participated in the meeting.

In a paper entitled "The Fluoride Complexes of Metals," A. K. Babko explained the principle of the tracer method proposed by him for the determination of the relative stability of complex compounds formed by a number of metals with the same additive. By using this method, the fluoride complex compounds of a great number of elements were investigated and data obtained concerning the dependence of the stability of fluoride complexes of elements on their position in the periodic system.

I. G. Ryss reported on new research pertaining to complexes formed by boron fluoride. The processes of the hydrolysis of  $\text{BF}_3$  and of a number of complexes derived from this substance were investigated. The polytherms of solubility of some fluorine compounds were determined.

In a report by Academician A. I. Brodskiy and I. F. Franchuk entitled "Investigation of the Mechanism of the Formation of Peracids at the Anode and the Hydrolysis of These Acids," which was presented at the meeting, the mechanism of the electrochemical formation of percarbonate, perborate, and persulfate, as well as that of the hydrolysis of these compounds, was discussed. This investigation and work by V. A. Lunenok-Burmakina reported under the title "Investigation of the Mechanism of Some Reactions of Oxidation With Hydrogen Peroxide and Persulfate" were conducted with the use of the  $\text{O}^{18}$  isotope. A report by A. M. Gurevich presented under the title "Investigation of the Composition and Structure of the Solid Phase and Equilibria in Solution in the System  $\text{UO}_2(\text{NO}_3)_2 - \text{NaOH} - \text{H}_2\text{O}_2 - \text{H}_2\text{O}$ " also dealt with reactions taking place with the participation of peroxidic compounds.

A number of the papers given at plenary sessions dealt with the chemistry of rare elements, which testifies to the development of work in this field in the Ukraine.

In a review paper entitled "Methods for the Separation of Rare-Earth Elements on the Basis of Properties of Their Complex Compounds," Ya. A. Fialkov discussed the physicochemical principles of different methods for the separation of rare-earth elements. He also subjected to consideration problems to be investigated in further research on the chemistry of complex compounds of rare-earth elements with a view of improving and developing methods for the separation of elements of this group and obtaining them in a state of high purity.

Ye. S. Burkser, G. Ya. Gornyy, M. I. Ivantishin, and O. A. Kul'skaya told about research done by them in the field of the chemistry and geochemistry of scandium. In this work a number of chemical reactions has been investigated which lead to the formation of colored and luminescent compounds of scandium. The conditions under which the spectral analysis of rocks containing scandium can be made were also investigated. By using chemical, spectrochemical, and spectral analysis the content of scandium in the minerals and rocks of the Ukrainian crystalline massif (shchit) was investigated.

I. Ye. Starik and L. D. Sheydina gave information on a new method for the analytical determination of protactinium which was developed by them. This method is based on the coprecipitation of protactinium with zirconium mandelate from acidic chloride solutions. The authors of the report also developed a method which makes it possible to separate microquantities of protactinium from microquantities or macroquantities of zirconium.

In a report entitled "The Interaction of Chlorides of Zirconium, Hafnium, Niobium, and Tantalum With Phosphorus Oxychloride," I. A. Sheka and B. A. Voytovich reported the results of thermal analysis and cryoscopic measurements which made it possible to establish the composition and stability of compounds formed in such systems.

G. V. Samsonov reported on work in the field of the chemistry and technology of compounds of alkaline earth and rare-earth elements with boron. These compounds are used to an ever increasing extent in technology because of their high thermal emission characteristics, hardness, metallic conductivity, and stability against oxidation. Technological methods for the production of these compounds were developed. Furthermore, a number of characteristics was investigated that are of importance from the standpoint of the practical application of compounds of this class.

Correlations between the characteristics of alloys of such compounds and their crystalline structure were brought out in the report and examples were given of the application of substances of this class in electronics and in the construction of equipment.

V. V. Udovenko and U. Ya. Fialkov reported on results obtained in the investigation of the tendency of tetrachlorides of silicon and germanium to form complex compounds. As distinguished from the capacity of the tetrachlorides of tin and of titanium to form such compounds, the capacity of the two tetrachlorides investigated to enter into complexes of this type proved to be very low.

N. V. Aksel'rud and V. B. Spirakovskiy told about a new variant of the potentiometric method developed by them which makes it possible to investigate difficultly soluble basic salts and hydroxides of metals. The procedure applied consists in the measurement of the activity of all three ions which form the precipitate of the basic salt, construction of a diagram of the octagonal projections of the experimental points, and determination from this diagram of the composition of the precipitate.

Of great interest was O. Ye. Zvyahintsev's report on the activity and prospects of further development of Zhurnal Neorganicheskoy Khimii. In connection with this report, a resolution was passed in which the conference noted that during the brief period of its activity Zhurnal Neorganicheskoy Khimii was successful and became one of the principal chemical periodicals published in the USSR. The conference proposed that the amount of information in inorganic chemistry published in Zhurnal Neorganicheskoy Khimii be increased by making available other journals devoted to adjacent disciplines such as electrochemistry and radiochemistry, and furthermore reducing as much as possible the length of articles published in this journal so that a greater number of contributions will be published. The conference furthermore regarded as desirable the expansion of the bibliographic subdivision of this periodical.

The conference passed a resolution which stated that, during the 2 years which had elapsed since the second Ukrainian Republic Conference on Inorganic Chemistry, Ukrainian inorganic chemists completed a number of important investigations on the chemistry of nonferrous and rare metals, the chemistry of boron and fluorine, the chemistry of various complex compounds, processes of the formation of complexes and equilibriums in solutions, salt equilibriums and mineral raw materials of the Ukrainian SSR, refractories and construction materials, absorbents, the application of tracer atoms in solving problems pertaining to the structure and properties of inorganic compounds and clarifying the mechanism of chemical reactions, the electrochemistry of fused salts, and analytical chemistry.

The resolution pointed out that insufficient research is being done on the chemistry of individual elements, the synthesis of inorganic compounds, the investigation of the structure of inorganic compounds, and the investigation of mechanisms of chemical reactions.

The resolution, furthermore, outlined the most important lines of research which must be pursued in the field of inorganic chemistry. Also, it emphasized the necessity of raising the theoretical level of the scientific research that is being done, adapting it to practical requirements, and coordinating to an increasing extent work done by various institutes of the Academy of Sciences Ukrainian SSR, the chairs of higher educational institutions, and specialized branch institutes.

It has been decided to hold the next Ukrainian Republic Conference on Inorganic Chemistry in 1960.

11. Lithium Fluoroberyllate

"The Isolation of Lithium Fluoroberyllate From Aqueous Solutions," by O. I. Vorob'yeva, L. M. Mikheyeva, and Yu. P. Simanov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 8, Aug 58, pp 1824-1828

It was established that as a result of the interaction of aqueous solutions of ammonium fluoberyllate with lithium chloride fluoroberyllates of lithium and ammonium of different compositions are formed. The properties of these fluoroberyllates are described. It was established that heating of these lithium-ammonium fluoroberyllates to 220-300° results in the complete elimination of ammonium fluoride. The residue obtained after heating consists of anhydrous lithium fluoroberyllate or the monohydrate of lithium fluoroberyllate.

Organic Chemistry

12. Research on Organophosphorus Compounds

"Triaroxisophosphazoacyl Compounds of the Aromatic Series," by A. V. Kirsanov and G. I. Derkach, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, No 8, Aug 58, pp 2247-2252

Triaroxisophosphazoacyl compounds were prepared by treating trichloroisophosphazoacyl compounds of the aromatic series with sodium arylates. The properties of these compounds are described. It was shown that in the thermal decomposition of triaroxisophosphazoacyl compounds, the aroxy group cannot split off to form triaryl phosphates. Diaryl esters of acylamidophosphoric acids of the aromatic series were prepared by means of alkali saponification of triaroxisophosphazoacyl compounds. The properties of these compounds are also described.

13. Organophosphorous Compounds as Additives for Motor Oils

"Demulsifying Property of Some Organophosphorus Compounds-Additives to Oils," by A. B. Vipper, K. K. Papok, P. I. Sanon, and V. V. Sher; Moscow, Khimiya i Tekhnologiya Topliv i Masel, No 3, Mar 58, pp 45-47

An essential requirement of additives, intended to decrease the formation of low-temperature sediments, in internal-combustion engines, is the possession of high cleansing and demulsifying properties. Additives now used do not possess both properties.

Several organophosphorus compounds were selected to determine whether they possessed both these properties. They possessed highly effective cleansing and anticorrosion properties. In contrast to the existing additives which as a rule are complex mixtures of unknown composition, the relationship between the action of these additives and their composition could be studied.

In the series nickel di-N-butyl-, nickel di-N-decyl-, and nickel di-N-octadecyldithiophosphates, as the hydrocarbon radical is increased the demulsifying property is decreased with a simultaneous increase in the cleansing property. However, barium dialkyldithiophosphates exhibit a reverse relationship, i.e., as the hydrocarbon radical is increased the demulsifying property is increased with a simultaneous increase in the cleansing property. Barium appears to be an excellent carrier of the demulsifying property when combined with high-molecular dialkyldithiophosphates.

But the presence of barium alone in an effective cleansing additive does not guarantee high demulsifying property as shown in the experimental comparison of barium di-N-decyldithiophosphate and barium disulfidedioctylphenyldithiophosphate. At the same effective cleansing activity, the additives exhibited different capacity for stabilizing an emulsion of distilled water in motor oil. Only 12% of the emulsion containing barium di-N-decyldithiophosphate remained after centrifuging for 30 min; whereas 38% of the emulsion containing barium disulfidedioctylphenyldithiophosphate remained after similar centrifuging. The authors assumed that the higher emulsifying property of the latter additive is explained by the presence of sulfur in the structure which connects two hydrocarbon radicals containing the benzene rings, and because of this, promotes, on the border of the division of oil-water protective layers, greater stability than in the case of barium di-N-decyldithiophosphate.



The experimental evidence indicates that, of the various organophosphorus compounds which appear as salts of the esters of dithiophosphoric acid, barium dialkyldithiophosphates possess the highest demulsifying property (from the viewpoint of the applicability of these substances as quality additives to motor oils for decreasing the formation of low-temperature sediments in internal-combustion engines).

14. New Method for Production of Acetylene

"On Obtaining Acetylene by the High-Speed Contact Cracking of Propane," by O. V. Kaminskaya, K. P. Lavrovskiy, and A. M. Brodskiy, Institute of Petroleum, Academy of Sciences USSR; Moscow, Khimiya i Tekhnologiya Topliv i Masel, No 3, Mar 58, pp 1-7

The equilibrium between  $C_2H_4$ ,  $C_2H_2$  and  $H_2$  is displaced in the direction of  $C_2H_2$  at a temperature above  $1,000^\circ$ . Therefore, the investigation of the cracking of hydrocarbons for acetylene should be carried out at temperatures above  $1,000^\circ$ . Although thermodynamic equilibrium at this temperature is displaced in favor of the formation of hydrogen and coke, the kinetic mechanisms of the process hold the formation of coke to a minimum if the raw material is rapidly heated and the end products are condensed immediately.

With this view in mind, the authors examined the possibility of producing acetylene by rapid surface heat exchange. Experiments were performed by a laboratory apparatus designed for the high-speed cracking of propane.

The cracking of the following gaseous products was investigated:

1. Propane at temperatures of 890, 970, 1,050, and  $1,100^\circ$  with 0.007 to 0.03 sec of contact.
2. Mixture of propane and methane ( $CH_4$  - 56%,  $C_3H_8$  - 36% and  $C_2H_6$  - 8% by volume) at 1,100 and  $1,150^\circ$  from 0.0088 to 0.014 sec.
3. Ethylene at 1,100 and  $1,150^\circ$  from 0.009 to 0.0185 sec.
4. Mixture of propane and ethylene ( $C_3H_8$  - 54.3%,  $C_2H_4$  - 44% and  $CH_4$  - 1.7% by volume) from 0.007 to 0.02 sec.

On the basis of the experimental data obtained the authors concluded that it is possible to employ high-speed cracking of propane and its mixtures, especially the mixture with ethylene, to produce acetylene.

Petroleum Chemistry

15. Valuable Substances in Pyrolytic Tars of Hydrocarbon Gases

"Pyrolytic Tars of Hydrocarbon Gases," by A. P. Znamenskaya;  
Moscow, Khimicheskaya Promyshlennost, No 4, Jun 58, p 208

The basic method of obtaining ethylene is the high-temperature pyrolysis of various oil products, mainly low paraffin hydrocarbons -- ethane, propane, and sometimes butane.

In addition to the gases formed -- methane, hydrogen, ethylene and propylene -- as a result of the high-temperature pyrolysis, a large portion of the raw material reverts to a liquid usually called the tar of pyrolysis. Until recently, this tar was not utilized. Now, however, these tars are being processed in order to obtain benzene and toluene. In addition to the latter two products, the tar was found to contain a series of other valuable compounds of technical interest.

As a result of the experiments conducted, the following hydrocarbons (by percentage weight) were isolated from the tar:

Isoprene	0.3-0.4
Cyclopentadiene	1.8
2,3-Dimethylbutadiene	1.35
Cyclohexadiene-1,3	0.8
n-Hexene	0.6-0.8
Cyclohexene	0.9-1.0
Styrene	1.5-2.3
a-Methylsterene	1.4-2.0
Indene	0.5-1.0
Pentane	2.65
Isopentane	3.75-4.0
Methylcyclopentane	1.35-1.4
n-Hexane	1.1-1.2

Cyclohexane	0.2-0.5
Benzene	20-22.0
Toluene	5-8
Xylols:	
o-Xylol	1.83
m-Xylol	1.64
p-Xylol	0.52
Ethylbenzene	0.26
Isopropylbenzene	1.4-1.6
1,2-Diethylbenzene	0.5-1.2
Naphthalene	4-6
Beta-Methylnaphthalene	1.65-2.0
2,3,6-Trimethylnaphthalene	0.8
Diphenyl	0.6-0.8
Anthracene	1.2-1.3
Phenanthrene	1.42-1.60
Carbazole	Traces
Chrysene	0.7-0.9

As a result of the investigation it was also concluded that the quantitative yield of the tar depends on the composition of the pyrolyzed raw material and varies widely, between 6 and 25% by weight, depending on the amount of raw material processed.

16. Physicochemical Properties of Ice-Forming Iodides

"Experimental Data Concerning Certain Physicochemical Properties of Iodide Particles Which Are Ice-Forming Nuclei," by A. D. Malkina, Tr. Tsent. Aerol. Observ. (Works of the Central Aerological Observatory), 57, No 22, pp 117-124 (from Referativnyy Zhurnal -- Khimiya, No 17, 10 Sep 58, Abstract No 56684, by M. Baranayev)

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"Electron microscope investigation of Ag, Pb, and Cd iodide aerosol particles confirm the importance of congruence in the crystallographic structure for ice-forming reagents and ice; it also showed that lead iodide and other no-less-soluble-in-water substances can change their form and partially lose their ice-forming capacity due to the action of droplet moisture. Chemical and electronographic investigations of the above-mentioned aerosols, obtained by heating iodide powders from 500 to 900°, as well as by burning coal briquettes containing these iodides, gave certain new information concerning the composition of the aerosol particles. After the sublimation of silver iodide, the particles of the aerosol formed do not correspond with regard to composition to the original iodide, and are not as active in relation to their ice-forming capacity. Loss amounts to 10-15%."

17. NaF -- AlF<sub>3</sub> -- CaF<sub>2</sub> -- BaF<sub>2</sub> Fusibility Diagrams

"Fusibility Diagram of Three Sections of the Quaternary System NaF -- AlF<sub>3</sub> -- CaF<sub>2</sub> -- BaF<sub>2</sub>," by V. M. Gus'kov and A. I. Ivanov, Tr. Vses. Alyumin.-magn. im-ta. (Works of the All-Union Aluminum and Magnesium Institute), 1957, No 39, 251-273 (from Referativnyy Zhurnal -- Khimiya, No 17, 10 Sep 58, Abstract No 56712, by I. Vereshchetina)

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"Three sections of the system NaF -- AlF<sub>3</sub> -- CaF<sub>2</sub> -- BaF<sub>2</sub>, with a fixed concentration of 22, 27, and 32% by weight of BaF<sub>2</sub>, were studied by plotting the cooling curves taken by visual and partially by crystallooptic methods. The investigations were carried out in an interval of 450-1,000°. The rate of cooling near 450° was 5 degrees/minute; at 1,000°, 20 degrees/minute. Three fusibility diagrams were constructed, each of which included five fields of initial crystallization. Cryolite crystallizes in field I; in II, phase X (apparently AlF<sub>3</sub>.BaF<sub>2</sub>) with a refractive index of  $n_g=1.410-1.415$  crystallized; in III, several phases with various refractive indexes are crystallized. In field IV, a phase with a refractive index of  $> 1,360$  and  $\leq 1.405$  is found. Because of the high volatility of AlF<sub>3</sub>, phase V was not fully investigated. Six ternary eutectic points were discovered:

(1) 22 BaF<sub>2</sub>, 43.2 AlF<sub>3</sub>, 20.6 NaF, 14.2 CaF<sub>2</sub>, 652°; (2) 22 BaF<sub>2</sub>, 46.3 AlF<sub>3</sub>, 10.5 NaF, 21.2 CaF<sub>2</sub>, 660°; (3) 27.0 BaF<sub>2</sub>, 38.2 AlF<sub>3</sub>, 19.0 NaF, 15.8 CaF<sub>2</sub>; 620°; (4) 27.0 BaF<sub>2</sub>, 42.0 AlF<sub>3</sub>, 4.9 NaF, 26.1 CaF<sub>2</sub>, 685°; (5) 32.0 BaF<sub>2</sub>, 32.0 AlF<sub>3</sub>, 17.0 NaF, 19.0 CaF<sub>2</sub>, 660°; and (6) 32.0 BaF<sub>2</sub>, 39.7 AlF<sub>3</sub>, 7.6 NaF, 20.7 CaF<sub>2</sub>, 678°.

Miscellaneous

18. Measures Adopted to Expand Soviet Research in Organic Synthesis

"Expand Scientific Research in Field of Organic Synthesis,"  
by Academician A. V. Topchiyev, chief scientific secretary,  
Presidium of Academy of Sciences USSR; Moscow, Pravda, 6 Jun  
58, p 2

In this article the author points out that certain institutes and scholars of the Academy of Sciences USSR are still insufficiently integrated with industry; they are not clearly aware of the requirements or the needs of industry and thus are not able to contribute adequately in the development of new technological processes.

The Academy of Sciences USSR has adopted a series of measures for the expansion in the work of its chemical institutes and in the concentration of efforts by its scholars for the solution of important scientific-technical problems.

The Institute of High-Molecular Compounds in Leningrad will expand its work in the search for new heat-resistant polymers, methods for their stabilization, and the study of physicochemical characteristics.

A new laboratory for the study of the theoretical basis of new methods for obtaining polymer products and the study of their characteristics will be established in the Institute of Chemical Physics, Academy of Sciences USSR.

Elsewhere, work will be expanded on the chemical conversion of petroleum and gases for obtaining semifinished materials of polymer compositions, on radiation chemistry, and on the production of new elementoorganic monomers and polymers.

The Academy of Sciences USSR and the Ministry of Chemical Industry USSR has organized a Scientific-Technical Council on Polymers in which will be included a number of important scholars and engineers. The council will direct and coordinate theoretical and applied research in the field of polymers.

The Academy of Sciences USSR proposes to establish an Institute of Petroleum-Technological Synthesis, new institutes, divisions, and laboratories in Irkutsk, Novosibirsk, Kazan', and other major industrial centers. New institutes will also be established in the Ukraine, in Uzbekistan, in Azerbaydzhan, and in other union republics. In addition, the following institutes will be called on to contribute to this new program: Institute of Automatics and Telemechanics, Institute of Radio Engineering and Electronics, Physicotechnical Institute, and a number of other institutes of the Academy of Sciences USSR and the academies of sciences of the union republics.

Finally, the Academy of Sciences USSR will soon conduct a session where a discussion will be held concerning the strengthening of the bonds between institutes of the Academy of Sciences USSR, sovnarkhozes (councils of national economy) of the country, and other scientific research organizations in order to assist industry in the development of chemical products.

19. New Chemical Institutes Formed Throughout USSR

"The Network of Scientific Research Chemical Establishments Is Being Expanded" (unsigned article); Moscow, Promyshlenno-Ekonomicheskaya Gazeta, No 101, 24 Aug 58, p 1

A new Scientific Research Institute is being organized in Yaroslav. The institute will conduct research on the production of raw materials -- monomers for synthetic rubber.

A new Institute of the Petroleum and Chemical Industry will soon begin work on the development of a new process of obtaining semiprocessed petroleum products for polymer materials.

Branches of the Leningrad and Moscow scientific research institutes of plastics are being formed in Novosibirsk and Kemerovo, a branch of the Moscow Paint and Varnish Institute is being formed in Chelyabinsk, and a branch of the Leningrad Institute of Synthetic Rubber is being formed in Yerevan. In both Kiev and Krasnoyarsk, branches of the Institute of Artificial Fibers will be formed.

At the same time in all the important centers of chemical industry branches of the Moscow Experimental-Design Bureau of Automatics will be formed.

