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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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I. BIOLOGY

1. Effect of X-Radiation on Lipoxidase Activity of Plants

"The Effect of Ionizing Radiations on the Activity of Lipoxidase in Seedlings of Various Plant Species," by Ye. V. Budnitskaya, I. G. Borisova, and A. G. Pasynskiy, Institute of Biochemistry imeni A. N. Bakh, Academy of Sciences, USSR; Moscow, Doklady Akademii Nauk SSR, Vol 120, No 1, May/Jun 58, pp 140-143

A previous work (Doklady Akademii Nauk, Vol 110, No 4, 1956, p 603) by the above authors is cited in which it was demonstrated that lipoxidase in vitro is quite resistant to the action of ionizing radiation.

In the present work the effect of X-irradiation on lipoxidase in vivo was studied. Seedlings of beans, peas, wheat, and buckwheat were X-irradiated with doses ranging from 1,000 to 50,000 r and the lipoxidase activity determined.

It was found that the degree of reaction of lipoxidase in plants to irradiation varies from species to species. For example, irradiation of buckwheat seedlings with 1,000-50,000 r leads to a slight drop in lipoxidase activity within 2-4 hours; there is a sharp drop in activity at the end of 24-48 hours. However, lipoxidase of seedlings of wheat and beans becomes "activated" (in most cases by more than 100%) when irradiated with the same dose, during the first 24 hours following irradiation.

2. Chinese Study Mating Process of Tsutsugamushi Mites

"Observations on the Mating Process of Acomatacarus yosanoi Fukusumi et Obata, 1953, With Discovery of Its Spermatophores (Acariformes: Trombiculidae) (Studies on Tsutsugamushi, Part XV.)," by Wen T'ing-huan (温 廷 桓), Department of Parasitology, Shanghai First Medical College; Peiping, Tung-wu Hsueh-pao (Acta Zoologica Sinica), Vol 10, No 2, 1958, pp 213-221

This article represents "the first published account" of tsutsugamushi mites depositing spermatophores. The discovery was made during a series of observations on the mating process of the mite, Acomatacarus yosanoi Fukuzumi et Obata, 1953 (aka Acomatacarus majesticus Chen and Hsu, 1955). Material resembling the sporagonium of the Mucorales fungi appeared in rearing dishes and was at first mistaken as fungal matter which Krischnan and others in 1949 had reported difficult to control in the breeding and maintenance of Trombicula deliensis. Close scrutiny revealed that they were in fact spermatophores. Since there is no sexual dimorphism in the adult mites, the males were determined by the spermatophores they deposited.

Further experiments discredited Wharton's supposition (1952) that copulation occurs in trombiculid mites, for it was observed that the females became inseminated and deposited fertilized eggs only after making contact with the spermatophores deposited by the males.

A full description of the spermatophores and other details of the experiments are included in the article.

The author concludes that the mating process of A. yosanoi can easily be controlled and that the mites can easily be bred and maintained in the laboratory.

"Studies on the Ecology of Trombicula Deliensis and Methods for Their Eradication," by Yu En-shu (于 恩 庶), Chou Yao-min (周 耀 民), Lin Shih-ching (林 師 敬), and Wu Hsi-i (吳 熙 儀), Fukien Epidemic Control Station; Peiping, K'un-ch'ung Hsueh-pao (Acta Entomologica Sinica), Vol 7, No 3, 1957, pp 363-372

This article presents the conclusions of studies undertaken by the authors during the previous 3 years on the behavior of the tsutsugamushi mite, Trombicula Deliensis, and eradication methods. Details of many of the experiments have been reported in other Chinese periodicals, as indicated in the authors' bibliographic citations.

This item includes the following data:

The larvae obtained from live rats can be reared artificially to the second generation within 49-65 days.

In studies on crawling rate, it was found that hungry, artificially bred larvae crawled at an average rate of 31.4 millimeters per minute, as compared with the rate of 12.1 millimeters per minute for hungry ones obtained from rats.

T. deliensis, E. indica, and Acomatacarus sp. can maintain life in sea water. Most of them die within a day, but some E. indica mites can live as long as 6-10 days in sea water. In well water, E. indica can even develop from larvae to nymph.

Two types of T. deliensis mites were found in the P'ing-t'an, Fukien, area. Those found on rats near the sea were larger, orange, easier to breed artificially, and more resistant, as indicated by the fact that they would continue to crawl on a body surface for 14-36 minutes after potassium sulfide solution was applied. Those found on rats farther away from the sea were smaller, light-red, and difficult to breed, and ceased to crawl 3 minutes after potassium sulfide was applied.

The results of mite control experiments using various insecticides are reviewed.

3. Chinese Study New Aphid-Borne Virus Disease of Millet

"Studies on Red-Leaf Disease of Foxtail Millet I. Red-Leaf, a New Virus Disease of Foxtail Millet, Transmissible by Aphids," by Yu Ta-fu (俞 大 紱), Pei Mei-yun (斐 美 云), and Hsu Shun-ken (許 順 根), Institute of Applied Mycology, Academia Sinica; Peiping, Chih-wu-ping-li Hsueh-pao (Acta Phytopathologica Sinica), Vol 3, No 1, 1957, pp 1-18

This item reports a "new" disease of the cereals which farmers in China call "red-leaf." According to the authors, the disease has occurred in epiphytic scale in most millet-growing areas of North China, affecting 20-30 percent of and sometimes entire crops. Details of experiments undertaken to study the nature of the pathogen, characteristics of the disease, mode of transmission, host range, chemical control, and resistant strains are presented.

It was found that red-leaf is a persistent, aphid-borne, virus disease of foxtail and other varieties of millet. Other cereal grasses, including corn, are also susceptible. Symptoms of the disease vary with different varieties of millet, the general characteristics being reddening, or yellowing, of the leaf blade, sheath, and spike; shortening of internodes, stunted growth, wrinkled leaf surface, wavy leaf margin, deformed spike, and underdeveloped root systems.

The authors say that red-leaf resembles the yellow dwarf disease reported by Oswald and Houston (1953) but has striking differences. Their tests eliminated many causes and transmitters of the disease other than virus and aphids, respectively.

II. CHEMISTRY

Chemistry and Technology of Nuclear Fuels and Reactor Construction Materials

4. Existence of Coffinite in USSR

"The First Finding of Coffinite in the USSR," by Ya. S. Filipenko; Moscow, Atomnaya Energiya, Vol 4, Jun 58, pp 581-582

Coffinite, a uranium silicate newly discovered in the US, was found in 1956 in the USSR. The mineral investigated in the USSR, which occurred in the form of outcroppings in granite, exhibited properties identical with those of coffinite from the US Arrowhead mine.

5. Investigation of Effectiveness of Liquid Metals as Heat Transfer Agents

"Heat Transfer to Liquid Metals," by S. S. Kutateladze, E. M. Borishanskiy, and I. I. Novikov; Moscow, Atomnaya Energiya, Vol 4, No 5, May 58, pp 422-436

This article reviews the principal investigations done by USSR and non-USSR workers on heat transfer between solid surfaces and a stream of molten metal. The results of experiments on heat transfer to the liquid metal during flow through long and short tubes or thin slots, lengthwise flow of the molten metal around bundles of rods and plates, transverse flow around cylinders, free convection, and condensation of the vapors of liquid metals are discussed. The effect of additives on the efficiency of the heat transfer is discussed. Problems are considered which are connected with the boiling of liquid metals and with the effects of moistening on hydraulic resistance and the rate of heat transfer. Formulas are given for the calculation of the heat transfer.

Results obtained with lead-bismuth eutectic, sodium, and potassium-sodium are reviewed. Results of experiments with mercury-magnesium amalgams, mercury to which sodium has been added, lead, tin, and cadmium are discussed. It is stated that the experimental data which are available do not make it possible to draw any definite conclusions in regard to the effect of surface active agents (e.g., magnesium or sodium added to mercury in contract with steel) on the heat transfer to liquid metals.

6. Mechanisms of Deformation of Zirconium

"The Modes of Deformation of alpha-Zirconium," by Yu. N. Sokurskiy and L. N. Protsenko; Moscow, Atomnaya Energiya, Vol 4, No 5, May 58, pp 443-447

The modes of deformation of iodide alpha-zirconium were investigated on large-grained polycrystalline samples subjected to deformation by an upsetting operation. The orientation of the grains was determined on the basis of Laue diagrams. The indices of deformation were determined by the method of two surfaces and the method of the geometric location of poles. The date obtained are given and the deformation characteristics of alpha-zirconium correlated with its high ductility.

Industrial Chemistry

7. Recent Developments in Synthesis and Application of Ion-Exchange Resins

"Ion-Exchangers," by V. S. Titov, Scientific Research Institute of Plastics; Moscow, Nauka i Zhizn', No 7, Jul 58, pp 25-29

During recent years, the application of ion-exchange resins has expanded in the industry, public health activities, and scientific research work.

A very important application of ion-exchange resins is in the desalting of sea water in order to render this water drinkable. In 1954, a small unit for the desalting of sea water was installed at a radar station maintained by the US Air Force on an island off the Pacific coast of the US. This unit operates on the electrodialysis principle and is equipped with ion-exchange diaphragms. By using ion-exchange diaphragms, one can even desalt sea water without applying electric power.

Application of ion-exchange resins for the concentration of gold from dilute solutions resulting from the hydrometallurgical treatment of gold ores is feasible and of importance from the standpoint of actual use of this process at present. In 1955, A. B. Davankov, docent at the Moscow Chemico-technological Institute imeni D. I. Mendeleyev, discussed this subject and demonstrated pieces of gold obtained from water that contained only a few milligrams of gold cyanides per liter. Davankov also advocated concentration by means of ion-exchange resins of the gold contained in sea water. According to his calculations based on an annual production of approximately 10 tons of gold from sea water, the losses due to the deterioration of the ion-exchange resin will amount to 5 million rubles, while gold worth 400 million rubles will be produced. However, the practical application of ion-exchange resins for the concentration of gold from sea water must be relegated to the indefinite future.

Treatment of blood with a special ion-exchange resin, according to a procedure developed by A. A. Bagdasarov and his collaborators in 1955, eliminates the calcium salts contained in the blood with the result that the tendency of the blood to coagulate is reduced and the blood can be preserved for a much longer time.

Work on the synthesis of ion-exchange resins has expanded greatly since World War II both in the USSR and in other countries.

To produce ion-exchange resins based on polystyrene, styrene is copolymerized with divinylbenzene, which serves as a cross-linking agent. The resulting resin is sulfonated and becomes capable of exchanging cations. To obtain an anion-exchange resin based on the styrene-divinyl-benzene copolymer, the latter is treated with nitric acid and the nitro groups that have been introduced in this manner are then reduced to amino groups. In the USSR, the sulfonated polystyrene cation-exchange agents KU-2 and SDV-3 are produced and also the aminopolystyrene anion-exchange resins AV-15, AV-17, AV-18 as well as several others.

Special grades of rubber can also be treated with sulfuric acid in such a manner that they are converted into cation-exchange resins. Such ion-exchange resins derived from rubber are known as SBS and SBSR resins in the USSR. As distinguished from rubber, the cation-exchange resins derived from rubber are brittle and swell in water.

The USSR cation exchange resins KB-4, KMD, and KMG are analogs of acrylic resins: their acidic properties are due to the presence of acrylic acid carboxyl groups.

Among phenol-formaldehyde ion-exchange resins, one may mention the sulfonated phenol-formaldehyde cationic resins KU-1 (Espatit-1) and MSF.

The urea-guanidine and melamine anion-exchange resins N-O, MMG, and AN-1 are well-known.

Starting with diverse initial materials, Soviet chemists have developed a considerable variety of ion-exchange resins containing different acidic and basic groups. A major contribution to the science and technology of synthetic ion-exchange materials has been made by Prof I. P. Losev and his collaborators at the Moscow Chemicotechnological Institute imeni D. I. Mendeleyev and by workers at the Scientific Research Institute of Plastics.

Ion-exchange resins are of importance in the treatment of water used at power plants. By using sulfonated cation-exchange resins and ordinary anion-exchange resins, one may remove almost completely all inorganic substances from the water, except for a small quantity of silicic acid, because silicic acid is not removed by ordinary anion-exchange resins. After this purification, the water can be used for the production of low-pressure steam (steam having a pressure of 10-15 atmospheres). However, at modern power plants steam at a pressure up to 100 atmospheres or higher is used. At these pressures silicic acid volatilizes together with the steam and is deposited on the turbine blades. For this reason, the feed water must be freed of silicic acid. This can be done by means of the strongly basic anion-exchange resins AV-16 and AV-17, which have been developed in the USSR. These resins are already being used for the treatment of the feed water at some USSR power plants.

Losses of sugar are considerably reduced when sugar solutions are treated with ion-exchange resins at sugar manufacturing plants. Ion-exchange resins can also be used as therapeutic agents in medicine, but this type of application is still in the experimental stage. On the other hand, these resins are already being applied in the production of antibiotics and other physiologically active agents. Ion-exchange resins are also used as chromatographic adsorbents, as insoluble acidic and basic catalysts which do not contaminate the product, in electrochemistry, in the production of pure reagents, in radiochemistry, and in many other fields of chemistry and technology. Selective ion-exchange resins which adsorb only definite ions will be developed in the near future.

Inorganic Chemistry

8. Research in Field of Inorganic Chemistry in Ukrainian SSR

"Third Ukrainian Republic Conference on Inorganic Chemistry," by O. I. Shor; Kiev, Ukrainskiy Khimicheskiy Zhurnal, Vol 24, No 3, May/Jun 58, pp 419-421

The Third Ukrainian Republic Conference on Inorganic Chemistry was held from 28 January to 1 February 1958 at Kiev. It was called by the Department of Chemical and Geological Sciences and the Institute of General and Inorganic Chemistry, both of the Academy of Sciences Ukrainian SSR. Plenary sessions and two sectional meetings were held. The first sectional meeting dealt with the structure of inorganic compounds and rare elements and the second with investigation of inorganic raw materials. Two hundred persons participated in the conference and 43 reports were given.

At the first plenary session, which was held jointly with the Kiev Department of the All-Union Chemical Society imeni D. I. Mendeleyev, the introductory address by Ye. Fialkov (Kiev) was followed by a report on progress of inorganic chemistry in the Ukrainian USSR during the past 40 years, which was given by Yu. K. Delimarskiy (Kiev).

A. K. Babko (Kiev) told about fluoride complexes of metals investigated with the aid of the metal tracer method. It was established that the stability of the fluoride complexes depends on the position of the complex-forming element in the periodic system.

A report by A. I. Brodskiy and I. F. Franchuk (Kiev) discussed the mechanism of the formation of peracids at the anode and of the hydrolysis of these acids. The investigation in question was carried out with the aid of heavy oxygen.

I. G. Ryss (Dnepropetrovsk) reported on new research on complex compounds of fluorine and boron. In the work described the hydrolysis of BF_3 complexes was investigated. The probable mechanism of the hydrolytic reactions was considered and the equilibrium constants of these reactions were calculated.

At the second plenary session a report by O. Ye. Zvyagintsev (Moscow) on Zhurnal Neorganicheskoy Khimii was heard with great interest. During the discussion of this report it was noted that the foundation of Zhurnal Neorganicheskoy Khimii testifies to the extensive development of research on inorganic chemistry in the USSR. The hope was expressed that the Presidium of the Academy of Sciences USSR will expand the volume of this periodical and expedite the publication of new periodicals on radiochemistry and electrochemistry.

Ye. E. Fialkov reported on methods for the separation of rare-earth elements and on the effects which the properties of the complex compounds of these elements have on their separation.

I. Ye. Starik and L. D. Sheydina (Leningrad) reported on a method developed by them which makes it possible to separate microquantities of protoactinium from microquantities or macroquantities of zirconium with a sufficiently high yield of protoactinium.

In a report by I. E. Sheka, B. A. Voytovich, and L. E. Nisel'son (Kiev) it was brought up that it is possible to use the reaction of the chlorides of zirconium, hafnium, niobium, and tantalum with phosphorus oxychloride for the separation of niobium and tantalum when zirconium is present.

At the third plenary session G. V. Samsonov (Kiev) gave a report on the chemistry and technology of boron compounds of alkaline earth metals and rare-earth metals. Samsonov's paper outlined the condition under which borides can be synthesized and discussed the effect of the electronic structure of elements on the properties of alloys and/or melts.

V. V. Udovenko and U. Ye. Fialkov (Kiev) demonstrated in work done by them that the tetrachlorides of silicon and germanium are very inert as far as formation of complex compounds by them is concerned.

A. M. Gurevich (Leningrad) reported on the results of the investigation of the composition and structure of solid phases and equilibriums in the systems.

$$UO_2(NO_3)_2 - NaOH - H_2O_2 - H_2O \text{ and } UO_2(NO_3)_2 - KOH - H_2O_2 - H_2O$$

N. V. Aksel'rud and V. P. Spivakovskiy (Kiev) reported on a new variant of the potentiometric method employed for the investigation of basic salts and metal hydroxides as well as on a method for the evaluation of the activities of cations on the basis of the composition of solutions, the activity of chloride ions, and the mean coefficient of the activity of the chloride. By using this method, some basic chlorides and hydroxides of zinc, cadmium, indium, and several lanthanides were investigated.

V. P. Chalyy and S. P. Rozhenko (Kiev) investigated the kinetics and mechanism of aging of hydroxides of a number of metals using the X-ray method. At the final plenary session V. A. Lunenok-Burmakine reported on the results of the investigation of the mechanism of some reactions of oxidation with hydrogen peroxide and persulfate.

At meetings of the Section of the Structure of Inorganic compounds and Rare Elements, 14 reports were presented and discussed. In one of these reports, S. I. Yakubson and N. E. Kostromina (Kiev) reported on results of the physicochemical investigation and synthesis of salts formed by lanthanides (lanthanum, cerium, neodymium, and ytterbium) with gluconic acid. In another report presented in this section, I. A. Sheka and B. A. Voytovich (Kiev) reported on the results of an investigation by methods of physicochemical analysis of the interactions of zirconium tetrachloride and hafnium tetrachloride with methyl alcohol. I. V. Vinerov and Ye. I. Kushnirskaya (Odessa) investigated the solubility of zirconium oxychloride in water and hydrochloric acid.

At meetings of the Section of Inorganic Raw Materials, 20 reports were presented. A paper by B. A. Shoykhet (Yevpatoriya) dealt with new results obtained in research work done in connection with the organization of the production of magnesium oxide and the extraction of boron from brines. This report resulted in a lively discussion in connection with the planned construction of a plant at which brines from Sivash lakes will be utilized.

A. I. Klimovich and Ye. P. Berkman (L'vov) reported on the production of phosphorus by the reduction of calcium orthophosphate with methane.

S. V. Kushnir and Ye. P. Berkman (L'vov) reported on work dealing with the production of carbon bisulfide by the reduction of sulfur dioxide with methane.

A. N. Kuznetsov and N. F. Kulish (Dnepropetrovsk) investigated the reduction of ferrous metals with carbon monoxide and hydrogen.

A resolution passed by the conference pointed out that it is necessary to expand research on the chemistry of individual elements, particularly in the field of the chemistry of rare and dispersed elements; to do more work on the structure of inorganic compounds, chemical equilibriums, and the kinetics and mechanism of chemical reactions; to expedite work on the synthesis and properties of peroxides, borides, nitrides, and carbides; and to expand investigations on the chemistry and technology of zirconium, hafnium, germanium, titanium, beryllium, rare-earth elements, gallium, indium, and thallium and on the chemistry and technology of the conversion of natural salts and brines found in the Ukrainian SSR.

9. Conversion of Hydrogen Peroxide and Water Vapors Into Hydrogen Superoxide

"The Reaction of Dissociated H_2O_2 and H_2O Vapors at a Temperature of Minus 196°C," by A. I. Gorbanev, A. B. Tsentsiper, P. M. Zhitneva, and M. S. Danilova; Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No 5, May 58, pp 43-51

A substance has been synthesized at minus 196° from hydrogen peroxide vapor and water vapor dissociated in a glowing discharge. It was found that the yields of the final products (H_2O, H_2O_2, and O_2 evolved on heating) depend on the generalized kinetic parameter up/v, where u is the power of the discharge in kilowatts, v the velocity in mols per hour at which the vapor of the initial substance is supplied, and p the pressure in mm Hg of the initial substance at the entrance to the discharge tube. The shape of the kinetic curves indicates that water is an intermediate product of the decomposition of H_2O_2 vapor in the discharge tube. The composition of dissociated H_2O vapor differs from that of dissociated H_2O_2 vapor mainly as far as the oxygen content is concerned.

It was established that the product obtained from dissociated H_2O_2 vapor is richer in hydrogen peroxide by a factor of 2 than that obtained from H_2O and that it is also richer in a substance which evolves oxygen on heating (supposedly H_2O_4). The molar ratio of evolved O_2 to H_2O_2 is approximately 0.3 in the case of H_2O_2 vapor and approximately 0.2 in the case of water vapor.

A reaction scheme is proposed which explains the relationships found including both those which pertain to processes taking place in the discharge tube and those occurring on the cold surface of the trap.

Physical Chemistry

10. Research on Kinetics of Combustion of Hydrogen

"Investigation of the Kinetics of the Combustion of Hydrogen With Oxygen Above the Lower Limit of Self-Ignition," by L. V. Karmilova, A. B. Nalbandyan, and N. N. Semenov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Zhurnal Fizicheskoy Khimii, Vol 32, No 6, Jun 1958, pp 1193-1204

The kinetics of the combustion of hydrogen above its lower limit of self-ignition have been investigated in the temperature range of 460-600°. The dependence on the pressure of the induction period which precedes the ignition has been determined in the same temperature range. It was demonstrated that, in complete accordance with the theoretical concepts formulated by N. N. Semenov as early as 1944, the maximum of the velocity of the reaction is displaced into the range of low ratios of burning-out as $R=p_1/p_0$ becomes smaller. This confirms the conclusion in regard to the formation above the lower limit of H_2-O_2 self-ignition of high concentrations of hydrogen atoms, the presence of which disturbs the proportionality between the velocity of the reaction and the pressure drop in the reacting system. On the basis of the kinetic data obtained, the values of the velocity constants of the reaction of branching $H + O_2 = OH + O$ were calculated for various temperatures. By using three different methods independent of each other, the energy of activation of this branching reaction was determined. All three methods led to a practically identical value of E_2.

11. Photochemical Decomposition of Ozone in Liquid Phase

"Some Correlations in the Photochemical Decomposition of Ozone in the Liquid Phase", by A. V. Pankratov and S. Ya. Pshezhetskiy, Physicochemical Institute imeni L. Ya. Karpov; Moscow, Zhurnal Fizicheskoy Khimii, Vol 32, No 7, Jul 58, pp 1605-1611

The work described was carried out with the purpose of clarifying the role played by chains in the photochemical decomposition of ozone.

Earlier investigations of the photochemical decomposition of ozone in the gas phase showed that the quantum yield of the reaction amounted to 3-6, which may be the case when the reaction proceeds over short chains. The development of chains in this process is possible only because of the participation of oxygen molecules which have an excess of energy, i.e., energy chains develop. In the absence of chains the quantum yield of the reaction cannot be higher than 2, in accordance with the formulation of the reaction in two stages, as shown below:

$$O_3 \xrightarrow{h\nu} O_2 + O$$

$$O + O_3 = 2\,O_2$$

However, in view of the fact that the quantum yields are only slightly higher than 2, an uncertainty remains in regard to the chain character of the reaction.

To solve the problem concerning the chain nature of the reaction, the photochemical decomposition of ozone in the liquid phase was investigated. Because of the formation of molecular associations, more favorable conditions for the transmission of excitation energy between molecules exist in a liquid than in a gas.

It has been shown by S. Ya. Pshezhetskiy, I. A. Myasnikov, and N. A. Buneyev (Dbornik Rabot po Radiatsionnoy Khimii [Collection of Papers on Radiation Chemistry], Publishing House of the Academy of Sciences USSR, 1955, p 133) that the formation of ozone from oxygen under the action of fast electrons proceeds much more effectively in the liquid phase than in the gas phase. This is due apparently to the greater participation of excited oxygen molecules in the liquid phase.

In the work described in this instance, the quantum yield of the photochemical decomposition of liquid ozone exposed to the action of ultraviolet light was measured. It was established that at minus 183°C the quantum yield of the reaction in the liquid phase reaches 25. When the liquid ozone has been diluted with oxygen, the quantum yield drops.

