

CIA/

7 APRIL 1958

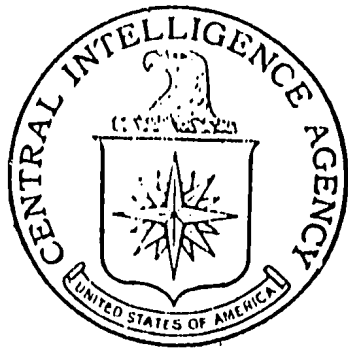
UNCLASSIFIED- SCIENTIFIC INFORMATION
Approved For Release 1999/09/08 : CIA-RDP82-00141R000100040001-9
REPORT NUMBER 4

1 OF 2

4

4

FDD
FILE
COPY



SCIENTIFIC INFORMATION REPORT

Number 4

7 April 1958

Prepared by

Foreign Documents Division
CENTRAL INTELLIGENCE AGENCY
2430 E. St., N. W., Washington 25, D.C.

ARCHIVAL RECORDS
Return to Archives & Records Center
Immediately After Use

JOB BOX 9
484

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

Table of Contents

	<u>Page</u>
I. Astronomy	1
II. Biology	2
III. Chemistry	9
IV. Earth Sciences	43
V. Electronics	45
VI. Engineering	53
VII. Mathematics	54
VIII. Medicine	55
IX. Metallurgy	102
X. Physics	105
XI. Miscellaneous	127

NOTE: Items in this report are numbered consecutively.

I. ASTRONOMY

1. Tenth Congress of International Astronomical Union

"In the Stalinabad Astronomical Observatory," by A. Solov'yev, Candidate of Physicomathematical Sciences, director of the Astronomical Observatory, Academy of Sciences Tadzhik SSR; Stalinabad, Kommunist Tadzhikistana, 5 Feb 58

"Soviet astronomers are preparing to participate in the Tenth Congress of the International Astronomical Union. The congress is to be held in August 1958 in Moscow. The congress is to be a "great political and scientific event, contributing to still closer collaboration of scientists of the brother republics of the USSR and other countries."

CPYRGHT

II. BIOLOGY

Plant Physiology

2. Effects of Sodium Azide, Fluoride, and Cyanide, and Succinic Dehydrogenase Assayed in Chlorophyll Biosynthesis in Wheat

"The Question Concerning the Participation of Cytochrome Oxidase in the Process of Chlorophyll Synthesis," by I. A. Chernavina, B. A. Rubin, and L. F. Nikolayeva, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 114, No 5, 11 Jun 57, pp 1080-1083

Tests were conducted on winter wheat No 2453. Tables represent chlorophyll a and chlorophyll b content under the effect of NaN_3 , NaF, and NaCN respiratory inhibitors in the process of the greening of wheat seedlings. NaCN stimulates, while NaN_3 , and NaF inhibit chlorophyll formation. Plants subjected to CO gas produce less chlorophyll, but both control and experimental plants subjected to CO produce more chlorophyll when under blue than under red light. Additional experiments illustrate the significance of succinic dehydrogenase in chlorophyll synthesis.

The authors conclude that the process of chlorophyll biosynthesis is closely connected with the activity of the Fe-protein enzyme group, i.e., the cytochrome oxidase. Experiments verify that specific poisons inhibiting various chains in the cytochrome system decrease the process of chlorophyll biosynthesis, and that the removal of the effects of enzyme poisons makes it possible to re-establish, in these plant tissues, normal biosynthesis of the green pigments.

Radiobiology

3. Radioactive Isotopes in Agronomy

"Application of Radioactive Isotopes in the USSR," by G. V. Kurdyumov, M. B. Neyman, and G. M. Frank; Moscow, Atomnaya Energiya, Vol 3, No 11, Nov 57, pp 465-478

The following account of Soviet application of radioisotopes in agricultural research (pp 475-476) is given:

CPYRGHT

"In addition to their other applications, radioactive isotopes are used to study important processes in plant organisms.

CPYRGHT

"Bayer's theory was for many years the accepted theory in plant physiology. According to this theory the initial product of photosynthesis is formaldehyde, which is formed through carbon hydration. It is assumed that the oxygen given off in the photosynthesis is obtained from carbon dioxide which the plant leaves absorb from the air.