20. Status of Chemical Research in Leningrad Area

"The People of Leningrad Will Introduce Worthy Contributions,"  
by M. Sidorov, head, Industrial Division of Leningradskaya  
Oblast Party Committee; Moscow, Izvestiya, 24 Jun 58, p 2

The Administration of the Chemical Industry, Leningradskiy Sovnarkhoz, has at present no planning, design, or scientific research organization under its jurisdiction, although these organizations exist in the Leningrad area. To correlate and coordinate chemical research, especially in the field of polymers, part if not all of the chemical organizations in the Leningrad area are scheduled to be placed under the administrative jurisdiction of the Leningradskiy Sovnarkhoz. Many of these organizations are currently subordinate to the State Committee of the Council of Ministers USSR on Chemistry.

The following institutions, located in Leningrad, are currently conducting research on problems concerning the synthesis of new polymers and the structure of the high-molecular compounds which determine their properties: Institute of High-Molecular Compounds, Academy of Sciences USSR; Institute of Applied Chemistry; Scientific Research Institute of Polymerized Plastics; Scientific Research Institute of Synthetic Rubber; Scientific Research Institute for Petroleum Processing; Leningrad Branch of the Scientific Research Institute of Chemical Machine Building; and planning and design institutes and bureaus.

21. Specialists in Polymer Materials To Be Trained in Irkutsk

"On the Shores of Lake Baykal," by N. Yaropolov, deputy chairman,  
Irkutskiy Sovnarkhoz; Moscow, Trud, No 141, 18 Jun 58, p 2

Since the chemical industry is greatly expanding in Irkutskaya Oblast, a large number of specialists with both secondary and higher educations are needed. To meet this requirement a number of secondary educational establishments of the Irkutskiy Sovnarkhoz will begin training technicians in polymer materials in 1959. In addition, an evening technological institute will be opened which will train engineers-technicians and mechanics for the chemical industry.

In Irkutsk State University a special course has been organized which will turn out specialists in the chemistry and physics of polymer products.

22. New Chemical Research Facilities To Be Organized in Bashkirskaya ASSR

"On the Path Toward More Chemistry," by V. Fedorov, chairman, Bashkirskiy Sovnarkhoz; Moscow, Izvestiya, 18 Jun 58, p 2

Numerous chemical establishments in the Bashkirskaya ASSR will soon organize bases for scientific research in chemistry. Taking the initiative in this will be the Bashkir Affiliate of the Academy of Sciences USSR, which will shortly establish an Institute of Chemistry and a series of laboratories and cabinets.

The Bashkirskaya ASSR is planning to establish a sufficient number of chemical research facilities to entice large numbers of highly qualified chemists from Moscow and other large centers of the USSR. In addition, a branch of the Institute "Giprokauchuk" is planned for the Bashkirskaya ASSR.



III. EARTH SCIENCES

23. Earth's Gravitational Field

"Gravimetry," Soobshch. o nauchn. rabotakh po geod. (Reports of Scientific Work in Geodesy), 1957, pp 26-29 (from Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 8, Aug 58, Abstract No 5434)

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"Work on gravimetry, based on materials published in the USSR during the years 1934-1956, is briefly reviewed. The review concerns absolute determinations of the force of gravity, the establishment of g values in initial points and in the reference network of the Soviet Union, evaluation of accuracy of measurements, unification of field gravimetry work, theory, analysis and test of pendulum devices and gravimeters, calibration of gravimeters and processing of observations, and investigations of the vertical gradient of the force of gravity."

24. Earth's Figure and Gravity

"Determination of the Figure, Dimensions, and Gravitational Field of the Earth," Soobshch. o nauchn. rabotakh po geodezii (Reports of Scientific Work in Geodesy), Moscow 1957, pp 30-37 (from Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 8, Aug 58, Abstract No 5417)

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"In a review of scientific problems connected with practical requirements of geodesic work, basic principles are reported by F. N. Krasovskiy for the determination of the ellipsoid and its orientation and on research by I. D. Zhongolovich concerning the gravitational field, the flattening of the ellipsoid, and the figure of the geoid by expanding the anomalies of the force of gravity into spherical functions. Research by M. S. Molodenskiy and his students concerning geodesic gravimetry and the theory of the Earth's shape is described."

25. Figure of the Earth

"Solution of the Integral Equation Determining the Figure of the Earth." by M. I. Yurkina. Tr. Tsentr. n.-i. in-ta geod., aeros'yenki i kartogr., 1957, No 121, pp 41-42 (from Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 8, Aug 58, Abstract No 5427)

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"It is suggested, in the numerical integration of the Molodenskiy equation determining the Earth's figure, to determine the first approximation by plotting the simple density layer  $\sigma = \frac{\delta - \delta^a}{2\pi a}$  on the auxiliary sphere of

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radius  $R + H_0$ , where  $R$  is the terrestrial radius,  $H_0$  the normal altitude of the investigated point, and  $g - \gamma$  the anomalies at the points of the physical surface of the Earth. Remark by the Editor: This method holds only in the particular case, when the normal altitude of the investigated point is not over the normal altitudes of other points of the environment."

26. Uzbek Branch of All-Union Petroleum Scientific Research Geologicoprospecting Institute Established in Tashkent

"Research Center of Petroleum Industry in Uzbekistan" (unsigned article); Moscow, Promyshlennno-Ekonomicheskaya Gazeta, No 102, 27 Aug 58, p 1

An Uzbek Branch of the All-Union Petroleum Scientific Research Geologicoprospecting Institute (Uzbekskiy Filial, Vsesoyuznyy Neftyanyy Nauchno-Issledovatel'skiy Geologo-razvedochnyy Institut) has been established in Tashkent; its director is A. M. Akram-Khodzhayev. The branch institute is scheduled to conduct research on improving methods used in the Uzbek SSR for industrial processing of deposits. To do this research, the institute has organized ten special laboratories equipped with the latest equipment.

27. Soviet Scientist Visits Czechoslovakia

"Local and Foreign News" (unsigned article); Prague, Obrana Lidu, 20 Sep 58, p 2

I. E. Starik, Corresponding Member of Academy of Sciences USSR and chairman of the Commission for Determining the Absolute Age of Geological Formations, Geological-geographical Section of Academy of Sciences USSR, recently visited the Czechoslovak Institute of Nuclear Physics, Czechoslovak Academy of Sciences.

28. New Chinese Periodical

Title: Ts'e-liang Chi-t'u Hsueh-pao (Acta Geodetica et Cartographica Sinica)

Periodicity: Quarterly

Editor: Geodetic and Cartographic Society of China Preparatory Committee (中國測量制圖學會籌備委員會). Editorial board includes Fang Chun (方 俊), chairman; Yeh Hsueh-an (叶 學安) and Ning Tu-i (宁 篤义), vice-chairmen; and others.

Publisher: K'o-hsueh Ch'u-pan-she, Peiping.

Contents of Vol 2, No 2, April 1958: The journal's purpose, as stated in this issue, is "to publish articles on geodesy and cartography, including original works, reviews of major achievements in foreign research, and critiques of Chinese publications." Authors are instructed to indicate on their manuscripts their respective organizational affiliations and current occupations. However, published articles do not all give this information.

Vol 2, No 2, contains four original articles: three with Russian abstracts and one with an English abstract. Titles and authors include the following:

CPYRGHT

"Conversion of Khristov's Formula for Gauss Conformal Projection With a Constant Coefficient to I. T. Letoval'tseva's Formula and Expansion," by Shih Shu-sen (史 樹 森), Wuhan Institute of Geodesy and Cartography.

"Formula for the Conversion of Coordinates From a Gauss Projection Zone to an Adjacent Zone and From Lambert's Secant-Cone Projection to Gauss Projection by the Method of Supplementary Points at Any Position," by Yeh Hsueh-an (叶 雪 安), Wuhan Institute of Geodesy and Cartography.

"Preliminary Report on the Investigation of Wooden Towers of Triangulation," by Lin Ming-i (林 明 仪), Wang Kuang-yun (王 广 运), and Wang Hua-chun (王 华 钧), Laboratory of Geodesy and Cartography, Academia Sinica.

"Preliminary Report on the Investigation of the Accuracy of Concentrating Control Points by Pencil Reduction With an A<sub>5</sub> Plotting Apparatus and by the Use of No-Warpage Model (s)," by Ch'en Hsien-k'eng (陈 显 铿).

#### IV. ELECTRONICS

##### Communications

##### 29. New Leningrad TV Tower

"New TV Tower for Leningrad TV Center," by O. I. Shumitskiy and L. G. Dmitriyev; Leningrad, Byulleten' Tekhnicheskoy Informatsii (po stroitel'stvu), No 7, Jul 58, pp 14-17

Lenproyekt and Kiev "Proyektstal'konstruktsiya" have completed the design of a 316-m television tower for the new Leningrad TV broadcasting center. The tower will be a hexagonal lattice-type all-welded prestressed structure utilizing rolled thick-walled tubes. The antenna on this tower will be capable of transmitting several black-and-white and one color broadcasting program. It is expected that such a tower can be erected in 6 months.

##### Electromagnetic Wave Propagation

##### 30. Radiowave Absorption in Ionosphere

"Absorption of Radiowaves in the Ionosphere According to Radio Observations of Artificial Earth Satellites," by A. N. Kazantsev, T. S. Romanova, and A. Ya. Klementenko; Moscow, Radiotekhnika i Elektronika, No 9, Sep 58 pp 1107-1121

The article describes a method for determination of absorption coefficient of radio waves in the ionosphere by measuring the electric field intensity. By comparing the integral absorption coefficient at various altitudes of the satellite with respect to the maximum of electron concentration in the F<sub>2</sub> layer, the radiowave absorption was determined over the whole thickness of the F<sub>2</sub> layer, as well as for layers below.

To measure field intensity from the satellite-borne transmitters, radio-comparator stations of the Ministry of Communications USSR located at various points in the Soviet Union were utilized. These stations were equipped with type VINP and TME-18 automatic recording field intensity meters. The Moscow and Khabarovsk comparator points processed the data. The data from the first satellite for 5, 6, and 7 October 1957 and data from the second satellite for 3, 7, and 8 November 1957 were carefully analyzed. In this analysis three separate ranges were studied: the range of direct visibility, the medium-distance range, and great-distance range (6,000-8,000 km).

Preliminary investigation has shown that integral absorption in the F<sub>2</sub> layer as determined from the experiment agreed well with theoretical calculations. For great distances, i.e., from 6,000 km, the actual field intensity exceeded the calculated values for conditions of ideal propagation. This points to the fact that for great distances the electromagnetic propagation was along ionospheric radioducts. Under these conditions the signals from the satellite could be heard as far as 16,000 km.

#### Computers and Automation

##### 31. Systems of 400 Unknowns Solved by New Computer

"SESM" (unsigned article); Moscow, Nauka i Zhizn', No 9, Sep 58, p 66.

The electronic computer constructed at the Computation Center of the Academy of Sciences Ukrainian SSR is known by the designation "SESM." Large numbers of ferrite elements, electron tubes, and semiconductor elements are employed within it. Its area is not great; in all, 8 square meters; in addition, it is simple in control. During one shift the machine does the work which would require 20 individuals a month to do using ordinary calculators. According to the article, the "SESM" is the first machine of its type in the USSR and Europe which can solve a system of linear algebraic equations having up to 400 unknowns. The "SESM" permits one to solve a series of complex problems concerning the construction of hydrotechnical installations, geodetics, and mathematical physics. With the help of this machine independent practical problems and problems of mathematical research have already been solved.

The new computer was developed by a group of scientists and engineers under the direction of S. A. Lebedev, Active Member of the Academy of Sciences Ukrainian SSR, and E. L. Rabinovich, Candidate of Technical Sciences.

[For additional information on computers, see [Item No 121.]

Instruments and Equipment

32. Precision Angular Velocity Measurement

"Heterodyne Device for Precise Measurement of Angular Velocity," by R. I. Utyamyshev; Moscow, Pribory i Tekhnika Eksperimenta, No 4, Jul/Aug 58, pp 66-68

The article describes an instrument for precision measurement of angular velocity based on heterodyne comparison of transducer voltage frequency with the frequency of a quartz oscillator. The device operates in conjunction with photoelectric and induction transducers. The detection range of the device is from 110 to 11,100 rpm with a precision of  $\pm 0.25$  rpm.

The photoelectric transducer consists of an illuminator, photocell FSA-1, and a disk with two rows of calibrated holes; the disk is attached to the rotating shaft. The working range of the device is divided into two bands: the lower for 110-1,100 rpm, and the upper for 1,100-11,100 rpm. Each band is further subdivided into 20 subbands, which is accomplished by the use of 20 quartz resonators. These resonators maintain the frequency stability within 0.01%.

The circuit of the device is made of two quartz oscillators, mixing stage, discriminator amplifier, photoelectric transducer voltage, amplifier, phase shifter, and a terminal stage connected to the winding of a synchronous motor driving the magnetic tachometer. On the instrument board are mounted two magnetic tachometers, one for measurement of the difference of frequencies and the other for continuous rough reading ( $\pm 0.5\%$ ).

33. High-Speed Oscilloscope

"High-Speed Pulse Oscilloscope," by L. S. Bartenev, G. V. Glebovich, L. V. Goryachev, and Yu. A. Sharov, Scientific Research Radiophysics Institute; Moscow, Pribory i Tekhnika Eksperimenta, No 4, Jul/Aug 58, pp 63-65

In this oscilloscope the high-speed sweep voltage is obtained by utilizing ionization characteristics of a pulse thyatron. The maximum speed of sweep is  $2 \times 10^9$  cm/sec, which permits examination of pulses with minimum duration of  $5 \times 10^{-10}$  sec. The oscilloscope uses a deflection system built in the form of a transmission line.

The oscilloscope has two sweep units: a high-speed sweep unit with 0.1-, 0.05-, and 0.015-microsec-duration sweep and a superhigh-speed sweep unit with 0.004- to 0.005-microsec-duration sweep. To calibrate the investigated pulse, two sinusoidal wave oscillators operating at 200 or 500 Mc are provided. The trigger system consists of external trigger pulse amplifier, a blocking oscillator, and two cathode followers. For undistorted reproduction of short-duration pulses a special cathode-ray tube was used; its vertical deflection system was built in the form of a simple transmission line and each plate of the tube had a rigid outlet through the bulb. To one end of such a line the examined pulse is fed through a matched cable; the other end of the line is terminated with a resistance equal to its characteristic impedance. The thus-matched deflection system permits the passage of 1,000-Mc band. The accelerating voltage in the tube might be as high as 3 kv and the deflection sensitivity up to 9 v/mm.

The oscilloscope has provisions for measurement of pulse duration by means of comparison with a sinusoidal voltage; the pulse amplitude can be measured by comparison with dc voltage.

#### 34. Pulse-Height Analyzer with Cathode-Ray Tube

"Amplitude Analyzer With Cathode-Ray Tube," by A. P. Tsitovich; Moscow, Pribery i Tekhnika Eksperimenta, No 4, Jul/Aug 58, pp 40-50.

The article describes a 49-channel pulse-height analyzer with a storage cathode-ray tube on the screen of which the examined spectrum is recorded and observed in linear coordinates. The analyzer has 147 "binary" channels and a storage capacity of 2<sup>13</sup>.

The device is built in two units: the storage unit, which acts as a registering device, and the input unit, which converts the pulse amplitude into pulse width. All the time relationships are formed in a master timing oscillator of the storage unit. The operating cycle of this timing oscillator is 20 microsec; during this period of time the beam scans the dotted raster of the screen. The examined pulse is first admitted to the input unit where it is stored until the beginning of a new frame, after which the pulse amplitude is converted into the width of the pulse, i.e., a pulse is formed which is delayed with respect to the beginning of a frame by a time interval proportional to the amplitude of the pulse. The storage system is based on representation with rings and dots.

This analyzer was used to examine radioactive isotopes ( $U^{238}$ ,  $Pu^{239}$ ,  $Am^{241}$ ) with the aid of an ionization chamber developed in the Laboratory of S. A. Baranov. The experiment revealed that this analyzer permits obtaining the measured spectrum directly. The instrument is a table model and incorporates 60 tubes. The power consumption is about 750 w.

The resolving power of this analyzer can be considerably increased if the storage of the signals is carried out in an interlaced manner. The 3LLO33 cathode-ray tubes with white phosphor screen were specially made at the laboratory of Tsekhanovich. The author thanks S. A. Baranov, V. I. Mostovoy, and M. I. Pevzner for assistance.

### 35. New Powerful Electron Microscope

"Magnetic Electron Microscope UEMB-100," by P. A. Stoyanov, V. V. Polivanov, and G. A. Mikhaylovskiy; Moscow, Pribery i Tekhnika Eksperimenta, No 4, Jul/Aug 58, pp 51-60

The new magnetic electron microscope UEMB-100 is a multipurpose instrument with improved electronic-optical parameters. G. A. Mikhaylovskiy, P. A. Stoyanov, and V. V. Moseyev are the designers of the UEMB-100 microscope. Its electronic-optical system consists of an electron gun to which a high voltage is fed through an armored feeder, and of a condenser, objective, intermediate, and projection lenses.

The UEMB-100 has a greater resolving power (up to 20 Å) and a wider field of application than other Soviet electron microscopes. The instrument permits investigations with smooth changes in magnification from 250 to 150,000. The accelerating potential of the microscope can be set at 50, 75, or 100 kv, depending on the thickness and density of the specimen. With the aid of attachments the microscope can secure images from reflected surfaces; it can also produce diffraction patterns from powdered material.

The lighting system consists of a three-electrode gun and a condenser lens. The electron gun has a V-shaped tungsten cathode and anode. The condenser lens acts as a magnetic lens with long focal distance. The objective lens is the most complex and responsible component of the whole microscope. The intermediate and projection lenses are combined into a single projection unit. The photographic camera holds twelve 6X9 cm plates or thirty-six 2.4X3.6cm film frames. Rotary and diffusion pumps produce a vacuum of  $3 \times 10^{-4}$  mm Hg. The cathode of the electron gun is heated by a high-frequency current of about 55 kc; such current can be regulated from 1.5 to 3 a. The lens current can be smoothly regulated in the range from 75 to 225 milliamperes. The lense winding is made of 20,000 turns divided into two sections (15,000 and 5,000 turns).

Maximum magnification is obtained when all lenses are engaged and a pole trip is mounted in the projection lens. Diffraction patterns are obtained by using the condenser lens alone. Three such microscopes have been built thus far.



36. New High-Voltage Electron Microscope

"Soviet Electron Microscopes," By Yu. M. Kushnir; Moscow, Pribery i Technika Eksperimenta, No 4, Jul/Aug 58, pp 3-18

A high-voltage (400-kv) electron microscope was developed in 1957 by N. M. Popov. Utilization of such a high voltage in electron microscopes permits examination of objects much thicker than is possible with other types of microscopes. The 400-kv microscope has two interchangeable columns, one being the electron microscope proper with attachment for taking diffraction patterns and the other a common lensless electronograph with a universal crystal holder. The microscope consists of a multi-stage electron gun, and of condenser, objective, intermediate, and projection lenses fed from a storage battery. The high-voltage power supply consists of a four-stage voltage multiplier built with kenotrons and R-C filters. The microscope is mounted on an earthquake-proof foundation.

The resolving power of the microscope is  $20 \text{ \AA}$  and it develops magnification up to 80,000. The first examinations with this new instrument have revealed its great possibilities in the field of examination of minerals, metals, and biological objects.

Patents

37. Soviet Patents in Field of Electronics

"Class 21: Electrical Engineering" (unsigned article); Moscow, Byulleten' Izobreteniy, No 6, 1958, pp 34-54

Class 21a, 108. No 113971 -- G. M. Utkin; Device for Frequency Stabilization in Radio Frequency Range

Class 21a, 35<sub>50</sub>. No 113901 -- O. A. Aleksandrov and N. N. Stepanov; Synchronization Method for Mobile Transmitting TV Camera

Class 21a<sup>1</sup>, 34<sub>31</sub>. No 113909 -- V. L. Kreytser, System of Compatible Color Television

Class 21a<sup>1</sup>, 35<sub>10</sub>. No 113808 -- R. A. Kudryavtsev and A. D. Kirpicheva; Method of Video Signal Stabilization in Facsimile Devices

Class 21a<sup>2</sup>, 18<sub>08</sub>. No 113840 -- I. M. Stolyarov; Three-Phase Magnetic Amplifier.

Class 21a<sup>4</sup>, 8<sub>02</sub>. No 113613 -- A. A. Timofeyev; Method for Obtaining High-Frequency Voltage for Continuous Range

Class 21a<sup>4</sup>, 22<sub>06</sub>. No 113636 -- Ye. K. Aukhimovich; Method for Adding Signals in Reception on Two Mutually Perpendicular Antennas

Class 21a<sup>4</sup>, 21. No 113877 -- G. N. Kalinin; Device for Investigating Electromagnetic Field Near the Inner Surface of Waveguide

Class 21a<sup>4</sup>, 21. No 113982 -- B. Ye. Kinber; Commutator and Unidirectional Circulator for Superhigh Frequencies

Class 21a<sup>4</sup>, 24<sub>01</sub>. No 113494 -- B. Sh. Kissel'gof; Transistorized Frequency Converter

Class 21a<sup>4</sup>, 29<sub>04</sub>. No 113624 -- V. F. Shmatchenko; Magnetostrictive Filter

Class 21a<sup>4</sup>, 46<sub>06</sub>. No 113931 -- Yu. V. Khodatayev; High-Frequency Cutoff Filter

Class 21a<sup>4</sup>, 66<sub>01</sub>. No 113586 -- N. V. Ryzhkov; Air-Borne Stiff Collapsible Antenna

Class 21a<sup>4</sup>, 71. No 113390 -- A. I. Tereshchenko; Method for Measurement of Dielectric Constant

Class 21a<sup>4</sup>, 71. No 113565 -- T. L. Ya. Ulanovskaya and A. A. Verkho-  
vin; Method for Measuring delay Time of Delay Lines.