The value obtained for the quantum yield shows that the photochemical decomposition of ozone in the liquid phase proceeds by a chain mechanism with the participation of excited oxygen molecules.

Radiochemistry

12. 1957 USSR Conference on Application of Radioactive Isotopes in Analytical Chemistry

"A Conference on the Application of Radioactive Isotopes in Analytical Chemistry," by Yu. A. Zolotov; Moscow, Atomnaya Energiya, Vol 4, No 5, May 58, pp 493-495

[SIR Note: This report supplements information given in "Application of Radioactive Isotopes in Analytical Chemistry (Conference in Moscow)" by S. S. Rodin, Vestnik Akademii Nauk SSSR, Vol 28, No 2, February 1958, pp 108-110, and "A Conference on the Application of Radioactive Isotopes in Analytical Chemistry," by A. N. Yermakov, Zhurnal Analiticheskoy Khimii, Vol 13, No 2, March/April 1958, pp 262-263 (cf. Scientific Information Report, PB 131891-T1).]

About 50 reports were presented at the conference. Of these reports, 26 were given at the conference and 24 published in the form of abstracts. All reports presented at the conference will be published in a collection of papers entitled Primeneniye Radioktivnykh Izotopov v Analiticheskoy Khimii (Application of Radioactive Isotopes in Analytical Chemistry).

Analytical Methods Based on Measurements of Radioactivity

I. P. Alimarin and G. N Bilimovich (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, GEOKhI) reported on a method developed by them for the separation of tantalum from titanium, zirconium, and niobium and the determination of tantalum by the method of isotope dilution. The precipitation of tantalum was carried out with a new organic reagent, viz., the ammonium salt of benzeneseleninic acid.

Radiometric titration, a new method of volumetric analysis in which the end point is determined by measuring the radioactivity of the solution was discussed in two reports. K. B. Yatsimirskiy and Ya. N. Roslyakova (Ivanovo Chemicotechnological Institute) reported on the application of complex compounds (luteosalts) of cobalt 60 for the determination of large anions such as phosphate, sulfate, and molybdate by the method of radiometric titration. I. M. Korenman and F. R. Sheyanova (Gor'kiy State University) pointed out the possibility of applying nonisotopic tracers in radiometric

titrations. For instance, the determination of mercury present together with zinc can be carried out by titrating with dithizon and using Zn^{65}, which functions as a nonisotopic tracer for mercury.

A new method of rapid analysis based on the reflection (reverse dispersion) of beta rays is being successfully developed in the USSR. This method is based on work done by A. A. Zhukhovitskiy and others. V. B. Gaydadymov (GEOKhI) presented a paper prepared by him and by L. I. Il'ina (Moscow Electric Bulb Plant) in which the application of this method for the determination of the composition of tantalum-niobium alloys was described.

Methods for Isolation and Separation of Elements

A considerable number of papers and communications presented at the conference dealt with problems in this field.

Radioactive isotopes are being used extensively as tracers in the chromatographic separation of elements. Their use in this manner makes it possible to observe the course of the separation and to study the distribution of substances between the solution and the adsorbent. Furthermore, as has been noted by N. N. Senyavin (GEOKhI) in his report, the solution of some problems in chromatography is inherently impossible without the application of radioactive isotopes. This applies to the investigation of the separation of very small quantities of substances, quantitative analysis with the application of isotope dilution, etc. Ye. I. Il'yenko, B. P. Nikol'skiy, and A. M. Trofimov (Radium Institute of the Academy of Sciences USSR) reported results obtained in the investigation of the adsorption of ruthenium on ion-exchange resins. L. V. Borisova (GEOKhI) reported data obtained in the investigation of the distribution of rhenium and molybdenum between the ETE-10 anion-exchange resin and hydrochloric acid solutions.

It is known that in the chromatographic separations of rare-earth elements the proper choice of the complex-forming substance, a solution of which is used for the elution of ions from the column, plays a considerable role. A paper by A. K. Labrukhina, K. Yun-pin, and V. Knoblokh (GEOKhI) dealt with a new complex-forming substance, namely trioxyglutaric acid, which proved not to be inferior to lactic acid in its effectiveness as an eluant.

Five papers dealt with problems pertaining to the coprecipitation of elements together with inorganic collectors (scavengers). Among these papers one may mention "The Coprecipitation With Metal Hydroxides of Some Elements Present in Low Concentrations," by Yu. V. Morachevskiy and A. I. Novikov (Leningrad State University), and "The Carbonate Method of the Separation of Microquantities of Uranium From Weighable Quantities of Iron," by I. Ye. Starik, F. Ye. Starik, and A. N. Apollonova (Radium Institute of the Academy of Sciences USSR). Morachevskiy and Novikov's paper dealt with the coprecipitation of strontium, lanthanum, cerium, yttrium, rhenium, gallium, indium, and zirconium.

V. P. Shvedov and L. M. Ivanova (Radium Institute of the Academy of Sciences USSR) described methods for the separation of the isotopes of Mo^{96}, Ag^{111}, Cd^{115}, and Ba^{140} from complex mixtures.

Some General Problems of Analytical Chemistry

The application of radioactive isotopes in the determination of a number of physicochemical constants which are of importance in analytical chemistry (e.g., solubilities, dissociation constants of complex compounds, etc.) is of considerable interest.

Work on the effect exerted by the solvent on the solubility of silver and cesium chlorides was reported in a paper by N. I. Izmaylov and V. S. Chernyy (Khar'kov State University). The authors of this paper correlated the solubilities with the dielectric constant of the solvent. D. M. Ziv and I. A. Efros (Radium Institute of the Academy of Sciences USSR) presented a communication that was of interest from the standpoint of the methods applied by them; they proposed the determination of solubilities by an ultramicromethod.

From this standpoint of the novelty of the method, one may also note a communication by N. P. Komar' (Khar'kov State University) on the application of radiochemical measurements in combination with determinations of the molar coefficient of absorption for the investigation of complexions in two-phase systems.

A considerable number of papers dealing with applications of radioactive isotopes in production control, e.g., in connection with the production of rare metals (A. A. Grizik and N. I. Marunina, State Scientific Research Institute of Rare Metals), was presented at the conference.

13. Use of Radioactive Triphenylstibine for Control of Successive Pumping of Different Petroleum Products Through Pipelines

"A Radiometric Method of Monitoring for Interfaces Between Different Varieties of Oil Products Pumped Through a Single Pipeline," by Votlokhin, A. Z. Dorogochinskiy, and N. P. Mel'nikova; Moscow, Atomnaya Energiya, Vol 4, No 5, May 58, pp 475-477

Experiments conducted at the Groznyy Petroleum Scientific Research Institute on the radiometric monitoring of the interface between diesel fuel and kerosene pumped successively through the same trunk pipeline are described. Triphenylstibine containing Sb^{124} was used as a tracer compound marking the interface. The results are considered satisfactory and the method is considered safe as far as exposure of personnel to radiation and contamination of the pipeline with radioactive material are concerned. On the basis of the results obtained, the procedure described has been introduced at the Groznyy-Trudovaya and Bavly-Kuybyshev pipelines.

14. Dernitz Chemicopharmaceutical Plant Starts Production of New Pharmaceuticals

"New Preparations Becoming Familiar," by N. Yemel'yanova, Kiev; Moscow, Meditsinskiy Rabotnik, 15 Jul 58, p 1

In 1958, the Dernits Chemicopharmaceutical Plant started production of some new drugs: adaline, isophenine, bromural, synthomycin, and sodium gluconate. Also, construction is under way for a 300-liter-capacity reactor for the production of splinine. In another department, the plant is expecting to start quantity production of piperazine. It is anticipated that this plant will fulfill the piperazine requirements of the Ukrainian SSR for medical purposes as well as producing about 40 tons for the collective farms to be used for poultry and milk production. Since the nearby Dernits Meat Combine is a valuable source of raw materials, the plant is planning to start production of glutamic acid, vitamin B_{12}, ATP, cortisone, and other preparations derived from meat products.

15. Conference on Chemistry of Complex Compounds

"Announcement by the Organization Committee" (unsigned item); Moscow, Uspekhi Khimii, Vol 27, No 5, May 58, p 668

"The Eighth All-Union Conference on the Chemistry of Complex Compounds is proposed to be held in Kiev in May-June 1959. Those desiring to present papers or short communications should contact the Organization Committee and submit the title and thesis of their paper together with the permission of the director of the institution or enterprise not later than 1 October 1958.

"Theses should be submitted in two copies, typewritten, double-spaced, using only one side of the paper. The size of the theses should not exceed two typewritten pages, including tables and drawings.

"The exact date of the meeting will be published later.

"Address of the Organization Committee:

1. Moscow V-71, Leninskiy Prospekt, 31, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR.

2. Kiev 30 ul. Leontovich, 9, Institute of General and Inorganic Chemistry, Academy of Sciences USSR."

16. Organization of Chemical Research in Kazakh SSR

"The Prospects for the Development of Chemical Industry in Kazakhstan and the Tasks of Scholars in Light of the Decision of the May Plenum, Central Committee CPSU," by A. B. Bekturov, Active Member, Academy of Sciences Kazakh SSR; Alma-Ata, Vestnik Akademii Nauk Kazakhskoy SSR, No 7, Jul 58, pp 3-12

In the Kazakh SSR at present, scientific research in chemistry is being conducted in the Institute of Chemical Sciences, Academy of Sciences Kazakh SSR; the Institute of Petroleum, Academy of Sciences Kazakh SSR; the Institute of Mineral Resources; Kazakh State University; chemistry chairs of various vuzes (higher educational institutions) of the republic, and a number of plant laboratories.

The Institute of Chemical Sciences, Academy of Sciences Kazakh SSR, has completed more than 60 research projects thus far. In Kazakh State University there have been completed a series of important studies on the physicochemical characteristics of the salt from Lake Balkhash and studies on the synthesis of medicinal preparations which will act as a substitute for cocaine and morphine.

The author points out several shortcomings in chemical research. Up to the present the scientific chemical institutions of the republic have done little on the synthesis of polymer materials or on the study of physicochemical properties. Also, there is insufficient coordination of the plans for scientific research between scientific establishments, departments, vuzes, and plant laboratories. For example, the study of rare elements is conducted in the Institute of Metallurgy and Ore Dressing, Academy of Sciences Kazakh SSR, and the Institute of Chemical Sciences, Academy of Sciences Kazakh SSR; both are doing independent research on the same subject.

Other shortcomings revolve around the fact that, frequently, completed projects are not introduced into production, sometimes due to insufficient initiative on the side of the institute and sometimes due to the fault of the economic organizations.

In connection with the development of the chemical industry in Kazakhstan, the following important tasks are to be accomplished: a sharp expansion of research on the study and production of monomers (semiconductors), expansion of theoretical and technological study of the synthesis of monomers and polymers, a study of the salt reserves of the republic, and the development of new and more economic methods for processing rare elements from ores.

To fulfill these tasks the following measures are necessary: (1) to strengthen and expand the Institute of Chemical Sciences, Academy of Sciences Kazakh SSR, and the Institute of Petroleum in the City of Gur'yev; (2) to organize a new Scientific Research Institute of Organic Chemistry in the city of Karaganda, an Institute of General and Inorganic Chemistry in Western Kazakhstan, and a branch Scientific Research Institute for Planning in the chemical industry and establishments; (3) to establish in the Institute of Chemical Sciences, Academy of Sciences Kazakh SSR, a Division of High-Molecular Compounds with a Laboratory for the Synthesis of Polymers and a Laboratory of Ion-Exchange Resins and to organize within the institute a Laboratory of the Chemistry of Rare and Dispersed Elements, a Laboratory of Roentgenostructural Analysis, a Laboratory of Hydrogenation Under High Pressure, a Laboratory of Isotopes, a Design Bureau, and a Division of Economics of the Chemical Industry; (4) to increase the number of persons working in the chemical industry and chemical research to 500 persons within the next 3 years; (5) to begin construction, no later than 1958, on the main building of the Institute of Chemical Sciences, Academy of Sciences Kazakh SSR, and to intensify research in plant laboratories of the chemical industry in the republic; (6) to expand the research work at the Chemical Faculty of the Kazakh State University and in the Chimkent Technological Institute; and (7) to organize the publication of a special monthly scientific periodical called the Kazakhskiy Khimicheskiy Zhurnal (Kazakh Chemical Journal).

17. Dispersion Analysis Method Proposed to Find Accuracy of General Means

"Dispersion Analysis During Evaluation of the Accuracy of Irregular Measurements," by Prof N. I. Lebedinskiy, Central Asian Polytechnical Institute; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy, Geodeziya i Aerofotos'emka, No 2, 1958, pp 15-32

The results of measuring will be irregular if they express the mean of several series of regular measurements having a different number of final measurements or means from several series of irregular measurements. All measurements may be assumed equal (proportional) to the number of measurements or inversely proportional to the square of the mean quadratic error. Exact coincidence of the values of the weights found by these methods is possible only for the same series of observations.

In the aggregate consisting of q series of regular measurements, the mean quadratic error of unit weight as well as the error of the weighed means may be determined by the slopes (1) of the individual observations from the weighed mean, (2) of the series of means from the weighted mean, and (3) of the mean in each series. Correspondingly, three independent empirical dispersions may be obtained, the variation between which indicates the presence of systematic errors in the individual series stipulated by this or by other methods of introducing the weights.

The question arises, which combination of the three dispersions is necessary to obtain an estimate of the general mean. Such a problem arises in the presence of several series of different volume for irregular measurements.

The solution of this problem cannot be accomplished within the scope of the theory of errors. The author demonstrates that the dispersion anaysis method of processing observations developed in mathematical statistics enables one to accomplish a solution.

[For additional information on earth sciences, see Item No 139.]

IV. ELECTRONICS

Communications

18. A Reinterpretation of Kotel'nikov's Theorem

"On Kotel'nikov's Theorem," by A. A. Kharkevich; Moscow, Radiotekhnika, No 8, Aug 58, pp 3-10

A reinterpretation is made of Kotel'nikov's theorem (sampling theorem) in an attempt to show its present applicability in communications technology. The theorem states, in part: "Any function F(t), consisting of frequencies from 0 to f_1, may be continuously transmitted with any degree of accuracy with the aid of numbers following in sequence within a period of $\frac{1}{2f_1}$ sec." The theorem makes it possible to replace the transmission of a continuous function with the transmission of a discrete sequence.

A number of recent works concerned with Kotel'nikov's theorem was examined by the author and a new understanding of the theorem is arrived which substantially differs from the original. The theorem is considered to apply to random processes having an unlimited spectrum and is seen as "an approximate (and not a precise) statement which may be used to obtain an approximate expression for a process in a series form according to lag functions or to determine approximately the number of measurements of a random vector, beginning with a given accuracy in the determination of the epsilon-entropy."

In the author's opinion, Kotel'nikov's theorem "has acquired a deeper theoretical meaning and a wider practical application."

19. Fixed Frequency Radio Receivers

"Ether Radio-Point," by N. Goryunov; Moscow, Radio, No 8, Aug 58, pp 25-26

The term "ether radio-point" (efirnaya radiotochka) is beginning to appear in the Soviet literature more often. This article interprets the ether radio-point as follows:

"Ether radio-point is a radio receiver previously tuned, as a rule, only to one local radio-broadcasting station. Such an ether radio-point is in many cases one of the simplest means for radiofication of villages. In case of proximity to the broadcasting station, a common crystal-detector receiver employing audio-frequency amplification can be used as the ether radio-point."

20. New Radio Receiver "Voskhod"

"Radio Receiver 'Voskhod,'" by Ye. Dryzgo and Ya. Levin; Moscow, Radio, No 8, Aug 58, p 23-24

The radio receiver "Voskhod," built with eight transistors, draws its power from four "Saturn" batteries. The receiver covers the wave ranges from 720 to 2,000 meters and from 187 to 577 meters. Sensitivity of the receiver when operating with a whip antenna is about 70 microvolts and its output is about 350 milliwatts. The function of the transistors is as follows: one functions as a frequency converter; one, local oscillator and mixer; 2, IF amplifier; and 3, AF amplifier. The receiver is made of three blocks: an audio-frequency unit, an intermediate-frequency unit and a detector with radio-frequency unit. The receiver uses printed circuits throughout. The over-all dimensions of the receiver are 222 x 282 x 158 millimeters and its weight is 3.5 kilograms.

21. The 11th All-Union Competition of Radio Operators

"Keep It Up, Expert Radio Operators!" by V. Lykov; Moscow, Radio, No 8, Aug 58, p 3

The article contains the following passage: "The following figures are very significant: at the 10th All-Union Competition of the radio operators, 103 teams participated with a total of 1,030 men, while at the 11th All-Union Competition the number of teams participating was 1,905 with 9,525 men."

22. Cylindrical Waveguide With Magnetized Ferrite Filler

"Gyromagnetic Cylindrical Waveguide of Finite Length," by L. G. Lomize; Moscow, Radiotekhnika i Elektronika, No 7, Jul 58, pp 896-907

"The propagation of electromagnetic waves in a gyromagnetic waveguide of finite length is considered and an approximation is made of reflection and refraction at the ends of the waveguide. Results of some numerical computations are given for a waveguide with a relatively large electrical radius. It is shown that reflections at the ends of a waveguide substantially affect the rotation of the polarization plane and in some cases lead to an abnormal Faraday effect. A family of curves is given by which the parameters of magnetized ferrite which fills the waveguide are determined."

23. Wave Propagation in Irregular Filled Waveguides

"Irregular Waveguides With Varying Dielectric Filler," by B. Z. Katsenelenbaum, Institute of Radio Engineering and Electronics of the Academy of Sciences, USSR; Moscow, Radiotekhnika i Elektronika, No 7, Jul 58, pp 890-895

"A study is made of the propagation of electromagnetic waves in a waveguide filled with a material whose specific inductive capacitance (ε) and permeability (μ) depend on all three coordinates. The substance of this method is that at any point x, y, z the E- and H-fields are divided into wave fields, capable of existing in certain regular waveguide, in which ε and μ are the same functions of coordinates x and y in a transverse cross-section as ε and μ in an irregular waveguide for a given z."

Coupling coefficients are found for waveguides with varying cross-sections and general equations are obtained for irregular bent waveguides.

24. Wave Diffraction in a Half-Infinite Grating of Infinitely Long Conductors

"Diffraction of an Electromagnetic Wave in a Half-Infinite Grating," by Ya. N. Fel'd; Moscow, Radiotekhnika i Elektronika, No 7, Jul 58, pp 882-889

The author suggests a method for applying Hilbert's nonhomogeneous problem, solved in quadratures, to a study of wave diffraction in half-infinite gratings. When a solution of the latter involves a large number of calculations, the problem is reduced to a variation and solved by means of expansion to a series by special polynomials."

25. Use of Doppler Effect to Determine Satellite Trajectory Parameters

"Use of Doppler Effect to Determine the Orbital Parameters of Artificial Earth Satellites," by V. A. Kotel'nikov, V. M. Dubrovin, V. A. Morozov, O. N. Rzhiga, and A. M. Shakhovskoy, Institute of Radio Engineering and Electronics, Academy of Sciences USSR; Moscow, Radiotekhnika i Elektronika, No 7, Jul 58, pp 872-881

The use of the Doppler effect in determining the time of maximum approach of satellites to a receiving point and their corresponding velocity and slant range is examined. These parameters are derived for an approximation of the orbit, by a tangent, and the errors arising from the use of this method are determined.

Expressions for computing time of maximum approach are given for the case when the true frequency of the transmitter is known and when only the approximate frequency is known.

Experiments based on the Doppler effect were conducted in the Institute of Radio Engineering and Electronics of the Academy of Sciences USSR using signals from the first and second satellites. Observations were made at a frequency of 40,002 kc.

It is concluded that the Doppler effect may be successfully used to determine the orbital parameters of Earth satellites. An accuracy of 0.2-1 second was achieved in determining the time of passing of the satellite over the observation point, and velocity and slant range were determined with an accuracy of 3-5%.

26. General Dispersion Equation for Delay Systems

"Dispersion Equation for an N-Rod Delay System," by V. N. Dashenkov; Moscow, Radiotekhnika i Elektronika, No 7, Jul 58, pp 933-944

Based on the theory of multiconductor lines, a dispersion equation is developed for the periodic structure of a delay system, each period of which contains n-rods of equal length. In certain planes where the cross-section of the rods changes abruptly and also at the ends, the rods are connected with each other and with the ground by susceptances. The dispersion equation is derived by the use of matrix equations for currents and voltages of multiconductor lines.

It is shown that this dispersion equation includes, for particular cases, the dispersion equations developed previously for other structures.

The author acknowledges the assistance of Docent V. A. Tolstikov and Professor V. I. Kalinin.

27. Comparison of Diaphragm-Type Waveguides

"Some Peculiarities of Coaxial Diaphragm-Type Waveguides," by G. I. Zhileyko; Moscow, Radiotekhnika, No 8, Aug 58, pp 24-29

The properties of coaxial diaphragm-type waveguides are examined, based on the determination of high-frequency power flux for E-mode waves, and a comparison is made of various types of diaphragm waveguides. It is found that coaxial lines with diaphragms on both conductive surfaces, under certain conditions, may be used successfully for a wide range of phase velocities. The possible use of these waveguides in traveling-wave tube systems (in particular, spirotrons) and in low-velocity accelerators is also mentioned.

28. Increased Coupling in Slot Resonators

"On the Theory of Twin-Unit Slot Resonators," by M. F. Stel'-makh; Moscow, Radiotekhnika, No 8, Aug 58, pp 30-36

An examination is made of the possibility of obtaining greater coupling for the odd harmonics of antisymmetrical waves in slot resonators by longitudinally displacing one slotted unit relative to the other. Results of these experiments are useful in the design of traveling-wave and backward-wave tubes which rely on the interaction of electron flow with a field of odd harmonics. Dispersion equations and coupling coefficients are derived for this system.

It was found that a greater coupling coefficient of odd harmonics for antisymmetrical-type waves could be obtained by displacing the units of a slot resonator by a half step without essentially changing the dispersion properties of the system. For symmetrical waves, such a displacement may change the dispersion characteristics of all odd harmonics.

The author expresses his appreciation for assistance in this work to S. D. Gvozdover and L. N. Loshakov.

Instruments and Equipment

29. Use of Electron Microscopes for Studying Cathode Surfaces

"Development of Electron Microscopy Methods for Observing the Microgeometry and Emission Centers of Thermionic Cathodes," by G. V. Spivak, Ye. M. Dubinina, I. S. Sbitnikova, I. A. Pryamkova, and D. N. Vinogradov, Physics Faculty of Moscow State University imeni M. V. Lomonosov; Moscow, Radiotekhnika i Elektronika, No 8, Aug 58, pp 1077-1083

Results are given of electron microscope observations of the emission distribution of a number of oxide-, L-cathode, and impregnated thermionic cathodes. A comparison is made between images obtained by means of combined-secondary and thermoemission microscopes and a correlation is established between the microgeometry and emission distribution on the cathode surfaces. Observations of pulse emission from pores of an L-cathode at a magnification of approximately 4000X were made by means of stroboscopic emission of a high-magnification electron microscope.

30. New High-Vacuum Electron Microscope

"A High-Vacuum Emission Electron Microscope," by B. N. Ponov and A. V. Druzhinin; Moscow, Radiotekhnika i Elektronika, No 8, Aug 58, pp 1084-1091

An electron microscope is described which operates with a vacuum of (2-3) x 10^{-7} mm Hg and a maximum voltage of 30 kv. Magnification of the microscope is 300-500X. With this microscope it is possible to observe simultaneously the emitting surface, photograph the image and measure the current from a small sector of the cathode. Work functions for various sections of the cathode surface may also be measured. A special molybdenum anode is described which may be moved between the cathode and the focusing diaphragm and serves to activate the cathode. The optical system of the microscope consists of an imersion lens and a projection lens.

The authors consider the possibility of using the microscope in the study of the distribution of active materials on the surface of metal-film cathodes.

The authors acknowledge the assistance of D. V. Fetisov in the construction of electrostatic lenses for the system and of M. M. Fedorov.