"This representation was refuted by the work of A. P. Vinogradov, using heavy oxygen (A. P. Vinogradov and R. V. Teys, Doklady Akademii Nauk SSSR, 33, 574, 1941). It was shown in this work that the oxygen in photosynthesis comes from water. The work of many foreign researchers the results of which were verified in the USSR, proved that formaldehyde is not the initial product of photosynthesis, a very complex process involving the production of phosphoric acid esters. This process and the chemical composition of products of the photosynthesis depend on a number of factors, one of which is the spectral composition of the light causing the photosynthesis (A. A. Nichiporovich, Primeneniye Izotopov v Tekhnike, Biologii i Sel'ckom Khozyaystve (Doklady Sovetskoy Delegatsii na Mezhdunarodnoy Konferentsii po Mirnomy Ispol'zovaniyu Atomnoy Energii) [Application of Isotopes in Technology, Biology, and Agriculture (Reports of the Soviet Delegation to the International Conference on the Peaceful Uses of Atomic Energy)], Publishing House of the Academy of Sciences USSR, 1955, p 383). In addition to carbohydrates, proteins and other compounds are products of photosynthesis. Details of the photosynthesis process are still being studied at present.

"The notion that plants are nourished by carbon dioxide in the air was changed and improved on by the work of A. L. Kursanov, who showed through the use of C^{14} that plants also utilize carbon dioxide which enters from the soil through the root system (A. L. Kursanov, loc. cit., p 338). Radioisotopes were used for supplementary feeding of the plants other than through the roots. The close relationship between root feeding of plants and the photosynthesis process was established by this work and that of other researchers.

"The fast renewal of chlorophyll in plant leaves came as a surprise in studying the processes of chlorophyll biosyntheses (A. A. Shlyk, Metod Mechenykh Atom v Izychenii Biosinteza Khlordifilla [Method of Tagged Atoms in Studying Chlorophyll Biosynthesis], Publishing House of the Academy of Sciences, Belorussian SSR, Minsk, 1956).

"A study of the way rubber is produced in plants showed that the rubber in a kok-saghyz may be formed from carbohydrates (M. B. Neyman, A. A. Prokof'yev, and N. S. Shantarovich, Doklady Akademii Nauk SSSR, 78, 367, 1952). It was shown that C^{14} atoms from tagged sugars, acetic and levulinic acid, and glycine and acetoacetic acid are involved in the biosynthesis of rubber to almost the same extent and to a considerably less degree than are C^{14} atoms from alanine-2- C^{14} (Ye. A. Shilov, Report Delivered at the International Conference on the Application of Radioisotopes in Scientific Research, Paris, 1957).

"The major portion of the work has been connected with studying the role of radioactive radiations on the life and reproduction processes of plants. Of great importance is the recently published work of A. P. Vinogradov, who showed that the presence of natural K^{40} does not appear to have any effect on the metabolism of *Aspergillus fungi* (A. P. Vinogradov, Doklady Akademii Nauk SSSR, 110, 375, 1956).

"The tagged-atoms method can be used to establish that there is an exchange of material between a graft and the root stock and that there is an interconnection between the root system and the tops of trees. The best methods of applying fertilizers to the soil was discovered through the use of tagged fertilizer atoms. In particular, it was learned that plants best assimilate phosphorus in small granules during the early stages of growth, whereas in the later period of vegetation they best absorb phosphorus in large granules. The best ratio of organic and mineral fertilizer components was also determined from these studies (V. M. Klechkovskiy, Doklad na Plenarnom Zasedanii Vsesoyuznoy Nauchno-tekhnicheskoy Konferentsii po Primeneniyu Izotopov [Report Delivered at the Plenary Session of the All-Union Scientific-Technical Conference on the Application of Isotopes], Publishing House of the Academy of Sciences USSR, 1957).

"A considerable improvement in the methods of using tagged atoms to study how plants assimilate fertilizers was made with the method of "selective absorption." This method amounts to introducing a standard tagged fertilizer into the soil and also an experimental nontagged fertilizer. The specific activity of the tagged element that was taken up by the plant is measured, and the relative assimilability of the fertilizer under study can then be calculated (A. V. Sokolov, Primeneniye Izotopov pri Agrokhimicheskikh i Pochvennykh Issledovaniyakh [Application of Isotopes in Agricultural-chemical and Soil Research], Publishing House of the Academy of Sciences USSR, 1955).

CPYRGHT

"This new research method, the application of radioactive isotopes, is being ever more widely used by Soviet scientists and engineers in scientific research and in industry, agriculture, and medicine. The growing number of papers by Soviet scientists at general conferences and at specialized meetings devoted to the application of isotopes in various areas of science and technology testify to the scope of this work. Such meetings are regularly held both in the many republics of the Soviet Union and abroad."