Class 21a<sup>4</sup>, 71. No 113757 -- B. B. Burenin and I. K. Kupriyanov; De-  
vice for Determination of High-Frequency Characteristics of Ferrites

Class 21c, 26<sub>02</sub>. No 113448. R. K. Pamfilov -- Contactless System  
of Synchro Transmission of Angle of Rotation and Rotation of Shaft With  
Aid of AC

Class 21c, 46<sub>02</sub>. No 113778 -- R. Sh. Shafeyev. Device for Remote-  
Control Transmission of Angle of Rotation by Selsyn

Class 21c, 54<sub>05</sub>. No 113842 -- N. I. Voronin, R. I. Bresker, and  
B. Ye. Benenson. Compound for Preparation of Temperature Compensating  
Electric Resistors.

Class 21d<sup>2</sup>, 42<sub>01</sub>. No 113922 -- P. V. Chebyshev; Ferroresonant Volt-  
age Regulator

Class 21e, 12. No 113411 -- A. M. Agafonnikov; Method for Changing  
the Magnitude of Magnetic Field Component in Assigned Direction

Class 21e, 36. No 113350 -- I. S. Kisel'gof Phase Discriminator

Class 21g, 13<sub>01</sub>. No 113403 -- V. I. Fistul' and G. E. Pines; Method  
of Manufacturing Superhigh-Frequency Detector Crystals

V. ENGINEERING

38. Calculation of Stresses in Delta Wings

"Method for Calculating the Strength of a Triangular Wing With Consideration of the Elastic Butt," by V. F. Kiselev; Moscow, Trudy Tsentral'nogo Aero-Gidrodinamicheskogo Instituta imeni Prof N. Ye. Zhukovskogo, No 703, 1957, 44 pp

A method is presented for determining stresses in a triangular wing in which the theory of Castigliano is applied in calculations of the effect of an elastic butt.

Equations are developed and calculations are performed for stresses in sections of a conical shell without taking into account the effect of the butt end, in the region of an elastic butt, in a multispar triangular wing, and in a swept wing with ribs parallel to lines of flow. A numerical example for a conical shell with rectangular cross sections is processed.

The author presents the following conclusions:

1. The theory for calculations of butt regions of conical shells is in principle analogous to the theory for calculations of cylindrical shells. Differential equations for the boundary problem of a conical shell are Euler-type equations instead of equations of the hyperbolic type which are applied in calculations of cylindrical shells.
2. Calculation of a swept shell with ribs parallel to lines of flow is reduced to the solution of differential equations of the hyperbolic type as in shells with normally placed ribs.
3. Calculation of stresses according to the approximated beam theory with reduced areas of cross sections is acceptable for all sections except those located in end regions of the shell. Stresses calculated for root sections according to the beam theory and those with consideration of the boundary effect may differ by 10-20%.

This issue (i.e., of the Trudy) is designed for engineering-technical workers of aviation design bureaus and for instructors and students in higher schools of aviation.

39. Hall Effect Relays

"Relays Based on Hall Effect," by I. M. Sirota; Moscow, Vestnik Elektro-promyshlennosti, No 9, Sep 58, pp 9-14

The article describes a method for calculation of semiconductor transducer based on the Hall effect. Such transducers are generally made of materials possessing high carrier mobility.

Electron-type semiconductors most suitable for construction of protective relays are indium arsenide (InAs), indium antimonide (InSb), and germanium. These materials, when highly refined, possess high carrier mobility and high Hall coefficient. Investigation has shown that the greatest power output can be obtained with InAs. However, InSb has an advantage of simpler technology. At present difficulties are still experienced in preparation of InSb and InAs plates possessing preassigned parameters.

The Hall effect can be most advantageously utilized in directional relays. If such a relay is restricted to operations near normal, then the InAs and InSb transducers can be connected directly to magnetoelectric or polarized relays without further signal amplification.

The power output of a circuit utilizing Hall effect is proportional to the ratio of Hall coefficient to that of the specific resistance of the plate material at given temperature and magnetic induction, and to the ratio of the power consumed in building the magnetic field and heating to that of the plate volume.

The author concludes that the data and equations presented in this article will serve well for future calculations of relays based on the Hall effect.

40. Successive Method of Floor Lifting in Construction of Multistory Buildings

"Construction of Residential Buildings by Method of Successive Lifting of Floors," by L. Yu. Gal'perin; Leningrad, Byulleten' Tekhnicheskoy Informatsii (po stroitel'stvu), No 7, Jul 58, pp 3-6

The Leningradskoye Institute has developed a method for multi-story building construction in which each successive floor (up to 500 sq m in area) with walls is lifted by means of special hydraulic jacks (of V. A. Kuznetsov's design) to the desired height.

The actual construction is done in three stages: the first stage consists in construction of foundation and ground floor slab; the second stage consists in erecting of a number of properly spaced concrete columns (about 40 X 40 cm) having the height of the whole building. On each column are placed metallic collars depending on the number of floors. Each successive floor slab is made on the ground-floor slab as follows: the ground-floor slab is covered with a separating layer of paraffin, and the reinforcing bars for the next floor slab are laid on the ground slab and are welded to the collars; the concrete is then poured. When the concrete hardens, the floor slab with the walls mounted on it are lifted into place by means of a number of hydraulic jacks attached to each column.

The economic feasibility of this method can be fully evaluated only after experimental constructions have been completed.

41. Activities of Scientific Research Institute of Electrography, Lithuanian SSR

"A Year of Fruitful Labor" (unsigned article); Vil'nyus Sovetskaya Litva, No 162, 11 Jul 58, p 3

The Scientific Research Institute of Electrography, which is under the Instrument Building Administration of the Lithuanian SSR Sovnarkhoz, recently celebrated its first anniversary. The institute's director is I. Zhilevich.

At present the institute consists of six laboratories, a design bureau, experimental shops, and a division of information. Nearly 70 persons are employed, who work on problems of contactless printing, electrography, and high-speed X-ray photography.

During the past year the institute has developed a device for magnetic image recording, a ferromagnetic printing press, a photoconductor multiplying machine, an electrographic magnifier for oscillograms and electrocardiograms, an electrophotocamera, a high-speed X-ray assembly, a special machine for applying a photoconductor layer on cotton cloth, and a number of other instruments.

The institute maintains close contact with many institutes of the Academy of Sciences USSR and other institutes under the various sovnarkhozes of the USSR.

VI. MATHEMATICS

42. New Method for Solving Linear and Nonlinear Differential Equations

"New Method for Solving Nonlinear and Linear Equations Having Variable Coefficients in Total Derivatives. The Finding of Periodic Solutions," by N. K. Kulikov, Stalingrad Mechanics Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika No 4 (5), Jul/Aug 58, pp 140-152

An account of a new method is given for solving and finding periodic solutions of differential equations in total derivatives. The essence of the method consists of the following:

According to the method, a special form for the general solution of all the equations is found one by one. The general solution and thereafter the periodic solutions are not sought in explicit form,

$$x = f(t),$$

as usual, but in the implicit form

$$\gamma(x, t) = 0 \text{ or } \gamma(x) = f(t).$$

The general solution is shown dependent on the definite number of unknown functions, or on the order of the equation. A system of special differential equations is obtained for determination of these unknown functions. By solving the system of auxiliary differential equations (in some cases exactly and in others approximately), the solution of the presented problem is obtained. It is extremely important that the solution of the problem in the zero approximation is often more exact than the ordinary first approximation and that solution of the system of auxiliary equations is not necessary.

43. Solution for Differential Equation Studied for Large Values of the Argument

"Concerning the Properties of the Solutions for the Differ-

$$\text{ential Equation } \frac{d^n y}{dx^n} + p(x) \frac{d^{n-1} y}{dx^{n-1}} + q(x) \frac{d^{n-2} y}{dx^{n-2}} + f(x) y = 0$$

and Their Derivatives for Large Values of the Argument," by I. Ya. Gofman; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4 (5), Jul/Aug 58, pp 54-59

In this work the behavior of the solutions of the differential equation  $y^{(n)} + p(x) y^{(n-1)} + q(x) y^{(n-2)} + f(x) y = 0$  and the behavior of their derivatives for large values of the argument is investigated, that is, for values of the argument lying as far as desired beyond large positive fixed values of  $x$ .

44. Nonholonomic Geometries

"Algebraic Theory of Coordinate Structures and Geometrical Objects," by M. A. Spivak, Saratov State University imeni N. G. Chernyshevsky Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4(5), Jul/Aug 58, pp 236-247

In differential geometry the coordinate structures (in the sense of Bourbaki) are the fundamental type of structure, which are determined by a certain set of coordinate systems, that is, of partially, one-to-one, single-valued mappings of the considered geometrical space into an arithmetical space. Differing from the coordinate system the partially, one-to-one, single-valued mappings of an arbitrary set A into an arbitrary set B will be called partial maps, and the sets of partial maps will be called atlases. In this work approximating theories for several types of atlases are constructed. The axioms of these atlases represent certain theoretical set properties of the coordinate structures of the Veblen and Whitehead spaces, the spaces of Klein, and of tangential composite manifolds. In the article it is proved that the fundamental properties arise from the corresponding coordinates of the structure chosen by the axiom and for that reason, because of the generality, the derivation of these properties are significantly simplified. In addition, the partial maps are considered as special binary relations making it possible to apply the algebra of binary relations to the study of atlases.

45. Solution of Singular Integral Equations by Theory of Approximation

"Several Properties of Singular Integrals," by V. V. Ivanov, Rostov Institute of Agricultural Machine Building: Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4 (5), Jul/Aug 58, pp 89-95

The questions, considered in this work, are those which naturally arise during the investigation of singular, integral equations by approximation theory. Two fundamental theorems were stated and proved.

46. Nilpotent Algebras of Lie Classified

"Classification of the Nilpotent Algebras of Lie of the Sixth Order," by V. V. Morozov, Kazan' State University imeni V. I. Ul'yanov-Lenin; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4 (5), Jul/Aug 58 pp 161-171

A classification of the exact representations of the algebras of Lie by nilpotent matrices of the fourth order was presented. From this a classification of the nilpotent algebras of Lie of the sixth order was obtained over an arbitrary field of the zero characteristic.

47. Approximation of Functions by Polynomials

"Concerning the Approximation of Functions by Polynomials With Whole Number Coefficients," by G. A. Zhirnov, Moscow Aviation Institute imeni Sergo Ordzhonikidze; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4 (5), Jul/Aug 58, pp 80-88

As is known, one of the important problems of contemporary mathematical analysis is the expansion of functions of one or the other class in series of polynomials as functions of simpler classes. If the coefficients of the polynomials are taken not only as rationals, but as whole number rationals, the series of polynomials in which the given function is expanded becomes simpler. But whole number coefficients impose restrictions on the function and on the character of that set over which approximation is conducted.

In the existing literature approximations of functions were considered over the following sets: a segment of the real axis, and a closed bounded, nowhere dense set which does not split the plane. However; up to the present sets of the n-dimensional space have not been considered.

The purpose of this work is to find those conditions for the n-dimensional space which would make it possible to approximate a uniform function by polynomials with whole number rational coefficients.



48. Galerkin's Method Generalized

"Concerning a Generalization of the Method of Galerkin," by A. D. Lyashko, Kazan' State University imeni V. I. Ul'yanov-Lenin; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy Matematika, No 4(5), Jul/Aug 58, pp 153-159

In this article the general theory of approximate methods was employed for an investigation of the method of Galerkin and its modifications. Herein, in addition to a theorem concerning convergence, the order of error of the approximation method for a series of concrete problems was established. Concerning the conditions of convergence, they in one way or the other replace the condition of N. I. Pol'skiy, and thus as a rule, appear comparatively simply.

It was noted that the theorems of convergence, presented in the work, envelop the earlier known results of the Hilbert space.

49. Asymptotic Integration of Nonlinear Systems Generalized

"Concerning the Problem of Asymptotic Integration of Nonlinear Systems With Many Degrees of Freedom," by N. G. Bulgakov, Ural State University imeni A. M. Gor'kiy; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4 (5), Jul/Aug 58, pp 36-40

In his work of 1949 N. N. Bogolyubov worked out a method of asymptotic integration of quasilinear autonomous systems having many degrees of freedom, which enables one to study not only stationary periodic conditions, but also the transitional processes or the processes of determination. N. N. Bogolyubov limited himself, however, to consideration of the partial case when the characteristic equation of the generating system has only one pair of critical (pure imaginary) roots.

In this paper the results of N. N. Bogolyubov are generalized for the case of an arbitrary number of critical roots and the method of calculating the periodic solutions is indicated.

50. Orthogonal Polynomials in the Complex Case

"On Certain Properties of Orthogonal Polynomials," by Ye. A. Sinyev; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4(5) Jul/Aug 58, pp 222-234

In this work several properties of polynomials, orthogonal to a contour or to the area of a region lying in the complex plane, are considered.

In Section 1 the necessary and sufficient conditions are sought for orthogonal polynomials to vanish at one and the same point.

In Section 2 the necessary and sufficient conditions are sought for orthogonal polynomials to have a uniformly bounded number of terms

In Section 3 the asymptotic formula is considered for polynomials orthogonal to the area of a region.

In Section 4 the problem concerning the simultaneous orthogonality of polynomials to the contour and area of a region is considered.

51. Problem of Optimum Control Clarified

"Concerning the Correctness of Presenting a Problem of Optimum Control," by F. M. Kirillova, Ural Polytechnic Institute imeni S. M. Kirov; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4 (5), Jul/Aug 58, pp 113-126

In this work the continuous dependence of the solution,  $u_k(x_{10}, \dots, x_{n0}, t_0, c_1, \dots, c_e, t), T(x_{10}, \dots, x_{n0}, t_0, c_1, \dots, c_e)$ , of the control system described by the differential equations:

$$\frac{dx_i}{dt} = \sum_{k=1}^n a_{ik}(t, c_1, \dots, c_e) x_k(t) +$$

$$+ \sum_{k=1}^n b_{ik}(t, c_1, \dots, c_e) u_k(t) \quad (i = 1, \dots, n),$$

where  $u_1(t), \dots, u_r(t)$  are controlling functions, on the initial data  $x_{10}, \dots, x_{n0}$  and on the parameters  $c_1, \dots, c_e$  (under certain suppositions) is indicated. In other words, the question concerning the correctness of presenting the problem of optimum control is clarified.

52. Reducibility of Infinite Groups of Cartan Transformations

"Concerning the Reducibility of Infinite Groups of Cartan Transformations," by Ku Chao-k'ao, Moscow State University imeni M. V. Lomonosov; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 4(5), Jul/Aug 58, pp 60-66

This work is dedicated to the reducibility of infinite groups of Cartan transformations. The transitive groups defined by differential equations of the first order are considered.

Let G be an infinite transitive group of transformations defined by equations of the first order in the n-dimensional space  $m_n$ . It is known that there exist invariant forms of the group  $w^1, w^2, \dots, w^r$  satisfying the following relations:

$$dw^i = \frac{1}{2} C^i_{jk} [w^j w^k] + a^i_{jp} [\tilde{w}^j w^p] \quad (C^i_{jk} = -C^i_{kj}), \quad (1)$$

$$i = 1, \dots, n, \quad p = 1, \dots, r,$$

where  $\tilde{w}^p$  are r new independent forms and  $w^i, C^i_{jk}$ , and  $a^i_{jp}$  are constants. Moreover these constants are satisfied by the following conditions:

$$1. \text{ The system } a^i_{jp} a^j_{k\sigma} - a^i_{j\sigma} a^j_{kp} = r_{p\sigma}^\lambda a^i_{k\lambda}, \quad (2)$$

$$a^k_{\lambda\tau} Z^{\tau}_{mp} - a^k_{m\tau} Z^{\tau}_{\lambda p} = C^i_{\ell m} a^k_{\lambda p} + C^k_{\lambda\ell} a^i_{mp} - C^k_{im} a^i_{\lambda p}, \quad (3)$$

$$a^k_{\lambda\tau} y_{mn} + a^k_{m\tau} y^{\tau}_{n\lambda} + a^k_{m\tau} y^{\tau}_{\ell m} = C^k_{\ell m} C^i_{mn} C^k_{i\ell} + C^i_{n\ell} C^k_{im} \quad (4)$$

2.  $\{a^i_{jp}\}$  generates the involute system.

Equation (2) indicates that the symbol

$$X_p \cdot f = a^j_{ip} x^i \frac{\partial f}{\partial x^j} \quad (5)$$

produces a linear group, which consists of transformations of the tangent vectors at any point p during transformations of the group, fixing the point p. This linear group is called the adjoint linear group.

The group G is called reduced if it is possible to find such a system of coordinates in the manifold  $m_n (x^1, x^2, \dots, x^n)$ , such that the general finite equations of G have the form

$$x^{i1} = f^{i1} (x^1, \dots, x^q) \quad (i_1 = 1, 2, \dots, q), \quad (6)$$

$$x^{i2} = f^{i2} (x^{q+1}, \dots, x^n) \quad (i_2 = q+1, q+2, \dots, n),$$

where  $f^{i1}$  and  $f^{i2}$  do not depend on each other.

The following result was obtained: if the adjoint linear group L does not have a fixed contravariant or covariant vector and is broken down to the direct product of two linear groups  $L'$  and  $L''$ , where  $L'$  and  $L''$  act in subspaces  $E_q$  and  $E_{n-q}$ , not possessing a general direction, the group G is reduced.

VII.. MEDICINE

Bacteriology

53. Effects of Methyl Bromide on B. pestis Studied

"Action of Methyl Bromide on B. pestis Under Experimental Conditions," by S. K. Gizatullina, Tr. Rostovsk.-na-D. Gos. N.-I. Protivochn. In-ta (Works of the Rostov-on-Don State Scientific Research Antiplague Institute), Vol 11, 1956, pp 59-64 (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 58, Abstract No 28999, by M. A. Gruzman)

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"The plague pathogen died in agar culture, in mucus, and in blood following 24-hour exposure to a dose of methyl bromide of 1.2 ml per 8 dm<sup>3</sup> of air (150 ml per m<sup>3</sup>). Since methyl bromide does not damage products and objects customarily used [in culturing], is a relatively harmless poison, and its transport, preservation, and use do not require special precautions, it is entirely expedient, in the author's opinion, to raise the question of replacing chloropicrin with it. For this operation, its action on rodents and ectoparasites in houses must be established in advance."

54. Effects of Ultrahigh Frequency on Microorganisms

"The Effect of Ultrahigh Frequency Fields on Microorganisms," by P. I. Schastnaya, Tr. Khar'kovsk. Med. In-ta (Works of the Khar'kov Medical Institute), No 34, 1955, pp 170-178 (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 58, Abstract No 28897, by Ye. N. Sokurova)

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"The effect of ultrahigh frequency electromagnetic fields (waves of centimeter range) on microbial suspensions of B. coli, Staphylococcus aureus, and Friedlander's bacillus was studied. The high-frequency fields affected the bacteria not only by means of the thermal action of the medium, but also by some other means. The author suggests that this specific action is connected with increased temperature inside the bacterial cells. The bacteriostatic action was not observed on irradiation at low temperatures."

55. Staining of Bacterial Spores

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"Tinctorial Characteristics of Spores of Bacteria," by K. N. Sherstoboyev, Nauch. Zap. Belotserkovsk. S.-Kh. In-t (Scientific Notes of the Belotserkovskiy Agricultural Institute), No 4, 1956, pp 119-125 (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 58, Abstract No 28815, by V. I. Biryuzova)

"Six different shades of staining in spores of the same species of microorganism in the same culture after using the same method of staining were observed: azure, faintly stained, normally stained, and intensively stained, violet, and blue. The presence of different tinctorial types indicates a difference in the organic composition of the spores. By investigation of preparations produced from cultures grown on a liquid medium, which had been put into the capillary part of Pasteur pipettes sealed at the bottom and through the upper part of which air had been blown, it was established that this depended not on the age of the spores but on the extent of aeration of the medium, which affects the character of nutrition of the microorganisms. The greatest number of faintly stained azure *Bacillus pseudoanthracis* and *B. subtilis* spores were observed in the well aerated part of the medium. The greatest number of moderately stained and blue spores were encountered in media with decreased aeration. The spores were stained intensively in poorly aerated parts of the medium."

Epidemiology

56. Epidemiology of Tularemia, Brucellosis, and Tick-Borne Encephalitis in the Urals, Siberia, and the Far East

"Interblast Scientific-Practical Conference on Regional Epidemiology of Natural Foci Diseases of the Urals, Siberia, and the Far East," by F. V. Krasovskiy, Moscow, Zdravooknraneniye Rossiyskoy Federatsii, No 5, May 58, pp 40-45

The above-mentioned conference was held in 1958 [month not specified] in Krasnoyarsk and was attended by more than 250 practical and scientific workers of the Urals, Siberia, and the Far East. Thirty-five reports were presented on problems of the prophylaxis of tularemia, brucellosis, and tick encephalitis.