31. Applications of a Phase Automatic Frequency Control System

"Applications of Phase Automatic Frequency Control," by A. D. Artym; Moscow, Radiotekhnika, No 8, Aug 58, pp 37-46

The author examines briefly the principle of operation of a phase automatic frequency control system and discusses the applications of the system as a band filter, frequency modulator, and phase detector.

"The system may be used as a phase modulator having a modulation index in a range up to 90°. In this case, nonlinear distortions are determined almost entirely by the phase detector characteristic. When used as a frequency detector, nonlinear distortions are determined by the modulation characteristic of the reactance tube. The basic advantage of this type of frequency detector is its simplicity of tuning and control."

Components

32. Improved Soviet Transistors

"Semiconductor Technology for Village Radiofication," unsigned article; Moscow, Radio, No 8, Aug 58, pp 16-17

The article contains the following passage: "To the glory of our radio industry, we may state that in a short period of time, the quality of transistors has greatly improved. To replace the poorly constructed transistors of P1, P2, and P3 series there are fully modern semiconductor devices with sufficiently stable parameters. The production of diffused and surface-barrier transistors which would operate satisfactorily at high frequencies up to VHF has begun. Together with improvement of quality, the volume of production of semiconductor devices has sharply increased."

33. Experimentation With Porous Nickel-Oxide Cathodes

"Technology of the Preparation of Porous Nickel-Oxide Cathodes and Results of Experimentation," by N. G. Arshanskaya, V. S. Parkhomenko, and N. I. Raskina; Moscow, Radiotekhnika i Elektronika, No 8, Aug 58, pp 1058-1063

The preparation of porous nickel-oxide cathodes having larger surface areas is discussed and results of experiments using various types of cathode bases and activating substances are given.

Coatings were applied to the cathode bases by means of dry sintering, using a carbonyl nickel powder and baking in a hydrogen-filled furnace at a temperature of 1200° C.

Emission properties of nickel-oxide cathodes were examined in experimental diodes -- type 6D3D lighthouse tubes -- and in actual instruments.

Results of experimentation showed that tubes using cathodes with thorium and a tricarbonate had higher parameter values than tubes with thorium and a dicarbonate. Both types of cathodes were found capable of operating for an extended period of time drawing a current of 500 ma/cm^2.

Among the advantages of porous nickel-oxide cathodes in comparison with ordinary oxide cathodes are their increased current density (up to 0.5 a/cm^2), their resistance to sparking at high voltages, and their greater antivibration qualities.

34. Pulse Amplification in Trigger Circuits

"Pulse Amplification of Electrical Signals," by P. G. Tager, All-Union Scientific-Research Cinephotographic Institute, Ministry of Culture USSR; Moscow, Radiotekhnika i Elektronika, No 7, Jul 58, pp 918-927

A method is described by which the high dynamic transconductance found in tubes of trigger circuits is used for the pulse amplification of signals with various amplitude values (in contrast to the two amplitude values obtained in ordinary trigger circuits). Some of the characteristics of the pulse method of amplification are listed and problems related to this method are theoretically and experimentally examined.

35. Instrument for Control of Manufacturing Processes

"Standardized Apparatus for Control of Manufacturing Processes Utilizing Radioactive Isotopes," by K. K. Shpor and V. A. Yanushkovskiy; Moscow, Byulleten' Tekhniko-Ekonomicheskoy Informatsii, No 2, 1958, pp 29-30

The Tallin Plant of Control-Measuring Instruments, in cooperation with the Physics Institute of the Academy of Sciences Latvian SSR, has completed the necessary arrangements for series production of standardized equipment intended for control and regulation of manufacturing processes with the aid of radioactive isotopes.

This standardized apparatus incorporates an electronic unit URAP which registers radioactive radiation, and a radioactive data transmitting unit RD. The electronic unit URAP-1 is used with instruments for registration of the position of a moving element tagged with a radioactive isotope, unit URAP-2 is used in devices based on registration of continuous radiation from the controlled medium and unit URAP-3 is used for registration of intermittent radiation. All three units are assembled in identical hermetically sealed containers and can be used in the presence of dust and moisture. The radioactive data transmitters for different units differ from each other by the type of gas-discharge halide counters and the type of radiation source used.

The described units may be incorporated into devices for the control of liquid level in nontransparent containers used in continuous flow processes, also for counting articles on conveyers, registration of radioactive mark on motion-picture films, etc.

The sensitivity of the electronic units of URAP type is from 250 to 1,000 pulses per second. The maximum length of cable connecting the radioactive data transmitter to the URAP unit should not exceed 20 meters.

Computers and Automation

36. Electrodynamic Multiplication and Division Device

"Electrodynamic Device for Multiplication and Division," by I. B. Vaysman; Moscow, Priborostroyeniye, No 8, Aug 58, p 16

A two-unit model of an electrodynamic multiplying device was developed by K. I. Goryachev. The main components of the multiplying device are: bruches, electromagnet cores, coils, ball bearings of the moving system, moving frame and the stationary part of the inductive data-transmitting unit. Static tests of the device have shown that, for current range of plus or minus 30 milliamperes, the error of mathematical operation does not exceed 1.5%.

37. Synthesis of Multitact Relay Systems Accomplished by the Use of Punch Cards

"Punch Card Method of Synthesis of Multitact Relay Systems," by V. I. Shestakov; Moscow, Avtomatika i Telemekhanika, Vol 19, No 6, Jun 58, pp 593-605

The paper deals with a vector-algebraic method of synthesis of multitact systems of two-position relays by using special cards. This method is applicable for synthesis of both autonomous and nonautonomous relay systems.

38. New Results for Solving Differential Equations With Retardation

"Solution by the Operation Method of Certain Differential Equations in a System of Differential Equations Having a Retarded Argument," by P. A. Murav'yev; Moscow, Matematicheskiy Sbornik Novaya Seriya, Vol 44 (86), No 2, 1958, pp 157-178

For the description of many processes having a reaction the necessity of solving differential equations with retardation frequently arises. Such equations are often encountered in the technology of automatic control, and are solved in closed form only in ideal exceptional cases. For this reason, all new methods for solving differential equations with retardation have theoretical and practical interest.

With the help of the operational method the author was successful in obtaining several new results in the solution of that problem. We stated them in a quadratic form and thus at a length suitable for a limited journal article. We will consider only linear differential equations and a system of equations with constant coefficients and constant positive retardation.

39. A Program for Symbolic Programing

"Symbolic Programing on the Electronic Computer of the Academy of Sciences, Latvian SSR," by E. I. Arin' and M. A. Shneps, Institute of Physics, Academy of Sciences Latvian SSR; Riga, Izvestiya Akademii Nauk Latviyskoy SSR, Vol 131, No 6, 1958, pp 101-107

During the construction of a program for an electronic computer the correct order of the addresses in the commands and the correct numbering of the cells present considerable difficulties.

In the process of delay and readjustment of the program the necessity is always present to change the numbers of the cells and addresses contained in them. That is extremely difficult and one of the chief sources of error. The so-called method of symbolic programing utilized on certain IBM machines is well known; arrangement for the required numbers of cells and addresses is conducted on the machine itself. This method is developed for single-address systems during the construction of which application of the method of symbolic addresses is already provided for.

In the present work a program for accomplishment of the indicated operation on a machine built by the Academy of Sciences Latvian SSR is presented. The machine itself is an insignificant modification of the M-3 Soviet computer. For that reason in the future a system of the Soviet computer's codes is used. We only assume that:

a. The machine of the Academy of Sciences Latvian SSR has a fixed memory and 30 binary digits after the decimal point.

b. It is a two-address computer; the code of operation occupies the six highest orders, the first address occupies the 7th-18th orders and the second address occupies the 19th-30th orders.

c. The memory of the calculator has 1,024 cells; external storage is not yet provided.

40. Electronic Computers in Photogrammetry

"The Application of Electronic Computers in Photogrammetry," Professor A. N. Lobanov, Doctor of Technical Sciences, Military-Engineering Academy imeni V. V. Kuybyshev; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy, Geodeziya i Aerofotos'yemka, No 2, 58, pp 57-65

At present, topographical maps are made as a rule by aerophotographs. Bench marks necessary for making maps are also determined by aerophotographs as a result of the development of three-dimensional phototriangulation. During this the phototriangulation grids are oriented relative to the geodesic coordinate system according to the accuracies of the field preparation of the aerophotographs. The volumn and cost of the field geodesic work performed during tying-in of the aerophotographs substantially depends on the accuracy of three-dimensional phototriangulation.

It is well known that the most accurate methods of three-dimensional phototriangulation are the analytical methods. Except for high accuracy these methods possess no merit; for gauging of aerophotographs simple instruments of the stereocolorimeter type are used. Nevertheless analytical instruments of three-dimensional triangulation are not employed owing to the great volume of calculations in the preparation.

This disadvantage is removed during utilization of electronic computers which enable one to perform more than 10,000 arithmetical operations per second. The operating accuracy of such a machine is extremely great and is limited only by the number of digits in the counters. The enormous velocity and high accuracy of the operation of electronic computers guarantee the possibility of applying the planning machines of analytical three-dimensional phototriangulation, in practice free of any errors of method. In addition, more perfect methods of leveling phototriangular grids are rendered by the application.

This article considers one of the fundamental problems of the analytical method of three-dimensional phototriangulation: determination of the elements of the mutual orientation of aerophotographs. The method of successive approximations is applied for the solution of this problem on electronic computers.

Materials

41. Emission Properties of Barium Tungstate and Barium-Calcium Tungstate

"Thermionic Properties of Barium Tungstate," by M. L. Kanitsa, A. I. Mel'nikov, A. V. Morozov, B. N. Popov, R. B. Sobolevskaya, B. M. Tsarev, and A. R. Shul'man; Moscow, Radiotekhnika i Elektronika, No 8, Aug 58, pp 1010-1016

The article is concerned with a study of the thermionic properties of barium tungstate (Ba_2WO_6) and barium-calcium tungstate (Ba_2CaWO_6) and is part of a more general study of the thermionic properties of certain semiconductor barium salts.

Measurements of work functions were made by Richardson's method at voltages of 280-300 v. Maximum emission was observed at temperatures of 1050-1100° K. Further increase in temperature caused a reduction in emission. Emission current density of Ba_2WO_6 cathodes was approximately 100 times greater than that of Ba_2CaWO_6 cathodes, the latter being equal to tenths of a microampere per square centimeter.

Although barium tungstate was found to be a comparitively good emitter, it is noted that the experiments were conducted at temperatures lower than the operating temperature of pressed cathodes.

42. Emission Characteristics of Some Rare-Earth Oxides

"Emission Properties of Rare Earth Metal Oxides," by B. S. Kul'varskaya, V. B. Marchenko, and G. V. Smepanov; Moscow, Radiotekhnika i Elektronika, No 8, Aug 58, pp 1005-1009

The thermoelectronic and secondary emission characteristics of a number of rare-earth metal oxides are examined. In measuring secondary emission properties, the relationship between the coefficient of secondary emission and velocity of primary electrons, collector potential, and the angle of incidence of primary electrons are determined. The coefficients of secondary emission for all the oxides studied (with the exception of erbium oxide) were within the limits of 2-2.8.

The Richardson method was used to measure thermoemission properties of oxides of lanthanum, praseodymium, neodymium, samarium, eruopium, gadolinium, terbium, dysprosium, holmium, erbium, ytterbium, lutecium, and yttrium.

The fact that the emission values lie within narrow limits is explained by the identical nature of the outer electron shells of all rare-earth elements. The corresponding electron levels are transformed in the oxide crystal to higher energy levels which essentially affect electron emission.

It is concluded that a great number of rare-earth metal oxides, and in particular the oxides of yttrium and gadolinium, may be used as cathode materials in instruments which precently use thorium oxide cathodes.

The author acknowledges the assistance of Professor B. M. Tsarev and Yu. F. Sokolov.

43. Review of Papers Presented at USSR Conference on Scintillators

"Review of Izvestiya Akademii Nauk SSSR, Seriya Fizicheskiya, Vol 22, No 1, 1958" (unsigned article); Moscow, Atomnaya Energiya, Vol 4, No 5, May 1958, p 499

"This issue of the periodical contains the published transactions of the First All-Union Conference on the Synthesis and Investigation of Scintillators for the Detection of Nuclear Radiation held at Moscow on 23-25 October 1956.

"The papers presented at this conference discussed problems pertaining to the synthesis of various scintillators, the investigation of their luminescence and scintillation characteristics, the development of photoelectronic multipliers, and also the application of scintillators in physical research and in the construction of industrially produced equipment.

A number of papers describe methods of growing scintillator crystals. The amplitude resolution obtained with the use of NaI-Tl crystals excited with gamma radiation emitted by Cs^{137} comprises 8-12 percent when photoelectronic multipliers of the types FEU-S and FEU-24 are used.

"The characteristics of the following scintillators for the recording of fast thermal neutrons are given: Ba F_2 crystals (without an activator); Li I activated with Ti and Sn; scintillators containing organoboron compounds; industrially produced detectors of thermal and fast neutrons; etc.

"Several reports deal with plastic scintillators. In these papers methods are discussed for the synthesis of scintillators that are based on polystyrene having a high transparency for its own radiation and a maximum ratio between the energy yield and the duration of the scintillation. Results of investigations are reported which dealt with the mechanism of the transfer of energy in scintillators, the dependence of the luminescence yield on the temperature, and the damage done to plastic scintillators by ionizing radiation.

"Data on the design and operational characteristics of new USSR photoelectronic multipliers of the types 1S, 1B, 1V, 2M, and 2B are given. Scintillation methods for the detection of beta- and gamma-radiation and some instruments the operation of which is based on these methods are described."

Patents

44. Soviet Patents in the Field of Electronics

"Publication of Authorship Certificates Awarded for Inventions Registered With the State Invention Register of the USSR," (unsigned article); Moscow, Byulleten' Izobreteniy, No 3, 1958, pp 45-75

Class $21a^1$, 7_{01}. No 111350; V. Ye. Bukh-Viner -- A method of transmission of discrete signals

Class $21a^1$, 7_{07}. No 111254; V. I. Kirsanov and I. A. Aleshin -- Device for restoration of telegraph signals at the output of the teletype

Class $21a^1$, 13_{01}. No 112121; V. G. Nalivkin and Yu. Ye. Livshits -- A circuit for electrical phasing of facsimile apparatus

Class $21a^1$, 32_{21}. No 110981; M. O. Gliklikh, V. G. Tsukerman, and A. Ya. Rogovskiy -- A method for reading text and apparatus for utilizing this method

Class 21a[1], 32_{21}. No 112123; V. G. Nalivkin. A method for automatic increase of contrast of facsimile black-and-white images

Class 21a[1], 36. No 112100; A. G. Konstantinovskiy -- Transistorized relaxation oscillator

Class 21a[1], 36. No 112114; A. B. Aronov, V. M. Ivanova, and A. I. Belokonev -- Precision generator of square pulses

Class 21a[2], 18_{08}. No 112022; O. B. Rosenbauli and R. N. Rodin -- Two-Stage magnetic amplifier

Class 21a[4], 21. No 111373; A. M. Pokras, M. Ye. Gertsenshteyn and I. I. Gak -- Waveguide splitter with controlled coupling

Class 21a[4], 8_{04}. No 111736; L. N. Tyul'nikov -- A method for obtaining millimicrosecond pulses

Class 21a[4], 76. No 111256; R. G. Varlamov -- A method for electronic instrument protection from thermal shocks

Class 21b, 27_{01}. No 112018; A. Kh. Cherkasskiy -- Thermobattery

Class 21c, 35. No 111527; V. A. Troitskiy -- Arc quenching chamber

Class 21c, 54_{01}. No 111453; V. V. Troyanovskiy and A. A. Merkulov -- A method of preparation of miniature ohmic resistors

Class 21g, 13_{06}. No 111685; G. A. Semenov -- A method of manufacturing copper grids for klystrons

45. Determining Vertical Wind Perturbations for Increasing Aircraft Stabilization

"On Determining Vertical Wind Perturbations," by A. L. Gorelik; Kiev, Avtomatyka, No 2, Apr-Jun 58, pp 12-18

The design of autopilots has heretofore been based on the assumption that the flying plane is subjected to isolated bumps. One way of increasing stabilization precision by means of autopilots would be to design them proceeding from the fact that a plane in flight is subjected to accidental perturbation. The solution of the problem involves gathering considerable statistical data on the nature and properties of these accidental perturbations.

One of the most convenient methods of investigating perturbed air is to record rolling of the plane (by means of sun photographs, for instance) with subsequent mathematical analysis of the experimental data to determine the correlative functions and the spectral density of the rolling. This method was applied to a study of the atmosphere over central Ukraine in the summer at heights of H_1 = 1,000 meters and H_2 = 5,000 meters.

The normal correlative function of the roll of the plane may be approximately expressed by the equation

$$\rho(\tau) = e^{-\alpha\tau}\cos\beta\tau \ldots$$

The spectral density equation for wind perturbations is given by

$$S_{BX}(\omega) = \frac{\left[\frac{R(\tau=0)\alpha}{(\beta+\omega)^2+\alpha^2} + \frac{R(\tau=0)\alpha}{(\beta-\omega)^2+\alpha^2}\right]\left[(K_2-\omega^2)^2 + K_1^2\omega^2\right]}{C_2^2 + C_5^2\omega^3}$$

The spectral density of these perturbations has a maximum in the frequency range ω = 0.1 - 0.15 rad/sec. As the altitude increases, there is a rise in the frequency at which the spectral density of perturbations attains its maximum.

46. Conference on Theory of Invariance and Its Use in Automatic Devices

"Announcement by the Organization Committee," (unsigned item); Kiev, Avtomatyka, No 2, Apr-Jun 58, inside back cover

"The Conference on the Theory of Invariance and Its Application in Automatic Devices will be held 1-4 October 1958 in Kiev.

"The conference is being convoked by the Bureau of the Department of Technical Sciences of the Academy of Sciences Ukrainian SSR together with Kiev city seminar on the theory of automatic regulation (Academician A. Yu. Ishlinskiy) and the Institute of Electrical Engineering of the Academy of Sciences Ukrainian SSR.

"Scientific associates of the Institute of Automatics and Telemechanics (Moscow), the Institute of Electrical Engineering (Leningrad), and a number of other organizations will participate in the conference.

"Papers in the following categories will be read:

"1. General problems.

"2. Theory of open-loop systems controlled by a single excitation.

"3. Theory of combination systems controlled not only by excitation but also by means of a closed reverse loop.

"4. Automatic and connected regulation (system invariance).

"5. Application of the theory of combination regulation to cybernetic systems with self-changing characteristics.

"6. Application of the theory of combination regulation in power engineering, electric drives, electroautomatics, and other branches of engineering.

"Persons desiring to present a paper at the conference should send their application to Kiev, ul. Chkalova, 55b, Institute of Electrical Engineering of the Academy of Sciences Ukrainian SSR, to N. A. Kachanov, Candidate of Technical Sciences, scientific secretary of the conference.

"A short summary of papers should be sent in two copies no later than 1 September 1958."

47. S. Ya. Gersh, Outstanding Soviet Low-Temperature Specialist, Dies

"S. Ya. Gersh" (unsigned article); Moscow, Promyshlenno-Ekonomicheskaya Gazeta, No 87, 23 Jul 58, p 4

Prof Semen Yakovlevich Gersh, Doctor of Technical Sciences, head of the Chair of Refrigeration and Compressor Machines, Moscow Higher Technical School imeni Bauman, and an outstanding specialist in the field of low-temperature engineering, died on 19 July 1958. Gersh had been associated with the Moscow Higher Technical School imeni Bauman since 1933. He was the author of over 50 scientific works on liquid gases and their application in the field of refrigeration. Gersh had worked for 45 years in engineering and scientific research and was the founder of the Laboratory of Deep Freeze, Moscow Higher Technical School imeni Bauman.

48. New Synthetic Insulations

"High-Molecular Compounds," by Prof K. A. Andrianov; Moscow, Elektrichestvo, No 8, Aug 58, pp 1-4

An analysis of the performance of about 100,000 electric motors in coal, metallurgical, machine-building, and other industries has disclosed that more than 70% of all failures were due to breakdown in insulation and that the average life of insulation of electric motors was at a very low figure of about 3.5 years.

The article stresses that the problem of increasing the service life of electric machinery insulation is of extreme urgency. The growth of production of high-molecular compounds, synthetic fibers, and plastics in the USSR has permitted considerable reduction in the use of thermally unstable natural and plant materials and their replacement with more stable high-molecular compounds. Many synthetic high-molecular compounds such as phenol-formaldehyde resins, silicon-organic polymers, polyester resins, polyvinyl chlorides, polyethylene, and polyvinyl acetal for enamel insulation have proved their durability and reliability under difficult operating conditions.

"A sharp increase and expansion in utilization of high-grade synthetic high-molecular compounds replacing the natural and plant materials should be accompanied in our opinion by an increased utilization of glass fiber, asbestos, mica, and 'slyudinit.' Combination of the desirable properties of polymers with the thermal stability of glass fibers, mica, and asbestos might considerably increase the reliability and prolong the service life of electric equipment."

For instance, the average life of coal-cutting machine insulation with old-type (Class B) insulation was only 3-6 months; the service life has increased to 2-3 years with the use of silicon-organic insulation.

49. New Developments in Enamel Insulation

"Heat-Resistant Wire for Windings," by Prof V. A. Privezentsev, Moscow Power Engineering Institute; Moscow, Elektrichestvo, No 8, Aug 58, pp 5-11

Although the production of enamel-coated electric wire in the USSR is about 50% of that of braided insulation wire, the production of high-strength polyvinylacetal varnish wire is only about 10% of the total enamel wire production. There was considerable expansion in the manufacture of high-strength enamel wire in 1956-1957 as a result of mastering the technique of producing polyamide-resol base insulation at the "Yuzhkabel'," "Estikabel'," and "Kuybyshevkabel'" plants.

The research work for the development of high-strength enamel wire having Class B heat-resistant properties was recently conducted at the Scientific Research Institute of the Cable Industry in two directions: development of new types of polyamide-epoxy varnishes and of varnishes on the base of polyurethane resins.

50. Casting Polyester Resin Insulation

"Casting Insulation on the Base of Unsaturated Cold-Hardening Polyester Resins," by R. K. Gavurina, P. A. Medvedeva, Sh. G. Yanovskaya, B. N. Shklyar, Ye. K. Dobrer, and V. M. Barzilovich; Moscow, Vestnik Electro-Promyshlennosti, No 8, Aug 58, pp 6-10

Several grades (F,AF) of casting compounds on the base of unsaturated polyester resins which harden at room temperature were developed and tested. These compounds were cast in units up to 5 kg without developing cracks. Quartz powder was used as a filler with these polyester resins to improve technological properties.

The possibility of practical utilization of these newly developed polyester resins was tested with a Type TCh-2 transformer. The results of the experiment have shown that the polyester insulation possesses satisfactory electrical characteristics when used in electric machinery operating in the voltage range from 0.5 to 3 kv.

The physical characteristics of the compound AF were as follows: specific density, 1.7 g/cm^3; compressive strength, 1,800 kg/cm^2; tensile strength, 360 kg/cm^2; impact strength, 10 kg.cm/cm^2; resistance to moisture absorption, 0.38% in 30 days; resistance to heat, 65 according to Martens; tangent of loss angle at 50 c, from 0.04 to 0.13; dielectric strength for one-minute test, 14 kv/mm; dielectric strength for gradual voltage rise, 25 kv/mm; and specific resistance, 10^{13} ohms.

51. Soviet High-Precision Visibility Meter

"Problems in Measuring Visibility With Polarized Meter of the L. L. Dashkevich System," by T. A. Glagoleva and A. F. Trusova, Moscow Institute of Labor Protection of the All-Union Central Council of Trade Unions; Moscow, Svetotekhnika, No 8, Aug 58, pp 1-5

CPYRGHT The article contains the following passage:

"In our opinion the polarized binocular visibility meter of the L. L. Dashkevich system is the best existing instrument for measuring visibility. The construction of the device is based on the manner of approach to threshold visibility by means of lowering contrast. It is well known that the contrast sensitivity is a function of vision which responds to the difference of illuminating conditions in a highly sensitive and stable manner. The reduction of contrast in the Dashkevich meter is achieved while maintaining the constancy of background brightness; therefore, the conditions for observer adaptation do not change during the measurement.

"The operation of the meter is based on optical matching of the observed object with the background and bringing the contrast to its threshold value by quenching one of the plane-polarized object images by means of rotating polaroids."