4. Roentgenokymographic Tracings of Heart During Radiation Sickness

"Roentgenokymography of the Heart During Acute Radiation Sickness Under Experimental Conditions," by I. B. Gurevich, Radiobiological Laboratory (head, Prof M. O. Raushenbakh), Central Order of Lenin Institute of Hematology and Blood Transfusion; Moscow, Meditsinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 49-56

The purpose of this research was to study the effects of X-ray radiation on the tone and on the contractile function of the myocardium. Tests were run on 50 dogs which were irradiated by 300 and 600 r, and changes in the myocardium were recorded by reontgenokymographic method.

Results indicate the following:

1. Changes developing in the heart during acute radiation sickness can be described in four phases which correspond to the four periods of radiation sickness.
2. Basic changes in the myocardium include the inhibition of the contractile function during the first, and especially during the third period. These two phases correspond to the initial and peak periods of radiation sickness. During the second and fourth periods of radiation sickness (latent and restoration periods) the compensatory intensification of the contractile function of the heart plays a prominent role.
3. The initial condition of myocardium, to a great extent, determines the changes developed in the myocardium.
4. Roentgenokymography is of great value in evaluating the changes occurring in the contractile function of the heart.

5. Plankton as an Indicator, Absorber, and Eradicator of Radioactive Pollution of Fresh-Water Reservoirs

"Plankton as an Indicator of Pollution of Fresh-Water Reservoirs by Radioactive Substances," by G. D. Lebedeva; Moscow, Medit-sinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 65-69

Research data indicate that certain water organisms are capable of absorbing and accumulating radioactive isotopes with a resultant radioactivity in their system up to 2,000 times higher than that of their external environment.

The present research was a study of the accumulation of radioactivity by *Daphnia magna*, *Diaptomus amblyodon*, and *Scenedesmus quadricauda*. Various tables represent the accumulation of radioactive strontium in *Daphnia*, accumulation of Sr^{90} in *Daphnia* at various specific activities of water, time factor in the dynamics of Sr^{90} accumulation, Sr^{90} accumulation by *Diaptomus*, and finally the decrease of beta-activity in *Daphnia* by transferring them to fresh water.

Results indicate the following:

1. *Daphnia* are able to absorb from water, and to accumulate in their system, during the first 5 minutes, radioactive isotopes in quantities 3-7 times that in water at a level below maximum accumulation value. Thus, in a very short time, it is possible to determine contamination of water by radioactive isotopes by using *Daphnia*. This is especially important where the specific activity of water is very low.
2. When the radioactive concentration of water ranges from 2.7×10^{-12} to 3.4×10^{-4} curies/liter, the accumulation of Sr^{90} in *Daphnia* may be 300,000 and 6 times, respectively, greater than that of water.
3. Immersion of *Daphnia* with radioactivity ranging from 7.5×10^{-7} to 7.8×10^{-5} curies/kg (damp weight) into fresh water decreases the radioactivity in the *Daphnia*, in 10 hours, to 25 to 2%, respectively, of the original value.
4. *Protococcus* algae (*Scenedesmus quadricauda*) attains a maximum accumulation of Sr^{90} , from a solution containing 3.4×10^{-10} curies/liter of up to 2.7×10^{-6} curies/kg in 36 hours; while *Diaptomus amblyodon* accumulates maximum radioactivity, from a solution containing 2.7×10^{-6} curies/liter, up to 1.6×10^{-5} curies/kg in 48 hours.

6. Effect of Radioactive Strontium on Processes of Self-Purification of Water Reservoirs and on Water Microflora Studied

"Certain Data on the Influence of Radioactive Strontium on the Processes of Self-Purification of Water Reservoirs," by V. M. Zhogova; Moscow, Meditsinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 69-73

The aim of this research was to study the effect of radioactive substances on the processes of self-purification and on the microflora of water reservoirs.

Results follow:

1. In the presence of Sr⁸⁹ and Sr⁹⁰ in water in concentrations not exceeding 10⁻³ curies/liter, radioactive isotopes exert no inhibitory effect on the microflora of water and on the processes of mineralization of organic matter (judging from total number of colonies per ml, titer of enteric coli, amount of ammonia nitrogen, nitrites, and nitrates).

2. The above-mentioned concentrations of radioactive strontium exert no effect on the processes of nitrification, as evidenced by experiments using special synthetic media.

3. Strontium in concentrations up to 10⁻³ curies/liter does not affect the development of B. coli in synthetic media at 37°, but when the radioactive concentration is raised to 10⁻² curies/liter there is evidence of some inhibitory effect on the rate of development during the first 4 hours.