The keynote address was given by M. A. Buslayev, deputy chief, Main Sanitation-Epidemiological Administration of the Ministry of Health RSFSR. He pointed out that tularemia is widespread in the RSFSR; the number of epidemics increased in 1957 over 1956. The epidemics occurred in Sverdlovskaya, Vladimirskaya, Kirovskaya, Arkhangel'skaya, Ivanovskaya, Bryanskaya, and Astrakhanskaya oblasts and in the Kom. ASSR. In these areas 85.3 percent of all illnesses were attributed to tularemia.

The reasons for these epidemics were the complacency of organs of public health, curtailment of the scope of prophylactic work, unsatisfactory training of medical cadre in the diagnosis of tularemia, and insufficient attention to vaccinations.

The number of brucellosis cases, on the other hand, decreased during the same period, but not in the Checheno-Ingushskaya ASSR, Krasnoyarskiy Kray, and Orlovskaya Oblast where the number of new cases increased.

Since 1952 the number of tick encephalitis cases has increased in the RSFSR. The greatest number of cases was reported in 1956. During 1957, however, the number of cases decreased in Kemerovskaya and Tomskaya oblasts, the Udmurskaya ASSR, and Altayskiy and Krasnoyarskiy Krays; this lowered the over-all number of tick encephalitis cases for the RSFSR by 21 percent under 1956.

57. Organization of Sanitation and Antiepidemiology Work in Uzbekistan

"The Organization of Sanitary-Antiepidemiological Work in Uzbekistan," by K. S. Zairov, Med. Zhurn. Uzbekistana (Medical Zhurnal of Uzbekistan) 1957, No 11, 17-25 (from Meditinskiy Referativnyy Zhurnal, No 7, Jun 58, pp 4-5)

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"The Uzbek Scientific Research Sanitation Institute was organized in 1934-1935. The Uzbek Tropical Institute, which investigated parasites and malaria, was opened in Bukhara in 1924. The first Antimalaria Stations were opened in Tashkent and Mirzachul'skiy Rayon in 1921. Subsequently they undertook the study of leishmaniasis, tick-borne spirochetosis and leprosy; in 1954 they were combined with the sanitary-epidemiological station. The number of the latter was 188 in 1956, 160 bacteriological laboratories and 33 pasteurization stations. In 1932 there were 717,000 registered cases of malaria in the republic; in 1950, 121,000, and in 1956, 659. Smallpox was liquidated in 1936. In 1956 there were 3,902 infectious rooms available for adults, and 1,236 for children. Temporary infectious disease stations were organized in the foci of infections. Between 1935 and 1956 the Sanitary-Hygiene Faculty of the Tashkent Medical

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Institute graduated 1,401 physicians with a sanitary-hygiene profile. At present, there are in Uzbekistan 368 sanitary physicians, 228 epidemiologists, (61 of these are epidemiological parasitologists), 196 bacteriologists, 24 physicians concerned with the sanitary education, 7 disinfectionists, 262 infectionists and 547 people who aid the sanitary physicians."

Hematology

58. Refrigerated Blood Proves Superior for Antishock Transfusions

"Transfusion of Stored Refrigerated Blood," by Docent N. G. Kartashevskiy, Clinic of General Surgery No 2 (head, Prof M. S. Lisitsyn) of the Military-Medical Order of Lenin Academy imeni S. M. Kirov and of the Leningrad Order of Red Banner of Labor Scientific Research Institute for Blood Transfusion (director, Docent A. D. Belyakov; scientific director, Prof A. N. Filatov); Moscow, Vestnik Khirurgii imeni I. I. Grekov, Vol 81, No 8, Aug 58, pp 7-10

Clinical observations were made on the transfusion effects of refrigerated blood stored at +4 to -15°C for periods varying between 7 and 73 days. The medical history and the outcome of such transfusions are discussed and the data are presented in the form of a table.

Results indicate that refrigerated blood stored at +4 to -15°C for up to 73 days and then used for the treatment of traumatic and surgical shock, anemias, and during pre- and post-operative periods in amounts of 300, 750, 1,000, and 1,250 ml is superior to blood stored according to the usual methods.

The author recommends the use of stored refrigerated blood for extensive use because it retains its biological properties and possesses an antishock effect.

59. Amino-peptides Recommended as Plasma Substitutes in Blood Loss

"Concerning the Use of Amino-peptides in Blood Loss," (Experimental Research) by T. Ye. Kudritskaya, Candidate of Medical Sciences, and D. Ya. Shurygin, Candidate of Medical Sciences, Chair of Pathophysiology (head, Prof I. R. Petrov) and faculty of Therapeutic Clinic No 1 (head, Prof V. A. Beyyer), Military-Medical Order of Lenin Academy imeni S. M. Kirov; Moscow, Vestnik Khirurgii imeni I. I. Grekov, Vol 81, No 8, Aug 58, pp 54-58

The aim of the investigation was to study the use of amino-peptides as plasma substitute solutions in treating acute blood loss of various degrees. Amino-peptide effectiveness was judged by changes in arterial blood pressure, frequency and depth of respiration, life duration of the experimental dogs, and the rate of blood restoration in surviving animals.

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The author makes the following conclusions:

"1. Amino-peptides exerted a sufficiently favorable therapeutic effect in experimental blood loss of medium severity, and in a number of cases of grave severity.

"2. Experimental research indicates that the best therapeutic effect is obtained when the amino-peptide solution has the maximum protein concentration (5.33-5.45%), maximum salt concentration (0.68-0.85%), and minimum percent of total amino nitrogen."

60. Intraosseous Transfusion of Blood and Plasma Highly Recommended

"Intraosseous Transfusion of Blood and Plasma in Children," by N. P. Iapshina, Candidate of Medical Sciences, Clinic of Pediatric Surgery (head, Prof A. F. Zverev) of the Sverdlovsk Medical Institute; Moscow, Vestnik Khirurgii imeni I. I. Grekov, Vol 81, No 8, Aug 58, pp 42-44

Because of the unavoidable difficulties connected with blood and plasma transfusion in infants and children, the author investigated the little-studied field of intraosseous transfusion in serious operations and severe blood loss in children. A total of 157 transfusions on 77 infants and 41 children were performed. The amount of blood and plasma used varied from 30 to 200 ml. Transfusion sites were the superior metaphysis of the tibia, the medial aspect of the malleolus, and the lateral condyle of the femur.



The author concludes that intrasosseous transfusion of blood and plasma is very effective, simple, and successful as an antishock measure, and he highly recommends it as the method of choice, especially in infants and children.

61. Blood Serum Cholinesterase Activity During Pathological Processes

"Blood Serum Cholinesterase Activity During Certain Pathological Processes," by V. N. Salyayev, A. A. Stolyerchuk, and G. K. Ushakov, Chair of Psychiatry and Chair of Pharmacology of the Yaroslav Medical Institute; Vrachebnoye Delo, No 9, Sep 58, pp 903-906

The blood of 304 patients suffering various diseases (118 mental patients, 80 patients with Q fever, 62 with Botkins disease, and 44 patients with cardiovascular insufficiencies) was investigated for blood serum cholinesterase activity by a method described by P. I. Borisov and V. I. Rozengart.

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As a result of the experiments it was determined that:

"1. During the course of many pathological processes in the body, including psychiatric, various depressions in the blood serum cholinesterase activity can be observed.

"2. A comparison of the degree of depression in enzyme activity associated with various diseases and pathological conditions did not reveal the nosological specificity of the established disturbances. The cholinesterase depression depends primarily on the gravity, depth, and duration of the pathological process and reflects the changes in the immunobiological reactivity of the body.

"3. The results of the investigations testify to the leading role of liver function disturbances in depressing cholinesterase activity.

"4. Disturbances in cholinesterase activity and changes in sympathetic conductivity associated with these disturbances should be considered secondary and not as pathological components of the pathological process."

62. Intensity and Duration of Glycogenolysis in Hypothermia

"Shifts in Certain Biochemical Blood Elements During Artificial Hypothermia," by G. B. Allakhverdibekov, S. N. Bagirov, and D. G. Tagdisi, Chair of Pharmacology (head, Docent G. B. Allakhverdibekov), Azerbaydzhan State Medical Institute (Imeni N. Narimanov (Director, Prof B. A. Eyvazov, Honorary Worker of Science); Baku, Azerbaydzhanskiy Meditsinskiy Zhurnal, No 6, Jun 58, pp 75-77

Tests were conducted on rats and rabbits to show shifts in blood sugar, calcium, and potassium content, erythrocyte count, and glutathione fraction under normal conditions and during hypothermia (cooling to 5-6°C).

Results indicate that the blood sugar level is increased in hypothermia by 73 mg %, and that the potassium level is increased by 6.3 mg %, but that the calcium concentration and glutathione fraction are slightly decreased. There is a slight rise in the erythrocyte count.

The author makes the following conclusions:

1. The intensity and duration of glycogenolysis in hypothermia depend on the functional condition of the sympathetic branch of the nervous system.
2. The results of this research are preparatory steps to further studies on cold trauma and the effects of the central nervous system on carbohydrate metabolism in hypothermia.

63. Immunological Shifts in Anemias, and Rhesus Negativity Correlated

"Immunological Shifts in Patients With Hemolytic, Aplastic, and Hypoplastic Anemias," by M. A. Umnova, Yu. I. Loriye, and F. E. Fayashteyn, Central Order of Lenin Institute of Hematology and Blood Transfusion (director, Prof A. A. Bagdasarov, Active Member of Academy of Medical Sciences USSR), Ministry of Health USSR; Moscow, Problemy Gematologii i Perelivaniy Krovi, Vol 3, No 4, Jul/Aug 58, pp 16-23

To study immunological shifts in diseases of the blood system, the authors analyzed the blood of 115 patients suffering from various forms of hemolytic, hypoplastic, and aplastic anemias. Tests were run for heteroagglutinins, isoagglutinins, and isohemolysins for erythrocytes, and rhesus factor for all patients. The direct and indirect Coombs test was also run.

Results indicate significant immunological shifts, i.e., presence of immune antibodies and of autoantibodies both fixed in the serum and erythrocytes, and titer increase of both normal, iso-, and hetero-antibodies in patients with acquired hemolytic anemia. The authors also revealed the prevalence of Rh negative factors in patients with congenital hemolytic anemia and with Marchiafava-Micheli syndrome.

The authors present two possible explanations for these facts:

1. Rh negativity, to a certain degree, predisposes people to the development of certain diseases.

2. Pathogenic factors which have caused certain diseases also affect the antigenic structure of the erythrocytes of these patients. The authors think the second explanation is the more probable one.

The authors conclude that the pathogenic factors which bring about deficient erythrocytes during the process of the latter's development also affect the development of the antigenic structure of erythrocytes, as a result of which Rhesus receptors are either not formed or are inadequately developed. Further research is necessary to confirm this explanation, the authors conclude.

#### 64. Study of Blood Coagulation System Urged

"The Problem of Thrombosis and Emboli," by Prof A. Filatov, Corresponding Member of Academy of Medical Sciences USSR (Leningrad); Moscow, Meditinskiy Rabotnik, No 61, Aug 58, p 2

The author reviews the causes for the onset of thrombosis and emboli, and the prophylaxis and therapy used. Prevention and treatment of thrombosis and emboli include the use of antispastic agents, anticoagulants, especially "phenylin" (a drug recently synthesized at the Academy of Sciences Latvian, SSR, and tested at the Leningrad Institute for Blood Transfusion, this preparation has been proved identical to the non-Soviet phenylindandione), novocain, papaverine, heparin, antivitamin K, and surgical intervention.

The author stresses the need for the standardization of thromboplastin to accurately determine prothrombin time. It is mentioned that the Leningrad Institute for Blood Transfusion has already prepared, according to the method of V. N. Tugolukov, tens of thousands of batches of dry thromboplastin. However, there is still the necessity of preparing thromboplastin on a commercial scale, standardizing it, accurately determining prothrombin time, and making it more accessible to physicians.

Professor Filatov is convinced that the study of blood coagulation system is vital, and suggests that groups of physicians, and special laboratories at various institutes for blood transfusion devote their attention to the study of the blood coagulation system and the diagnosis and therapy of thromboembolic diseases.

65. New Anticoagulants for Conserving Blood

"The Conservation of Blood With New Anticoagulants," by Ye. P. Mikhnovich, Aktual'n. Vopro. Pereliv. Krovi. (Actual Problems in Blood Transfusion), No 5, Leningrad, 1957, 89-94; (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 18, 25 Sep 58, Abstract No 23925, by E. Larskiy)

"Angerin (the sodium salt of sulfonated dextran, mol. wt. 11,000, containing 12.4% sulfur, pH 6.5 - 7.0) was added to conserved blood in amounts of 2.5 gm per 10,000 ml of blood. The ESR of the conserved blood remained normal. During tests on transfused rabbit's blood, which was stored for 9 days, no changes were noted; however, rabbits transfused from blood preserved for 9 - 15 days perished. The preparation possessed no pyrogenic action. After transfusion into circulating blood, the thrombocytes decreased from 18 - 85%; the coagulation time increased from 34 to 207 secs. After transfusing freshly preserved angerin treated blood to two patients, the appearance of headaches and vomiting was noted and further tests in the clinic were abandoned. According to the author, the unfortunate results of the transfusion were caused by the presence of high-molecular admixtures which formed insoluble complexes with the fibrinogen of the blood serum."

66. New Anticoagulant, Phenylindandione, Synthesized in Latvian SSR Proves Identical With Non-Soviet Phenylindandione

"Experimental and Clinical Study of a New Anticoagulant, Phenylindandione," by Z. D. Bleksmit Candidate of Medical Sciences, M. A. Kotovshchikova, Candidate of Biological Sciences, and N. V. Martynova, Candidate of Medical Sciences, Laboratory of Dry Preparations (head, Prof L. G. Bogomolova), Leningrad Institute of Blood Transfusion and the Clinic of General Surgery (head, Prof I. M. Tal'man), Leningrad Sanitary Hygienic Medical Institute; Moscow, Vestnik Khirurgii imeni I. I. Grekov, Vol 81, No 8, Aug 58, pp 64-68

The authors studied, under experimental and clinical conditions, a new anticoagulant called phenylindandione, synthesized at the Chemical Institute of the Academy of Sciences Latvian SSR (Prof G. Ya. Vanag). The preparation, administered in daily doses of 0.03-0.1 mg/kg produces hypoprothrombinemia, and therefore can be used for the therapy and prophylaxis of thromboembolic diseases.

The authors present diagrams illustrating changes in the leukocyte count, prothrombin time, and indexes of blood coagulation after the administration of 5 mg phenylindandione per kg body weight, and 10 mg phenylindandione per kg body weight. The authors make the following conclusions:

"1. Good results were obtained by administering phenylindandione both to treat patients with thrombophlebitis and to prevent thromboemboli after surgery.

"2. To attain a therapeutic effect in treating thrombophlebitis, it was necessary to lower the prothrombin level by 35-40%. To prevent thrombosis, it was necessary to lower the prothrombin level by 60-70%.

"3. It was necessary to maintain systematic control over the plasma prothrombin level when prescribing phenylindandione.

"4. Phenylindandione is less toxic than dicoumarin, it acts faster, and does not have a cumulative effect."

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Immunology and Therapeutics

67. Reactions in Persons Inoculated With Anti-plague Vaccine

"Observation for Reactions in Persons Inoculated With Anti-plague Vaccine 1.17," by Ye. I. Novikova, A. A. Rozhkov, A. F. Optyakova, F. V. Gorbunoy, A. F. Aleksentseva, E. M. Barsunova, and G. G. Chivileva, Tr. Rostovsk.-na/D. Gos. N.-I. Protivochnn. In-ta (Works of the Rostov-on-Don State Scientific Research Institute) No 11, 1956, pp 69-79 (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 58, Abstract No 29004, by A. S. Shevelev)

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"The intracutaneous introduction of bivalent antiplague vaccine 1.17 caused fever, chills, headaches and muscular pains in all inoculated persons during the first day after introduction (at night). Local reaction developed within 4-6-8 hours after introduction of the vaccine (hyperemia, infiltration, painfulness) and achieved a maximum within 36-40 hours after inoculation. Lymphangitis was noted in 29%, and lymphadenitis, in 34% of the inoculated persons. Local and general reactions began to recede within 40-48 hours after vaccination in 80% of the inoculated persons. Severe disease also developed in inoculated persons in certain cases. The vaccine process was very mild following cutaneous application. No new local reaction developed in 12.3% of inoculated persons. General reactions were not observed. The complexity of the intracutaneous method of vaccination and the expediency of cutaneous application are emphasized."

68. Bivalent Anti-plague Vaccine

"Reactogenicity of Bivalent Anti-plague Vaccine," by G. I. Demina, R. B. Krivtsova, V. M. L. tsyna, L. V. Filimonova, E. F. Gorbunova, and V. K. Volodova, Tr. Rostovsk.-na-D. Gos. N.-I. Protivochnn. In-ta (Works of the Rostov-on-Don State Scientific Research Anti-plague Institute), No 11, 1956, pp 65-67 (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 58, Abstract No 29005, by A. S. Shevelev)

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"Local reactions developed in almost all, and general reactions in some, inoculated persons following intracutaneous introduction of bivalent anti-plague vaccine. Local reactions were observed in 98.4% of persons inoculated for the first time, and general reactions, in 74.2%. In persons inoculated for the second time, local reactions were observed in 94.1%; general reactions, in 33.8%. The authors consider that it is expedient to vaccinate not intracutaneously but cutaneously under epidemically favorable conditions."

69. Antibiotic Therapy of Experimental Plague

"Therapy of Experimental Plague With Antibiotics," by L. N. Makarovskaya, Antibiotiki, Eksperim.-Klinich. Izuch. (Antibiotics, Experimental-Clinical Study) Medgiz, 1956, pp 199-202 (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 58, Abstract No 29003, by M. A. Gruzman)

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"Experiments were performed on 2,029 guinea pigs. It was demonstrated that therapy with streptomycin (I) up to the occurrence of generalization or in its initial stages (up to 3 days after infection) led to complete recovery of all animals when sufficiently high doses were administered (20,000-40,000-80,000 units). When the dosage was decreased to 5,000-10,000 units, some of the animals died even following early therapy. Therapy in the generalization stage (4th-5th day) was only slightly effective even when very high doses of (I) were administered. It was shown that doses of 20,000 units and higher established the maximum concentration (19.96 units) and caused (I) to remain in the blood longer (12.18 hours); lower doses gave a concentration of not more than 7.5-8.5 units. The administration of lower doses of antibiotics, in addition, established conditions for streptomycin-resistant variants to be developed. Therefore, only optimum doses which provide a high concentration of (I) in the blood should be administered. The introduction of an aerosol of (I) 30 minutes after intranasal infection gives very good results; its testing is thus promising for emergency therapy of pulmonary plague. Combination with ecmoline considerably augmented the therapeutic effect and permitted a decrease in the dose of (I). Virulent strains are more sensitive to levomycetin or synthomycin, and avirulent strains, to biomycin. All the antibiotics tested were considerably more active with respect to young, growing cells, causing pronounced morphological changes in them and cessation of normal therapy. Levomycetin and synthomycin impeded the development of infection but did not completely rid the organism of the pathogen. Biomycin (in mice) showed high prophylactic but insufficient therapeutic action."

70. Action of Streptomycin in Experimental Plague of Guinea Pigs

"The Prophylactic and Therapeutic Action of Streptomycin in Experimental Plague of Guinea Pigs," by L. N. Makarovskaya, Tr. Rostovsk. n/D Gos. N.-I. Protivochumn. In-ta, (Works of the Rostov-on-Don State Scientific Research Antiplague Institute), Vol 10, 1956, pp 3-16 (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 58, Abstract No 29000, by M. A. Gruzman)

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"The experiments were performed on 1,314 guinea pigs; infection was done with virulent Pasteurella pestis strains 177, 545, and 546. In all methods of infection, the intramuscular introduction of the optimum dose of

streptomycin (20,000-40,000 units) and sufficient duration of therapy (7 days) is most effective. Of eight animals whose therapy was begun in the stage of pronounced generalization of the process, seven survived and one died on the 10th day. In cases in which therapy was begun earlier, all the pigs survived. Preventive therapy begun 30 minutes after intranasal infection of the pigs was most effective on use of the aerosol method. Intramuscular introduction of the antibiotic yielded better results at a later time. The author considers it promising to test the aerosol method in cases of emergency prophylaxis of pulmonary plague (laboratory or hospital infection) immediately after possible infection; the more so because use of this method a considerably higher concentration of streptomycin is obtained in human blood than in guinea pig blood."

71. Nonspecific Substances for Increasing the Efficacy of Antiplague Serum

"The Role of Certain Nonspecific Substances in Increasing the Quality of Antiplague Serum," by Ye. D. Shkutko and L. Ye. Khundanov, Izv. Irkutskogo n.-i. Protivochnn. In-ta. Sibiri i Dal'n. Vost. (Herald of the Irkutsk Scientific Research Antiplague Institute of Siberia and the Far East), 57, 15, pp 149-155; (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 16, 25 Aug 58, Abstract No 20765)

CPYRGHT

"The simultaneous subcutaneous utilization of  $\text{CaCl}_2$  and starch with EV vaccine during the immunization of producers increases the effectiveness of antiplague serum by 15%. The subcutaneous administration of nonspecific aloe irritants and extracts from the internal organs of cattle during the immunization of animals with the plague bivaccine increases the effectiveness of the antiplague serum. Sera, obtained by the immunization of animals by plague antigens with the use of  $\text{CaCl}_2$ , starch, aloe and extract from internal organs, according to their agglutination properties, are superior to ordinary antiplague sera."