52. Subscription to Soviet Patents Now Available

"State Publishing House of Standards" (advertisement); Moscow, Byulleten' Izobreteniy, No 4, 1958, back cover

CPYRGHT The advertisement reads as follows:

"Attention: The State Publishing House of Standards is continuing to accept subscriptions in 1958 for invention descriptions for authorship certificates and patents registered with the State Register of the USSR for the years 1950 to 1958.

"The descriptions will contain complete delineations of the essence of the registered invention, its specific peculiarities, and the possibilities of its practical utilization.

"Each description is accompanied by all necessary schematic drawings.

"Subscriptions are accepted for any specified class of patents and ... authorship certificates as a whole.

"During the year up to 6,000 descriptions will be issued covering 89 classes. The average cost of one description will be 50 kopecks. All necessary material for making a subscription will be sent immediately on request.

"Please direct requests to:

"Moskva, I-90, 2-ya Meshchanskaya ul., d. 51, Otdel rasprostraneniya Standartgiza (Moscow, I-90, 2-nd Meshchanskaya st., house 51, Distribution Department, 'Standartgiz')."

53. Nonlinear Differential Equations

"Investigation of the Solution for a System of Nonlinear Differential Equations Containing Small Derivatives With Certain Derivatives," by K. V. Zadiraka; Kiev, Ukrainskiy Matematicheskiy Zhurnal, Vol 10, No 2, 1958, pp 121-127

The author investigates the solution of a system of nonlinear differential equations containing a small parameter with certain derivatives and rapidly oscillating terms. It is shown that the solution of such a system uniformly tends toward the solution of a degenerated system, averaged by the argument t/μ, when the parameter μ tends to zero.

VII. MEDICINE

Behavioral Sciences

54. Soviet Concept of Character

Voprosy Psikhologii Kharactera (Problems of the Psychology of Character), by Nikolay Dmitriyevich Levitov, Institute of Psychology, Academy of Pedagogical Sciences RSFSR, State Scientific Pedagogical Publishing House of the Ministry of Education RSFSR; Moscow, 1956, 368 pp

Author of this book makes an attempt to throw light on the subject of character as something that reflects personality. He states that the need for a book like this has been felt in both scientific research and in the teaching profession. Practical problems in education have persistently indicated the need for generalization, critical re-examination, and further elaboration of what has been done in the field of the study of character.

The author states that personality is a process or operation of an individual who organizes experience and reacts effectively to situations confronting him. This organizing process will of necessity reflect the cultural training he has experienced.

In reflecting briefly on the emergence of character traits, the author of this book states that "personality is an outcome of the interaction of cultural agents and the individual. We may be able to distinguish the main aspects of this process in an individual who develops and matures under the tutelage of parents and teachers who are intent on patterning him according to the culturally prescribed and socially sanctioned modes of action, speech, and belief.

"Emergence of creative forces and evolution of character of a Soviet man were brought about by the Communist revolution in Russia. The profile of a Soviet man began to be molded under the guidance of the Communist Party during the stormy days of the October revolution and the fight against the White Army and foreign interventionists; it continued in the days of all-out efforts to restore the shattered economy, in the days of industrialization and collectivization of agriculture, and during the struggle against the German fascist aggressor.

"Little progress has been made, in the USSR, in the field of study of the character of a Soviet man. The Soviet psychologists have been giving ever greater attention in their research to the problem of personality. This can be explained by the fact that, before the meaning and formation of character can be clarified, it is necessary to have an idea of what personality is because personality finds its strongest expression in character.

"Leading scientists and thinkers of the past were greatly engrossed in the study of the personality of a specific man, living within the limits of a group of people representing definite social conditions. The question of the psychology of personality occupied a prominent place in the philosophical teachings of Russian revolutionary democrats like Belinskiy, Hertzen, Chernyshevskiy, and Dobrolyubov. Understanding human psychology and manifestation of personality belongs, however, to Russian teachers and psychologists like Ushinskiy.

"Actually, the theory of personality received its scientific basis in the works of the founders of Marxism and Leninism. The only correct conception of common attributes of personality and conditions governing its formation can be found in the teachings of Marx, Engels, and Lenin.

"Utilizing the rich heritage of the most advanced Russian pedagogical thought and encouraged by utterances of M. I. Kalinin, N. K. Krupskaya, and A. S. Makarenko, Soviet pedagogy is solving one of its main problems: that of molding a new man, a partisan for Communism. Many scientists have made contributions to the effort of creation of a Soviet man. A prominent place in that respect is occupied by many psychologists and by Pavlov and his teachings concerning higher nervous activity. Soviet literature and art also have contributed to solving this problem. We only stand on the threshold of this great and interesting trend. For that reason not all questions can at present be examined with the profoundness desired.

"To understand the personality of a Soviet man and to modify it properly, especially during the early period of his life, it is important that those personal traits of an individual which make up his character are investigated. Recognition of the distinctive features of a Soviet man gives you a sort of key to recognition of his personality even though the personality of an individual may not be decided solely on the basis of his character traits."

The following outline of the principal traits of a Soviet man is offered by N. D. Levitov (page 91). He states that this outline may be used for recording personality evaluation:

1. Communist consciousness and conviction.

2. Soviet patriotism.

3. Attitude toward work.

4. Attitude toward science, art, and nature.

5. Attitude (of an individual) toward himself.

6. Attitude (of an individual) toward other people and toward the collective.

Levitov further states that the conclusions arrived at were not arrived at accidentally. The factual material in the book was made up mainly of data collected as result of a study conducted among the upperclassmen of Moscow public schools. Literary works were also utilized to a considerable extent. He expresses the view that the theory concerning the nature of formation of character and personality of a Soviet man may be formulated on the basis of combined efforts of psychologists, teachers, artists, and writers of literary works.

 The table of contents of the book follows.

55. Natural Distribution of R. burneti

"The Problem of the Distribution of Rickettsia burneti in Nature," by P. N. Blinov, All-Union Institute of Experimental Veterinary Medicine; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 29, No 8, Aug 58, pp 85-88

Special studies on the distribution of the Q fever pathogen in nature are reported in this article. The work was done in two locations in the southern USSR which were threatened with Q fever; epidemiological and epizootological characteristics of these points with respect to this disease are discussed. A 1957 outbreak in which half the workers of a dairy products farm were involved is analyzed. Cattle and horses were also tested serologically and the elimination of R. burneti with animal excreta was investigated by infection of white mice. To substantiate conclusions drawn from results of the latter experiments, the author examined grasses collected from pastures in which animals threatened with Q fever were kept. A table included in the article is entitled "Results of Biological Investigations of Cattle With Clinical Symptoms of Q Fever."

The following conclusions are presented on the basis of the entire study:

"1. In active foci of Q fever, the pathogen of the disease can be widely disseminated in nature due to its elimination by infected ticks, other wild inhabitants, and agricultural animals.

"2. The fact that cattle with Q fever can eliminate the pathogen into the environment with milk, mucus, and feces was verified. The presence of Rickettsia in cattle feces was observed within 70-90 days (time of observation) after Q fever was diagnosed.

"3. The high survival rate of Rickettsia in the external environment, particularly in manure, in dust on pastures, and in water was substantiated.

"4. Data from the investigations indicate a good possibility for humans and agricultural animals in Q fever foci to become infected by aspiration and by the alimentary route."

56. Cholera in China Said To Be Imported

"The Problem of the Endemicity and Periodicity of Cholera in China," by K'o Kuan-t'ien and Gnien [sic] Shou-min, Public Health Division, Chinese Union Medical College, and Sanitary Antiepidemic Bureau, Administration [Ministry] of Public Health of China; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 29, No 7, Jul 58, pp 85-90

Various statistics on the endemicity and periodicity of cholera in China from 1881 to the present are analyzed in this article. Several conflicting arguments concerning the occurrence and location of endemic cycles are presented, concluding with the authors' opinion that cholera is not endemic in China. This view is discussed in detail and substantiated by statistical data for the Shanghai area presented in two tables. Also, evidence is offered to support the supposition that the appearance of cholera at a warm time of the year and its complete absence during cold weather can be caused by importation of the disease. The article concludes with the following statements:

"Whoever supports the theory of the endemicity of cholera in China, intentionally or otherwise, creates a smoke screen which conceals the bacteriological warfare waged by the enemy. They employ this theory through a desire to exonerate the Kuomintang regime, which did not know how to suppress cholera in the country. The theory is also leveled against recent measures taken to prevent the importation of cholera into the country.

"We have every reason to believe that cholera is an imported disease in China and that the theory of endemicity and periodicity is devoid of scientific basis."

Hematology

57. Initial Favorable Results Reported in Using "AIK" Apparatus for Artificial Circulation Under Clinical Conditions

"Hematological Factors in Artificial Circulation While Using Apparatus for Artificial Circulation," by L. A. Levitskaya, I. D. Shishkina, N. I. Kondrat'yeva, and N. S. Supko, Scientific Research Institute of Experimental Surgical Apparatus and Instruments (director, M. G. Anan'yev), Ministry of Health USSR; Moscow, Eksperimental'naya Khirurgiya, No 3, May/Jun 58, pp 42-47

The authors have used the "AIK" artificial-blood-circulation apparatus on dogs. Determinations of prothrombin time, blood coagulation index, leukocyte and erythrocyte count, etc. indicate that the AIK apparatus can be

used for artificial circulation. It causes no hemolysis, and there are no contraindications for its use. By using the AIK apparatus, certain links in the blood coagulation chain have been clarified. Heparin dosage under normal conditions and under hypothermia is prescribed.

58. Arrest of Cerebral Circulation Under Hypothermia Tolerated for 18 Minutes

"The Arrest of Cerebral Circulation Under Conditions of Hypothermia," by Ye. V. Gukevich, Vinnikovskiy Rayon Hospital of L'vovskaya Oblast (chief physician, V. S. Cherednik; and scientific director and head of the Chair of Faculty Surgery, Therapeutic Faculty, L'vov Medical Institute, Prof G. G. Karavanov); Moscow, Eksperimental'naya Khirurgia, No 1, Jan/Feb, 58, pp 30-35

Tests were conducted on 102 rabbits subjected to hypothermia for the purpose of studying the limits of cerebral circulation arrest.

On arresting cerebral circulation by clamping both carotid arteries and both cerebral arteries under hypothermia (26-27°C), the condition was tolerated for 15-18 minutes, and the first death occurred after 20 minutes (as compared with 3-4 minutes tolerance under normal conditions). At 26 to 27°C, oxygen consumption decreases 62.7%, while blood sugar level rises 20-30%.

59. Book Published on the "Arm IPK" Plasma Substitute Antishock Fluid and the Mechanism of Its Therapeutic Effect

"Book Shelf" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 50, 24 Jun 58, p 4

The following book is listed: Plazmozameshchayushchaya Antishokovaya Zhidkost' "Arm IPK" i Fiziologicheskiy Mekhanizm Lechebnogo Deystviya ("Arm IPK" Plasma-Substitute Antishock Fluid and the Physiological Mechanism of Its Therapeutic Effect), by S. A. Akopyan, Yerevan University, Publishing House 1958, 241 pages.

60. Effects of Low Temperatures on Blood Properties

"The Effect of Unusually Low Temperature on Certain Physicochemical Properties of Sheep Blood," by F. A. Aliyev, Candidate of Veterinary Sciences; Moscow, Doklady Vsesoyuznoy Ordena Lenina Akademii Sel'sko-khozyaystvennykh Nauk imeni V. I. Lenina, Vol 4, Apr 58, pp 37-40

Two series of tests at temperatures ranging between 0 to +4 and -10 to -20°C were conducted on sheep to study the effect of a cold environment on the physicochemical properties of the blood.

Results indicate the following: Moderately low and very low temperatures accelerate the erythrocyte sedimentation rate, decrease erythrocyte resistance, decrease alkali reserve, delay blood coagulation, and increase catalysis. Repeated exposure to moderately low temperatures acclimatizes the farm animals, and changes in the blood subside.

61. Virulence of B. pestis Affected by Immune Organism

"The Effect of a Naturally Immune Animal Organism on the Virulence of the Plague Pathogen," by Ye. L. Semenova, Central Asian Scientific Research Antiplague Institute; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Vol 29, No 8, Aug 58, pp 23-24

"The purpose of the research was to explain the effect of the organism of dogs which possess species immunity against plague on the virulence of pathogenic mocroorganisms.

"Virulent B. pestis strains 100 and 1918 were selected for the experiments. An agar culture of a 2-day growth of a loopful (about 1.5 billion microbial cells) was put on a strip of thick paper, which was put into the lumen of a three-layered tube of filter paper. The latter was inserted into 3-month-old puppies under the aponeurosis or into the peritoneal cavity and withdrawn every 7-14 days. B. pestis isolated by seeding from the strips of paper or from the walls of the tube were passed again. For subsequent passage, a culture was taken from a colony with the most typical formation. The morphology of the cells and the character of their growth on culture media were tested after each passage through the animal organism. The biochemical characteristics of the cultures were studied only at the beginning and the end of the experiments; properties of virulence were tested on white mice (six animals for each dose) only after 3, 6, and 10 passages. Initial strains which were seeded in the same manner were always used as controls.

"B. pestis strain No 100 was passed ten times in all; out of these ten passages, a tube with a culture was seeded under the aponeurosis six times, and into the peritoneal cavity, four times. As a rule, this culture could be found in the animal organism over the course of 94 days. B. pestis strain No 1918 in tubes was introduced under the aponeurosis four times and into the peritoneal cavity twice, and remained under the effect of the organism for 58 days. Three puppies were used for each strain. The tubes with the cultures were seeded into them alternately. The seeding and withdrawal operations were performed under ether anesthesia while maintaining asepsis. The puppies were all in good condition after the operation.

"Toward the completion of the experiments, the puppies were killed. and their internal organs were subjected to careful bacteriological examination. Plague pathogens were not observed in any case. In tubes withdrawn from the peritoneal cavity or aponeuroses of the animals, B. pestis was readily observed, although its growth on culture media was frequently scanty (in the form of isolated colonies). Specific microorganisms could not be isolated in four cases (after the tubes had been left in the organism for 14 days.

"Passed cultures did not differ from initial cultures in cellular morphology, in the characteristics of their growth on culture media, or in biochemical characteristics. Very small, isolated achromogenic colonies without pronounced centers, which consisted of compact, circular zones with fibrous, serrated borders and which grew in bouillon in the form of fragile clumps on the bottom of the test tube appeared only in seedings from first-generation cultures of typical growth. Small gram-negative bacilli, polymorphous in size and staining, were observed in smears. The culture was lysed by specific bacteriophage. It did not change sugar, alcohol, urea, or milk. White mice infected subcutaneously (four mice) or intraperitoneally (four mice) with 0.5 ml of the bouillon from the culture survived. They died only after repeated infection with 100 Dcl of the initial strains, but they died later than control animals.

"Studies of virulence in passed cultures showed that an appreciable decrease in virulence occurred only in the tenth-generation of strain No 100. White mice infected with 10 and 100 microbial cells survived; all died from doses of 1,000 microbial cells, but they lived five times as long as control animals. White mice died from doses of 100 and 1,000 microbial cells of sixth-generation strain No 1918, but they lived 11-15 days, whereas the control animals died on the 5th-6th day.

"Initial cultures and tenth-generation strain No 100 and sixth-generation strain No 1918 were maintained for 5 years without reseeding on meat-peptone agar (pH, 7.2) in wide, sealed test tubes at room temperature. Morphological and biochemical characteristics of the cultures preserved as described above did not differ from the characteristics of the initial strains, but they were markedly less virulent; white mice infected with tenth-generation strain No 100 survived a dose of 1,000 microorganisms, and only part of the animals died from a dose of one billion microorganisms; animals infected with sixth-generation 1918 only survived doses of 10, 100, and 1,000 microbial cells. Under the same conditions of preservation, initial cultures of both strains maintained their original virulence.

"The experiments performed showed that microorganisms die off gradually in the organisms of dogs which have species immunity to plague. Scanty growth following seeding from tubes and the appearance of avirulent variants after the first passage substantiate this. On the whole, the cultural characteristics of the microorganisms were not altered appreciably despite their multiple and prolonged residence in the animal organism. However, residence in the animal organism had a considerable effect on the virulence of the microbial cells; virulence was markedly decreased and was found to be less stable during prolonged preservation of the culture in agar."

62. Method of Administering Injections Without Needles

"Injections Without Needles" (unsigned article); Moscow, Meditsinskiy Rabotnik, 26 Aug 58, p 4

"Many patients, particularly those needing frequent injections (in sugar diabetes, postoperative septic conditions, etc.) and children (in various mass inoculations) do not withstand injections well. At the Laboratory of General Surgical Instruments, Scientific Research Institute of Experimental Surgical Apparatus and Instruments, Ministry of Health USSR, Engineers M. M. Trusov and B. P. Ippolitov and P. D. Belyakova, Candidate of Medical Sciences, designed an injector with no needle -- an apparatus for introducing therapeutic substances without needles under high pressure.

"The apparatus consists of an electric motor, a system of replaceable detainers, and nozzles connected by rubber hoses to ampules filled with the therapeutic preparation. The replaceable detainers make it possible to create pressure of 75-250 atm, and the therapeutic substances easily penetrate subcutaneous cellular tissue under these pressures with nozzles having one or two openings 0.12-0.14 mm in diameter. The volume of the preparations introduced can vary from 0.2 to 1.0 ml. The higher the pressure, the more deeply the therapeutic substances penetrate into the tissues. In this manner, the needleless injector permits the subcutaneous or intramuscular introduction of preparations.

"The injections are performed automatically by means of touching the skin surface with the nozzle and pressing the release mechanism.

"The institute prepared an experimental sample of the needleless injector and tested it on animals. The apparatus will be tested in a number of Moscow clinics in the very near future."

[For additional information on immunology and therapeutics, see Items No 73, 88, and 89.]

63. Effects of Radial Acceleration Investigated

"Respiration and Respiratory Metabolism of Gases in Man Subjected to Radial Acceleration," by V. I. Babushkin, P. K. Isakov, V. B. Malkin, and V. V. Usachev; Moscow, Fiziologicheskiy Zhurnal SSSR imeni I. M. Sechenov, No 4, Apr 58, pp 342-347

Experiments were conducted with five healthy men, between 20 and 25 years of age, to gain a clearer understanding of the functional changes that take place in a human organism due to radial acceleration and to make possible evaluation of various antigravity suits. It was found that radial acceleration caused an increase in pulmonary ventilation, oxygen consumption, and exhalation of carbon dioxide, as well as a considerable rise in energy expenditure. These changes are connected with the development of compensatory reactions, particularly with a reflex increase in the tonus of skeletal muscles. Determination of energy expenditure during radial acceleration may serve as one of the indices of the magnitude of compensatory reactions in the adjustment of the human organism to the changing conditions produced by the action of gravitational forces.

64. Changes in Biochemical Blood Composition Due to Centripetal Acceleration

"Effect of Centripetal Accelerations on Content of Acetylcholine, Adrenalin, Adrenaline-Like Substances, Potassium, and Sodium in the Blood of Animals," by A. S. Barer, Central Institute for the Advanced Training of Physicians (V. P. Lebedeva, director), Moscow (received by the editorial office on 7 December 1957; submitted by V. N. Chernigovskiy, Active Member of the Academy of Medical Sciences USSR; Byulleten' Eksperimental'noy Biologii i Meditsiny, No 7, Jul 58, pp 56-59

Experiments were conducted with 300 white rats and 5 dogs to determine what changes take place in the amount of adrenalin, acetylcholine, adrenalin-like substances, potassium, and sodium in the blood after the action of centripetal accelerations. It was noted that there is a definite dependence of changes in the content of these substances on the magnitude, direction, and duration of accelerations. Morphological changes were also observed in various tissues of the animal organism after undergoing a large number of accelerations. The article illustrated by three photomicrographs and includes three tables.

65. Experimental Data on General Vertical Vibration

"Experimental Data Concerning the Effect of General Vertical Vibration on Change in Body Weight of Growing Rats," by A. F. Lebedeva, Sanitary Hygiene Medical Institute; Moscow, Gigiyena Truda i Professionalnyye Zabolevaniya, No 3, May/Jun 58, pp 25-28

The purpose of this work was to study the effect of the vibration factor on body weight in relation to exposure time.

Three groups of rats were exposed to general vertical vibration, 6-7 hertz and an amplitude of 2-2.5 mm, for 2-2 1/2 months. The first group (8 rats) was exposed daily for 5 consecutive hours, the second group (40 rats) was exposed daily for 4 consecutive hours, and the third group (36 rats) was exposed daily for 3 consecutive hours. The rats received a diet of 68 calories per day for each 100 g of weight.

As a result of the experiments, the following conclusions were derived:

1. The vibration parameters selected were sufficiently strong inhibitors which, with prolonged action, can produce the development of diffused inhibition. Vibrations over a short period of time caused a predominance of excitation over inhibition. With vibrations over a long period of time, various degrees of inhibition were observed.

2. Protracted systematic vibration action retarded the accumulation of body weight in young rats.

Public Health, Sanitation, and Hygiene

66. Foam Rubber Used in Face Masks

"On the Use of Foam Rubber as a Material for Dust Filters and Respirators," by Yu. S. Koryukayev, Sanitary-Hygienic Medical Institute, Leningrad; Moscow, Gigiena Truda i Professional'nyye Zabolevaniya, No 4, Jul/Aug 58, pp 55

Foam rubber was tested and found satisfactory for use as dust filtering material in face masks. The testing was first done mechanically using tobacco dust. A thickness of 15-20 mm retained 70-80% of the dust particles. One of the greatest advantages of using foam rubber for this purpose is that after use the face mask can be washed out in ordinary soap and water, thus renewing the mask's efficiency. A disadvantage is that there is no satisfactory standard for pore size.

67. Prompt and Extended Antibiotic Treatment of Staphylococcus Pneumonia During Radiation Sickness Most Effective

"Treatment of Staphylococcus Pneumonia in Radiation Sickness," by P. N. Kiselev, R. M. Rabinovich, and I. D. Meter, Central Scientific Research Roentgeno-Radiological Institute, Ministry of Health USSR; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 41-46

A study was made of the possibility of treating experimentally produced staphylococcus pneumonia in irradiated animals by various antibiotics.

Pneumonia was produced by the intratracheal introduction of staphylococcus aureus on the 7th day after irradiation with 500 r of X rays. Five series of tests showed the progress of the development of staphylococcus aureus in irradiated and nonirradiated rabbits and albino rats when treated with penicillin, bicillin, and streptomycin.

Results, illustrated in a diagram, prove that the number of microbial foci in the lungs is definitely decreased by the 3d day, and reaches zero by the 6th day due to therapy by streptomycin, while in the untreated irradiated animals even on the 11th day there is evidence of infection. However, in 10% of the cases, starting with the 8th to the 9th day after antibiotic treatment, there was evidence of a new rise in the multiplication rate of staphylococci, due chiefly to the appearance of penicillin- and streptomycin-resistant strains of microorganisms. Recovery in the unirradiated untreated animals infected with staphylococci was faster than in the treated irradiated ones.

An analysis of the results of antibiotic therapy of staphylococcus pneumonia against a background of radiation sickness, at present, leads one to the conclusion that an early diagnosis can result in full recovery by using streptomycin, penicillin, bicillin, and their appropriate combination if therapy is started on the 2d to the 3d day after the onset of pneumonia. However, considering the fact that penumonia is developing against a background of decreased immunity due to radiation sickness, recovery will require a long course of treatment.

The authors conclude that treatment of staphylococcus pneumonia is not successful in 100% of the cases because of delay in the beginning of therapy, the possibility of the development of antibiotic-resistant strains of microorganisms, a short course of therapy, and the necessity of combining various antibiotics and chemotherapeutic drugs. Finally, in about 10% of the cases antibiotic therapy is ineffective, and leads to the development of a chronic form of pneumonia which terminates in the death of the organism.