4. Radioactive strontium in concentrations up to 10⁻² curies/liter exerts no negative effect on the survival of B. coli in physiological salt solution at room temperature, but concentrations of 1.3 x 10⁻¹ curies/liter speed the rate at which the B. coli perish (75-80% die during the first 24 hours). But even at this high concentration of radioactive strontium, 3-5% of radio-resistant bacilli remain.

5. Concentrations of radioactive strontium which may get into water and into the bottom of water reservoirs with sewage exert no inhibitory effect on water microflora or on the processes of self-purification.

Miscellaneous

7. Conference on Problems of Heredity in Institute of Genetics, Academy of Sciences USSR

"Anniversary Conference on the Problems of Heredity in the Institute of Genetics, Academy of Sciences USSR," by Prof Kh. F. Kushner, Institute of Genetics, Academy of Sciences USSR; Moscow, Zhivotnovodstvo, No 1, Jan 53, pp 84-89

The scientific conference on the problems of heredity and variations in plants, animals, and microorganisms and dedicated to the 40th anniversary of the Great October Revolution was held at the Institute of Genetics, Academy of Sciences USSR, from 8 to 14 October 1957. Over 1,000 scholars attended, and 191 reports were given on the genetics of animals, the genetics of microorganisms and viruses, and the heredity and viability of plants. The principal report, "On the Laws of Life of Biological Species and Its Significance to Practice," was given by Academician T. D. Lysenko, director of the Institute of Genetics, Academy of Sciences USSR.

III. CHEMISTRY

Analytical Chemistry

8. Chinese Design Source Circuit for Determining Traces of Halogens

"A New Double-Arc Source for Detecting Traces of Halogens in Powdered Specimens," by Huang Pen-li (黄本立), Institute of Applied Physics, Academia Sinica, and T'ien Li-ch'ing (), Department of Chemistry, Nanking University; Peiping, K'o-hsueh T'ung-pao (Scientia), No 24, 1957, pp 759-760

This article presents a circuit diagram for a double-arc source which can be used to detect traces of halogens by the method of spectral analysis. The circuit is an improvement over the double-arc source Huang Pen-li had designed and introduced in the No 10, 1957, issue of K'o-hsueh T'ung-pao. Tests demonstrated that the original circuit had a better spectrum recurrence than other known double-arc circuits. Moreover, its excitation discharge could be adjusted over a wide range. However, its sensitivity to "difficult to excite" volatile elements such as the halogens was hampered by the necessity of a large inductance along the discharge loop. The new improved circuit with several inductance coils, each equal to or less than 350 microhenries, eliminates that problem.

The article says that an experimental light source with alternating circuit for heating and direct current for charging was set up according to this circuit. The phase difference between pilot and rectifying circuits was 120 degrees. An ordinary Feussner spark generator, which ordinarily sets off 100 discharges per second, was used to produce 50 excitation discharges per second. This source was used in connection with a KC-55 glass spectrograph to detect traces of chlorine and bromine in CuO. The sensitivity to these two halogens was 0.03 percent, whereas the sensitivity of a method advanced by I. I. Levintov was 0.15 percent. The latter had to use 0.5 gram of specimen while the authors' experiments required only 0.3 gram.

The authors' intention to use this light source in the investigation of whether the low-voltage spark of small or large capacitance is better, for the excitation of halogens is mentioned.

[For additional information on analytical chemistry, see Item No 91.]

Industrial Chemistry

9. Production of Pure Xenon Feasible Because of Expansion of Industrial Production of Oxygen

"The Production of Pure Xenon," by V. G. Fastovskiy, A. Ye. Rovinskiy, and Yu. V. Petrovskiy; Moscow, Zhurnal Prikladnoy Khimii, Vol 31, No 1, Jan 58, pp 5-13

The extensive development of the oxygen industry and of the production of krypton as a by-product of this industry have created prerequisites for the production of considerable quantities of xenon, a gas the content of which in the air is insignificant (it amounts to 0.000008% by volume). The results of an investigation on the subject are therefore reported. The separation of xenon is preceded by separation from the air of a krypton-xenon mixture containing 7-8% of xenon. This mixture can be separated into krypton and xenon either by fractional distillation (rectification) or by adsorption. The calculations and experiments which are outlined indicate that the rectification method results in a higher degree of separation of xenon and better separation. However, this method is somewhat more difficult to apply than the adsorption method.