72. Increased Production of Diagnostic Preparations Advocated

"The Status of the Production of Diagnostic Preparations," by A. N. Meshalova, Main Administration of Institutes of Vaccines and Sera, Ministry of Health USSR; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 29, No 7, Jul 58, pp 126-130

This article presents data to characterize the general status of diagnosticum production in Soviet institutes which manufacture bacterial preparations (institutes of vaccines and sera, institutes of epidemiology and microbiology, and the Institute imeni Gamaleya). The statistics collected for this report indicate that a large quantity of different diagnosticums are being produced at present, but that on the whole, preparations for diagnosing intestinal and especially dangerous infections (brucellosis and tularemia), viral and rickettsial diseases, and children's infections are produced in limited amounts. These data are summarized in the first of two tables included in the article; the second table shows that the institutes supply not only a large assortment but also large quantities of diagnosticums.

A survey carried out by the author showed that out of 170 reports on the subject "Scientific Bases of the Production of Bacterial Preparations" in 1957, the institutes of vaccines and sera devoted only 15 to the question of diagnosticums; and out of 190 in 1958, only 16. It was not possible to present concrete work plans for other institutes, but their features are contained in a resolution adopted in December 1957 by the Inter-Institute Scientific Conference on Strains, Standards, and Diagnostic Preparations. The need for producing and introducing into practice larger quantities of certain types of diagnosticums is pointed out, and it is emphasized that their sensitivity should be augmented to facilitate diagnosis of atypical forms of diseases. The resolution points out certain production deficiencies and suggests that various preparations be manufactured in larger quantities.

Poliomyelitis research in progress at the following three institutes is discussed briefly: Leningrad Institute of Experimental Medicine, the Institute for the Study of Poliomyelitis, and the Institute for the Production of Preparations Against Poliomyelitis.

Differential diagnosis of various forms of encephalitis is noted as a subject of importance to Soviet investigators. In connection with rickettsial diseases, it is stated that two antigens, Prowazeki and Mooseri, are widely used, and that two other antigens for diagnosing Q fever and rickettsial-pox have been developed experimentally but have not been introduced into practice. In general, however, laboratories do not have preparations for detection and differential diagnosis of these diseases at their disposal and the problem remains unresolved. It is noted that the lack of cadres of specialists on rickettsioses in the institutes of the Ministry of Health USSR further complicates the task.

It is pointed out that immunological methods cannot be limited only to the problem of diagnosis; immunological reactions, microbiological and serological methods, determination of the source of infection, factors affecting its distribution, and establishment of immune contingents among the population assume great significance in considering such diseases as brucellosis, tularemia, anthrax, and botulism. Methods of diagnosing brucellosis and tularemia are further discussed. According to this report, the Tbilisi Institute of Vaccines and Sera has developed an experimental series of brucellar bacteriophages with which it is possible to differentiate species of Brucella. The Moldavian Institute of Epidemiology and Microbiology is reported to have obtained anthrax allergen which is harmless and completely specific under experimental conditions. With respect to especially dangerous infections and botulism, the primary problem is considered to be improvement of existing preparations.

CPYRGHT The article concludes with the following list of tasks confronting the various institutes in the field of diagnosing infectious diseases:

"1. To radically change the attitude of production institutes toward the problem of improving existing methods and searching for new methods for laboratory diagnosis of infectious diseases.

"2. To reconsider the nomenclature of diagnostic preparations which are produced at present, determining which among them are of high quality and should be produced for extensive practical use.

"3. To expand production of viral and rickettsial diagnostic preparations by organizing production laboratories in 2-3 institutes which have viral and rickettsial departments.

"4. To re-examine and improve the system of providing clinical institutions with diagnostic preparations and to test a method of free sale of these preparations in the pharmacy network.

"5. To provide clinical workers with specially developed, methodical instructions for the use of diagnostic preparations."

73. Transparent Therapeutic Film Sprayed on Burns Proved Effective

CPYRGHT "Equipment for Burn Therapy" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 71, 5 Sep 58, p 4

"New equipment for the treatment of burns has been developed by the Scientific Research Institute of Experimental Surgical Apparatus and Instruments of the Ministry of Health USSR. The equipment was constructed

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and developed at the Laboratory for Bone Splicing. It consists of a turning bed with two detachable racks supplied with rubberized belts. These racks can also be used as stretchers. With this bed it is possible to turn a patient over and treat any part of his body. The bed has a special basin-like attachment for holding liquids such as water and antiseptics, and a drain pipe. This appliance has been included in the production plans of the L'vov medical equipment plant.

"Another apparatus for the direct treatment of burns has been constructed at the Laboratory of General Surgical Instruments. This is an electrodermatome for the removal of skin from donors and its application to an injured body surface with second to fourth degree burns. This apparatus consists of an electromotor in the form of a pistol with detachable fittings, blades, and thickness gauges, making it possible to graft skin flaps with thicknesses ranging from 0.3 mm to 1.0 mm, and 5-10 cm in width. The electrodermatome can be connected to an alternating current outlet, and due to special grounding it is harmless to the donor and the surgeon. This new apparatus has been approved by the Scientific Council of the institute and has been accepted for production by one of the plants of the medical industry.

"A spraying apparatus for applying drugs to a burn surface was constructed on the principle of an atomizer. Blood plasma containing vitamin A, thrombin, and a solution of antibiotics is poured into a glass jar, and connected to an oxygen cylinder. The medication is then sprayed on the surface of the wound or the burn and in a short time forms a transparent film, like a fibrin film. Such a film, consisting of drugs enriched with oxygen, creates favorable conditions for tissue regeneration and protects the patient from infections. The transparency of the film makes it possible to observe the process of wound healing, and the elasticity of the film makes early movement of the extremities possible, thus preventing the development of cicatrization. After the wound is healed, the biological film sloughs off or can be easily removed with physiological saline solution.

"The spraying apparatus can be used for the initial treatment of burns, after which the patient may be transported to special therapeutic institutions.

"These items have passed clinical tests and are ready for series production."

Internal Medicine

74. Chinese Describe Kaschin-Beck's Disease Versus K'o-shan Disease

[SIR Note: Several articles in recent issues of Chinese medical periodicals give information on two endemic diseases, K'o-shan disease and Kaschin-Beck's disease, both of which are major topics in China's medical research program. Although one sounds like the transliteration of the other, the articles definitely distinguish them as different diseases.

Both are reportedly endemic in the same areas in China, namely, Kirin, Heilungkiang, Hopeh, Honan, Inner Mongolia, Shensi, Shansi, Kansu, and Liaoning provinces. However, Kaschin-Beck's disease, also known in China as "disease of the big joints" (大關節病), "is characterized by early fusion of the epiphyses, associated with disturbances in longitudinal growth of tubular bones"; whereas K'o-shan disease, so named by Japanese physicians because they first observed a case in K'o-shan, Heilungkiang Province, is a heart disease associated with morbid changes in the myocardium." ]

"Disease of the Big Joints," Chang Kuo-chu (張國柱), Chinese Academy of Medical Sciences; Peiping, Chung-chi I-k'an (Intermediate Medical Journal), No 12, 1957, pp 10-11

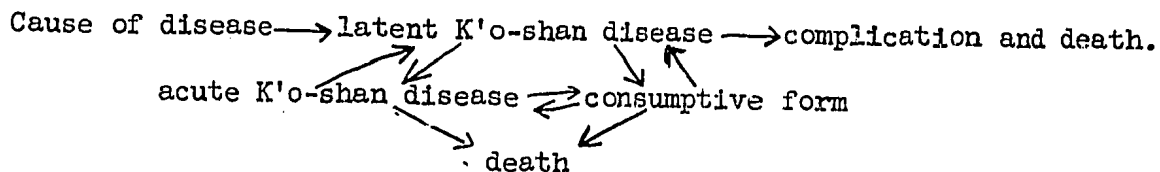
Following a general description of Kaschin-Beck's disease, the author reviews the state of research on its etiology. He states that Chinese research on this disease is largely based on the theory that its direct cause is "food mycotoxication" and that they are following the steps of the Soviets in studying the microorganism, *Fusarium sporotrichiella*, (鐮刀菌 literally, sickle microorganism) as the probable pathogen. It was found that cereals in endemic areas are seriously infested with *F. sporotrichiella*. Furthermore, Soviet scientists have isolated the microorganism and used it in animal experiments to produce disturbances simulating those manifested in Kaschin-Beck's disease. Present control measures in China are centered in the acceptance of the food mycotoxication theory.

With respect to the incidence of the disease, the author states that over 90 percent of the population of Fu-sung Hsien, Kirin Province, had deformities due to Kaschin-Beck's disease and were only about "one meter tall."

"Summary of Acute K'o-shan Disease," by Ch'i Wei (齐 葦) and Wu Hui (吴 辉), K'o-shan Disease Control Command Section, Kan-man, Heilungkiang Province; Peiping, Chung-chi I-k'an (Intermediate Medical Journal), No 3, 1958, pp 3-5

This article, presenting a general review of acute K'o-shan disease, is developed under nine subheadings: etiology, exciting causes, endemiology, morbid anatomy, symptoms, physical signs, diagnosis, treatment, and prevention. The information includes the following.

There are three forms of K'o-shan disease, classified according to the degree of myocardial involvement. The acute and most severe form is characterized by acute myocardial disturbance manifested in acute circulatory failure. In the consumptive form, there is chronic compensatory myocardial disturbance with symptoms of congestive heart failure. In the latent form, there is compensatory myocardial disturbance without subjective symptoms. The interrelationship between the three forms may be represented as follows:



### Epidemiology

Every year in endemic areas there are serious outbreaks resulting in many deaths. Statistics show that during October 1955-May 1956 there were almost 3,000 cases with 29 percent mortality in a Heilungkiang district covering one municipality, 31 hsiens, and 478 t'uns. The endemic areas are mostly low temperature hills, pasturelands, and rural sections, rarely large cities or places near the shore. K'o-shan disease occurs all year round with an incidence peak in December-January. The ratio of female to male victims is 3:1, mostly between 21 and 40 years of age. A survey of 145 cases showed that most of them had migrated from nonendemic to endemic areas and lived there 1-5 years. However, the disease is also found among natives of endemic areas. Often several members of the same household are affected. Current mortality is 10 percent as compared with 50 percent before liberation.

### Etiology

The etiology of K'o-shan disease is still undetermined. Sino-Soviet studies since 1952 have evolved theories that the disease is associated with trace carbon monoxide poisoning, infection transmitted by insect vectors of a pathogenic organism of which rodents may be the reservoir hosts, bad water, vitamin deficiency, food fungus poisoning (i.e., poisoning from fungus growth found in foods), etc.

### Exciting Causes

The exciting cause may be one or a combination of the following: cold stimulus, nervous excitement, fatigue, overindulgence in food and drink, a cold, exposure to smoke and fumes, etc.

### Morbid Anatomy

K'o-shan disease is a systemic disease which strikes hardest at the heart. Morbid changes appear in the left ventricle, the muscili papillares, and more noticeably in the septum of the ventricles (particularly the myocardium near the endocardium). Changes which occur in the right ventricle are slight; in the auricles, less frequent or not at all. The course of pathological changes is cardiomyoliposis, degeneration, degenerative and necrotic fibrotic myocardosis, interstitial myocarditis and cicatrization. Sometimes all these changes are found in the same patient.

Changes seen with the naked-eye include heart color grayish-yellow or grayish-white, increased heart weight due to compensatory dilation or hypertrophy, ventricles gorged (if heart stopped beating during stage of dilatation) with blood in fluid state and pieces of coagulated blood, and scarred myocardial tissue.

Under the microscope varying degrees of myocardial degeneration may be seen along with effusion of interstitial cells and scarred tissue. However, there are no noticeable changes in the endocardium, epicardium, valves, coronary artery, or aorta. Besides these changes, there is also congestion of the liver, spleen, and kidneys.

### Symptoms and Signs

The onset is sudden. Initial general discomfort is followed by dizziness, headache, great discomfort in the heart region, and pain in upper abdomen due to congestion of the liver. Then follow nausea and persistent vomiting. The patient may be very thirsty, but drinking induces more vomiting. He shows signs of anxiety, his breathing is labored; limbs are cold and convulsive; extremities are purple; but he remains conscious throughout his illness.

Changes in temperature, pulse, respiration, and blood pressure vary according to severity and length of illness. When the disease is progressing rapidly, temperature is below 35 degrees centigrade; pulse is quick, weak or undetectable, and allorhythmic. However, the heartbeat rate may be as slow as 40-60 per minute. Respiration is fast and sometimes tidal; blood pressure, depressed.

Physical signs include pallor, cold and clammy skin, visible pulsation of neck veins, apex beat not clear, feeble heartbeat accompanied with mid-systolic blowing murmurs, diastolic gallop rhythm in some patients, pain upon pressure on liver region but neither liver nor spleen palpable; cold, convulsive limbs, and purple extremities.

#### Diagnosis

The diagnosis of acute K'o-shan disease is to be considered if the patient resides in an endemic area, has a typical history, and shows the signs and symptoms of the disease. Blood and urine analyses, roentgenography, and electrocardiography are helpful. For in K'o-shan disease there is leukocytosis as well as mild albuminuria, general hypertrophy of the heart, feeble pulse, and pulmonary congestion. The electrocardiogram shows heart block (including right bundle-branch heart block and complete or incomplete auriculoventricular heart block). These are usually associated with a prolonged Q-T interval and changes in the S-T section. Depressed arterial and venous pressures and normal or prolonged circulation time also aid positive diagnosis.

Differentiation must be made between K'o-shan disease and angina pectoris, neurocirculatory asthenia, acute gastritis, food poisoning, acute abdomen, etc. Other heart diseases should be eliminated.

#### Treatment

As yet there is no specific therapy for K'o-shan disease. The patient is treated symptomatically with cardiants and other drugs. Nervous stimulants recommended include camphor water, camphor oil, vitacamphor, oxycamphor, Coramine, and Anacardone. K-strophanthin is recommended as a cardiac stimulant instead of digitalis, which reportedly is not as effective. Atropine, luminal, and morphine are recommended for sedation. [Dosage schedules are given for these drugs.] In addition certain traditional drugs, acupuncture and moxibustion, and popular remedies have been used effectively.

"Memoranda on K'o-shan Disease Conference" (unsigned article),  
Chung-hua I-hsueh Tsa-chih (National Medical Journal of China),  
No 1, 1958, p 103

This news item reports highlights of a K'o-shan Disease Conference which was held in Pei-an, Heilungkiang Province, 28 October-4 November 1957. The meeting was called by the K'o-shan Disease Committee to secure information from the standpoints of community hygiene, pathogenicity, microbiology, parasitology, and sitology which will aid further studies on the etiology of the disease. Specialists attended from Harbin Medical College, Peking Medical College, Mukden Medical College, Shanghai First Medical College, and the First Military University. The Chinese Academy of Medical Sciences and the Committee on Medical Research, both of the Ministry of Health, were also represented.

In reviewing the results of research in 1955 and 1956 it was pointed out that pathological studies indicated that K'o-shan disease is a toxic cardiopathy which produces cardiolysis and cicatrization. Impairment of the heart, occurring in definite stages, becomes chronic, but the attacks are acute.

Established by Heilungkiang authorities, the K'o-shan Disease Research Committee has held two previous scientific conferences -- one in Harbin Medical College in 1955 and the last in the Ministry of Health in 1956. The committee hopes to determine within a year or two whether the disease is infectious.

Pharmacology and Toxicology

75. Effect of Caffeine and Chloral Hydrate on Certain Phosphorus Compounds in Mice

"The Effect of Caffeine and Chloral Hydrate on the Content of Total Acid Soluable Phosphorus and Phosphopyroracemic Acid in the Tissues of White Rats," by M. Akulova, Nauchn. Raboty Stud. Mosk. Farmatsevtich. In-ta. (Scientific Works of the Students of the Moscow Pharmaceutical Institute) (from Referativnyy Zhurnal -- Khimiya. Biologicheskaya Khimiya, No 18, 25 Sep 58, Abstract No 24104

CPYRGHT

"Some 5-7 weeks after the administration of caffeine into the brain and liver tissue of rats the acid soluble phosphorus and phosphopyroracemic acid content increases in all tissues except the muscles and lungs. The administration of chloral hydrate produces a lowering of the phosphorus content in all tissues except the brain and spleen, while the content of phosphopyroracemic acid is lowered in all the tissues."



76. Pharmacological Properties of Phenoxydiethylaminopropanol Derivatives

"Concerning the Pharmacological Properties of Phenoxydiethylaminopropanol Derivatives," by L. A. Yakimovich, Sb. Nauchn. Rabot. Minskiy Med. In-t. (Collected Works of the Minsk Medical Institute), 1957, No 18, 64—77; (from Referativnyy Zhurnal Khimiya, Biologicheskaya Khimiya, No 16, 25 Aug 58, Abstract No 21504, by I. Chertkov)

CPYRGHT

"The pharmacological properties of phenoxydiethylaminopropanol derivatives chlorhydrates (I), iodoethylates (II) and nitro-derivatives (III). In experiments on mice, the LD<sub>50</sub> varied from 75 to 275 mg/kg; the toxicity increased as follows, II > III > I. Type (II) compounds, in doses of one to 30 mg/kg, possessed the strongest hypotensive action in acute experiments on dogs and in chronic experiments on rabbits. Peripheral vascular dilation was not observed with the compounds studied. On the isolated stomach of the rabbit and isolated heart of the frog, reactions were observed with high, however, not physiological, concentrations."

Physiology

77. Exposure to Ultrasonic Vibrations Depresses Brain Tissue Respiration and Glycolysis

"The Effect of Ultrasonic Vibrations on Tissue Respiration and on Glycolysis in the Brain of White Rats," by N. F. Svadkovskaya, Experimental Division of the Scientific Research Institute of Physiotherapy, Ministry of Health RSFSR (Moscow); Kiev, Ukrain-skiy Biokhimicheskiy Zhurnal, Vol 30, No 3, 1958, pp 384-391

The aim of this research was to study the effect of ultrasonic vibrations of various magnitudes on tissue respiration and glycolysis (Warburg's method) in the brain tissue of rats.

Tests were conducted on 59 white rats, 12 of which were controls. The rats were subjected to single or repeated ultrasonic vibrations of the following magnitudes: 2 watts per cm<sup>2</sup>, 0.85 watt per cm<sup>2</sup>, and 0.14 watt per cm<sup>2</sup>. The level of rat brain tissue respiration and glycolysis was tested immediately after exposure to ultrasonic vibrations, and then 10 minutes, 2 hours, and 55 days later.

CPYRGHT Results indicate the following:

"1. Ultrasonic vibrations of a 2 watt per cm<sup>2</sup> magnitude, 10 minutes after their single application, caused decreased tissue respiration in the cortex and lower divisions of the brain. This decrease became more pronounced 2 hours after exposure. Glycolysis was also decreased, but to a lesser degree than tissue respiration.

"2. Ten minutes after a single exposure to ultrasonic vibrations of 0.85 watt per cm<sup>2</sup> magnitude a decrease in tissue respiration and in glycolysis was noted in all the specimens of the brain tissue tested. Two hours after the exposure, there was almost complete restoration of tissue respiration. Glycolysis also tended to be restored in all divisions of the brain except in the posterior corpora quadrigemina and cortex.

"3. Single exposure to ultrasonic vibrations of 0.14 watt per cm<sup>2</sup> magnitude revealed slight fluctuations (both rise and fall) in tissue respiration and in glycolysis immediately after the exposure.

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"4. Repeated exposure to ultrasonic vibrations of 0.14 watt per cm<sup>2</sup> magnitude 10 minutes after the last exposure caused increased tissue respiration in the cerebral cortex, and thalamic region: however, after a 2-hour interval there was a decrease in tissue respiration in all the divisions of the brain except in the posterior corpora quadrigemina. Glycolysis in the cortex and underlying divisions of the brain also was significantly decreased.

"5. Research on oxidation processes, conducted 55 days after the last exposure to ultrasonic vibrations, revealed an acute depression of tissue respiration and glycolysis in all areas of the brain tested; depression of glycolysis was greater than that of respiration."

78. Changes in Respiration and Basal Metabolism During Artificial Hibernation

"Changes in Total Gas-Exchange and Basal Metabolism Under Conditions of Artificial (Pharmacological) Hibernation," by B. A. Agayev and G. D. Chesnokova, Clinic of Hospital Surgery of Pediatric Faculty (head, Prof A. V. Gulyayev) of the Second Moscow State Medical Institute imeni N. I. Pirogov; Baku, Azerbaydzhanskiy Meditsinskiy Zhurnal, No 6, Jun 58, pp 65-70

The aim of this research was to study the changes in total gas exchange (oxygen absorbed, minute volume of respiration, CO<sub>2</sub> content of exhaled air, and respiratory coefficient and to determine whether basal metabolism was decreased during artificial hibernation or whether this decrease depended on the dose of neuroplegic preparations.