68. Penicillin and Bicillin Proved Superior to Biomycin in Treating Combined Injuries in Radiation Sickness

"Experimental Study of the Effect of Biomycin, Bicillin and Penicillin in the Treatment of Complex Injuries," by G. T. Golikov, Chair of Battlefield Surgery (head, Prof A. N. Berkutov) : Military-Medical Order of Lenin Academy imeni S. M. Kirov; Moscow, Eksperimental'naya Khirurgiya, No 1, Jan/Feb 58, pp 40-43

Fifty rabbits were exposed to 500 r of X rays in an effort to study the prevention and therapy of infection during combined injuries. Results indicate that best therapeutic results were obtained by using penicillin and bicillin, i.e., the mortality rate dropped and wounds healed well. Biomycin decreased the incidence of wound infection, but the mortality rate rose during the peak of radiation sickness since this antibiotic damages soft tissues and hinders wound healing.

69. Evidence for Therapeutic Use of Pentoxyl in Radiation Leukopenia

"Concerning the Administration of Pentoxyl in Radiation Leukopenia in People;" by M. P. Domshlak, and L. B. Koznova; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 29-33

Leukopenia, a symptom of disturbed hemopoiesis, is often a serious complication of radiation therapy. Leukopenia of various etiologies has often been treated by preparations from nuclèic acid or substances that resemble it in chemical structure. The author tested pentoxyl, an analogue of methacyl, for its therapeutic effectiveness in radiation leukopenia.

Details of the medical history of different patients receiving radiation therapy, radiation dosage, and the pentoxyl therapy are included. In the majority of patients the number of leukocytes was 44-68% of the initial value when pentoxyl treatment was begun. Pentoxyl treatment was effective in increasing the leukocyte count in 20 of 35 patients treated. The author draws the following conclusions:

"1. Pentoxyl is a drug which exerts a certain stimulating effect on leukopoiesis to counteract the leukopenia resulting from radiation.

"2. The therapeutic effect of pentoxyl is due principally to an increase in the absolute number of neutrophils.

"3. The effectiveness of pentoxyl does not depend on the degree of leukopenia.

"4. Considering the insufficiently stable stimulating effect of pentoxyl, it is efficacious to combine it with other agents for the improvement of leukopoiesis."

70. Colloidal Infusion Preferred to Blood Transfusion in Forestalling Hemorrhagic Syndrome in Acute Radiation Sickness

"The Use of Colloidal Infusion in the Complex Therapy of Acute Radiation Sickness," by L. S. Rogacheva (Moscow), Central Order of Lenin Institute of Hematology and Blood Transfusion, Ministry of Health USSR (director, Prof A. A. Bagdasarov, Active Member of the Academy of Medical Sciences USSR); Moscow, Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, Vol 2, No 4, Jul/Aug 58, pp 38-43

A series of tests was conducted on dogs subjected to acute radiation sickness (600 r X-ray radiation). Studies of the survival of dogs treated by various methods and studies of the dynamic changes in the peripheral blood and in bone marrow punctate indicate that the method of colloidal infusion exerts an undisputed therapeutic effect in the treatment of acute radiation sickness. Furthermore, colloidal infusion excels blood transfusion in that it is not accompanied by secondary reactions, reduces the number of necessary transfusions, and forestalls the development of a hemorrhagic syndrome.

71. Tissue (Skin and Umbilical Cord) Therapy Stimulate Hematopoiesis in Radiation Leukopenia

"The Use of Tissue Transplantation in Radiation Leukopenia," by K. N. Chochia, Radiosurgery Department, Central Scientific Research Roentgenoradiological Institute (director, Prof M. N. Pobedinskiy), Ministry of Health USSR; Moscow, Vestnik Rentgenologii i Radiologii, No 4, Jul/Aug 58, pp 79-80

The author used the method of tissue therapy employing skin and umbilical cord to stimulate hematopoiesis in radiation leukopenia resulting from radiation therapy. There was no essential difference in the effect of these two tissues, i.e., skin or umbilical cord.

Results indicate positive therapeutic effects in 67 of 95 patients treated. One case history illustrates that in 2 weeks the number of leukocytes rose from 3,100 to 4,450 per mm^3 of blood due to the above-mentioned method of tissue therapy. The rise in lymphocytes was from 6 to 9%.

72. Angiograms Indicate Dilatation and Constriction of Different Major Arteries During Acute Radiation Sickness

"Angiography in Acute Radiation Sickness," by K. B. Tikhonov, Candidate of Medical Sciences, Military-Medical Order of Lenin Academy imeni S. M. Kirov (head, Prof P. P. Goncharov); Moscow, Vestnik Rentgenologii i Radiologii, No 4, Jul/Aug 58, pp 60-63

Research was conducted on changes in blood vessels of the pelvis, of the internal organs of the abdominal cavity, and of the extremities. Differences in vascular permeability due to radiation sickness were recorded by angiograms by using a special apparatus designed by the author.

Results may be summarized as follows:

"During the period of initial reaction to radiation effects, the author noted dilatation of the major arteries of the organs of the abdominal cavity; while during the peak of acute radiation sickness the author noted that the major arteries of the internal organs of the abdominal cavity often were dilated or seemed unchanged, but significant constriction could be observed in the lumens of the arteries of the pelvis and of the extremities."

73. Direct Relationship Noted Between Decrease of Immunity Due to Radiation and Multiplication of Tularemia Bacteria in Bone Marrow and Spleen

"Vaccine Tularemia Infection in Albino Mice Against a Background of Radiation Injuries," by A. S. Shevelev, Chair of Microbiology (head, Prof V. A. Yudenich) of the Smolensk Medical Institute; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 50-56

This study was conducted because a review of the literature showed that very little work had been devoted to processes of infection and immunity of vaccinated animals under conditions of radiation injuries. Tests were conducted on albino mice subjected to a 370 r dose of X rays.

Studies were made of the following:

1. Changes in the resistance of animals following irradiation inflicted at various periods before the administration of vaccine strains.

2. Changes in the sensitivity of albino mice to vaccine tularemia infection at various periods after irradiation.

3. The effect of irradiation inflicted at various periods after inoculation with vaccine strain of B. tularense.

4. Changes in the white blood and results of bacterioscopy of slide sections of organs.

 The article is accompanied by the following English abstract:

"Preliminary irradiation of white mice by a sublethal dose of X rays (370 r) causes acute decrease of natural immunity to vaccine tularemia infection. This decrease in resistance is most pronounced if infection takes place within 2-24 hours after irradiation. It is clearly evident in 3 days, the infection decreases in 7-10 days, and disappears almost completely on introduction of vaccine strain 21-22 days following irradiation.

"A sublethal dose of X rays administered within 2-24 hours after introduction of vaccine strain of B. tularense causes almost the same decrease of immunity in mice as irradiation performed 2-24 hours before infection. Administration of the same dose of radiation 5 days after introduction of bacteria has almost no effect on the course of vaccine infection. A large dose of radiation equal to 684 r (DL 15-20/30) administered 24 hours after infection caused 100% death of the animals from tularemia with massive involvement of internal organs and positive precipitation reaction. Irradiation by the same dose 5 days after the introduction of bacteria increases the length of the incubation period of the vaccine infection and causes death of 95% of the mice. Positive precipitation reaction and the presence of B. tularense in slide sections and smears of the organs are found only in 50% of the animals. If the same dose is administered in 12 days, no death from tularemia is noted.

"There is a certain parallelism between the degree of lowered resistance to vaccine tularemic infection as a result of ionizing radiation and the decrease in the number of lymphocytes in the peripheral blood. A direct relationship is noted between the degree of lowered congenital immunity as a result of irradiation and the degree of multiplication of tularemia bacteria in the bone marrow and, partially, in the spleen."

74. Radiation Bacteremia Linked to Disturbance of Intestinal Phagocytic Protection

"Histochemical Study of Phagocytic Processes in the Appendix of Rabbits Irradiated by X Rays," by A. Ya. Fridenshteyn, Division of Medical Microbiology (head, Prof V. L. Troitskiy, Corresponding Member of the Academy of Medical Sciences USSR), Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, Academy of Medical Sciences USSR; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 56-64

The author presumes that autoinfection arising as a result of general irradiation is not commensurate with the dose of ionizing radiation which causes radiation sickness in mammals. Therefore, he investigated changes in the properties of the microorganisms of the intestinal flora as the cause of radiation autoinfection.

Tests were conducted on 53 fully grown rabbits, 36 of which were irradiated with a 600-800 r dose of X rays, and the method of determining polysaccharides was used to detect microorganisms in the walls of the appendix. Various photomicrographs show phagocytosis of microorganisms in the walls of the appendix of normal and irradiated animals, centers of multiplication of lymphatic follicles, reaction of microorganisms to polysaccharides, and phagocytosis of microorganisms at various periods after irradiation.

 Results indicate the following:

"1. In the appendix of fully grown normal rabbits, there is a phagocytic apparatus due to which a great number of microorganisms penetrating the walls of the large intestines and invading the appendix is captured and digested.

"2. As a result of this process, the products of intracellular decomposition of microorganisms, including large amounts of polysaccharides, are deposited in the centers of multiplication of lymphatic follicles.

"3. After irradiation of rabbits, this process of phagocytosis is disturbed. Phagocytosis becomes incomplete, and the polysaccharides are no longer deposited in the centers of multiplication of lymphatic follicles as was previously done under normal conditions."

75. Oxygen Utilization During and Shortly After X-Ray Irradiation Studied

"Oxygen Utilization by Rats and Mice During Their Irradiation by X Rays," by I. S. Belokonskiy, Scientific Research Military-Medical Institute (Sofia); Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 21-25

The purpose of this research was to study the changes in the utilization of oxygen during X-ray irradiation of experimental animals. Tests were conducted on albino mice and rats subjected to 100, 200, 300, 400, 500, 600, 700 r, and 3,000-3,500 r of X rays. The method for determining gas exchange is described. It consists of placing the experimental animals in a desiccator with a 3- to 4-liter capacity and creating within this container conditions similar to atmospheric air with regard to temperature, humidity, and composition. The drier has an outlet which connects it to a graduated burette with a 50 cc capacity by means of a rubber tube. Absolute values for oxygen utilization from this apparatus can be determined at any moment.

Diagrams illustrate changes in the utilization of oxygen and in the frequency of respiration of rats during irradiation; oxygen utilization at one-minute intervals (up to 10 minutes) (after irradiation by 100, 200, 300, 400, 500, and 600 r); oxygen utilization at 5 minute-intervals following fractional irradiation with a total dose of 3,500 r; and oxygen utilization following continuous irradiation by a dose of 3,000 r (simultaneously on ten animals).

Results indicate the following:

"1. Oxygen utilization by rats and mice during the period of irradiation by X rays and during the first few minutes after irradiation is increased significantly. This increase is accompanied with a simultaneous deepening of respiration.

"2. On increasing the dose and time of irradiation, the amount of oxygen utilized is decreased.

"3. After uninterrupted irradiation with large doses of X rays, (up to 3,500 r), decreasing oxygen utilization is characterized by wavelike fluctuations, which points to a probable disturbance in the mechanism which regulates gas exchange in the organism."

76. Differences in Magnitude and Pattern of Inclusion of Phosphorus Into Nucleic Acids of Rats' Organs After Lethal X-Ray Doses

"The Inclusion of Phosphorus Into Nucleic Acids of Rats' Organs After Lethal X-Ray Irradiation," by A. S. Orlov, Biochemical Division (head, Prof S. Ye. Manoylov), Central Scientific Research Roentgenoradiological Institute; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 16-21

Studies were conducted on the inclusion of phosphorus into nucleic acids of the liver, kidneys, spleen, and small intestines of albino rats subjected to 500 and 2,000 r general X-ray irradiation. Details of the method of isolating the acid-soluble and lipid compounds of phosphorus by 5% trichloracetic acid, alcohol, and ether, etc. are presented. Diagrams illustrate the comparative specific activity and concentration of phosphorus in the nucleic acids of the liver, kidneys, spleen, and small intestines in both normal and irradiated animals immediately after irradiation and 24 and 48 hours after irradiation.

 Results indicate the following:

"1. The inclusion of phosphorus into nucleic acid compounds that are firmly bound with proteins in the liver and kidneys of rats irradiated with a dose of 2,000 r is inhibited immediately after irradiation, but 24 and 48 hours after irradiation it sharply exceeds the normal level. The inclusion of phosphorus into ribonucleic acid and the concentration of nucleic acids under the above-mentioned conditions are within normal limits.

"2. In the spleen and in the small intestines even immediately after irradiation the inclusion of phosphorus into nucleic acids decreases and continues to drop progressively (with the exclusion of desoxyribonucleic acid which is firmly bound with the protein of the spleen). The concentration of these compounds immediately after irradiation remains at normal levels, but it is decreased at later periods.

"3. The magnitude of the changes described above differs depending on the organs studied, type of nucleic acid, and time elapsed after irradiation.

"4. In certain organs (spleen, and sometimes the small intestine) 24 and 48 hours after the irradiation of the experimental animals the inclusion of phosphorus into desoxyribonucleic acid which is loosely bound with proteins ceases."

The author concludes that a comparison of the results of the data obtained on irradiated animals indicates that there are differences not only in the magnitude of the changes studied (inclusion of phosphorus into nucleic acid), but also in their pattern.

77. Sensitivity of Auditory Analyzors Decreased After General Irradiation

"The Condition of Hearing Following Radiation Sickness," by M. Ya. Kozlov, Chair of Medical Radiology (head, Prof M. N. Pobedinskiy) and Chair of Diseases of Ear, Throat, and Nose (head, Prof V. G. Yermolayev) of the Leningrad State Institute of Advanced Training for Physicians imeni S. M. Kirov; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 64-69

A special method based on registering the bioelectric current from the cochlea was developed to test the condition of the auditory analyzors of the internal ear of guinea pigs (97 experimental and 43 controls) subjected to a 350 r X-ray dose.

Results indicate that, during the peak of acute radiation sickness of medium degree, hearing is decreased, as evidenced by a decrease of auricular reflexes and decreased magnitude of the bioelectric current from the cochlea. This decreased hearing is registered at all frequencies from 500 to 8,000 cycles per second and from 3.9 to 9.1 decibels.

78. Tissue Doses From Neutrons

"Tissue Doses From Fast and Superfast Neutrons," by M. I. Shal'nov; Moscow, Atomnaya Energiya, Vol 4, No 6, Jun 58, pp 557-570

Research was done on depth doses during irradiation of tissuelike phantoms (water and paraffin) by wide beams of fast and superfast neutrons, generated in the 1 1/2 meter cyclotron by bombarding a thick beryllium target with deuterons accelerated to 13 Mev (reaction $Be^{9}(d,n)B^{10}$) and in the 6-meter synchrocyclotron by bombarding a thick copper target with deuterons accelerated to 280 Mev (deuteron spallation reaction) and in the 6-meter synchrocyclotron by bombarding a beryllium target with protons at 480 Mev (proton charge-exchange reaction).

The results of research extended to cases of irradiation of a tissue by narrow and wide beams of monoenergetic neutrons make it possible to establish a concept of depth doses at an arbitrary neutron spectrum and make it possible to compute an average tissue dose used in comparative radiobiology. Besides, data on weakening of the neutron dose at various energies in hydrogen-containing media may be helpful in engineering and in the contruction of shielding structures.

Experimental and theoretical curves of the "rigid behavior" of the maximum tissue dose using wide and narrow neutron beams in the energy range of 0.1 to 500 Mev were obtained. These curves may be used for the calibration of dosimeters.

Opinions are expressed on methods of approach to the evaluation of the biological effectiveness of nuclear radiations and on the establishment of the maximum permissible dose for a man.

Tentative values of maximum permissible doses of neutron radiation for man are presented.

79. Portable Electrofilter for Determining Atmospheric Concentration of Radioactive Aerosols

"Electrofilter for Determining the Concentration of Active Aerosols," by Yu. M. Shtukkenberg, K. S. Kalugin, and A. I. Bobkov, Issledovaniya v Oblasti Dozimetrii Ioniziruyushchikh Izlucheniy (Studies in the Field of Ionizing-Radiation Dosimetry), Moscow, Academy of Sciences USSR, 1957, pp 132-153 (from Referativnyy Zhurnal -- Geofizika, No 4, Apr 58, Abstract No 2786)

"A new portable electrofilter for determining the concentration of active aerosols in the air is described. The instrument is distinguished by a high air-pumping rate (800-1,000 liters per min), which corresponds to a sampling time of 5-6 minutes. A corona discharge between corona electrodes consisting of 19 needles circularly arranged in a plane precipitates the aerosol. The active aerosol settles onto circular dismountable targets having a polished surface, the absolute activity of which is determined with great accuracy. The efficiency of the electrofilter depends to a slight degree on the dispersion characteristics of the aerosol and the air-pumping rate and equals 95% for aerosols with a particle radius of 10^{-5} -10^{-6} cm and 7-8% for ion complexes."

80. Scintillators Designed for Dosimetry of X Rays and Gamma Rays and for Detecting Alpha, Beta, and Gamma Rays

"New Methods of Dosimetry of Ionizing Radiations," by M. N. D'yachenko, Physicotechnical Division, Khar'kov Institute of Medical Radiology; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 75-78

To resolve certain practical problems of dosimetry of soft and hard X-ray radiation, the Khar'kov Institute of Medical Radiology has developed a sulfate-silver semiconductor dosimeter using the internal photoelectric effect of X rays. The advantages and disadvantages of the use of scintillators for dosimetry are reviewed and compared with those of gas-discharge indicators.

Detailed research was conducted on the subject of the dependence of the intensity of luminescence of certain scintillators on the hardness or the wave length of X rays and gamma rays to indicate their suitability for dosimetry. On the basis of experimental data, aluminescent dosimeter was constructed and tested. It consists of a stilbene crystal with a "FEU-19" photoelectric multiplier. A photograph showing its external appearance accompanies the article. Another photograph shows the external appearance of a scintillation attachment for measuring gamma radiation to be attached to a radiometer of the TISS type. Detailed data are presented on the properties and range of sensitivity of these two appliances.

The author concludes that the use of scintillators for dosimetry of X rays and gamma rays and for the detection of alpha, beta, and gamma rays significantly increases the possibility of solving a number of problems of dosimetry and of roentgenometry.

81. Experimental Installation for Irradiation of Animals by "ENO-1" Neutron Fluxes

"Experimental Installation for the Irradiation of Animals by "ENO-1" Neutron Fluxes (Report No 2)," by A. G. Istomina, and I. B. Keirim-Markus; Moscow, Meditsinskaya Radiologiya, Vol 3, No 4, Jul/Aug 58, pp 69-75

Report No 1 of this series presented a description of an experimental installation for the irradiation of small animals in a uniform field of fast neutrons, and suggested a method of measuring the neutron flux. Report No 2, a continuation of the first, describes the method of measuring the neutron flux, presents diagrams and graphs of the distribution of the fast-neutron flux in a phantom, a diagram for the distribution of the thermal-neutron flux in a phantom, and a diagram for the distribution of resonance neutrons in a phantom, and derives formulas for the measurement of the dose rate of gamma rays. The article is accompanied by the following English abstract:

"The results of the measurement of the fields of irradiation in the working chamber of the ENO-1 installation are presented. A uniform flux of fast neutrons, $(7.6 \pm 1.5) \times 10^4$ n/cm^2 per sec or 16.7 [sic] per hour, is created in the central chamber. The flux in the center of the phantom rabbits is equal to 60% of the flux on the surface of the phantom. The flux of resonance neutrons in the center of the chamber is equal to about 5×10^4 n/cm^2 per sec, and thermal neutrons are practically absent. The dose rate of the gamma radiation equals 0.5 r per hour. The dose rate of the fast neutrons in the lateral chambers equals 1.3 per hour, thermal neutrons 0.085 per hour, and gamma radiation 0.1-0.15 r per hour. The reasonance-neutron flux equals 3.2×10^3 n/cm^2 per sec.

"Thus, the dose rate of gamma rays in the central chamber of the installation equals only 3% of the dose rate of fast neutrons and a uniform field of irradiation is created. In the lateral chambers of the installation a mixed field of neutrons and gamma radiation exists."

 The author gives the following summary:

"1. An experimental installation with a 200 curie Po+Be mixture has been created to irradiate animals with neutron fluxes.

"2. In the central chamber of the installation there is a uniform flux of fast neutrons equaling 7.6×10^4 n/cm^2 per sec which yields 97% of the total power of the dose of mixed radiation (excluding resonance neutrons).

"3. In the lateral chambers of the installation there is a uniform field of mixed radiation of fast neutrons, thermal neutrons, and gamma radiation.

"4. The neutron flux with an energy range of 0.4 e^V to one Me^V (resonance neutrons) contributes 5×10^4 n/cm^2 per sec in the central chamber, or about 40% of the total stream of neutrons, while in the side chamber the flux equals 3.2×10^3 n/cm^2 per sec, which is about 15% of the total neutron flux.

"5. Measurements are presented of the distribution of the flux of fast, thermal, and resonance neutrons inside the paraffin phantom rabbit in the central and lateral chambers of the installation. The large proportion of resonance neutrons in the general radiation flux confirms the importance of calculating the dose of resonance neutrons and their biological effects."

82. Subthreshold Biological Effects of Nuclear Explosions

"Radiocarbon From Nuclear Explosions and Subthreshold Biological Effects," by A. D. Sakharov; Moscow, Atomnaya Energiya, Vol 4, No 6, Jun 58, pp 576-580

According to data by O. I. Leypunskiy (Atomnaya Energiya Vol 3, No 12, 530 [1957]), subthreshold biological effects produced by radiostrontium and external irradiation by radiocesium will increase the number of victims by a factor of 1.5, including present and future generations. The number of people injured by past atomic tests is estimated at half a million. It is concluded that the stopping of atomic tests will indirectly save the lives of hundreds of thousands of people.

83. Hazards From Nuclear Tests Discussed and International Measures to Decrease Harmful Effects of Ionizing Radiation Urged

"Leukosis and Ionizing Radiation (Critical Review)" by S. A. Reynberg, Honorary Worker of Science (Moscow), First Chair of Roentgenology and Radiology (head, Prof S. A. Reymberg, Honored Worker of Science), Central Institute for the Advanced Training of Physicians; Moscow, Klinicheskaya Meditsina, Vol 36, No 7, July 58, pp 22-30

The aim of this critical review is to explain to the Soviet people and others the increasing hazards of ionizing radiation, as evident from various statistics, chiefly US. A link is sought between increased ionizing radiation in the external environment and leukosis. The work of E. B. Lewis, 1957, on the biological hazards of ionizing radiation is stressed. Four tables by E. B. Lewis accompany the article. These tables illustrate the frequency of leukosis among the people of Hiroshima and Nagasaki, frequency of death from leukosis among roentgenologists in the US, and frequency of leukosis among people treated with various doses of X rays for therapeutic purposes. The last table, also by E. B. Lewis, presents statistics on radiation leukosis giving source of radiation, nature of radiation, irradiated areas (general or local), forms of leukosis, and the computed probability of radiation leukosis.

Topics discussed include induced and spontaneous leukosis, mutation effects, genetic effects, and aging effects of ionizing radiation.

Measures to be taken include the organization of high-level authoritative committees for the control of sources of ionizing radiation and the coordination of the activities of the various services, institutes, and people. The review says prompt agreement on an international level for standardizing units of radiations and for establishing new norms and new permissible doses are necessary. In addition to the advanced training of medical personnel in radiobiology and the introduction of all technological discoveries into medical practice against ionizing radiation, the article stresses that the most important factor for decreasing hazards of ionizing radiation is the fulfillment of the demands of the Soviet nation, of Soviet society, and of all progressive people which is the immediate cessation of the testing and use of nuclear weapons.

84. Research on Human Cardiovascular Ailments and Transfer of Healthy Hearts in Higher Animals

"Transplantation of Vitally Important Organs," by V. Demikhov, Head of the Laboratory for Transplantation of Organs, First Moscow Medical Institute; Moscow, Meditsinskiy Rabotnik, No 64, 12 Aug 58, p 4

The author reviews the seriousness of cardiovascular diseases (two thirds of which result from insufficient coronary circulation) and the general methods of treating both congenital and acquired cardiac deficiencies. However, data from pathological anatomy prove that 90-95% of cardiovascular deficiencies are due to atherosclerotic strictures, especially of the left coronary artery.