10. Significance of Ultrapure Substances in Present-Day Technology

Chistoye Veshchestvo (Pure Substances), by Academician I. I. Chernyayev, "Znaniye," publishing house, Moscow, 1957, 16 pp

This popular booklet discusses the problem of the production of pure elements and pure chemical substances. On the example of the purification of platinum, the great difficulties connected with the development of procedures for the production of ultrapure substances are illustrated. The significance of special purification of elements for nuclear technology and semiconductor technology is emphasized. The principal methods for the production of ultrapure elements are outlined, including zone refining, melting in high vacuum so that the volatile impurities are distilled off, growing of single crystals in melts, and solvent extraction. The concept of isotopic purity is defined.

[SIR Note: I. I. Chernyayev has been active in research on complex compounds of platinum and metals of the platinum group. By using these compounds, platinum can be separated from the metals which accompany it and purified.]

11. Hungarians Develop New Crop Spray and Fertilizers

"Substitute for Copper Sulfate and Other New Procedures at the Heavy Chemical Industry Research Institute, Veszprem," by Istvan Vig; Budapest, Magyar Nemzet, 22 Sep 57, p 5

According to the author, NEVIKI (Nehezvegyipari Kutato Intezet, Heavy Chemical Industry Research Institute), which is under the direction of Dr Gyorgy Koranyi, Candidate of Technical Sciences, has developed an effective substitute for copper sulfate. The preparation was evolved by Guztav Fehervari and Mrs Laszlo Gorog in cooperation with a section of the Plant Protection Research Institute (Novenyvedelmi Kutato Intezet). This section has since become part of NEVIKI. The preparation is known as DNRB, an abbreviation of dimitrothioeyanobenzene.

To date, 2 tons of DNRB has been prepared and distributed to experimental farms which successfully utilized it as an antiperonospor spray in the vineyards. Preparations for producing DNRB at full plant level and plans for procuring the necessary investments are now under way.

NEVIKI has also had excellent results with the compound fertilizer developed there. This fertilizer consists of 20 percent phosphorus and 20 percent nitrogen. One kilogram of the compound is as effective as one kilogram of phosphorus mixed with one kilogram of "Pet salt." Since 1956, forty tons of the compound fertilizer has been produced at the pilot plant established in Pet at that time.

Bela Balla, department head of NEVIKI, and Gyula Kincses, his colleague, evolved the manufacturing technology of the new fertilizer. Balla recently gave a lecture about the compound fertilizer in Moscow before experts from the "friendly countries." The lecture aroused great interest.

Bela Raskai, scientific leader and Miklos Kovacs, his colleague, have evolved a new and much cheaper procedure for extracting pyrocatechol from brown coal tars. As a result of their research, a shop for extracting pyrocatechol with methyl alcohol rather than ether is being established at the Dorog Coal Processing Enterprise. Henceforth this basic material, which is used in the production of papaverine, will be produced cheaply and in large quantities.

Candidate Dr Pal Takacs, a department head of NEVIKI, has developed a new procedure for recovering sulfur from gas. The author does not discuss this procedure.

[For additional information on industrial chemistry, see Item No 30.]

Inorganic Chemistry

12. Investigation of Thermodynamics of Formation of Hydrogen Super-oxide From Water Vapor That Has Been Subjected to the Action of an Electric Discharge

"Concerning the Problem of a Higher Peroxide of Hydrogen and Frozen Radicals; Part 1 -- Determination of the Heat of Decomposition of the Vitreous Matter Formed in an Electric Discharge From Water Vapor," by L. A. Reznitskiy, K. G. Khomyakov, L. I. Nekrasov, and I. I. Skorokhodov, Moscow State University; Moscow, Zhurnal Fizicheskoy Khimii, Vol 32, No 1, Jan 58, pp 87-92

A calorimeter has been designed and a procedure developed for investigating low-temperature reaction products of water vapor dissociated in an electric discharge. It was established that three thermal effects occur during the heating of the vitreous matter that is formed. The first is an exothermal effect which begins at minus 115° and is accompanied by an evolution of O₂. This effect, which amounts approximately to 78.8 kgcals/mol, corresponds partly to the heat of the reaction of free frozen radicals HO₂ in the solid phase according to the equation $2 \text{HO}_2 = \text{H}_2\text{O}_2 + \text{O}_2$ and partly to the heat of crystallization of the vitreous matter. The second, endothermal effect begins at minus 70° and is associated with a change in the state of the vitreous matter: it is accompanied by melting and an evolution of gas. It amounts to 100 cal per gram of H₂O₂ and represents the heat of melting of H₂O₂. At minus 55° the endothermal effect passes over to a second exothermal effect, which is accompanied by a decomposition of H₂O₄. This exothermal effect amounts to 68.0 kgcals/mol and corresponds to the heat of the reaction $\text{H}_2\text{O}_4 (\text{solution}) = \text{H}_2\text{O}_2 (\text{solution}) + \text{O}_2 (\text{gas})$.