Observations and tests were conducted on 41 patients suffering from toxic goiter (30), and ulcers or gastric cancer (11).

Results indicate that under artificial (pharmacological hibernation conditions, the majority of patients with toxic goiter showed a significant decrease in the quantity of oxygen absorbed in the minute volume of respiration, and in basal metabolism. The decrease in basal metabolism and in the intensity or rate of total gas exchange, under conditions of pharmacological hibernation, are in direct ratio to the initial functional condition of the central nervous system, to the level of basal metabolism, and to the nature of the sickness. No direct quantitative relationship was evident between decrease in basal metabolism and dose of neuroplegic drug. Decrease in basal metabolism due to neuroplegic preparations was much less in patients with ulcerous diseases and gastric cancer than in those with thyroid toxicosis.

79. Novocain Hypothermia Proves Significant Role of Thyroid Gland in Temperature Regulation

"Concerning the Problem of the Participation of the Thyroid Gland in the Mechanism of the Development of Novocain Hypothermia," by L. I. Abaskuliyeva, Chair of Pathophysiology (head of chair, Prof M. M. Mir-Silimov (deceased), Honorary Worker of Science), Azerbaydzhan Institute of Advanced Training for Physicians (director, M. I. Aliyev); Baku, Azerbaydzhan-skiy Meditsinskiy Zhurnal, No 6, Jun 58, pp 71-74

CPYRGHT

The present research was conducted on 84 rats which received a 2% solution of novocain subcutaneously at the rate of 250 mg per kg body weight. Results indicate that the novocain decreased body temperature by 1.5°C in 92.4% of the cases. Thyroid deficiency, produced by thyroidectomy or by the administration of thiouracil, caused a greater decrease in body temperature with the administration of novocain than when the novocain was administered to rats with sound thyroid glands. Hyperthyroidism hindered the onset of novocain reaction i.e., temperature fall. The functional condition of the thyroid gland plays a significant role in the mechanism for developing novocain hypothermia."

80. Starvation Effects on Phosphorus and Nitrogen Compound Metabolism and on Pepsin Activity in Gastric Mucosa

"A study of the Metabolism of the Gastric Mucosa During Prolonged Starvation," by L. I. Volokhonskaya, Institute of Biochemistry of Academy of Sciences Ukrainian SSR; Kiev, Ukrainskiy Biokhimicheskiy Zhurnal, Vol 30, No 3, 1958, pp 441-450 (Ukrainian summary in Russian and in English)

The aim of this research was to study phosphorus and nitrogen compound metabolism and the activity of pepsin in the mucous membrane of the stomach during prolonged starvation periods.

Results prove that during prolonged starvation, the following changes occur:

CPYRGHT

"1. The content of acid-soluble phosphorus, and easily hydrolyzable ATP phosphorus in the gastric mucus membrane is decreased. Total inorganic phosphatide phosphorus, phosphorus of nucleic acids, and phosphorus of phosphoproteins remains within normal limits.

CPYRGHT

"2. The rate of restoration of acid-soluble phosphorus of nucleic acid, phosphoproteins, and ATP in the mucous membrane is increased. There is a rise in the content of glutamine, but the ammonia level is decreased.

"3. The pepsin activity in the gastric mucosa is decreased during prolonged starvations periods."

81. Quantity and Distribution of Adenosine Triphosphoric Acid and Its Decomposition Products Studied by Paper Chromatography

"The Use of Distributive Paper Chromatography for Determining Adenosine Triphosphoric Acid and Its Decomposition Products," by Z. Yu. Nechiporenko, Institute of Biochemistry, Academy of Sciences Ukrainian SSR; Kiev, Ukrainskiy Bikhimicheskii Zhurnal, Vol 30, No 3, 1958, pp 402-415 (Ukrainian, summary in Russian and English)

A method is described for determining adenosine triphosphoric acid and the products of its decomposition by two-dimensional paper chromatography. Tables and microphotographs accompany the article.

Determinations conducted on rabbit skeletal muscles showed the presence of 41 mg% of adenosine triphosphoric acid, 13 mg% of adenosine diphosphoric acid, and 75 mg% of total inorganic and creatine phosphoric acid phosphorus.

82. Effect of Sodium and Chlorine Deficiency in Animals

"The Effect of Sodium and Chlorine Deficiency on the Intensity of Tissue Respiration," by N. G. Litovchenko, Naychn. Ezhegodnik. Chernovitsk. Un-ta. (Scientific Yearbook of Chernovitsk University) 1956, (1957), 1, No 2, 24-27; (from Referativnyy Zhurnal-- Khimiya, Biologicheskaya Khimiya, No 18, 25 Sep 58, Abstract No 24039, by I. El'man)

CPYRGHT

"Experiments were conducted on white mice from whose rations sodium and chlorine were excluded for a period of 3 months; the animals were then killed and the intensity of respiration determined in the muscle, kidney and liver tissues. The intensity of respiration in the liver tissue was 2.7 times less than in the control animals, in the muscles, 3.3 times less; and in the kidneys, 2.3 times less."

83. Effects of Light on EEG During Hypnosis

"Changes in Potentials of the Brain, Caused by Stimulating Irritants, During Various Stages of Hypnosis," by A. I. Marenina, Laboratory of Physiology and Pathology of the Higher Nervous Activity (chief, F. P. Mayorov), Trudy Instituta Fiziologii imeni I. P. Pavlov, Tom VI, Voprosy Fiziologii Nervnoy Deyatel'nosti (Works of the Institute of Physiology imeni I. P. Pavlov, Volume VI, Questions of Physiology and Pathology of Nervous Activity), Publication of Academy of Sciences USSR, Moscow-Leningrad, 1957, pp 330-334

The author of this article reports the results of experiments conducted on 24 healthy and 67 sick people to determine the effect of light on the electrical activity of the brain of man both when he is awake and when subjected to various phases of hypnotic sleep. It was found that light exerted the same effect on the electric activity of the brain during the initial phase of hypnosis of an individual as it did when he was awake. The effect of light during the second phase of hypnotic sleep for the most part was different. During the third phase of hypnotic sleep, light for the most part did not exert any substantial effect on electroencephalogram pattern; in some cases it was possible also to see the effect of light on the brain potential during the somnambulistic phase of hypnosis when the cortex was inhibited superficially. The effect of stimulation with light during natural sleep appeared on the electroencephalogram in the form of changes that looked like a transition to the stage that preceded it.

A 100-volt electric bulb was used in the experiments. Exposure to light was equal to 20 luxes. Electroencephalographic recordings were made on a film by means of cathodal oscillograph.

84. Neurophysiological Effects of Vibrations

"Vibration as an Irritant of Receptors of Internal Organs," Reflektornoye Vzaimodeystviye Lokomotornoy i Vistseral'noy Sistem (Reflex Interaction Between Locomotor and Visceral Systems), by Mokhail Romanovich Mogendovich, State Publishing House of Medical Literature, Leningrad Section, 1957, Chapter 3, pp 108-119

The author describes physiological experiments on frogs, dogs, and humans to determine the significance of vibration as an irritant of receptors of internal organs. Besides confirming the importance of vibration in occupational pathology and physiotherapy, these experiments made it possible to discover a number of new facts and offered the possibility of entertaining the idea that physicians could turn this unique physical factor

to act directly and by reflex action not only on many internal organs that are inaccessible to direct effect of other therapeutic factors, but also on the central nervous system. Experiments were conducted both in the laboratory and under clinical conditions.

Results of series of experiments, conducted with the isolated heart of a frog, revealed that application of vibration to the heart ventricles evoked, mainly, a change in the amplitude of contractions. The change was recorded on the drum of a kymograph. In the majority of experiments these changes had a two-phase character: decrease in amplitude, noted at first, followed by an increase in amplitude above the initial value. The frequency of heart beats, in most cases, remained the same; in 34% of cases, it decreased. The reaction of heart to the direct action of vibration did not appear to be well defined.

Vibration had a more distinct effect on the venous sinus of the isolated heart. A two-phase change in the frequency of heart contractions was noted in addition to changes in amplitude of contractions similar to those stated above.

Effects of vibration on the stomach of a frog were also investigated under conditions similar to those described above. Results of 54 experiments showed that in 45 (85%) of frogs, vibration stimulated the motor activity of the stomach. With the aid of a gastrograph it was established that tonus of the stomach increased and peristalsis became more frequent and more energetic.

Experiments by V. P. Ryumin attempted to determine the least amount of time needed for vibration to cause a reaction in the smooth muscles of the stomach; 100 such experiments were conducted. The magnitude of threshold time was 0.02-2.0 seconds in 77% of the cases; in 23% of the cases it was higher.

Having established the principal facts concerning the action of vibration on the stomach of cold-blooded animals, experimentation was switched to warm-blooded animals. A dog with a gastric fistula was used. The vibrator was applied to the fistular tube which transmitted vibration to the stomach. The amplitude of vibration was equal to 0.3mm. Experiments were conducted 16-18 hours after feeding. A gastrograph was used to make recordings of stomach activity during the period of hunger. Vibration was applied both during periodic contractions and during periods when the stomach was at rest. A total of 25 experiments was conducted. It was observed that vibration, during periodic contractions of the stomach, caused some increase in the force of these contractions and caused an increase in the tonus of muscles. Furthermore, repetition of contractions was noted in isolated instances. Contractions also appeared and the tonus of muscles increased when vibration was applied to the stomach while it was at rest. But these contractions did not resemble those usually observed during "a period of hunger": their amplitude was considerably smaller, pauses between them were almost imperceptible, and their duration was from 2 to 30 minutes.

Thus, the experiments on a dog confirmed the conclusion reached as a result of experiments on frogs -- that vibration is a factor which directly stimulates the motor activity of the stomach.

The above experiments, however, did not help to determine whether vibration exerts any effect on the visceral receptors. To clarify that point it was necessary to make use of the gastrocardiac reflex. The method used was the same as that used in experiments on frogs; the only difference was that the activity of both the heart and the stomach was recorded on the drum of the kymograph simultaneously. The surface of the serous membrane of the stomach was subjected to vibration (amplitude 0.1 mm). In half of the experiments the heart reaction obtained was of an unusual character: the effect was not of parasympathetic character, but of a sympathetic character; an increase in pulse rate was noted. The latent period of this reaction lasted 30 seconds and longer. A special series of experiments was conducted in which vibration of a single frequency (100 cycles), but of two different amplitudes (very low 0.1 mm and high 1.5 mm), was applied to the stomach. The first produced either an increase in frequency of heart rhythm or produced no effect at all. The second, however, caused the heart to stop, which came about very rapidly.

In some experiments it was observed that application either of weak or strong vibrations to the cardiac part of the stomach and lower terminal portion of the esophagus produced an inhibiting effect on the heart. Application either of weak or strong vibrations upon any other part of the stomach produced a stimulating effect on the heart.

The possibility of obtaining a stimulating effect on heart activity from the stomach seemed to be so significant that attempts were made to apply it to people. Observations were made in one series of experiments with people in a reclining position. After establishing the uniformity of pulse beats a vibrator (of 100 cycles and amplitude of 0.2 mm) was applied in the region of the stomach for a period of 10 minutes. The average pulse rate during the last 3-5 minutes prior to the application of vibration was taken as the initial pulse rate. Calculation of pulse rate continued without interruption every 30 seconds during the entire 10 minutes and for 10-15 minutes after application of vibration in the region of the stomach. Sphygmographic recordings were made in some experiments.

These experiments were conducted with 13 healthy men and women 20-25 years of age. Twenty-one observations were made in this series of experiments. Since results obtained were contradictory and vague, usually in the form of changes between 2-3 pulse beats one way or the other, it was decided to conduct experiments on people in a sitting position, instead of a reclining position. Fifty-seven observations were made in experiments on 14 people in this series of experiments. The results of this series of experiments were clearer.



Increase in pulse rate was observed in 50 observations out of 57 (in 88% of cases) when vibration was applied in the region of the stomach. No clear-cut changes were observed in five observations, and retardation in pulse rate was noted in two observations. In the majority of observations, an increase of from 6 to 16 beats per minute was noted in pulse rate. This usually developed 1-2 minutes after vibration was applied and reached its maximum level within 2-4 minutes after the increase in the rate was noted. The rate did not remain at that level all the time. It decreased gradually even when vibration was still present. The pulse rate even dropped below the initial level at this time. This was followed by a new rise in the rate. Such alternation in pulsation recurred several times during vibration. However, in the majority of observations the increase in pulse rate continued even after cessation of vibration and lasted for a period of 10-15 minutes, sometimes even longer.

For control purposes, one more series of observations was conducted in experiments where vibration was used on the skin of a man. This was necessary to find out whether an increase in pulse frequency takes place by means of reflex action from the stomach when vibration is applied to any area of the skin.

Observations were made of the effects of vibration in the area of the shoulder and on the left side of the forearm, other conditions being the same. In 12 observations on seven people experimented with, no noticeable change in pulse rate was noted. Special studies were then made on the results of the action of vibration on the right half of the abdomen, in the same segment of the spinal cord as the stomach. Any change observed in pulse rate was insignificant; either an increase or a decrease of 3-5 beats per minute was noted.

Thus, all observations of control groups offer a basis for thinking that the increase in pulse rate, arising as result of the application of weak vibration in the area of the stomach of a man, is a reflex action from the stomach and not from the skin. There is sufficient basis for thinking that intensification of vibration would produce not stimulation, but inhibition of cardiac activity. Thus, it is quite probable that there is a two-phase character to the action from the stomach to the heart in man. It is interesting to note that the two-phase character of the action was also detected when a study was made of the effect on the plethysmogram of the hand of temperature stimuli applied to the stomach.

Clinical and physiological observations found in the literature discussing morphological and experimental data showed long ago that the heart was able to receive irritations. On the basis of this and on the basis of data published by the author of this article in 1941 it can now be stated (as it was stated then) that the heart is a powerful afferent system, possessing unique irritability and, therefore, acts as a reflexogenic zone, exerting an influence on a multitude of internal organs.

It can be considered an established fact at present that the heart, with vessels contiguous to it, possesses the ability to act as an active afferent apparatus which is part of the visceral analyzer system and, consequently, possesses the capacity to send its impulses to the brain and to the spinal cord, coming thereby into relationship with other organs.

Despite the fact that the gastrocardiac reflex is a well-known viscerovisceral reflex, and has been known for a long time, the idea somehow arose that this was a one-sided reflex, i.e., the stomach influences the heart, but not vice versa. The reverse effect, from the heart to the stomach, has not been thoroughly studied in physiological experiments.

Proceeding, on the one hand, from the principle of reflex interaction of organs and, on the other hand, from the secondary effects of vibration on the heart of a frog, attempts were made to investigate whether there exists any reflex action from the heart to the stomach.

A series of experiments was conducted by V. P. Ryumin on frogs in which recordings of the movements of the stomach and of heart beats were made on a kymograph simultaneously. An electromagnetic vibrator with a frequency of 100 cycles and an amplitude of 0.3 mm was used to irritate the heart. Vibration lasted 1-3 minutes. Results of 67 experiments, in which vibration was used to irritate the heart, showed that more frequent and energetic contraction of the stomach took place. This was observed in 54 experiments (80%); peristalsis remained the same, but the tonus of the stomach increased in 11 experiments (17%). Retardation in peristalsis was observed in two experiments.

To verify that any change in the movements of the stomach, during action on the heart, was a reflex action, 40 experiments were conducted by applying vibration to the heart with successive disintegration of various branches of the nervous system in each frog. These experiments showed that when the area above the medulla oblongata and the spinal cord have been disintegrated, the effect on the stomach remains the same. It disappears during disintegration of the medulla oblongata alone. In this manner, the presence of cardiogastric reflex and existence of a central link in the medulla oblongata was established.

This was verified on warm-blooded animals. Thirty experiments were carried out on a dog with a gastric fistula.

Experimentation began with recording of the periodic contractions of the stomach in a hungry dog by means of a gastrograph. The purpose of this was to carefully detect the individual peculiarities, duration, and character of the stomach action during periods of work and rest. Vibration (frequency 100 cycles, amplitude 0.3mm) was applied after that in the area of the heart for a period of 2-10 minutes. Vibration was applied when the stomach was at rest and at the beginning and at the end of the period when the stomach was working. It seems, therefore, that the reaction of the stomach to a given irritation depends to considerable degree on its functional condition. So, during the period of complete rest the stomach seems to be refractory to vibration applied to the area of the heart. Clear-cut results were also produced when vibration was applied at the moment when periodic contractions of the stomach began. However, when vibration was applied at the end of the work period, that is within 4-8 minutes after cessation of work, a brief resumption of contractions of the stomach, similar to the periodic ones, was observed in nine experiments out of ten. These conditions appeared when vibration was first applied and subsequently disappeared despite the continued application of vibration.

Additional experiments were conducted for control purposes. Vibration was applied in the area of the stomach and other parts of the body of an animal. Results obtained in the experiments in which vibration was applied in the area of the stomach did not resemble the results observed when vibration was applied in the area of the heart. Contraction of the stomach was produced even during the period of profound sleep, within 20-40 minutes after work. But these contractions were not identical with the usual periodic contractions of a "hungry stomach." It was possible to observe frequent changes in the character of contractions even at the very beginning of work of the stomach. This did not obtain when irritation was applied in the area around the heart.

To differentiate the possible effect of irritation of the skin on the stomach, experiments were carried out in which vibration was applied on the right side of the chest (in the area of the heart) that corresponds to spinal cord segments of the skin. These experiments, however, did not produce any clear-cut reactions of the stomach. Experiments of this series, therefore, correspond to data obtained in cold-blooded animals, i.e., reflex action from the heart on the stomach can also be obtained in warm-blooded animals.

It must be assumed that the reflex effect which arises when vibration is applied to irritate the heart is not limited to the stomach alone, but applies also to other viscerovisceral and visceromotor reflexes. In any case this question is not only of theoretical interest, but also of practical interest. For that reason it can be claimed that significant results have been obtained if the laboratory studies made so far, establishing the existence of a cardiogastric reflex, will serve to stimulate further experimental and clinical research in that direction.

L. Mikheyeva conducted experiments to find out the effects of local vibration on motor conditioned reflexes in dogs. She claimed that local action of vibration has a widespread functional effect. Conditioned reflexes, in the form of lifting paws, were developed to light and sound signals during electrocutaneous reinforcement. Kymographic recordings and measurements were made of a latent period with precision of up to a hundredth of a second. Experiments were conducted with two dogs of different types: an excited type and a calm type. Conditioned reflexes and differentiations were developed and 83 experiments were conducted. Various areas of the skin, particularly the back, were subjected to vibrations. A 100-cycle electromagnetic vibrator was used for 10-15 minutes. The effect of the sound component was excluded. The following results were obtained by Mikheyeva (1955): (1) Local irritation with vibration applied in order of consequences produced an effect on the motor analyzer. This effect is different in itself. (2) In the calm dog, the effect of vibration appeared during a brief extension of the latent period; an increase in the conditioned motor reaction was noted. However, these changes were noted only during the initial experiments, after which adaptation appeared. Subsequently, vibration produced no shifts of any kind in the conditioned reflex action. (3) Vibration produced changes in the higher nervous activity which were much more profound and lasting. These changes in the nervous activity manifested themselves in disruption of the balance between inhibition and excitation of the motor analyzer. In addition to this, excitation prevailed during the first period of experimentation; during the second period, inhibition prevailed. (4) Discovery of dependence of effects of vibration on individual peculiarities of the nervous system places a number of new questions before the physiology of work and occupational pathology.

Public Health, Hygiene, and Sanitation

85. Facts on Public Health in Uzbek SSR

"Congress of Public Health Workers of Uzbekistan," by N. Golovin: Moscow, Meditsinskiy Rabotnik, No 77, 26 Sep 58, p 3

R. S. Sagatov, Minister of Health Uzbek SSR, in his address at the recently concluded Fourth Congress of Public Health Workers of the Uzbek SSR, reported that the network of therapeutic establishments in Uzbekistan has increased to 12 times the prerevolutionary number and there are 45 times as many hospital beds in these establishments. At present, the republic has 8,560 physicians, 1,737 pharmacists, and over 27,000 medical workers. During the same period the death rate is one fifth the prerevolutionary rate, and the birth rate greatly increased.

Other speakers at the congress pointed out that within the next 10-15 years tuberculosis will be completely wiped out in the republic and that the struggle for the elimination of malaria has progressed considerably.