With this in mind, the author conducted tests and ligated this artery, which caused the death of all the experimental animals. But when immediately after applying this ligature the left coronary was joined to the internal mammary artery just below the ligature, none of the animals died. Autopsies performed 2 years later showed that this anastomosis between the left coronary and the internal mammary was still in perfect condition. To treat such atherosclerotic blood vessels, the author suggested using a special plastic prosthesis for blood vessels, and a laboratory of plastics of one of the technical institutes of Moscow (name not mentioned) has already prepared appropriate prosthetic tubes with diameters as fine as 2 mm and larger sizes (the diameter of most frequently affected human arteries is 3-5 mm). Many such plastic tubes can be introduced simultaneously into the injured coronary arteries leaving the heart, thus preventing initial and repeated infarcts.

Many years of experimental work by the author have led to a successful method of transplanting the heart in dogs by a procedure in which the whole heart-lung apparatus is removed from the donor dog and placed into the thoracic cavity of the recipient dog (extracardial nerves and all major blood vessels also are transected). The author reports that no experimental animals died during these operations, although they did die later from other complications.

The author was successful in reviving the heart of 12 of 15 people who died suddenly but then received immediate help. Results of these studies indicate that the human heart has a greater capacity to preserve its function by stimulation than the heart of a healthy dog.

Additional work reviewed on the subject of heart transplantation includes Professor Rusanov's method of pinching the thoracic aorta if blood pressure and cardiac activity fall too abruptly, the surgical dry heart method, the "artificial heart-lung preparation," the isolated heart, and the attached heart which can continue to function for a month.

As for the replacement of the heart and lungs of man, it is still too early to pass judgment, for the period of life of experimental animals after such operations is usually measured by days and weeks. It is possible, however, to connect a revived heart and lungs temporarily to an organism to support circulation and respiration during surgical operations. The author predicts that the use of a revived heart will in the future replace that of artificial heart and lung, thus making heart transfers in higher animals completely possible. The problem of compatibility in tissues involved has been solved for functional periods of from several days to a week. In the near future the next step will be the transfer of organs of man for longer periods of function.

The author concludes that joint research efforts of US and Soviet scientists will lead to solving the problems of treating cardiovascular diseases and prolonging the life span of man.

Toxicology

85. Toxicity of Benzylchlorphenol

"The Toxicity of a Bactericide, Benzylchlorphenol, for Warm-Blooded Animals," by N. A. Sazonova and A. P. Volkova, Tr. Tsentr. n.-i. Dezinfekts. in-ta. (Works of the Central Scientific Research Disinfection Institute), 1957, No 10, 24-27; (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 17, 10 Sep 58, Abstract No 22793, by M. I. Shuster)

"Benzylchlorphenol (a mixture of p-chlor-o-benzyl phenol) is lethal to small laboratory animals in doses of 1.5-2 g/kg. Parynchymatous degeneration was observed in the liver of these animals. General or local appearances of intoxication were not observed after the application of emulsions to the skin or the action of aerosols."

86. Prophylaxis of Intoxication From Residual Liquid of Freon Rectification

"The Prevention of Intoxication During the Handling of the Residual Liquid After the Rectification of Freon-12," by V. F. Shlyapin, Gor'kiy Scientific Research Institute of Labor Hygiene and Occupational Diseases; Moscow, Gigiyena i Sanitariya, No 8, Aug 58, p 74

The author states that, according to its chemical composition, the residual liquid consists of a mixture of freon-11 and some freon-12. In an open flame, the residual liquid or its vapors decompose and form hydrogen fluoride and other fluorine-containing compounds. Phosgene may also be formed. Carbon tetrachloride and sulfur-containing compounds may also be found in the residual liquid.

Because of the toxicity of these compounds to humans, it is suggested that the processes involving this residual liquid be hermetic and mechanized with sufficient ventilation provided. During the repair or cleaning of the apparatuses, the workers should be equipped with gas masks containing BK-f, MO-2, and A and V type filters. The use of a gas mask is required especially when working with an open flame. In addition, the workers should be protected by rubber boots, aprons, and gloves which should be washed, after being used, with a 25% alkaline solution and water.

Miscellaneous

87. First All-Russian Conference of Epidemiologists, Microbiologists, and Infectionists

"First All-Russian Conference of Epidemiologists, Microbiologists, and Infectionists," by G. P. Belikov and L. N. Devyatova; Moscow, Zdravookhraneniye Rossiyskoy Federatsii, No 1, Jan 58, pp 45-47

"During 1957 significant events occurred in the scientific and social life of Soviet specialists working in the field of epidemiology, microbiology, and infectious pathology.

"Through the initiative of outstanding scholars and with the support and assistance of the Ministry of Health RSFSR, the First All-Russian Conference of Epidemiologists, Microbiologists, and Infectionists was held in Kuybyshev.

"The establishment of the All-Russian Scientific Medical Society of Epidemiologists, Microbiologists, and Infectionists was approved during the conference. The program of the conference called for the discussion of scientific problems having special actual significance for the public health of the RSFSR and problems concerning the struggle against dysentery and problems of virus infections with natural foci.

"At the start of the work of the conference in Kuybyshev over 400 delegates and guests met who were selected to attend by local scientific medical societies and individual public health establishments from the majority of the larger cities of all oblasts, krays, and autonomous republics of the RSFSR. Guests from the Ukraine, Belorussia, the Uzbek SSR, the Kazakh SSR, and other union republics had the right of a consultative voice during the conference.

"The majority of delegates at the conference represented the following establishments: sanitary-epidemiology stations, infectious diseases hospitals and departments, diagnostic laboratories, and other practical establishments of public health. The high scientific level of the conference was due partially to the large number of highly qualified scientific workers, i.e., 25 professors and doctors of science, 12 senior scientific associates, 14 docents, more than 40 candidates of science, and other workers of scientific research institutes and medical vuzes (higher educational institutions) of the RSFSR. More than half the delegates had 15 or more years' experience in their work and more than one quarter had more than 25 years' experience.

"The following scholars presented scientific reports at the conference: T. A. Nikolayeva, Deputy Minister of Health RSFSR; Prof T. Ye. Boldyrev, Corresponding Member of the Academy of Medical Sciences USSR; Prof A. A. Smorodintsev, Corresponding Member of the Academy of Medical Sciences USSR; Prof K. N. Tokarevich; and Prof K. V. Bunin. All these reports evoked considerable discussion and animation.

"The report of T. A. Nikolayeva, Deputy Minister of Health RSFSR, discloses the multisided analysis of morbidity and the status of the measures for the control of infectious diseases. In the area of the RSFSR complete eradication of plague, cholera, typhus, smallpox, and a number of other infectious diseases has been achieved. Also eradicated were mass-scale outbreaks of typhoid, malaria, and certain other infections.

"Considerable achievement in public health of the RSFSR is found in the lowering of the incidence of dysentery, diphtheria, whooping cough, measles, pneumonia, and other diseases in children.

"However, a real need for lowering the morbidity caused by virus infections (influenza, tick-borne encephalitis, poliomyelitis, epidemic hepatitis, etc.) and for the prevention of certain bacterial infections (dysentery, typhus, diphtheria, etc.) is still felt in various regions of the RSFSR.

"In her report, T. A. Nikolayeva emphasized the more important problems of public health in the RSFSR which will require further scientific development and attention from the members who were recently installed in the new society, and proposed the consideration of certain new organizational-methodological measures for the prevention of infectious diseases in the RSFSR.

"The report of Prof T. Ye. Boldyrev evoked great interest from the participants in the conference. His report, based on an enormous amount of factual material and personal experience, disclosed existing shortcomings in the status of the study of the etiology, pathogenesis, and epidemiology of dysentery, and indicated the direction that scientific research should take in this field in the future.

"According to Boldyrev, it is necessary, in order to lower dysentery, morbidity, not only to improve the sanitary conditions of populated areas and the growth of the cultural level of the population, but also to expand our knowledge in the field of the differential diagnosis of enteric diseases through laboratories and clinical methods. Boldyrev pointed out the necessity for a far-reaching study of the etiology of all diseases included in the enteric infections complex, the problems of variability and reversion in dysentery pathogens (atypical strains, antibiotic—resistant variants, etc.) and peculiarities of the pathogenesis and epidemiology of diseases, and the necessity of working out new effective medicinal preparations and methods for specific and nonspecific prophylaxis of dysentery, especially in children.

"The speaker further recommended specific direction in working out the problems of dysentery, and underlined the special significance of a thorough scientific study of these problems for the public health of the RSFSR and for the newly organized Scientific Society of Epidemiologists, Microbiologists, and Infectionists.

"Prof A. A. Smorodintsev's report was read by Safronov, Candidate of Medical Sciences, and concerned the epidemiology, etiology, and prophylaxis of transmissive virus infections in the RSFSR. The latest published facts obtained currently worked out by Soviet scholars on virological problems as a result of a higher incidence of virus infections were presented in the report. Special attention was given in the report to hemorrhagic fever and tick-borne encephalitis, and particularly the problem of classification and differential diagnosis of various forms of tick-borne encephalitis, one of which is most often registered in the RSFSR under the name of two-wave meningoencephalitis, having clinical and certain epidemiological peculiarities.

"Professor Smorodintsev's report called to the attention of the members of the newly organized scientific society the necessity for a wider, more complex study of medical virological problems and recommended specific measures for lowering the morbidity of tick-borne encephalitis within the territory of the RSFSR.

"The status of research on the problem of rickettsiosis was analyzed in the report by Prof K. N. Tokarevich. The speaker pointed out existing defects in the organization of laboratory (immunological) diagnosis of the most important rickettsioses which give rise to insufficient information on the actual distribution within the territory of the RSFSR of such diseases as Q fever, tick rickettsiosis, boutonneuse fever, and trench fever.

"K. N. Tokarevich introduced, for discussion at the conference, concrete proposals for expanding research in the diagnosis, epidemiology, and treatment of rickettsiosis within the public health establishments of the RSFSR.

"The clinical point of view of the basic problems and prospective scientific developments of the problems of the diagnosis and treatment of dysentery were presented in the report by Prof K. V. Bunin. The speaker disclosed the latest facts concerning clinical diagnosis and immunogenesis in persons afflicted with dysentery, and pointed out the necessity of the creative approach toward the utilization of the method recommended by the Ministry of Health USSR for treating persons afflicted with dysentery.

"More than 60 persons expressed a desire to participate in the discussion of the above-mentioned reports.

"Prof P. N. Kashkin (Leningrad) discussed the problem of drug-resistance and other problems concerning the microbiology of dysentery.

"Prof L. G. Perets (Sverdlovsk) discussed the importance of the study of variability in the pathogens of dysentery and other enteric infections and pointed out possible means for controlling dysbacteriosis.

"The report of Prof Sh. D. Moshkovskiy (Moscow) was warmly received. He spoke on the necessity of re-examining certain 'canonized' hypotheses in the epidemiology of dysentery and of changes in relation to this approach in the organization of antiepidemic measures during enteric infections.

"A. I. Vasil'yev (Tambov) devoted his interesting discussion to phage-typing and dysentery pathogens and to the nature of the so-called lyso-resistant cultures.

Ye. M. Pavlovich (Kuybyshev) gave a short presentation on the results of the clinicoepidemiological study of apparent and asymptomatic forms of dysentery according to the material obtained by the Chair of Infectious Diseases, Kuybyshev Medical Institute.

"Of considerable importance were the discussions by Prof I. A. Sutin (Stalingrad), Prof T. A. Yanovich (Rostov-na-Donu), M. N. Rasin (Chita), I. N. Volkov (Chelyabinsk), Yu. F. Veselov (Omsk), Yu. A. Myasnikov (Tula), V. S. Fedoseyev (Nal'chik), and others. Altogether 37 delegates and guests participated in the discussions of the reports.

"The conference approved the proposal made by a number of delegates for the publication of Trudy of the First All-Russian Conference of Epidemiologists, Microbiologists, and Infectionists. All scientific material presented by the delegates to the organizational bureau and presidium of the conference are to be included in the Trudy.

"At the conclusion, the conference discussed organizational problems. Prof V. V. Skvortsov (Moscow) spoke on the plans for the statutes of the new society. All those who had participated in the discussions unanimously upheld the timeliness and necessity for the establishment in the RSFSR of a scientific society of specialists in the above field. The basic aims of the society were adopted; these revolve around raising the level of scientific research in the fields of epidemiology, microbiology, and infectious pathology; attracting practical physicans into this type of work on a wider scale; and improving scientific information. At the proposal of delegate Yu. A. Myasnikov, an amendment to the 36th article on the bylaws of the society was included. The amendment reflected the specifics and structure of the work of the sanitary-epidemiological service; i.e., persons may become members of the society who are not physician-microbiologists, zoologists, entomologists, etc., but who work in sanitary-epidemiological establishments and who have a higher education. In addition, participants in the conference recommended that, should less than 20 physician-epidemiologists, microbiologists, and infectionists be present in any scientific medical society, they form a combined section with hygienists and sanitary-physicians.

"Docent A. M. Levitov (Kubybshev), a member of the Credentials Commission, reported that the Credentials Commission considers the conference to have the right to decide the organizational questions. The report of the Credentials Commission was unanimously approved, after which the bylaws of the society were accepted and an election of the Board and Auditing Commission of the society was held.

T. Ye. Boldyrev was elected chairman of the Board of the All-Russian Scientific Medical Society of Epidemiologists, Microbiologists, and Infectionists; K. V. Bunin, Sh. D. Moshkovskiy, V. V. Skvortsov, K. N. Tokarevich, deputy chairmen of the Board; G. P. Belikov and L. N. Devyatova, scientific secretaries of the Board; V. M. Rozhdestvenskiy, treasurer; and M. G. Kashtanova, chairman of the Auditing Commission. At the conclusion of the conference the resolutions of the First All-Russian conference of Epidemiologists, Microbiologists, and Infectionists were accepted.

88. March and April Plenary Sessions of Presidium of Academy of Medical Sciences USSR

"In the Presidium of the Academy of Medical Sciences USSR," by M. A. Ivanova; Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 8, Aug 58, pp 93-95

On 12 March 1958, Prof S. A. Sarkisov presented his report, "On the International Scientific Bonds of the Academy of Medical Sciences USSR," for general discussion at the Presidium of the Academy of Medical Sciences USSR.

In the past few years scientific bonds between medical scholars have continued to grow. In 1956 the number of Soviet delegates attending international congresses numbered 165, while in 1957 the number of Soviet delegates was 349. In 1958 some 375 Soviet medical scholars are to attend international medical congresses with an additional number which are officially sent by the Ministry of Health USSR.

The number of publications of scientific works by Soviet scholars is increasing not only in the bloc countries but also in Western countries such as England, France, and the Netherlands.

Work on the coordination of scientific research with the People's Democracies is being accomplished. Commissions for the coordination of scientific research in the fields of antibiotics, pediatrics, and tuberculosis have been established. The Academy of Medical Sciences USSR has rendered considerable assistance to specialists of the People's Republic

of China in the preparation of their 12-year plan for medical research. The participation of Soviet scholars in the work of the international periodical Excerpta Medica, published in the Netherlands, has been greatly expanded. Nearly 2,000 abstracts of works by Soviet specialists have been published in this periodical. Since 1957 the periodical has published a special edition devoted exclusively to Soviet medical science (there have been six published thus far).

During its 2 April 1958 Plenary Session the Presidium of the Academy of Medical Sciences USSR heard the report of Prof L. A. Zil'ber, Active Member of the academy and chairman of the Problem Commission, concerning the status and prospects of the problem of immunity in the USSR. The speaker pointed out that in the field of immunology during the past few years basic attention in the USSR has been given to the problem of improving bacterial preparations, many of which have been placed into production. Also, certain successes have been obtained in the study of the role of the nervous system in immunity, although a series of errors have been found in this work. The study of the influence of ionized radiation on immunological processes has been widened. Biological laws relating to immunity and the morphology of immunogenicity are being studied.

According to the speaker, however, research on the theoretical basis of immunity is still insufficient. For the past several years, there has been hardly any work done on immunochemical studies of antigens and antibodies and other problems of general immunology.

The study of immunology in the USSR is concentrated primarily in institutes in Moscow and Leningrad. Zil'ber pointed out, however, that certain research on problems of immunology has been conducted in the laboratory headed by Professor Kirhenshteyn in Riga (study of the role of vitamins in immunity) and in the laboratory headed by Professor Oyvin in Irkutsk (the pathophysiology of immunity).

The following individuals participated in the discussion of Zil'ber's report: Professors N. G. Olsuf'yev, I. N. Mayskiy, A. D. Ado, N. N. Zhukov-Verezhnikov, T. A. Vershilova, P. N. Kosyakov, S. N. Muromtsev, V. N. Orekhovich, V. V. Timakov, V. L. Troitskiy, Ye. I. Smirnov, I. V. Davydovskiy, and P. G. Sergiyev.

The Presidium of the Academy of Medical Sciences USSR decreed that research on immunology must be expanded within the Division of Biochemistry, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, Academy of Medical Sciences USSR. The Division of Biochemistry of the institute was also charged with the responsibility of coordinating, through the Problem Commission of the Academy of Medical Sciences USSR, research conducted in this field by other institutes of the academy and of the Ministry of Health USSR.

89. Results of Scientific Session of Poliomyelitis

"The Results of the Scientific Session of the Institute of Infectious Diseases, Academy of Medical Sciences USSR, on the Problem of Poliomyelitis (Kiev, 1958)," by I. L. Bogdanov, Corresponding Member, Academy of Medical Sciences USSR; Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 8, Aug 58, pp 53-57

A scientific session on the problem of poliomyelitis was held in the Institute of Infectious Diseases, Academy of Medical Sciences USSR, from 26 to 29 March 1958.

Over 250 specialists attended; 44 reports were given, 19 of which were presented by members of the Institute of Infectious Diseases, and the rest by members of Institute of Neurology, Academy of Medical Sciences USSR; Institute of Experimental Medicine, Academy of Medical Sciences USSR; Institute for the Study of Poliomyelitis, Academy of Medical Sciences USSR; and the Institute of Microbiology, Academy of Sciences Latvian SSR.

The reports presented covered such subjects as the therapeutic use of adenosinetriphosphoric acid and carbachol in the early developmental stage of poliomyelitis, the use of oxygen therapy, orthopedic therapy, and early treatment by the use of mud baths.

90. Visiting Session of Academy of Medical Sciences USSR in Baku

"On the Visiting Session of the Academy of Medical Sciences USSR in Baku," by M. Zhukovskiy, scientific secretary of the Scientific Plans Commission, Presidium, Academy of Medical Sciences USSR; Baku, Azerbaydzhanskiy Meditsinskiy Zhurnal, No 5, May 58, pp 61-63

The article reports that the Presidium of the Academy of Medical Sciences USSR and the Ministry of Health Azerbaydzhan SSR was to conduct a visiting session of the Academy of Medical Sciences USSR from 20 to 24 May 1958 in Baku.

The session was to discuss the problems of labor hygiene and occupational diseases among petroleum workers of the Azerbaydzhan SSR and the problem of endemic goiter which is widespread in the republic.

Other topics were to be diseases of natural foci and the problem of developing more and better health resorts in the republic.

91. Soviet Sanitation Physicians Given Higher Qualifications Courses

"Raising the Qualifications of Sanitation Physicians" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 67, 22 Aug 58, p 4

A series of continuous courses has been organized for raising the qualifications of sanitation physicians, chemists, bacteriologists, laboratory assistants, and workers of sanitary-epidemiological stations. The courses have been developed by the Ministry of Health RSFSR and are offered at the Moscow Scientific Research Institute of Sanitation and Hygiene imeni F. F. Erisman.

92. Medical Research in Lithuanian SSR

"Medical Scientific Research in the Lithuanian SSR," by V. N. Kviklis; Moscow, Sovetskoye Zdravookhraneniye, No 2, Feb 58, pp 63-64

Scientific medical research in the Lithuanian SSR is conducted by the following scientific and educational institutions: Institute of Experimental Medicine, Academy of Sciences Lithuanian SSR; Scientific Research Institutes of Oncology, Tuberculosis, and Epidemiology and Hygiene of the Ministry of Health Lithuanian SSR; the Kaunas Medical Institute; and the Medical Faculty, Vil'nyus State University imeni V. Kapsukas.

The Scientific Medical Council, Ministry of Health Lithuanian SSR, in the period after World War II considerably expanded its work in the organization, planning, and coordination of scientific research in the republic. Since 1957, a Coordinating Council under the Presidium of the Academy of Sciences Lithuanian SSR, which is responsible for planning medical research in the republic has been organized.

The most important medical problem being investigated during the Sixth Five-Year Plan concerns rheumatism and diseases of the blood vessels. This medical problem is being studied by the Institute of Experimental Medicine, Academy of Sciences Lithuanian SSR.

The Scientific Research Institute of Epidemiology and Hygiene, Ministry of Health Lithuanian SSR, is currently studying problems involving the prophylaxis and treatment of enteric infections and virus infections.

93. Kazan' Veterinary Institute imeni N. E. Bauman

"The Kazan' Veterinary Institute imeni N. E. Bauman," by Prof A. P. Studentsov, Corresponding Member, All-Union Academy of Agricultural Sciences imeni Lenin, and I. M. Sabin; Moscow, Vestnik Sel'skokhozyaystvennoy Nauki, No 4, Apr 58, pp 87-91

The Kazan' Veterinary Institute imeni N. E. Bauman was founded in 1874. In 1925 the Council of People's Commissars ordered that the institute establish a Military Department for the training of veterinarians for military service. Five years later there was organized within the institute a Zootechnical Faculty and an evening department for the training of veterinarians and zootechnicians without interrupting their daytime professional activities.

Since the revolution, the institute has graduated 4,015 specialists in veterinary sciences, 468 zootechnicians, and 128 military veterinarians.

During the past 40 years the institute has developed new methods of diagnosis and treatment of agricultural animals. Other developments include the working out of new methods of teaching pathological processes in the organism of animals, pathogenesis, and the treatment of epidemic and other diseases of agricultural animals. Considerable attention has been given to the study of the nervous system of animals, to the problems of feeding and maintaining livestock, and to the increase of their yield.

94. Public Health Work by Clinics of Medical Faculty of Friedrich-Schiller University in Jena

Berlin, Neue Zeit, 17 Aug 58

The clinics and institutes of the Medical Faculty, Friedrich-Schiller University, Jena, have contributed greatly to the good reputation of this university, which celebrates its 400th anniversary during the week 31 August — 5 September 1958.

One of the numerous clinics which has achieved great importance in the training of young scientists and in the public health service is the university's polyclinic, headed by Dr Kleinsorge. Five times more patients are treated at this polyclinic than in 1945. Twenty thousand patients are being treated there annually for internal and nervous diseases. At the special Psychotherpapeutic Department, headed by Dr Wicht, patients with nervous diseases are being treated by various methods of hypmotherapy. In some cases patients are being hypnotized

by means of the telephone, phonograph records, and tape recordings. Treatment with radioactive isotopes also has been introduced at the polyclinic. Since 1956, the Isotope Laboratory, headed by Dr Correns, has been located in the basement of the polyclinic. The laboratory is equipped with modern apparatus, including a scintillation counter which is protected against radioactive radiation in the atmosphere by a thick lead screen.

At present the laboratory is working on thyroid gland diseases and it diagnoses up to 500 cases annually.

Still under construction is the Treatment Station, which will be used for curing blood and cancerous diseases through radioactive isotopes, radioactive phosphorus, radioactive iodine, and radioactive gold.

95. Coatings for High-Temperature Alloys

"Protective Coatings for High-Temperature Alloys," by V. A. Parfenov, Candidate of Technical Sciences; Moscow, Metallovedeniye i Obrabotka Metallov, No 6, Jun 58, pp 33-37

Investigations were conducted with alloys EI437B (20.10% Cr, 2.40% Ti, 0.71% Al, 0.04% C, 0.45% Si, 0.20% Mn, 0.005% S, 0.006% P, 0.60% Fe, 0.05% Cu, 0.05% Zr, and the remainder Ni) and EI617 (composition according to technical specifications) to determine the effect of protective coatings of chromium and enamel on the endurance of these alloys at operating temperatures of 750-800°C. Chromium coatings of 0.09-0.185 mm thickness were applied to the alloy specimens by electrolytic plating. Enamel coatings (36.8% silica, 33% barium oxide, 1.9% titanium dioxide, 4.9% boric anhydride, 3.7% zinc oxide, 4% calcium oxide, and 15.8% chromium oxide) of 0.017-0.025 mm thickness (after baking) were applied by dipping. The endurance tests were performed on Ya-8 machines built by the Central Scientific Research Institute of Technology and Machine Building (TsNIITMASh).