After the paper containing these data had been submitted for publication, a paper by J. A. Ghormley (Journal American Chemical Society, Vol 79, 1957, p 1862) which reports the results of a thermographic analysis of the decomposition of the vitreous matter appeared in print. The agreement between a number of experimental data is noteworthy: Ghormley reported that the solid matter melts at minus 70° and that there is decomposition in the liquid phase at minus 60° which is accompanied by an evolution of oxygen. On the other hand, the author of the American paper does not mention that there is an evolution of gas at minus 115° and that this process is accompanied by a thermal effect. The heat evolved during the exothermic process taking place at minus 60° is estimated in Ghormley's paper at 44 kgcals per mol of O₂, which differs from the value determined at Moscow State University. It is true that the method of evaluating the reaction heat that had been applied by Ghormley could only have been expected to furnish a value which indicates the order of magnitude of the thermal effect.

13. Hungarians Produce Gallium

"Gallium, Which Is Worth Four Times As Much As Gold, Is Being Produced From Hungarian Bauxite," by Laszlo Lantos, Budapest, Esti Hirlap, 27 Jul 57, p 1

According to the author, Elemer Papp, department head of the Metal Industry Research Institute (Femipari Kutato Intezet) and Jozsef Uveges, deputy department head of the institute, succeeded in the summer of 1956 in producing a small quantity of pure gallium from the caustic solution used in the production of alumina.

Uveges says, "Since then we have completed large-scale laboratory experiments. So far, we have obtained 30 grams of gallium.... About 10,000 cubic meters of caustic solution which contains gallium is at present circulating in the installations of our alumina factories," he continues. "From approximately 10 cubic meters of this caustic solution, we can produce one kilogram of gallium."

Uveges would like to establish a pilot plant which, he feels, could be equipped inexpensively with instruments and installations made entirely of domestic materials. "At the pilot plant, even with simple equipment," he maintains, "we could produce 2 kilograms of metal per month.... Our method is cheap. The alumina factories will supply the caustic solution and we do not use any sort of imported auxiliary material.... As a by-product of our process we obtain washing soda."

Uveges says that the process evolved by him and Papp has not been patented, but has been put at the disposal of international science; they have described it in detail in local and foreign periodicals.

Insecticides and Rodenticides

14. New Rodenticidal Preparations

"Some New Preparations for Disinfestations," by I. P. Yershova, All-Union Institute for the Protection of Plants, VASKhNIL; Moscow, Gigiyena i Sanitariya, No 11, Nov 57, p 96

At present, the author points out, the Sanitary Epidemiological Service and agriculture in general are faced with the problem of searching for new rodenticidal preparations because of the resistance being built up by rats and other pests to the present-day preparations.

Among the preparations being investigated are the coumarin compounds, because of their anticoagulant and noncumulative properties', the indandion series; fluoramines; and ethylene-fluorhydride and pyrophosphoric acid.

Anticoagulant compounds, the author explains, are being introduced in the USSR as rodenticides. The principle is that when coagulation time is reduced the pest becomes susceptible to a fatal blood hemorrhage. One of these compounds, warfarin, has been successfully synthesized and tested by the Central Scientific Research Disinfection Institute.

[For additional information on insecticides and rodenticides, see Item No 90.]

Biochemistry

15. Decreased Blood Thromboplastic Activity Attributed to Bartonellosis

"Deficiency of Blood Prothrombokinase and of Thrombotropin in Splenectomized Rats," by B. A. Kudryashov, T. M. Kalishevskaya, V. Ye. Pastorova, and M. Ye. Preobrazhenskaya, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 114, No 5, 11 Jun 57, pp 1128-1131

Some albino rats (262) were subjected to complete, and others (149) to partial splenectomy, and a third group (145) served as controls and were not operated on.

Various tables illustrate changes in the thromboplastic activity of blood after partial or complete splenectomy; changes in concentration of thrombotropin in plasma; changes in hemoglobin, erythrocytes, and blood platelets; and changes in thromboplastic activity of blood of rats following complete splenectomy with and without the administration of novarsenol (neocarsphenamine).

Results indicate that the deficiency of blood prothrombokinase (factor 3 of blood platelets) arising after complete splenectomy of rats is due, almost with no exception, to latent infection with *Bartonella muris*, the infectious agent for bartonellosis. Therefore, deficiency of blood platelets with regard to their prothrombokinase (factor 3) content may be due to infectious toxicosis blocking the formation of blood thrombokinase. This blockage of blood thromboplastic activity may be amended by means that rid the animals of the infection.