86. Advancement of Public Health in Uzbekistan

"The Advancement of Public Health in Uzbekistan," by R. S. Sagatov, Med. Zhur. Uzbekistana (Medical Journal of Uzbekistan), No 11, 1957, 8-17; (from Meditsinskiy Referativnyy Zhurnal, No 7, Jun 58, p 4)

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"During the prerevolutionary days in Uzbekistan, there were one physician, one feldsher, 2-3 midwives, and 3-4 people capable of giving vaccinations in the entire country. The sanitary organization, consisting of two physicians, had one bacteriological laboratory and one pasteurization station. In 1892, 21,858 people died from cholera. During the first year of life, 30 out of every 100 infants born died; in some years the ratio was 60 out of every 70. In 1914 only 14 kopecks per person per year was spent on public health. At present, there are in the republic 40,875 hospital rooms or one room per 180 people. Appropriations for public health in 1957 amounted to 145 rubles per person. There are 124 specialized dispensaries, 360 female and children's consultation offices (approximately half of which are in villages), 1,528 permanent nurseries with a capacity of 50,822, and 8,703 seasonal nurseries with a capacity of 168,000. The medical network consists of 772 unified hospitals and dispensaries. Twenty-six stations and rooms were organized for transfusing blood, as well as 211 physician-manned and 427 feldsher-manned health stations in industrial enterprises, and 31 medical-sanitation units. Uzbekistan has the following

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number of physicians in the following specialties: 197 physicians engaged in therapeutics, 1,130 pediatricians, 606 surgeons, 588 obstetrician-gynecologists, 414 phthisiologists, 358 sanitation physicians, 364 dermatologists and venerologists, 237 oculists, 262 infectionists, and 528 dentists. There are a chemopharmaceutical plant, 317 pharmacies, and 1,654 pharmacy points. Some 2,427 people are engaged by the pharmaceutical administration.

Parasitic worms were liquidated in 1932. In 1955, quartan malaria was liquidated as a massive disease: the mean intensity index was lowered in 1956 to 0.9. Infant mortality rate in 1956 was one tenth that in 1914; the ratio of births to deaths was 6:1.

### Radiology

#### 87. Acceleration and Inhibition of Ascorbic Acid Oxidation Due to Various Types of Ionizing Radiation

"The Oxidation of Ascorbic Acid by Certain Types of Ionizing Radiation," by B. I. Pukhov, Tr. Kirg. Med. In-ta (Works of the Kirgiz Medical Institute), 1957, 9, 119-123; (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 16, 25 Aug 58, Abstract No 20497, by A. Trufanov)

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"The oxidation of a 0.05% solution of ascorbic acid proceeds at a faster rate due to the effect of  $H_2O_2$  than due to  $O_2$ . The oxidation of ascorbic acid is speeded up by a factor of 8.5 after a single ultraviolet irradiation, while after irradiation by roentgen rays, ascorbic acid oxidation is speeded by a factor of 2. The oxidation of ascorbic acid, after a single roentgen irradiation (without  $H_2O_2$ ), proceeds at the same rate in the 200-800 roentgen range, but with doses of 1,000 roentgens, oxidation is inhibited.

Miscellaneous

88. Establishment of Republic Affiliates of Academy of Medical Sciences USSR Urged

"The Problem of the Means for Reorganizing the Medical Sciences," by Prof E. I. Atakhanov, chairman, Scientific Medical Council, Ministry of Health Uzbek SSR; Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 6, Jun 58, pp 85-88

In the Uzbek SSR considerable progress has been made in the medical field. At present the republic has five medical vuzes (higher educational institutions) and nine scientific research institutes, but one of the greatest shortcomings in the scientific medical research program of the republic is the planning and organization of research. The author, therefore, states that: "One of the most important problems in the development

of medical science in our country is that of good organization in the planning of scientific research and the coordination of the work of medical scientists.... Since the function of planning all important medical problems and the coordination of work is now the responsibility of the Academy of Medical Sciences USSR, it is up to the academy to establish the planning and coordination operation and to work closely with scientific medical councils of the union republics.... This type of operation is most difficult for one body to handle; we believe that the solution to this is to establish in each union republic an affiliate of the Academy of Medical Sciences USSR. The organization of such affiliates would serve to intensify the study of occupational diseases, morbidity, and mortality of the population of individual krays and would indicate concrete preventive measures. All republic scientific research institutes of the republic's academy of sciences and medical vuzes should be transferred to the administration of the republic's affiliate of the Academy of Medical Sciences USSR.... The affiliate would then be responsible for all planning and coordination of medical research in the republic."

89. Current Status of Soviet Medical Institutes

"For the Future Improvement of the Work of Medical Institutes," by M. G. Sirotkina (Moscow); Moscow, Sovetskaya Meditsina, No 6, Jun 58, pp 131-135

Since 1952 four new medical institutes have been opened in Siberia and the Far East. At the same time the number of students admitted to medical vuzes of the Urals, Siberia, and Far East has greatly increased. The number of students in these vuzes in 1957 was more than double the 1940 number: there were nearly 29,000 students in 1957.

At the same time the number of students admitted to medical vuzes of the central and southern RSFSR has decreased. There are at present 44 medical institutes in the RSFSR, and the number of graduates is "sufficient for the public health needs of the RSFSR; thus no new medical vuzes are being established."

During the Fifth Five-Year Plan, 47,300,000 rubles was spent on the construction of classroom buildings and dormitories, while, during 1956-1957, 65,300,000 rubles was spent. Five new classroom buildings and eight dormitories for 3,000 students have been completed. These dormitories were built at the Blagoveshchensk, Khabarovsk, Novosibirsk, Kursk, Ryazan, Chelyabinsk, Stalingrad, and Second Moscow Medical Institutes.

During 1958, fifteen classroom buildings and 14 dormitories will be built; of these, 6 classroom buildings and 8 dormitories will be located in the medical vuzes of the Urals, Siberia, and Far East.

To improve the quality of graduates from medical institutes, especially in clinical experience, 20 new therapeutic establishments are now being built in cities where medical vuzes are established.

In 1957, 40,200,000 rubles was appropriated for the educational and scientific activities of medical vuzes; this appropriation is four times greater than that of 1951.

90. New Medical Institute in Vladivostok

"Medical Institute in Vladivostok" (unsigned article); Moscow, Meditsinskiy Rabotnik, 19 Sep 58, p 1

By decree of the Council of Ministers RSFSR, the Medical Faculty of Vladivostok State University has been disbanded, and in its place there has been established the Vladivostok Medical Institute. All former students of the Medical Faculty will be transferred to the new institute.

During the 1958-59 academic year the new institute will admit 100 students in the first-year class. Classes are to begin on 1 October 1958.



91. North-Osetian Medical Institute To Be Expanded

"Medical Vuzes in the Eastern Part of the Country" (unsigned article); Moscow, Meditsinskiy Rabotnik, 26 Sep 58, p 2

The North-Osetian Medical Institute, which has been scheduled to be transferred to Vladivostok to become the Vladivostok Medical Institute, has been allowed to continue functioning in the city of Ordzhonikidze. Plans have been made to expand the institute; a complete renovation of the institute's buildings will be made and new equipment will be installed.

The institute will continue to graduate medics for work in North-Osetia and the neighboring Checheno-Ingushskaya and Kabardino-Balkarskaya ASSRs.

92. New Faculty Established at Yerevan Medical Institute

"Short News" (unsigned article); Moscow, Meditsinskiy Rabotnik, 19 Sep 58, p 2

A Faculty for the Advanced Training of Physicians (Fakul'tet Usovershenstvovaniya Vrachey) has been established at the Yerevan Medical Institute. The faculty will consist of the Chairs of Therapy, Pediatrics, General Hygiene, Obstetrics and Gynecology, and others.

93. New Laboratory for Experimental Cancer Therapy

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"Khronika," Vrachebnoye Delo, No 9, 1958, p 1008

"A Laboratory of Experimental Cancer Therapy is being organized at the Kiev Roentgen-Radiological and Oncological Institute. Prof. R. Ye. Kavetskiy, an academician of the Academy of Sciences Ukrainian SSR, has been designated director of the laboratory. It is contemplated that the following areas will be covered: radioisotope therapy, chemotherapy, biotherapy, and morphology.

"The laboratory has been presented with the task of developing and introducing new methods and improving existing methods for treating malignant tumors mainly by searching for new preparations such as antibiotics, antimetabolites, and synthetic antitumor substances.

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"The new laboratory will have close contact with the Institute of Organic Chemistry; the Institute of Microbiology, Academy of Medical Sciences Ukrainian SSR; the Sanitary Chemical Institute; the Institute of Epidemiology and Microbiology, Academy of Sciences Ukrainian SSR; the Khar'kov Radiological Institute, Ministry of Health Ukrainian SSR; other institutes which will be able to obtain new substances having antitumor action; and clinics which have been approved for conducting experiments with the preparations.

"Although there have been notable successes in anticancer endeavors, it is still necessary to develop new methods of treating those forms of the disease for which surgery and radiation therapy are not practical.

"The new laboratory will be the coordination center for this type of experimentation."

94. All-Union Conference of Surgeons

"All-Union Conference of Surgeons" (unsigned article); Moscow, Meditsinskiy Rabotnik, 23 Sep 58, p 4

The Ministry of Health USSR and the All-Union Society of Surgeons will convoke an All-Union Conference of Surgeons on 25 September 1958 in Kazan!. The conference is to last 6 days. The program will include reports on the problems of anesthesiology, tumors of the colon, compound fractures, and the treatment of traumatism. Over 70 reports will be given on these problems.

95. International Parasitology Conference in Budapest

"International Parasitology Conference in Budapest," by Academician Sandor Kotlan; Budapest, Nepszabadsag, 14 Sep 58, p 10

The international parasitology conference organized by the Fourth Department (Agricultural Sciences) of the Hungarian Academy of Sciences will begin on 15 September 1958. Experts from the Soviet Union, the People's Democracies, and several Western countries will participate. The conference which will last until 18 September, will include discussion of public health and veterinarian parasitology problems; including prevention of liver fluke disease in domestic animals and prevention of lung worms.

From the public health viewpoint there will be an exchange of ideas concerning enterobiosis and entamoebiosis.

Foreign guests will include K. I. Skryabin, Soviet academician; W. Stefanski, Polish academician; O. Jirovec, Czech academician; Hovorka, Slovak academician; Matoff and Pavlov, Bulgarian professors; Enigk, West German professor; Kendall, English doctor and chief of the Parasitology Department of the Veterinarian Institute, Ministry of Agriculture, and Petrovich, Yugoslav docent.

96. Congress of Public Health Workers of Armenian SSR

"Congress of Public Health Workers of Armenia" (unsigned article); Moscow, Meditsinskiy Rabotnik, 19 Sep 58, p 1

The First Congress of Medical Workers of the Armenian SSR, attended by nearly 1,200 scholars, physicians, nurses, feldshers, sanitation workers, and party members, was convened on 19 September 1958 in Yerevan. The keynote address was given by A. I. Khrimlyan, Minister of Health Armenian SSR. In his address, he pointed out that the republic now has 3,500 physicians compared with 73 in 1913. The current annual budget for medical public health in the republic is 311 million rubles; during the past 15 years the budget has tripled.

Malaria is considered completely liquidated in the republic and the spread of infectious diseases greatly reduced.

The congress heard reports on measures for controlling enteric infections, on the medical-sanitation service for industrial workers, and on tasks in sanitation education.

97. Third Congress of Phthysiologists of Ukraine To Be Held in Late October

"Third Congress of Phthysiologists of the Ukraine" (unsigned article); Moscow, Meditsinskiy Rabotnik, 26 Sep 58, p 4

The Organizational Committee of the Third Congress of Phthysiologists of the Ukraine announces that the congress will be held in Kiev from 20 to 23 October 1958.

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The program will include (1) the epidemiology and prophylaxis of tuberculosis and the organization of its control, (2) recovery from various forms of tuberculosis, (3) current indications of the various methods of surgical treatment of cavernous tuberculosis, and (4) compensating processes in the organism following surgical intervention as a result of tuberculosis.

"All questions concerning the congress should be addressed to the following: Kiev, Baykova gora, Klinicheskaya, 4, Ukrainian Scientific Research Institute of Tuberculosis imeni Academician F. G. Yanovskiy; telephone, 4-25-82, 5-41-33."

98. Czechoslovak Psychiatrists Hold First National Congress

"Local and Foreign News" (unsigned article); Prague, Obrana Lidu, 21 Sep 58, p 2

From 22 to 27 September 1958, the Czechoslovak Psychiatric Society (Ceskoslovenska psychiatricka spolecnost) will hold its first national congress in Marianske Lazne. The psychiatric society is a section of the "J. E. Purkyne" Medical Society (Lekarcka spolecnost J. E. Purkyne). About 300 Czechoslovak psychiatrists and other specialists will be present at the congress to discuss neuroses.

99. Prof I. R. Braude, Ukrainian Infectionist, Dies

"Il'ya Rafailovich Braude" (unsigned article); Kiev, Vrachebnoye Delo, No 9, Sep 58, p 999

Prof Il'ya Rafailovich Braude, one of the outstanding Soviet-Ukrainian infectionists, Doctor of Medical Sciences and head of the Clinic of Infectious Diseases of Khar'kov Medical Institute, died recently. He was born in 1890 and graduated from the Medical Faculty, Khar'kov University, in 1914. In 1932 he was elected head of the Clinic of Infectious Diseases, Khar'kov Medical Institute, which he headed until his death.

Braude is the author of 65 scientific works, including a textbook on the diagnosis of infectious diseases. His major studies concerned the pathology, diagnosis, and therapy of dysentery, typhoid fever, typhus, malaria, and influenza.

100. Prof D. N. Nasonov, Soviet Cytologist, Dies

"Dmitriy Nikolayevich Nasonov (1895-1957)," by A. V. Zhirmu-  
skiy and V. P. Mikhaylov; Moscow, Vestnik Akademii Meditsin-  
skikh Nauk, No 5, May 58, pp 85-86

Prof Dmitriy Nikolayevich Nasonov, Active Member of the Academy of  
Medical Sciences USSR, Corresponding Member of the Academy of Sciences USSR,  
and one of the most outstanding Soviet specialists in cytology, died on  
21 December 1957.

Nasonov was born on 10 July 1895 in Warsaw and graduated in 1919 from  
the Natural Sciences Department, Physicomathematical Faculty, of Petrograd  
University. In 1933, he became head of the Cytology Laboratory, All-Union  
Institute of Experimental Medicine; in 1935 he joined the Laboratory of  
Cell Physiology, Physiology Institute, of Leningrad State University. Dur-  
ing 1939-1940 he was dean of the Biology Faculty, Leningrad State University,  
and from 1945 to 1950 was head of the Division of General Morphology. From  
1948 to 1950 he was director of the Institute of Experimental Medicine,  
Academy of Medical Sciences USSR. In 1957, he was elected director of the  
Institute of Cytology, Academy of Sciences USSR, which he had helped  
organize.

He was the author of over 100 scientific works dealing with various  
aspects of the synthesis of morphological and physiological investigations.

101. Prof A. I. Dobrokhotova, Soviet Pediatrician, Dies

"Aleksandra Ivanovna Dobrokhotova (1884-1958)" (unsigned arti-  
cle); Moscow, Vestnik Akademii Meditsinskikh Nauk, No 5, May 58,  
pp 86-87.

Prof Aleksandra Ivanovna Dobrokhotova, Corresponding Member of the  
Academy of Medical Sciences USSR, died on 13 February 1958. She was born  
in Kineshma in 1884 and graduated from the Medical Faculty of the Moscow  
Higher Women's Courses in 1913. In 1921 she joined the staff of the In-  
stitute of Pediatrics, Academy of Medical Sciences USSR, and for the past  
25 years was head of its Division of Acute Children's Infections.

For her work in the field of children's public health, she was awarded  
the Order of Lenin and Order of Labor Red Banner and other medals. She was  
the author of over 150 scientific and popular works concerning important  
problems of children's infections.

VIII. METALLURGY

102. Tensile Strength-Hardness Relationships of Copper Alloys at High Temperatures

"Relationship Between Tensile Strength and Hardness of Certain Copper Alloys at High Temperatures," by M. V. Zakharov, L. I. Karpenko, and M. V. Stepanova; Moscow, Tsvetnyye Metally, No 8, Aug 58, pp 64-67

Investigations were conducted on binary (Cu-Al, Cu-Mn, Cu-Cr, Cu-Zr), ternary (Cu-Ni<sub>2</sub>Si, Cu-NiAl, Cu-Cr-Zr, Cu-Ni-Be), and quaternary (Cu-Ni-Be-Zr, Cu-Ni-Be-Cd) copper alloys at 600 and 800°C in an attempt to determine the relationship of tensile strength and hardness in nonferrous alloys. Data and graphs are presented for tests on 70 alloy specimens which were prepared in high-temperature resistance furnaces.

Graphic comparison of tensile strength and hardness gives an almost straight-line relationship. In the case of Cu-Cr-Zr alloys, the largest deviation from a straight-line relationship is 9-10% at 600 and 800°C. For the Cu-Ni-Be group, with or without admixtures of Zr or Cd, the deviation is 8% at 800°C and 14% at 600°C. The large scattering of points at 600°C is explained by increased brittleness of these alloys at this temperature.

The authors say that short-duration, i.e., "hot" hardness of alloys can serve as a criterion for preliminary evaluation of their strength characteristics at high temperatures.

103. Drawing and Rolling Under High Hydrostatic Pressures

"Apparatus for Drawing and Rolling Metals With Free-Running Rollers in a Fluid Under High Hydrostatic Pressure," by B. I. Beresnev, L. F. Vereshchagin, and Yu. N. Ryabinin; Moscow, Tsvetnyye Metally, No 8, Aug 58, pp 61-63

A description is given of the design and operation of an apparatus developed by the Laboratory of Superhigh Pressures, Academy of Sciences USSR (with participation by Engr A. F. Gavrilov) which deforms metals by both drawing and rolling (utilizing free-running rollers) in a fluid under pressures up to 10,000 kg/cm<sup>2</sup>.

Steels 45KhNMFA ( $R_c = 45-48$ ) and ShKh15 ( $R_c = 60-62$ ) were used in various components of the apparatus.

Experiments were conducted with this apparatus in drawing and rolling specimens of aluminum to different degrees of deformation and at different hydrostatic pressures. No results are given.

#### 104. Tellurium and Indium Extraction

"Extraction of Tellurium and Indium From Antimonous Slags,"  
by Ya. Z. Malkin, V. Ya. Sergiyenko, N. V. Bovtuta, and  
I. G. Yudelevich; Moscow Tsvetnyye Metally, No 8, Aug 58,  
pp 34-39

Investigations were performed at the Chimkent Lead Works (other participants were Ye. Agatova, T. Shumkova, N. Popova, and N. Ivanova) to develop an industrial method for extraction of tellurium and indium from antimonous slags and to determine the distribution and concentration of indium in various products of lead production for the purpose of finding points with highest concentrations of indium for further extraction.

Analysis of indium concentration in different materials from lead production indicated that such materials as dry dross, flue dust from shaft smelting of agglomerate, flue dust from shaft smelting of waste materials, and antimonous slag may be used as raw materials for extraction of indium.

A flow chart is presented showing the process for extraction of tellurium and indium from antimonous slags. Up to 90% of the tellurium in the slag is extracted by this method. Elemental tellurium is electrolytically deposited and has the following impurities: 1.2% Pb, 1.8% Sb, 0.5% As, 0.5% Sn, 0.01% Cu, 0.2%  $Fe_2O_3$ , 0.3%  $Al_2O_3$ , 0.2% S, and traces of Se. Pure tellurium can be obtained by further electrolysis. About 99% of the indium in the slag is extracted in the form of a concentrate which contains 1-2% indium. This concentrate serves as the raw material for obtaining metallic indium. The method for obtaining metallic indium from the concentrate has been put into practice at the "Elektrotsink" plants, the Chelyabinsk Zinc Works, and the Novosibirsk Tinworks.

IX. PHYSICS

Nuclear Physics

105. Catalysis of Nuclear Fusion by Mesons

"At General Conferences of the Departments" (unsigned article);  
Moscow, Vestnik Akademii Nauk SSSR, Vol 28, No 8, Aug 58,  
pp 57-68

At a general conference of the Department of Physicomathematical Sciences, Academy of Sciences USSR, held 16-17 June 1958, Ya. B. Zel'dovich, Corresponding Member of the Academy of Sciences USSR (elected Active Member of the academy on 20 June 1958) presented a paper entitled "Catalysis of Nuclear Reactions by Mesons and Phenomena Connected With This." He considered three possible ways of accomplishing reactions of nuclear synthesis (fusion), namely, the heating of matter to a high temperature, strong compression of matter, and catalysis by means of mesons.

A decisive role in reactions of nuclear synthesis at energies of the order of 10 kev is played by quantum leakage (tunneling). Theoretically nuclear reactions would be capable of taking place in ordinary molecules of hydrogen or deuterium as a result of tunneling. The calculation of existing conditions shows, however, that the probability of passage through the Coulomb barriers, which is equal to  $e^{-k\sqrt{\frac{M}{m}}}$  (where M is the mass of the nucleus, k a numerical factor of an order of magnitude close to unity, and m the mass of the electron) is too small for ordinary molecules, so that the reaction for all practical purposes does not occur. At the same time it appears from this formula that if the chemical bond in the molecule were not brought about by an electron, but by a particle with a considerably higher mass, for instance, a meson, occurrence of a nuclear reaction would be much more probable. The idea concerning the possibility of the catalysis of nuclear reactions in hydrogen by mesons was expressed earlier by the British physicist Frank and by A. D. Sakharov and Ya. B. Zel'dovich (the first detailed calculation of this phenomenon was published by Zel'dovich in 1954).

In 1956, the reactions in question were discovered experimentally by Alvarez and his collaborators. A further experimental investigation was conducted by a group of British physicists. An explanation for a number of details involved in the process observed experimentally was given by Zel'dovich, Sakharov, and others.