Results showed that a 0.1 mm layer of chromium on specimens of EI437B increases fatigue endurance at 750°C by 16%. A 0.1-0.2 mm layer of chromium on specimens of alloy EI617 increases fatigue endurance at 800°C by 14% (based on tests of 50 x 10^6 cycles). However, the chromium layer recrystallizes at notable speed at operating temperatures of 800°C and is therefore unsuitable for temperatures in excess of 800°C. Enamel coatings increase fatigue endurance of alloy EI617 by 15% at 800°C.

96. Solid Flux for Titanium Welding

"Solid Flux for Initiating the Process of Electroslagwelding of Titanium," by V. P. Didkovskiy; Kiev, Avtomaticheskaya Svarka, No 4, Apr 58, pp 95-96

A description is given of the special oxygen-free, electrically conducting flux (alternately termed slag) developed at the Institute of Electric Welding imeni Ye. O. Paton, Academy of Sciences Ukrainian SSR, for electroslagwelding of large thicknesses of titanium in an additional protective medium of argon.

The slag is composed of calcium flouride of grade "Ch" (State Standard 7167-54) and a metallic powered form of titanium (for example, powdered titanium derived by the hydride method). The titanium powder

and calcium flouride are carefully mixed by six or seven siftings through a screen (100-400 openings per cm^2) and the resulting mixture is pressed in cylindrical forms at pressures of 2-4 tons/cm^2 without binder material. Electric conductivity is dependent on titanium content and very good results were obtained with 40-50% titanium (by weight). Electrical resistance for such a pressed specimen with a 10 mm diameter and 20 mm length does not exceed 10-12 ohms.

Slag with the above-mentioned composition assures reliable excitation of the welding process when voltage during the idle period of the power plant in not lower than 15 volts.

97. Gas Corrosion of Titanium Alloys

"Gas Corrosion of Titanium-Base Alloys During Furnace and Induction Heating," by V. A. Yakovlev, Candidate of Technical Sciences, and Engr Ys. I. Spektor; Moscow, Metallovedeniye i Obrabotka Metallov, No 6, Jun 58, pp 52-56

Investigations were performed on specimens of alloy VT2 to determine the effect of heating temperature parameters on the kinetics of corrosion and the depth of the altered layer of titanium-base alloys during furnace and induction heating (Engineers A. F. Gracheva and A. I. Pekarev participated in the experimental portion of the study). The specimens were heated in dry and humid air media to temperatures of 200-1,200°C by means of a MGZ-108 generator at a frequency of 8,000 cycles and power of 100 kilowatts. Temperature measurements and current cut-off were performed with an FF-3 photoelectric pyrometer. An apparatus designed by Prof I. I. Sidorin was used in the continuous weighing method for determining the kinetics of corrosion.

Results indicated that gas corrosion of titanium-base alloys is more intense when heated to temperatures of 800-1,000°C in resistance furnaces with moist air (as compared to dry air). Corrosion sharply increases at 700°C when the alloys are heated in a dry air medium in resistance furnaces. Heating time to 1,000°C is 200 times faster with induction heating and scale formation is one tenth as great as with furnace heating. In induction heating to 1,200°C at a rate of 10-50 degrees/sec. the depth of the altered layer is 1/5 to 1/6 that encountered in furnace heating. Due to the shortened heating time required in induction heating, manifestations of corrosion occur at temperatures 200 degrees higher than in furnace heating.

98. Welding Steel 2Kh13 in a Carbon Dioxide Medium

"Welding of High-Chrome Steel 2Kh13 in a Gaseous Carbon Dioxide Medium," by N. I. Kakhovskiy; Kiev, Avtomaticheskaya Svarka, No 4, Apr 58, pp 44-45

The effects of chemical composition on the structure, mechanical properties, and cold crack resistance of high-chrome weld joints were investigated at the Institute of Electric Welding imeni Ye. O. Paton, Academy of Sciences Ukrainian SSR. The tests were performed on 4 and 12 mm thicknesses of the high-temperature stainless steel 2Kh13 (widely applied in turbine construction, in particular in gas turbine construction) which had been welded in a gaseous CO_2 medium with electrodes Sv-1Kh18N9T, Sv-Kh25N20 (State Standard 2246-54), EI -613 (Ferrous Metallurgy Specification 2990-51), Sv-2Kh13, Sv-0Kh14, and several experimental powdered metal wires of 2.8 mm diameter containing 1.2-1.5% Mn, 0.6-0.9% Si, 13-18% Cr and 0.45-2.27% Ti (long duration strength tests were performed by Engr R. O. Lents).

The investigations proved that the standard electrode wires Sv-2Kh13 and Sv-0Kh14 are satisfactory in automatic and semiautomatic arc welding of steel sKh13 in a gaseous CO_2 medium. After annealing at 700°C the mechanical properties of these weld joints meet the requirements of the welded metal. However, after 100,000 hours' operation at 500°C, the strength of such joints drops below that of the base metal. Considering that the operating temperature is comparatively low (lower than 450°C) and the life of weldments of steel 2Kh13 in gas turbines is comparatively short, the above-mentioned electrodes are recommended as a temporary measure. Additional investigations are considered necessary to improve composition of weld joints and to perfect electrodes.

Thicknesses of steel 2Kh13 up to 10 mm can be welded in one or two passes without preheating. Thicknesses in excess of 10 mm must be preheated to at least 150°C. Subsequent high annealing at 700°C is imperative.

The austenitic welding wires Sv-1Kh18N9T, Sv-Kh25N20, and EI-613 did not produce satisfactory weld joints.

99. Alloyed Weld Joints of Titanium Alloys

"Structure and Mechanical Properties of Alloyed Weld Joints of Titanium," by S. M. Gurevich, Candidate of Technical Sciences; Moscow, Metallovedeniye i Obrabotka Metallov, No 8, Aug 58, pp 18-21

The structure and mechanical properties of titanium alloy weld joints which were alloyed with various admixtures (in quantities up to 7%) were investigated at the Institute of Electric Welding imeni Ye. O. Paton, Academy of Sciences Ukrainian SSR. Industrial titanium (VT-1D) 3 mm thick was automatically welded with filler electrodes of the same material and additional alloying electrodes of Al, Sn, Mo, Fe, and Cu in a medium consisting of flux AN-TI. Predetermined amounts of powdered Cr, Mn, and V were also added. Admixture concentrations of approximately 1, 2, 3, 5 and 7% were selected so as to obtain single-phase (α -phase) or double-phase ($\alpha + \beta$ -phase) joint metal.

β -phase stabilizers such as Mn, Fe, and Cr have a higher strengthening effect on titanium weld joints than the stabilizers V. Mo, and Cu which form isomorphic β -phase systems. Additions of alloying elements Al and Sn (which do not change the single phase structure) in concentrations up to 4-5% preserve ductility and toughness at a considerably high level. For β -phase stabilizers the optimum limit for weld joint alloying should be decreased to 2-3% when subsequent heat treatment is not performed. The elements Mo and Cu are most suitable in this case. Weld joint metal having fine acicular α' -phase structure (transformed β -phase) possess satisfactory ductility and toughness. The greatest decrease of impact strength was noted in double-phase alloyed joints which were not heat treated. In these cases a fine dispersal of the α -phase in the matrix (β -phase) was observed.

[For additional information on metallurgy, see Item No 6.]

IX. PHYSICS

Atomic Energy

100. Atomic Energy Instruments Exhibited at Riga

"Exhibit on Peaceful Uses of Atomic Energy," by Ya. Chudars; Riga, Izvestiya Akademii Nauk Latviyskoy SSR, No 12, 1957, pp 177-180

Article describes some of the apparatus on exhibit at a Scientific-Technical Exhibit on Peaceful Uses of Atomic Energy at the House of Scientific-Technical Propaganda in Riga.

"The most convenient recording instrument is the BK-3,...a halide beta counter with an operating voltage of about 400 volts. Pulses resulting from radioactivity are detected electronically and recorded on a mechanical counter.... This is a light-weight, compact instrument, because of the application of electron tubes with cold cathodes, using autoelectronic emission."

Mention is made of the use of control instruments (for temperature, voltage, etc.) having a radiation source applied to the pointer. As the pointer moves along the scale the radiation source approaches a small ionization counter and, at a preset point, activates a relay. A standard, universal block for relay circuits, made by associates of the Institute of Physics of the Academy of Sciences Latvian SSR in collaboration with the Tallin Control-Measuring Instruments Plant, is on display.

101. Economic Expediency of Using Special Heavy Concretes for Protection From Radiations

"Evaluation of the Economic Expediency of Using Special Heavy Concretes for Protection From Radiations," by A. N. Komarovskiy; Moscow, Atomnaya Energiya, Vol 4, No 5, May 58, pp 437-442

The first part of the article reviews the works of non-Soviet authors on the economic expediency of using various concretes for biological shielding of nuclear reactors and charged-particle accelerators. Some of these authors maintain that it is economically feasible to use heavy concretes for the above purpose. However, there are also proponents of the use of ordinary concretes with mineral fillers. Results of corresponding economic calculations carried out in the USSR are given in the second part of the article. These calculations lead to the conclusion that the use of special heavy concretes is expedient only in unusual cases.

102. Method for Obtaining Cast Metallic Thorium Described in Polish Journal

"Metallic Thorium" (unsigned article); Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 9 Apr 58, p 4

A method for obtaining cast metallic thorium, based on an item originally appearing in the Polish journal Przeglad Wynalazczości (Journal of Inventions) for February 1958, is given.

"A molten mixture of the fluorides of thorium, zinc, and one of the alkaline-earth metals is reduced by means of calcium formed at the cathode through electrolysis. Thorium is deposited on the cathode in the form of a thorium-zinc alloy; zinc is separated from the alloy at a high temperature. Pure thorium remains as a product of the electrolysis. The current density is approximately 6.5 amperes per square centimeter."

103. Imported Nuclear Emulsions and Photoelectron Multipliers Used by Hungarian Physicists

"Symposium on Nuclear Physics" (unsigned article); Moscow, Vestnik Akademii Nauk SSSR, No 2, Feb 58, p 89

Article gives a brief account of a symposium on nuclear physics conducted by the Physics Society imeni Eytvesh Lorand, 3-7 December 1957, at Matrakhasa, approximately 100 kilometers from Budapest. Soviet delegates were among those in attendence. Article concludes with the following statement:

"As is known, instrument building in Hungary is on a fairly high level. However, in a number of cases Hungarian physicists also use imported material and equipment, especially nuclear emulsions and photoelectron multipliers. The Hungarian scientists expressed a desire to obtain more detailed information on instruments and materials produced in the USSR so that they could use them more fully in their work."

104. 10-Mev Stereobetatron of Tomsk Polytechnic Institute

"Stereobetatron," by Engr Yu. Akimov, Tomsk; Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 18 Apr 58, p 4

The advantages of a 10-Mev stereobetatron recently constructed at the laboratory of the Tomsk Polytechnic Institute are presented. By means of this stereobetatron, intersecting and opposed beams of gamma rays or accelerated electrons can be obtained because of the simultaneous acceleration of electrons in two accelerating systems. This makes possible the rapid determination of the depth of defects in an opaque object.

Four beams of gamma rays intersecting at a common point can be obtained by using both half-cycles of the alternating current supplied to the electromagnet.

105. Uranium Discovered in Coal of Transdanubian District of Hungary

"Uranium and Germanium From Coal" (unsigned article); Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 23 Mar 58, p 4

"Associates of the Institute of Atomic-Nuclear Research in Hungary have discovered a large amount of uranium in the coal of mines of the Transdanubian Oblast. The institute is doing considerable research to determine the most economical method for extracting uranium from lignite."

106. Polish Nuclear Reactor

"Ewa, the Polish Atomic Beauty," by J. K., Master of Engineering; Warsaw, Zolnierz Wolnosci, 30 May 58, p 3

"Ewa" is the first nuclear reactor plant in Poland which was supplied by the Soviet Union. The capacity of the reactor is a fully 2 megawatts; this power will be increased by introducing certain improvements.

The fuel consists of rods of uranium, approximately 6 millimeters in diameter and 50 centimeters in length, with aluminum cladding. There are about 800 such rods (distributed in 52 sections) in the interior of the reactor. The reactor contains 65 kilograms of uranium, including 6.5 kilograms of U-235. It can function on this charge, without changing the fuel, for 600 days.

The reactor has nine horizontal chambers in which various experiments in physics, chemistry, and biology will be conducted. The reactor will also be utilized for studies on the influence of nuclear radiations released in the reactor on the properties of various substances, including semiconductors.

The reactor will also produce isotopes. If its full productive capacity were to be used, the reactor could produce isotopes equal in quantity to one ton of radium. In practice, however, one tenth of this quantity can be produced without difficulty. Consequently, the Polish reactor will fully satisfy Polish requirements for radioactive isotopes. The Institute of Nuclear Research is now preparing the production of some of the most important isotopes, such as I-131, P-32, S-35, C-14, and Au-198.

The reactor is located in a building having dimensions of 20 x 30 meters and 16 meters in height. The building includes a basement and three floors above ground. There are additional installations such as the ventillating plant with a 40-meter stack and the basin with six fountains to cool the water for the reactor. The basement of the reactor building contains the pump plant, shelter for highly radioactive materials, and water distillation plant for cooling the reactor. There are four "hot chambers" where simple mechanical and chemical processing of materials subjected to radiation in the reactor will be conducted. The chambers will be equipped with a machine tool for cutting radioactive samples and four pairs of mechanical manipulators. The chambers are constructed of acid-resistant steel, covered by heavy concrete. The lead glass apertures of the chamber are 80 centimeters thick.

The reactor is shielded by 220 centimeters of heavy concrete and 20 centimeters of cast iron. In the reactor core, there will be as many radioactive disintegrations as in 1,000 kilograms of radium.

The radioactive waste will be stored for several years in two containers of 600 cubic meters each.

Nuclear Physics

107. The Pinch-Effect

"Observations of the Pinch-Effect During a Drop of the Current Strength," by V. L. Granovskiy, K. P. Rumina, V. I. Savoskin, and G. G. Timofeyeva, All-Union Electrotechnical Institute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 45-49

An image converter tube was used to photograph the instantaneous state of the arc plasma in H_2 at $p = 10^{-3} - 10^{-2}$ mm Hg., current pulses of 1.3 - 5.5 kA and current pulse durations up to 300 μsec. It has been found that electrodynamical deformation (compression and bending) of the arc column exists for the value $di/dt < 0$. Their disappearance (straightening and compression of the column) starts at points of high gas density (near the anode or cathode, depending on the conditions of the experiment).

108. Paramagnetic Resonance

"Paramagnetic Resonance in Weak Fields on Free Radicals," by A. K. Chirkov and A. A. Kokin, Ural Polytechnical Institute,; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 50-55

The shape and width of the electron paramagnetic resonance absorption line of crystalline α α-diphenyl β-picryl hydrazyl (DPPH) was studied in weak fields at room temperature. It is shown that near the maximum the shape of the curve can be described by a Lorentz curve. The estimate of the half-width is in good agreement with the theory. The asymptotic Curie points have been calculated for a number of new radicals.

109. Photoproduction of π^--Mesons

"Investigation of the Final States Obtained in the Photoproduction of Negative π-Mesons on Deuterium," by M. I. Adamovich, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 39-44

The $\gamma + d \rightarrow p + p + \pi^-$ reaction was studied with the aid of photographic emulsions. The angular distribution and energy spectra of mesons and the relative motion of two protons have been obtained near the threshold of photoproduction of mesons. The analysis indicates the existence of an electric dipole transition which leads to a change of the spin of the nucleon system and to production of mesons in the S-state. The shape of the spectra and the energy dependence of the cross section is explained by the interaction of nucleons in the final state.

110. Negative π-Mesons

"Photoproduction of Negative π-Mesons on Deuterium Near the Threshold," by M. I. Adamovich, G. V. Kuz'micheva, V. G. Larionova, and S. P. Kharlamov, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 27-38

The investigation was carried out on the 265 Mev synchrotron of the Lebedev Physical Institute with photographic emulsions containing D_2O. Detailed information on the reaction $\gamma + d \rightarrow p + p + \pi^-$ has been obtained for photon energies up to 200 Mev. Various experimental characteristics of the reaction are compared with the predictions of the impulse approximation. The experimental results are consistent with the theory which

takes into account interaction between nucleons in the final state. It is shown that the square of the matrix element for photoproduction of π -mesons on neutrons near the meson threshold is a constant and equals $(0.785 \pm 0.072) \cdot 10^{-27}$ cm^2. This quantity corresponds to the ratio $\sigma^-/\sigma^+ = 1.34$.

111. Self-Contracting Discharges in Deuterium

"Self-Contracting Discharges in Deuterium at High Rates of Current Growth," by V. S. Komel'kov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 16-26

Results of investigation of self-contracting discharges involving rates of current growth of $7 \cdot 10^{11}$ and $1.4 \cdot 10^{12}$ a/sec and current amplitudes up to $2 \cdot 10^6$ a are described. The initial pressure of the deuterium in the chambers was varied from 0.1 to 10 mm Hg. The highest temperature in the gas which it was possible to attain was about 200 ev.

112. Cosmic Ray Particles

"Interaction of Cosmic Ray Particles With Various Types of Nuclei," by N. L. Grigorov, A. V. Podgurskaya, A. I. Savel'yeva, and L. M. Poperekova; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 3-15

The transition effect of stars and single heavily ionizing particles produced on photographic plates at altitudes of 9 and 20 km was studied under various types of filters. The experimental data thus obtained indicate that the number of particles in stars and the mean disintegration energy of the stars is proportional to $A^{1/3}$. Due to the constancy of the flux of the heavily ionizing particles and of their spectrum in air and lead it has been possible to analyze previously obtained results (N. L. Grigorov, V. S. Murzin, Izv. AN SSSR, ser. fiz. 17, 21, 1953) on π^0-meson production in air and lead. It is shown that the mean energy carried off by π^0-mesons produced in the interaction of $\sim 10^{10}$ ev primary cosmic ray particles with nuclei is proportional to the radius of the nucleus target.

113. Alpha-Decay

"Alpha Decay of Non-Spherical Nuclei," by L. L. Gol'din, G. M. Adel'son-Vel'skiy, A. P. Birzgal, A. D. Piliya, and K. A. Ter-Martirosyan; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 184-202

Expression of the motion of α particles emitted in the α-decay of non-spherical nuclei with arbitrary spin are analyzed in order to obtain equations suitable for practical application. The purpose is achieved by obtaining formulas defining the boundary conditions for the radial functions on the nuclear surface and also formulas which express the probability for α-decay in terms of values of the radial functions on the nucleus and of the shape of the nucleus. A simple approximate formula has been derived for the dependence of α- decay probability on the momentum ℓ carried off by the α-particle and on the energy of the daughter nucleus.

For even nuclei (spin 0) an analysis is carried out of the various ways of approximate solution of the equation set for the radial functions. It is shown that the terms which connect the equations cannot be regarded as a perturbation for $\ell > 2$.

An exact numerical solution of the equation set is carried out for an elliptic nucleus with account of all multiple interactions, the wave function being assumed constant on the nuclear surface. The significance of higher harmonics is determined in the Legendre polynomial expansion of the equation on the nuclear surface. The computations were compared with experimental data.

114. Beta and Gamma Decay

"Polarization Correlation of Beta-Particles and Gamma Quanta in Allowed Decay of Oriented Nuclei," by A. Z. Dolginov, Leningrad Physicotechnical Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 178-183

Formulas are derived for the correlation between the polarization of beta-particles and the circular polarization of the subsequent gamma-quanta in allowed beta-decay of oriented nuclei.

115. Weak Nuclear Interactions

"On the Theory of Weak Interactions. I," by Yu. A. Gol'fand, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 170-177

A scheme of a universal four-fermion interaction is suggested, differing from the usual schemes by the introduction of quantized fields into the theory. Electron and positron beta-decays are described by different Fermi interaction variants. The CPT-theorem is invalid, but the theory is invariant with respect to CP, CT, and PT transformations. The main consequence is that the analyzed system leads to a new type of theoretical scheme.

116. Fast Particle Energy

"Determination of the Energy of Fast Particles From the Angular Distribution of the Reaction Products," by A. I. Nikishov and I. L. Rozental', Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 165-169

The error appearing in the determination of the energy E of fast colliding particles from the angular distribution of the produced particles is analyzed. It is found that in order to determine the energy with the help of this method it is necessary to consider the relation between the total number of observed star tracks and the energy E. The relation predicted by the Landau theory is applied in this work. An approximate distribution of E as a function of angles and the number of the observed tracks is obtained.

117. Internal Conversion Electrons

"Polarization of Internal Conversion Electrons Emitted After Beta-Decay," by V. S. Berestetskiy and A. P. Rudik; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 159-164

The correlation between the polarization of conversion electrons and the direction of electrons emitted in the preceding beta decay is analyzed. If the Coulomb field of the nucleus is neglected, it is found in the case of a magnetic multipole that the polarization is longitudinal and is independent of the energy. In the case of an electric multipole, longitudinal as well as transverse polarization exist and are related to the energy.

118. Photoproduction of Electrons

"Photoproduction of Electrons and μ Meson Pairs on Nucleons," by I. T. Dyatlov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 154-158

Photoproduction of electrons or μ mesons pairs on nucleons by high energy gamma quanta is analyzed, and the conditions under which the cross sections for these processes can be expressed through the electromagnetic form factors of the free nucleon, are shown.

119. Experiments on $K_{\mu 3}$ Decay

"On the Possibility of Determining the Interaction Constants From Experiments on $K_{\mu 3}$ Decay," by I. G. Ivanter, Institute of Scientific Information, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 111-115

Expressions for the spectra and polarization of μ-mesons created in $K_{\mu 3}$ decays have been obtained for fixed π-meson energies and arbitrary complex interaction functions. It is shown that within an accuracy to an insignificant phase shift one can determine from measurements of the spectra and three polarizations all interaction functions except the second vector, which, under the conditions of the given experiments, cannot be separated from that of the first vector and scalar interaction functions. The presence of tensor interaction can be ascertained from measurements on the spectrum and polarization of μ mesons near an energy close to the maximum value.

120. The Fermi Liquid

"Contribution to the Theory of the Fermi Liquid," by L. D. Landau, Institute of Physical Problems, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 97-103

The scattering properties for the angle 0° of quasi-particles colliding in a Fermi liquid are considered. It is shown that the amplitude of this scattering depends significantly on the limit to which the ratio of the transfer of momentum and energy during the collision approaches as these quantities tend to zero. It is ascertained which of these limits is connected with the energy of the quasi-particles involved in the general theory of the Fermi liquid previously developed by the author.

121. Reaction on Polarized Protons

"Investigation of the $p + p \rightarrow d + \pi^+$ Reaction on a Beam of Polarized Protons," by Yu. K. Akimov, O. V. Savchenko, and L. M. Soroko, Joint Institute of Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 89-96

The angular dependence of the symmetry of π^+ mesons emitted in the $p + p \rightarrow \pi^+ + d$ reaction was measured on a polarized beam of 536, 616, and 654 Mev protons. A direct proof of the existence of a d-state of the mesons in the $p + p \rightarrow \pi^+ + d$ reaction has been obtained. The results of the experiments are consistent with the assumption that the amplitudes of the s- and d-transitions are much smaller than that of the $^1D_2 \rightarrow {}^3S_1P_2$ transition. Limiting estimates of the values of some of the partial cross sections are presented.

122. Charged Pion Production

"Measurement of the Total Charged π-Meson Production Cross Section in n - p Collisions at a Neutron Energy of 586 MeV," by Yu. M. Kazarinov and Yu. N. Simonov, Joint Institute of Nuclear Research, Laboratory of Nuclear Problems; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 78-84

The total yield of charged π mesons produced in collisions between 586 MeV neutrons and protons was measured at angles between 15 and 120° (in the laboratory system). Assuming the charge symmetry of nuclear forces the total cross section for production of π^+ and π^- mesons derived on the basis of the experimental data was found to equal $\sigma(np \rightarrow \pi^+) = \sigma(np \rightarrow \pi^-) = (2.0 \pm 0.5) \cdot 10^{-27}$ cm^2.