16. Inactivation of Adenosine Triphosphate by Isolated Kidneys in Situ

"On the Inactivation of ATP in situ by Isolated Kidneys of Cats," by A. Tshebskiy and T. Ksheskiy, Byul. Pol'skov A. N. (Bulletin of Polish Academy of Sciences), Department 2, 4, No 11, 1956, 417-420 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 21, 10 Nov 57, Abstract No 23727, p 62.

Intra-arterial and intravenous administrations of adenosine triphosphate (ATP) to cats lead to decreased blood pressure. However, no fall of blood pressure is observed if ATP first passes through isolated kidneys and then through the general circulation. Perfusion of the kidneys by ATP solution, also, causes the solution to lose its hypotensive properties. Preliminary passage of a solution of $MgSO_4$ through the kidney vessels decreases the capacity of the kidneys to inactivate the ATP.

Nuclear Chemistry

17. Investigation of Chromatographic Separation of Rare-Earth Elements

"Theory of the Separation of Rare-Earth Elements by the Chromatographic Method," by N. N. Tunitskiy, V. V. Nekrasov, and Ye. P. Cherneva, Scientific Research Physicochemical Institute imeni L. Ya. Karpov, Ministry of Chemical Industry USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 66-73

A theory of the washing-out (broadening) of chromatographic bands of rare-earth elements has been developed. It has been demonstrated that experimental data pertaining to the dependence of the washing-out of chromatographic peaks on the velocity of the flow of the solvent are in agreement with the theory. The experimental data in question were obtained by using La^{140} and Eu^{154} .

The diffusion coefficients of a number of rare-earth elements in KU-2 resin (polystyrene sulfonic acid) washed with different solvents (eluants) were determined. It was found that at a low pH these coefficients are practically the same with hydrochloric acid as with citric acid. When the pH is raised, the diffusion coefficients increase. They also increase with higher atomic numbers of the rare-earth elements.

The conditions under which rare-earth elements can be separated chromatographically have been defined, and an equation has been derived for the calculation of the minimum time necessary for the separation of two elements from each other.

[For additional information on nuclear chemistry, see Item No 29.]

Nuclear Fuel and Reactor Materials Chemistry and Technology

18. Some Exhibits at USSR Exposition on Peaceful Uses of Nuclear Energy

"New Exhibits at the Pavilion of Peaceful Uses of Nuclear Energy at the All-Union Industrial Exposition", by F. Musayev; Moscow, Atomnaya Energiya, Vol 3, No 12, Dec 57, pp 558-559

The All-Union Industrial Exposition has been open at Moscow for the second year. The exhibition on the peaceful uses of nuclear energy, which forms a part of the All-Union Industrial Exhibition, is housed in a special pavilion. Many changes have been made in this pavilion during the second year of the exhibition (1957) and many new exhibits added. In the subdivision of nuclear raw materials, the following exhibits are of interest: the aerogeophysical installation ASG-38, which is equipped with a scintillation aerogamma-radiometer-analyzer and makes it possible to detect uranium and thorium deposits; the laboratory scintillation analyzer LAS by means of which qualitative and quantitative analyses of samples of radioactive ores can be made and the absolute and relative content of uranium and thorium in them determined; and the field radiometer SG-42 equipped with a scintillation counter.

A part of this subdivision contains exhibits pertaining to the determination of the absolute age of rocks.

In the subdivision of nuclear reactor materials, tables listing the principal characteristics of materials used in the construction of reactors are being shown for the first time.

An extensive collection of protective equipment and dosimetric devices is shown. Much new equipment is exhibited, including the dosimetric control assembly ILK-1 for individual use. The operation of this dosimeter is based on the use of tablets of scintillation crystal-phosphors which have the property of accumulating energy when exposed to the action of radiation emitted by radioactive substances. The energy accumulated

in the tablet is proportional to the radiation dose and is preserved in the tablet for a sufficiently long period of time. On subsequent illumination of the tablet with infrared light, the energy that has accumulated is spent as a result of de-excitation. On the basis of the intensity of the scintillation of phosphor, the dose of radiation to which the tablet has been exposed can be determined.

The following exhibits are also shown in this subdivision:

The electrofilter EF-2, which is a portable device fed by alternating current from the network and is designed for taking samples of air with the purpose of determining the concentration of alpha- and beta-active aerosols in the atmosphere -- The aerosols are precipitated to the extent of 85-95%. With the aid of this apparatus, one can measure concentrations of radioactive aerosols as low as 10^{-15} curies per liter.