It was pointed out in Zel'dovich's report that the catalysis of nuclear reactions by mesons cannot be utilized as a method for producing power (even if a stable meson existed), because the energy evolved is lower than the energy expended for the generation of the meson. At the same time catalysis by means of mesons is of considerable scientific importance, because nuclear reactions take place in this case under conditions radically different from those encountered when the reactions are conducted in accelerators. Nuclear reactions occurring in mixtures of hydrogen with tritium as a result of the action of mesons are of particular interest. Catalysis by mesons can theoretically be used for the discovery and investigation of properties of long-lived negative mesons.

Different mesomolecular processes taking place in hydrogen are of great importance for proving experimentally the law of weak interaction between  $\mu^-$ -mesons and nucleons.

The reaction of the synthesis of hydrogen nuclei could take place in cold matter at measurable velocities by tunneling if the actual distances between nuclei were by tens of times greater than the mean distances (even in this case the distances between nuclei would still be thousands of times greater than the dimensions of the nuclei). Pressures required for compressing matter to this extent are too high to be used on Earth for practical purposes. However, important astrophysical conclusions follow from this. Zel'dovich showed that evolution of energy because of nuclear reactions taking place by tunneling in astral bodies consisting of cold hydrogen will at a mass of the body equal to only 0.75 of the mass of the sun result within  $10^6$  years in heating of matter to such an extent that thermonuclear reactions will proceed in it to a considerable degree. Because of the occurrence of thermonuclear reactions, there is a maximum possible mass for a cold planet consisting of hydrogen.

At the conclusion of Zel'dovich's report it was pointed out that the most feasible way of realizing a controllable nuclear fusion reaction will be by the application of high-temperature plasma.

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REPORT

31 OCTOBER 1958

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106. Theoretical Analysis of Betatrons

"The Capture Mechanism and the Limiting Current in Betatrons,"  
by A. N. Matveyev, Moscow State University; Moscow, Zhurnal  
Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 2 (8),  
Aug 58, pp 372-380

The computations carried out give a clear picture of processes governing the capture mechanism in the betatron and concur with experimental results. A detailed mathematical solution of the problem is cumbersome, but not indispensable for the physical interpretation. The pulse duration of injection is assumed equal to one turn of electrons; if the injection duration is longer than one turn, the Coulomb interaction of the electron beams should be taken under consideration. Such interaction has been analyzed by B. N. Rodimov (dissertation, Tomsk Polytechnic Institute, 1954). In a limiting case of high electron density and if the injection duration is longer than one turn, definite conclusions may be made on the capture mechanism, as described in a previous article by the author (Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 34, 1331, 1958).

107. Fission of Silver

"Fission of Silver Nuclei Induced by High-Energy Protons," by  
V. P. Shamov, Radium Institute, Academy of Sciences USSR; Moscow  
Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35,  
No 2 (8), Aug 58, pp 316-321 (English abstract)

Some parameters relating to fission of silver nuclei induced by protons possessing energies between 300 and 660 MeV are investigated. An analysis of the experimental data shows that (1) fission of silver nuclei induced by high-energy protons predominantly leads to the formation of fragments of equal masses; (2) the fission cross section does not significantly vary in the investigated energy range of the incident protons and is  $\sigma_f = (3.2 \pm 1) 10^{-28} \text{cm}^2$ ; and (3) as a rule fission is accompanied by the emission of a large number of charged particles which indicates that the initial degree of excitation of the fissioning nuclei is quite large. The complete curve for the yield of residual nuclei as a function of charge and the differential yield for various nuclear interaction processes such as fragmentation, fission, and the cascade-evaporation process are presented.

108. 1902-keV Transition in Ce<sup>140</sup> Called New 0<sup>+</sup>→0<sup>+</sup> Transition

"0<sup>+</sup>→0<sup>+</sup> Transition in Ce<sup>140</sup>," by B. S. Dzheleпов, Corresponding Member of the Academy of Sciences USSR, V. P. Prikhodtseva; and Yu. V. Khol'nov, Radium Institute imeni V. G. Khlopin, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol. 121, No 6, 21 Aug 58, pp 995-997

The hypothesis that conversion electrons K-1909 correspond to a transition between the 1909-keV excited state of Ce<sup>140</sup> with quantum characteristic 0<sup>+</sup> and the ground state, also 0<sup>+</sup>, is examined. The gamma spectrum of La<sup>140</sup> was studied in the region of 1900 keV. The study showed that the intensity of gamma rays in this region is less than 4·10<sup>-4</sup> quanta/decay. On the basis of this figure and known data on the intensity of the 1909-keV conversion line it is concluded that this is a case of 0<sup>+</sup>→0<sup>+</sup> transition.

A more detailed study of the conversion electrons of La<sup>140</sup> was made to verify the existence of the K-1909 line and determine its intensity exactly. K- and L-1909 lines were found to definitely exist and have an average transition energy of 1902 keV. The lower limit of the conversion coefficient of a 1902-keV transition was found to be greater than 0.38. This value, it is stated, could be explained by a high multipole order, but in this case there would have to be an isomer level with a lifetime of more than 10<sup>10</sup> years. The counting rate on the K-1902 line was found to drop off with a period of about 38 hours, which is approximately the half-life of La<sup>140</sup>. The conclusion is drawn that a 1902-keV transition in Ce<sup>140</sup> is a new 0<sup>+</sup>→0<sup>+</sup> transition and that the ratio of the conversion coefficients for this transition is  $\alpha_K/\alpha_L = 6.33$ .

109. Mass Spectroscopy

"A New Optical Method of Mass Spectroscopy," by L. A. Tumerman, Physics Institute Academy of Sciences USSR, Fiz. sb. L'vovsk. un-ta, 1957, No 3 (8), pp 81-83 (from Referativnyy Zhurnal -- Fizika, No 8, Aug 58, Abstract No 17337)

A method of isotopic analysis is suggested, in which the Doppler effect of line shift of ions moving "toward the observer" is used. Because the magnitude of the Doppler shift of each line is determined by radial velocity, and the latter in the case of ions is determined by mass, the possibility of creating an optical mass spectrograph is evident. The computation of the resolving power attained in this method leads to the following result:  $M/6M = 4 \cdot 10^{-4} \sqrt{U/M} \cdot \lambda/\delta\lambda$ , where U is the ion energy, M - the ion mass, and  $\lambda/\delta\lambda$  the resolving power of the spectral apparatus used.

Theoretical Physics110. Kinetic Equations in Study of Magnetohydrodynamic Waves

"Kinetic Theory of Magnetohydrodynamic Waves," by K. N. Stepanov, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 34, No 5, May 58, pp 1292-1301

The propagation of magnetohydrodynamic waves is considered on the basis of kinetic equations. Wave frequency is taken to be much greater than the frequency of close collisions of charged particles with one another and with neutral particles.

It is shown that magnetohydrodynamic waves with an angle of propagation  $\theta \neq \pi/2$  are damped. This damping is similar to the damping of longitudinal plasma waves found by Landau (Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 16, 574, 1946.) The coefficient of damping increases with a decrease in the phase velocity of the waves,  $V_{ph} \sim c/n_A$ , where  $n_A = (4\pi n_0 m_i c^2 / H_0)^{1/2}$ ,  $n_0$  is the equilibrium ion density,  $m_i$  is the mass of an ion, and  $H_0$  is the external magnetic field strength. It becomes nonexponentially small for  $V_{ph} \sim v_{Te}$ , where  $v_{Te}$  is the mean thermal velocity of electrons. If  $\theta \ll 1$ , and  $V_{ph} \ll v_{Ti}$ , (the mean thermal velocity of ions,) the damping of magnetohydrodynamic waves is small only for a very narrow range of angles,  $\theta^2 \ll 1/\beta$  and  $n_A < 1$ , where  $\beta = v_{Ti}^2/c^2$ . If  $\theta \sim 1$  and  $V_{ph} \sim v_{Te}$ , the damping coefficient of an ordinary wave  $\gamma_2$  is considerably greater than the damping coefficient of an extraordinary wave  $\gamma_1$ , i.e.,  $\gamma_2/\gamma_1 \sim u_i \gg 1$ , where  $u_i = \omega^2 / (\omega_{Hi}^2)$ ,  $\omega_{Hi}^2 = e_i H_0 / m_i c$ , and  $e_i$  is the ion charge. An ordinary wave is strongly damped ( $\text{Re } n_1' \sim \text{Im } n_1'$ ) for  $V_{ph} \ll v_{Ti}$ , when  $\beta \gg n_A^3 \sim u_i$ , where  $n' = kc/\omega'$ ,  $k$  is the magnitude of the wave vector, and  $\omega'$  is the complex frequency of the wave. Propagation of an extraordinary wave is not possible because of the strong damping ( $\text{Re } n_2' \sim \text{Im } n_2' \sim n_A$ ) for  $V_{ph} \sim v_{Ti}$ .

111. Propagation of Magnetohydrodynamic Waves in Arbitrarily Oriented Field

"On Riemann Waves in Magnetohydrodynamics," by A. G. Kulikovskiy, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 121, No 6, 21 Aug 58, pp 987-990

Riemann waves in magnetohydrodynamics are considered for a case when the magnetic field has an arbitrary position with respect to the wave front. It is claimed that this case produces mechanical effects which do not appear in the case when the field is parallel to the plane of the wave, the problem treated by S. A. Kaplan and K. P. Stanyukovich (Doklady Akademii Nauk SSSR, 96, No 3, 1954).

The equations for the isentropic motion of plane waves in a gas with infinite conductivity under a magnetic field are solved. The solutions are said to be applicable to the problem of the breakup of an arbitrary burst in magnetohydrodynamics and to the problem of a piston which moves either with constant velocity or with a variable velocity chosen so as to cause a wave of only one type or cause a succession of waves such that they do not overtake one another.

### Mechanics

#### 112. Stability of Permanent Rotations Around Any Axis of a Body Studied

"Contribution to the Theory of Permanent Rotations," By P. A. Kuz'min, Kazan' Aviation Institute, Chair of Theoretical Mechanics; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatzionnaya Tekhnika, No 2, 1958, pp 16-19

The stability of motion of a rotating body is considered. The invariant form of the conditions for permanent rotations and a unique sufficiency condition for stability of motion are given. It is noted that earlier works treated permanent rotations around the body's principal axis, only.

#### 113. Form of Bodies for Minimum Wave Resistance Studied

"On the Form of Bodies With Minimum Wave Resistance," by G. I. Kostychev, Kazan' Aviation Institute, Chair of Aerodynamics; Kazan' Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatzionnaya Tekhnika, No 2, 1958, pp 9-15

The problem of determining the form of a body with minimum wave resistance for the case of potential and vortex flow is considered, taking into account bow shock waves. The method used is one developed by A. A. Nikol'skiy ("Bodies of Revolution Containing a Channel Which Have Minimum Wave Resistance in Supersonic Flow," Trudy TsAGI [Trudy of the Central Aerohydrodynamics Institute], 1950) in which the forces acting on the body are expressed in terms of the gas-dynamics functions of the characteristics of the region of influence. An advantage of the method is that the variation problem can be solved without integrating the gas-dynamic equations. The present work is an extension of a paper by Yu. D. Shmyglevskiy ("Certain Variation Problems of the Gas Dynamics of Axially symmetrical Supersonic Flows," Prikladnaya Matematika i Mekhanika, Vol 21, No 2, 1957), which did not consider bow shock waves.

114. Optimum Flight Conditions Not Given by Stationary Conditions

"On an Investigation of the Solutions of Certain Variation Problems of Aeromechanics," by Yu. V. Kozhevnikov, Kazan' Aviation Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika, No 2, 1958

Two problems are considered for which it is shown that stationary flight conditions are not the optimum conditions. It is remarked that the indirect methods of the calculus of variations are frequently used to determine optimum flight conditions providing an extreme value for one of the characteristics, such as distance, time, and fuel consumption; but that the conditions obtained in this way may not be the optimum since not all variation problems have a solution among the continuous functions.

The problem of determining the optimum trajectory and the best program for the thrust of the rocket engine of a plane making a maneuver in a vertical plane with minimum lapse of time is considered first and the problem of determining the maximum distance along the trajectory under the same conditions, second. It is shown that in both cases the stationary flight conditions is not the solution of the problem.

115. Thermodynamic Properties of Air

"The Thermodynamic Properties of Air During Thermal Ionization and the Shock Wave," by V. V. Selivanov and I. Ya. Shlyapintokh, Institute of Chemical Physics; Moscow, Zhurnal Fizicheskoy Khimii, No 3, Mar 58, pp 680-678

The internal energy, entropy, and pressure of air are calculated at temperatures from  $2 \cdot 10^4$  to  $5 \cdot 10^5$  °K and at densities from 10 to  $10^{-3} \rho_0$  with determinations made of the dissociation, ionization, and hear emission. The values obtained were used to calculate the parameters of a strong shock wave front propagated at the rate of 115 km/sec.

Magnetism

116. Measurement of Weak Magnetic Fields

"Evaluation of the Accuracy of Measurement of the Magnetic Field by Means of Nutation," by A. I. Zhernovoy, Yu. S. Yegorov, and G. D. Latyshev, Leningrad Institute of Railroad Engineering imeni Obratsov; Leningrad, Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, Vol 22, No 8, Aug 58, pp 988-992

The basic method of measuring a magnetic field by means of nutation was previously described by the authors (PIE, 5, 1958). Equipment for measuring heterogeneous magnetic fields by means of nuclear resonance is described. The method is considered advantageous for absolute measurements of fields with a sharply expressed gradient. The independence of the nutation effect from the strength of the external field makes this method applicable for absolute measurement of very weak fields. Preliminary tests confirmed the expectations.

Optics

117. Diffraction Gratings

"Diffraction Gratings of the State Optical Institute," by F. M. Gerasimov, I. A. Tel'tevskiy, S. S. Naumov, S. N. Spizharskiy, and S. V. Nesmelov, State Optical Institute imeni Vavilov, Leningrad, Optika i Spektroskopiya, Vol 4, No 6, June 58, pp 779-790

The ruling machine and the techniques of manufacture of diffraction gratings at the State Optical Institute are described. More details have been given by the writers in their articles in Optiko-mekhanich. promyshl., No 3, 47, 1957, and No 4, 56, 1957. These gratings are used in Soviet scientific and applied spectroscopy in ultraviolet, visible, and infrared bands. The gratings have a resolving power reaching 600,000 and a high concentration power of light in a specified direction. A characteristic change of polarization properties was revealed in the region of maximum concentration of light.



Electronics

118. Properties of Plasma

"Motion of Heterogeneities of Plasma in Presence of an Alternating Electric and Constant Magnetic Fields," by A. V. Bogdanov Tr. Vses. zaozn. energ. in-ta. 1957, No 11, pp 62-67 (from Referativnyy Zhurnal--- Fizika. No 8, Aug 58, Abstract No 18445)

The analysis of kinetic equations by A. A. Vlasov leads the writer to investigation of heterogeneities in plasma. The plasma is considered as consisting of electrons and the abundance and motion of ions is not taken under consideration. The motion of heterogeneities in the plasma occurs perpendicularly to  $E_0$  and  $H_0$  (the amplitude of voltage of the electric field and the strength of the magnetic field). The velocity of this motion does not exceed the value of thermal velocity equal to  $\sqrt{kT/m}$  ( $T$  is the temperature of the electron gas and  $m$ , the electron mass).

Miscellaneous

119. Conference on Luminescence

"Sixth Conference of Luminescence," by B. S. Neporent and P. P. Feofilov; Leningrad, Optika i Spektroskopiya, Vol 4, No 6, Jun 58, pp 810-811

The Sixth Conference on Luminescence was held in Leningrad from 17 to 22 February 1958 by the Physics Institute imeni Lebedev, the Academy of Sciences Belorussian SSR, and the State Optical Institute. The meeting was devoted to problems of molecular luminescence and luminescence analysis. It was attended by 350 delegates from 22 cities. The following problems were discussed: general problems of molecular luminescence; basic characteristics of luminescence; the effect of the surrounding medium on luminescent characteristics of molecules; energy migration in luminescent systems; investigations of luminescence of biologically important objects: chlorophyll and its analogs; and various applications of luminescence in particular in biology, medicine, chemistry, and engineering.

120. Institute of Nuclear Physics of Academy of Sciences Kazakh SSR Nears Completion

CPYRGHT "Great Accomplishments and Bold Plans," by Sh. Chokin, chief scientific secretary of the Presidium, Academy of Sciences Kazakh SSR; Alma-Ata, Kazakhstanskaya Pravda, No 167, 22 Jul 58, p 3

"In the foothills of the Zailiyskiy Ala-Tau Mountains near Alma-Ata, the Institute of Nuclear Physics of the Academy of Sciences Kazakh SSR is being built." The institute will occupy an area of 450 hectares.

CPYRGHT The institute will house a reactor with great experimental potential. In addition, the institute will have a cyclotron, a radiochemical laboratory, and other unique installations.

The fundamental studies of the institute will include experimental and theoretical nuclear physics and the use of radioactive radiation and isotopes in geology, mining, metallurgy, agriculture, medicine, and biology.

The director of the institute is Zh. Takibayev, a young Kazakh scholar, who recently defended his dissertation in Moscow for the degree of Doctor of Physicomathematical Sciences.

X. MISCELLANEOUS

121. Shortcomings Disclosed in Network of Soviet Scientific Research Establishments

"Once Again Concerning the Network of Scientific Establishments," by Academicians A. Blagonravov and B. Stechkin and A. Tselikov and B. Semkov, Corresponding Members, Academy of Sciences USSR; Moscow, Izvestiya, No 231, 26 Sep 58, p 2

CPYRGHT

The following shortcomings were disclosed by the authors as existing currently within the network of Soviet scientific research establishments in regards to scientific planning, coordination of research, and application of scientific research to production:

"Technological institutes, existing earlier within the system of machine-building ministries, remain practically untouched [i.e., have not been subjected to reorganization under the administration of USSR or union republics' gosplan or sovnarkhozes], and these institutes, more than any others, require consolidation, reorganization, and specialization... in order to avoid parallelism and disagreement in research and planning."

"Only four institutes (three of them under the Academy of Sciences [USSR]) are specifically engaged in computer engineering, which in no way satisfies the requirements of electronic machine building."

"Shortcomings in the development of the network of scientific establishments is in part explained by the fact that there is neither in Gosplan USSR nor in the Academy of Sciences an organization [organ] which would systematically supervise the rational division of labor among scientific research institutes."

CPYRGHT

In conclusion the authors propose: "It is absolutely necessary to establish within the system of Gosplan USSR or the Academy of Sciences USSR an organ which would systematically study the problems of the organization of science... this organ may be of an institute level, like the one in existence in Czechoslovakia."

CPYRGHT

122. Research Progress Exhibit at Jena University

Berlin, Sonntag, 7 Sep 58

In view of the great success which the Office for Research Guidance (Forschungsleitstelle) of Friedrich-Schiller University, Jena, attained with its research exhibit 5 years ago, another large-scale exhibit on East German research was shown in Jena on the occasion of the 400th anniversary of Jena University. The exhibit, titled, "Instruction -- Research -- Studies," was prepared by 41 institutes and dealt with about 120 subjects.

One of the major points of attraction of the exhibit was the 10-kilocycle betatron with which an electron radiation or an X-ray retarding radiation (Roentgenbremsstrahlung) with a maximum power (Grenzenergie) of 2 million volts can be produced. This versatile betatron not only is a valuable aid for basic research but also makes possible extremely precise material tests. Furthermore, this betatron is to be used in medicine -- for the treatment of dangerous tumors -- and in other fields. The exhibit showed other appliances which, like the betatron, were developed at the Physicotechnical Institute for the determination of the power of the betatron and its control.

For years, considerable losses were incurred in cauliflower cultivation especially in the Erfurt area, losses which were caused by an infection (Meerrettickkrankheit) and which destroyed some 42 percent of the crop each year. Research done by the Institute for Phytopathology brought to light that this disease is not, as formerly believed, caused by a pest, but is a deficiency disease caused by the lack of some trace elements (boron, manganese, copper, zinc, and others). In the present case, the soil lacks molybdenum (Molybdaen). On the basis of these findings, measures were taken to avoid cauliflower losses amounting to 230,000 DM in the Erfurt area alone.

Another exhibit showed that the Institute for General Botany is examining the possibility of whether the Colorado beetle can also be controlled "biologically," i. e., through the use of a natural enemy. Such a natural enemy of the Colorado beetle is the fungus "Beauveria bassiana" which can penetrate the chitin integument of the beetle, grow in it, and thus cause the beetle's early death. However, the experiments have not been completed so that no definite statement could be made as to the possible practical use of this fungus.

The exhibit also showed materials on dental medicine, including the plastic "Placryl IM" which was developed for artificial dentures.

Another exhibit indicated that the Institute for Pharmacology is concerned with various subjects, including the synthesis of pharmaceuticals for which the basic material had to be imported heretofore. This includes strophanthin, which is extracted from a tropical plant. The lily of the valley (Convallaria) contains a similar substance, the "Convallatoxin" which can be substituted for strophanthin in specific heart therapy (Gezielte Herztherapie). The institute developed a process which makes possible the isolation of this "Convallatoxin" so that East Germany will no longer import the strophanthus plant.

The exhibit also showed measuring and testing instruments developed by the Institute for Applied Optics, including the "Interferometer"; a lens-testing instrument which was produced by the application of calcite crystals; and the "Mikrotom," a device for the preparation of thin specimens of live animal and vegetable tissues.

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