123. Decay Scheme of Mo-99

"On the Decay Scheme of Mo-99," by I. V. Estulin, G. M. Chernov, and Z. V. Pastukhova, Nuclear Physics Institute of Moscow State Univesity; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 71-77

The angular correlation of 742-180 kev gamma-quanta emitted in the decay of Mo-99 was measured. By chemical separation of Tc-99m it is proved that the beta--transition in Mo-99 with $E\beta = 1.23$ Mev leads to an isomer level in Tc-99 and that (7 ± 1) % of the 140 kev gamma-quantum intensity is not related to the isomeric transition. Arguments are presented in favor of the following characteristics of the ground state of Mo-99 as $3/2+$ and of the excited states of Tc-99 of 922-kev energy as $3/2+$ or $5/2+$ and of 180 kev energy as $7/2+$.

124. Energy Spectra of Positive Pions

"Energy Spectra and Agular Distribution of π^+ Mesons Produced in p - p Collisions at 660 - 670 Mev," by A. G. Meshkovskiy, Ya. Ya. Shalamov, and V. A. Shebanov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 64-70

The energy spectra of π^+ mesons produced in p - p collisions at proton energies of 670 Mev were investigated for observation angles of 19°30', 38° and 56°. It has been found that in the c.m.s. the shape of the π^+ meson spectrum for the $pp \rightarrow pn\pi^+$ reaction depends on the emission angle. The angular distribution of π^+ mesons produced in 660 MeV p-p collisions is given in the c.m.s. by the formula: $d\sigma/d\Omega = [(0.97 \pm 0.06) + (0.05 \pm 0.21) \cos^2 \theta] \cdot 10^{-27}$ cm^2 sterad^{-1}. The total cross section was found to equal $(14.4 \pm 1.2) \cdot 10^{-27}$ cm^2.

125. Secondary Nuclear Reactions

"Secondary Nuclear Reactions in Bismuth and Lead Induced by High Energy Proton Bombardment," by B. V. Kurchatov, V. N. Mekhedov, L. V. Chistyakov, M. Ya. Kuznetsova, N. I. Borisova, and V. G. Solov'yev; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 56-63

The production of astatine isotopes (Z = 85) by bombardment of bismuth (Z = 83) and lead (Z = 82) with protons at energies up to 480 Mev was studied by a radiochemical method. The cross sections for At-211 and At-210 production from bismuth were found to equal $6 \cdot 10^{-29}$ and $2 \cdot 10^{-29}$ cm^2, respectively. The formation of light isotopes At-210 and At-203 was established. At-211 was detected in lead ($\sigma \sim 10^{-31}$ cm^2).

The phenomena observed are explained by assuming them to be the result of secondary reactions of capture of the disintegration products (α - particles or lithium nuclei). Formation of light astatine isotopes is explained by high energy proton capture with subsequent emission of π^- mesons and several neutrons. The cross section for production of α - particles with $E > 20$ Mev from bismuth irradiated by 480 Mev protons was determined from the astatine yield and found to be $5 - 6 \cdot 10^{-25}$ cm^2.

126. Photographic Action of Ionizing Particles

"Survey of Soviet Work on the Photographic Action of Ionizing Particles," by A. L. Karmuzhanskiy and B. P. Soltitskiy; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 3, No 4, Jul/Aug 58, pp 299-306

The authors, underlining USSR precedence in developing and using the photographic method in nuclear physics, state that there are hundreds of available works on the subject. However, they limit themselves in this survey to work relating to development of the basic principles of the photographic method and clarification of the nature of the photographic action of ionizing particles.

Cosmic Rays

127. Theory of Showers

"On the Cascade Theory of Showers," by I. P. Ivanenko, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 132-136

The equation for the average number of particles created in a layer of finite thickness and possessing energies exceeding some given value has been solved, taking into account collision losses. The solutions obtained are compared with those of the usual cascade theory. An expression has been obtained for the mean energy of particles of a cascade shower at any stage of its development.

Theoretical Physics

128. New Variation Principle Used in Setting Superconductivity Criteria

"Concerning a Variation Principle in the Many Body Problem," by S. V. Tyablikov, Mathematics Institute imeni V. A. Steklov, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 121, No 2, 11 Jul 58, pp 250-252

A variation principle is formulated which states that the second variation of the expression for the energy of the ground state is positive when a solution of the generalized Fok method gives the minimum energy of the ground state. Since there is always a solution of the ordinary Fok method contained in the solutions of the generalized method, it follows that the energy minimum should be sought in the wider class of solutions of the generalized method when the ordinary method does not give a minimum.

The new method is used in problems connected with the electron theory of solids such as determining superconductivity criteria in the calculation of a crystal lattice.

129. Probability Theory in Quantum Mechanics

"Quantum Mechanical Probabilities as Sums Over Trajectories," by G. V. Ryazanov, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 121-131

A new formulation of nonrelativistic quantum mechanics, that is, a general definition of the probability for any event, is proposed. The physical content of quantum mechanics reduces to a single principle which is similar to the Gibbs principle and permits one to solve problems without recourse to wave fuctions and operators.

Electronics

130. Gas Discharge

"Anodic Oscillations in Arc Discharge in Inert Gases," by I. Efendiyev, Uch. zap. Azerb. un-ta, 1957, No 9, pp 23-40 (from Referativnyy Zhurnal -- Fizika, No 7, Jul 58, Abstract No 16063)

Plasma oscillations in a frequency range of 10^4 to 10^6 cycles were studied in a cylindrical discharge tube (diameter 35 mm, length 500 mm) filled with Ar (or Ne, Kr or He) at pressures of $7 \cdot 10^{-3}$-1 mm Hg and discharge currents of 2 to 300 ma. The cathode of the tube was of the oxide type, directly heated, the anode was movable and of various shapes (wire, flat, cylindrical). A part of the measurements was carried out by means of a cylindrical probe. Stable anodic oscillations occurred only with the use of wire (rod) anodes of small dimensions. The amplitude of oscillations rises with increasing discharge current and the potential of gas ionization and decreases with increasing anode area and gas pressure. The oscillation frequency increases with increasing discharge current and with decreasing ion mass (faster than $m^{-1/2}$). At certain pressures the frequency has a maximum.

It was established that the positive column does not play an essential role in the excitation of anodic plasma oscillations. The dynamics of developing a second plasma (by Langmuir's method) is studied. The relationship of the maximum, medium, and minimum values of the anodic voltage drop to pressure, current strength, and anode area is found. The obtained experimental data facilitate the explanation of the anodic oscillations as a result of periodic break-down of the negative space charge around the anode by positive ions. The maximum anode voltage drop equals the break-down voltage and is not below the potential of gas ionization.

"Anodic Oscillations in Arc Discharge in Mercury Vapor," by I. Efendiyev, Uch. zap. Azerb. un-ta. 1957, No 8, pp 9-22 (from Referativnyy Zhurnal -- Fizika, No 7, Jul 58, Abstract No 16062)

Plasma oscillations were studied oscillographically in a frequency range of 10^4 to 10^5 cycles. The oscillations were generated in an arc discharge in a permanently evacuated cylindrical tube (diameter 35 mm, length 350 mm) with a liquid mercury cathode and an anode of various shapes: wire, flat, sectional cylindrical. The Hg vapor pressure was regulated by the temperature of a water bath (10 to 55°C). The discharge current varied from 0.1 to 7 a. The plasma oscillations of most stable frequency and highest amplitude occur in the case of a wire (rod) anode with the least area. With an increase of area the plasma oscillations become chaotic.

The transition from stable to unstable oscillations is accompanied by a characteristic change in anode luminescence. The frequency of stable oscillations increases with pressure and current strength, and the amplitude increases with the rise of current strength but drops with higher pressure. The wandering of the cathodic spot does not play an essential role and leads only to the appearance of supplementary chaotic oscillations with a low amplitude. It was established by means of probe measurements that the plasma oscillations occur in the near-anode region and are caused by the instability of the anodic voltage drop. In the case of stable oscillations the mean value of this voltage is higher than the excitation potential of Hg atoms; in the case of chaotic, lower. The character of relationship of the anodic voltage drop to the current strength and pressure is the same as for the amplitude of stable oscillations. The coaxial magnetic field (up to 580 Oersted), created by means of an ironclad lens, lowers the stability of oscillations. The effect of the field is maximum if the lens is located in the anode region of discharge.

131. Kinetic Equations of Semiconductors

"Nonequilibrium Processes in Impurity Semiconductors," by V. P. Shabanskiy, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 35, No 1(7), Jul 58, pp 143-153.

Kinetic equations for impurity semiconductors which take into account transitions from impurity levels to the conduction band are considered. An explicit expression for the energy and kinetic coefficients are given for cases when the lifetime of electrons in the conduction band is determined by photo and triple recombination processes, under the assumption that the free electron (hole) distribution function has the form of an equilibrium

distribution function with a certain effective temperature. Nonradiative transitions which differ for the triple recombination nonradiative transitions are introduced phenomenologically. In this case, because of such transitions in the equilibrium state, the kinetic and energy coefficients can be expressed in terms of the electron lifetime. The equations thus obtained permit one to determine the electron temperature and the number of electrons in the conduction band in various nonequilibrium processes.

Magnetism

132. Hall Effect in Ferromagnetics

"Hall Effect in Ferromagnetics," by V. A. Lipatova, Tr. Ural'skogo politekhn, in-ta, 1957, sb. 72, pp 21-34 (from Referativnyy Zhurnal -- Fizika, No 7, Jul 58, Abstract No 15770)

A study of the Hall effect below and above the Curie point was carried out on three samples of ferromagnetic alloys Cu-Ni with various content of components. Measurements showed that the e.m.f. of Hall may be expressed by the formula $E_x = R_1 Jib + R_2 Hib$, where R_1 and R_2 are the extraordinary and the ordinary Hall constants, respectively, J - the magnetization, i - the current density, b - the thickness of sample. This follows from the fact that the relation $E_x = f(J)$ differs from a linear one, and the relation $E_x/j = f(H/j)$ represents a straight line. Measurements above the Curie point showed that the e.m.f. of Hall may be considered as the sum of the e.m.f. depending on J, and the e.m.f. depending on H, not only in a ferromagnetic but also in a paramagnetic.

133. Hall Constant in Ferromagnetics

"Temperature Dependence of Hall Constant in Ferromagnetics," by V. A. Lipatova, Tr. Ural'skogo politekhn, in-ta, 1957, sb. 72, pp 35-40 (from Referativnyy Zhurnal -- Fizika, No 7, Jul 58, Abstract No 15769)

Three ferromagnetic alloys Cu-Ni with Curie points T_c 192, 152, and 92°C are studied for their temperature behavior of the Hall constant R_1 below T_c. The temperature coefficient R_1 below and above T_c decreases with an increase of Cu concentration and at a concentration of — 27 % Cu changes its sign. During the transition through T_c the temperature behavior of R_1 does not change.

134. Hall Effect at Low Temperature

"Hall Effect in Pure Nickel at Helium Temperatures," by N. V. Volkensteyn, G. V. Fedorov, and S. V. Vonsovskiy, Institute of Physics of Metals, Ural Affiliate of the Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy, Vol 35, No 1(7), Jul 58, pp 85-88

Experimental data are presented on the Hall effect in pure nickel (99.99%) in a wide range of temperatures going down to the temperature of liquid helium. It is shown that the ferromagnetic constant R_1 sharply drops with the temperature T and has a minimum at 20-30° K. A physical interpretation of the observed phenomena is proposed which is based on the (s-d) exchange model.

135. Excitation of Hydromagnetic Waves

"On the Theory of Excitation of Hydromagnetic Waves," by A. I. Akhiyezer and A. G. Sitenko, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskov Fiziki, Vol 35, No 1(7) Jul 58, pp 116-120

Excitation of hydromagnetic and magnetoacoustic waves by external currents is investigated. Damping of the waves due to conductivity and viscosity of the medium is taken into consideration. Excitation by currents is compared with excitation by mechanical means in respect to intensity.

Mechanics

136. Expression Given for Accumulation of Disturbances in Nonstationary Systems

"On the Accumulation of Disturbances in Nonstationary Linear Systems," by Ya. N. Roytenberg, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 121, No 2, 11 Jul 58, pp 221-224

The accumulation of disturbances is considered for nonstationary linear systems described by the differential equations

$$\sum_{k=1}^{n} f_{jk}(D)y_k = [L_j(t)D + R_j(t)]x_j(t) \qquad (j = 1,\ldots,n)$$

where $f_{jk}(D)$ are polynomials in D, whose coefficients are given functions of time and $D = d/dt$ is an operation indicating differentiation with respect to time.

The form of the general solution is given. An expression is found for the maximum deviation in the system at some fixed time, when the external forces are limited according to the modulus $|x_\eta \quad (t)| \leq K_\eta$.

137. Homing Guidance in Proportional Navigation Discussed

"Proportional Navigation as a Problem in Cybernetics," by A. S. Kel'zon and O. V. Grigor'yev, Leningrad Higher Engineering Naval School imeni Admiral Makarov; Moscow, Doklady Akademii Nauk SSSR, Vol 121, No 3, 21 Jul 58, pp 432-435

The dynamics of homing guidance in proportional navigation and the choice of an automatic control system which will provide stable guidance of an object to a traget are considered. It is commented that previous works on proportional navigation are restricted to a kinematic study of the relative motion of two points, employ numerical integration methods, and arrived at results which are not valid.

"The idea of proportional navigation is to counter the rotating tendency of the line of sight, or the line of target joining the object and the target, and, consequently, the tendency of the object trajectory to approximate a rectilinear path of parallel approach. The law of proportional navigation is

$$\dot{\psi} = b\dot{\eta}$$

where ψ is the angle of rotation of the velocity vector of the object, η is the angle of rotation of the line of target, and b is the navigation constant."

The differential equations are given for the motion of an object in a horizontal plane, assuming that the target velocity is constant in magnitude and direction, the object velocity is constant in magnitude, and the navigation constant is equal to 2.

These equations are solved in closed form for the trajectory of the object and the angular velocity of the line of target, and a law for the change in rudder angle is obtained from the solutions for attack angle and turning angle.

"In earlier works, (A. Locke, Guidance, N. Y. 1955; L. C.-L. Yuan, J Appl Phys, 19, No 12, 1948,) where proportional navigation was considered in terms of the kinematics of the relative motion of two points, the possibility of the object intercepting the target was determined on the basis of the magnitude of the angular velocity of the velocity vector of the object. This is equivalent to saying that it is determined on the basis of the magnitude of the normal acceleration when the velocity is constant in magnitude. This conclusion is based on the incorrect assumption (Locke, Ibid) that the rudder angle is proportional to the angular velocity of the velocity vector. Locke, on the other hand, after arriving at a contradiction with his own conclusion, and Adler (F. P. Adler, J Appl Phys, 27, No 5, 1956) after him, assert that for a real body, considered as a solid body with a control rudder, a miss is unavoidable, which is not true."

The authors claim that their presentation resolves this "seeming contradiction." Limits on the ratio of the object velocity to the target velocity within which interception will occur are given. Outside these limits the rudder angle is said to increase without limit close to the target and interception is termed impossible. In the case when object velocity is less than target velocity, it is stated that misses will decrease as the initial lead angle and angle of the line of sight approach values corresponding to parallel approach.

X. MISCELLANEOUS

138. Scientific Activities of Gosplan and Sovnarkhozes of Ukrainian SSR

"Tasks of Planning Organs in Connection With the Reorganization of the Administration of the National Economy," by I. Senin; Kiev, Kommunist Ukrainy, No 5, May 58, pp 28-38

Gosplan Ukrainian SSR has the function of coordinating the thematic plans of all scientific, planning, and educational institutions within the territory of the Ukrainian SSR for the purpose of increasing the efficacy of scientific research and the elimination of duplication in the development of individual problems. Gosplan Ukrainian SSR, therefore, has under its jurisdiction nearly 70 percent of all planning, design, and scientific research institutions which were formerly subordinate to union republic ministries and departments.

For the past several years certain scientific research institutes have been severed from idustrial establishments, which has lowered their work considerably. Hence, to improve the work of scientific research and planning organizations their administration had to be reorganized. In 1958 some 30 percent of all scientific research and planning organizations are to be administratively subordinate to Gosplan Ukrainian SSR and the rest are to be administratively subordinate to the various sovnarkhozes (councils of national economy) of the republic. The following institutes have been placed under the administration of sovnarkhozes: the Dnepropetrovsk Scientific Research Turbine Institute; Krivoy-Rog Planning and Design Institute "Giprorudmash"; Makeyevka Scientific Research Institute for Safety in Work in the Mining Industry; and Stalino Institute "Dongiprouglemash."

139. Three New Academia Sinica Branches Established

"Academi Sinica Wuhan Branch Preparatory Committee Inaugurated," by Chou Hang, Peiping, K'o-hsueh T'ung-pao (Scientia), No 4, 1958, pp 122-123

This article reports the inauguration of the Preparatory Committee for the Wuhan Branch of the Academia Sinica on 19 January 1958. The expressed mission of the branch is "to supervise the academy's research components in the Wuhan area, to promote better liaison with nonacademy research bodies, and gradually to become the organizer and motivator of scientific activities in that area."

Seven new institutions, besides the 7-year old Institute of Hydrobiology, make up the Wuhan Branch. They are the [Wu-han] Microbiological Laboratory, Laboratory of Geodetics and Cartography (測量製圖研究室), Geophysical Observatory (地球物理觀象台), Laboratory of Mathematics, Institute of Philosophy and Social Sciences (哲學社會科學研究所), Wuhan Botanical Gardens (武漢植物園), and Wuhan Branch Library.

The article gives a summary of the organization and work of each of the above institutions. The information includes the following:

The Institute of Hydrobiology, which moved to Wuhan from Shanghai in 1954, has five research divisions (組): botany, invertebrate zoology; ichthyology, fish pathology, and chemistry.

Preparations for the Microbiological Laboratory were initiated in 1956 and the laboratory was just recently formally established. The laboratory will place emphasis on viruses and soil microbes, according to the "1956-1957 Long-Range Plan for Scientific and Technical Development." It will conduct studies on the physical, chemical, biological, and immunological properties of animal and plant viruses and bacteriophages, their growth and propagation, and the interaction between viruses and parasites. The research projects in the field of soil microbiology are the microbiological processes found in the chief soil types and crop systems; characteristics of microbial colonies found among the roots of various plants and their effect on plant nutrition; physiology of soil microbes, particularly the actinomyces; etc. The laboratory will also conduct work on biological control of plant diseases.

The Laboratory of Geodetics and Cartography was formerly the Geodetic Surveying Division of the Institute of Geography. In 1957 it became an independent organization and was moved from Nanking to Wuhan. The research tasks of its three divisions of astronomical and geodetic surveying, aerial surveying, and cartography, respectively, include the following: methods and instruments used in applied astronomy, large-scale adjustment problems, gravity measuring instruments and methods, map projection problems, studies in geomorphology, and the application of gravity in geodetic surveying; methods for establishing greater density of control points and greater density of elevations in aerotriangulation; close-range photogrammetry; and the making and publishing of large-scale maps according to actual measurements. In addition to these projects, the laboratory will cooperate with the State Bureau of Geodesy and Cartography in studying problems of radio orientation surveying encountered in aerophotogrammetry, in taking gravity measurements at points throughout the country, and in setting up an observation station in Wu-ch'ang to note gravity changes.

The mission of the Geophysical Observatory is to conduct research on upper atmosphere physics to meet China's needs for developing upper atmosphere aeronautics (airplanes, rockets, guided missiles, etc.) and for improving radio communication. The work will be carried out by the observatory's three research divisions, as described below.

The Ionosphere Division investigates the physical properties of the ionosphere and their effect on electric wave propagation. Specific projects growing out from this central theme are: absorption and polarization of reflected waves, the study of ionospheric "wind," analysis of regular and irregular changes seen in records of ionosphere over China, short-wave communications frequency forecast over China, changes in intensity of artificial satellite signals, and short-wave field intensity measurements.

The Atmospheric Ozone and Nightglow Division will conduct studies centered in the physical properties of the ozone layer and of nightglow -- specifically, improvement of observation methods, the chemical constitution and physical processes of the upper atmosphere, changes in spectral line intensity as effected by time and latitude, determination of altitudes, and the causes of nightglow.

The Cosmic Ray Division's research will be centered in problems related to cosmic ray intensity and cosmic ray showers. The relation of cosmic ray intensity to atmospheric phenomena, solar activity, terrestrial magnetism, the ionosphere, the ozone layer, and nightglow will be studied as will the relation of large showers to small showers, their particle distribution, properties, incidence angles, etc.

"Academia Sinica Chekiang Branch Organized," by Yang Hsuan-jen; Peiping, K'o-hsueh T'ung-pao (Scientia), No 13, 1958, pp 407-408

This article reports the formal organization of the Chekiang Branch of the Academia Sinica during a meeting held in Hankow, 18-19 June 1958. Chou Chien-jen (周 建 人), governor of Chekiang Province, is branch president.

On the organization structure and mission of the branch the article gives the following information:

The following provincial and muncipal research institutes form the basis for the Chekiang Branch: Agricultural Research Institute, Silvicultural Research Institute, Tea Research Institute, Zoological Research Laboratory, Institute of Experimental Hygiene, Hankow Botanical Gardens, Marine Products Experimental Station, Fresh Water Products Experimental Station, Native Medicine Research Institute, Weaving Research Institute, Institute of Applied Chemistry, Basic Materials Testing Laboratory, Ningpo Industrial Research Institute, and Wen-shou Industrial Research Institute. The branch has three departments (technical sciences, basic sciences, and social sciences) and a Scientific Information Office(科學情報處).

The branch's policy is to unite the masses in the interest of production, promote research in the basic sciences on matters of special concern, and initiate positive research in the philosophical and social sciences. Its mission is to assume, under the guidance of the Provincial Party Committee and the Provincial People's Council, the unified leadership of scientific research throughout the province, raise the masses' level of inventiveness, control the political ideology of scientific agencies, and train and augment the scientific force.

The Chekiang Branch will soon construct a 10,000-square meter science building in the outskirts of Hankow. It will also set up research institutes of philosophy and social sciences and cooperate closely with all higher professional schools in the province. (Since the initiation of the "leap forward" movement, the number of higher professional schools has jumped from five to over 50.)

"Academica Sinica Shensi Branch Inaugurated," by Huang Wei; Peiping, K'o-hsueh T'ung-pao (Scientia), No 10, 1958, p 316-317

This article reports the inauguration of the Shensi Branch of the Academia Sinica on 27 April 1958. Established on the foundations of the academy's Sian Business Office, the Shensi Branch has four divisions (組), specializing in basic and earth sciences, biology, technical sciences, philosophy and social sciences, respectively.

At present there are five research bodies in Shensi Province which belong to the Academia Sinica: the Sian Institute of Agricultural Biology, Sian Archaeological Laboratory, Sian Seismological Station, Satellite Observation Station, and Huang Ho Middle Reaches Water and Soil Conservation Expedition. The Shensi Branch will supervise the work of these components besides that of five other research components to be established in the first half of 1958. The new research bodies will be the Institute of Agricultural Machines and Implements (農機農具研究所), the

Institute of Power Research (動力研究所), the Laboratory of Chemical Technology (化工研究室), the Laboratory of Geology (地質研究室), and the Institute of Philosophy and Social Sciences (哲學社會科學研究所).

The article mentions the general tasks of each new research body.

140. Recent Developments in Academia Sinica

"News Briefs" (unsigned article); Peiping, K'o-hsueh T'ung-pao, No 7, 1958, p 224

The Institute of Physiology and Biochemistry of the Academia Sinica has been divided into two institutes with separate heads: Institute of Physiology, Feng Te-p'ei, director; and Institute of Biochemistry, Wang Ying-lai, director.

The Wuhan Microbiological Laboratory (武漢微生物研究室) of the Academia Sinica recently was formally established.

The Laboratory of Hydraulic Engineering, Academia Sinica, was merged with the Water Conservation Research Institute of the Ministry of Water Conservancy. The resulting institute is known as the Water Conservation Research Institute of the Academia Sinica and the Ministry of Water Conservancy (水利部,中國科學院,水利科學研究院). The institute's provisional office staff includes Huang Wen-hsi (黃文熙), Chang Kuang-tou (張光斗), Chang Tzu-lin (張子林), Chang Jen (張任), Hsieh Chia-tse (謝家澤), Yang Chia-te (楊家德), and Li Shu-ming (李叔明).

The Preparatory Office for the Peiping Astronomical Observatory was recently set up with Ch'eng Mau-lan (程茂蘭) as director.

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