A universal scintillation dosimeter for the control of the safety of work conditions as far as exposure to radiation is concerned -- This dosimeter measures radiation emitted by radioactive substances with the aid of an assortment of scintillation devices and a photoelectronic multiplier of the FEU-25 type.

A network radiometer of the RN-3 type for the measurement of the magnitude of the flux of fast and thermal neutrons -- This appliance makes it possible to determine the intensity of the flux of fast neutrons in the energy range of 0.5-14 Mev. Signalization when the magnitude of the neutron flux exceeds any one of two independently set levels is provided for. The apparatus is equipped with an automatic recording device.

A portable radiometer of the RN-4 type for fast and thermal neutrons, which has the same characteristics as the RN-3 device, but is more compact.

A field alpha-radiometer of the RAP-1 type for the determination of the alpha-activity of samples of various substances at radiometric field laboratories and also at stationary laboratories -- This apparatus can be used for the detection of the contamination of surfaces of various objects with alpha-active substances. The range in which measurements can be conducted is 50,000-100,000 decay processes/min \times cm^2 .

A part of this subdivision of the exposition is devoted to the planning of radiological laboratories. In 1957, two new subdivisions were created at the exposition, namely, that of science and technology and that of the production of isotopes. In the subdivision of the production of isotopes visitors are familiarized with methods for the production of radioactive and stable isotopes.

A large subdivision of the exposition concerns with the applications of radioactive isotopes and of radiation in the economy. This subdivision was supplemented by new devices. The most interesting among them are a device for measuring the water content of the soil (IVP-64) and an apparatus which measures the use of gas (RGR-1). The IVP-64 device measures the water content of the soil under field conditions without the necessity of taking soil samples and drying them in a drying closet. This device can be employed for measuring the moisture accumulated in the form of snow during snow observation surveys and for determining the evaporation from the surface of the soil. It is adapted to work with tracer atoms. The principle of measuring the water content of the soil is based on the weakening of the intensity of gamma rays when they pass through the soil.

The RGR-1 device is a meter for determining the use of gas in general industrial applications by uninterrupted measurements at a distance and for recording and controlling the quantities of different gases used without interruptions in the flow of the gas or introduction of sensitive elements into the gas conduit. The operation of the RGR-1 device is based on a compensation method for measuring the time necessary for the displacement of an accumulation of ions produced in the gas periodically by irradiation with the radioactive isotope Ru¹⁰⁶.

In the same subdivision of the exposition work is demonstrated that was reported at the Moscow Conference on the Application of Radioactive Isotopes and of Radiation in the People's Economy (April 1957). This includes an investigation on the killing of silk worm pupae with gamma radiation. This work has been conducted at the Institute of Silk Culture, Academy of Sciences Georgian SSR.

Of interest is the model of an experimental installation for the irradiation of potatoes with gamma rays demonstrating a method by means of which the process of photosynthesis under conditions corresponding to the natural growth of the plant can be studied. There are also a number of devices applied in radiobiology, for instance, an apparatus for measuring the intensity of the radiation emitted by tracer atoms (IMA-1), which operates either on alternating network current or on current supplied by batteries. With the aid of the IMA-1 device, one may record beta and gamma radiation under field or stationary conditions.

A special subdivision is devoted to the application of radioactive isotopes and radiation in medicine. A GUT-Co 400 therapeutic installation for treatment with gamma rays and a model of a 25-Mev betatron installation for medical applications are exhibited there.

19. Electrolytic Deposition of Thorium

"Electrolytic Reduction of Thorium Tetrachloride in Salt Melts," by L. D. Yushina, Ural Affiliate of the Academy of Sciences USSR; Moscow, Zhurnal Obschey Khimii, Vol 28, No 1, Jan 58, pp 272-276

The electrolytic reduction at 700° of thorium tetrachloride at the cathode in alkali chloride melts containing 16.1% by weight of ThCl₄ has been investigated. It has been established that thorium of lower valencies reacts energetically not only with silicate materials (quartz, glass, and porcelain) and alundum, but also with a number of metals (Pt and Ta), forming thorium alloys of these metals.

20. Behavior of Perchloric Acid During Extractions With Tributyl Phosphate and Distribution of Uranyl Perchlorate Between the Aqueous and Organic Phases

"The Extraction of Perchloric Acid and of Uranyl Perchlorate With Tributyl Phosphate," by V. B. Shevchenko, I. V. Shilin, and A. S. Solovkin, Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 225-230

It is assumed that the perchlorate ion has no tendency to form complexes with actinide elements. For this reason perchloric acid and soluble perchlorates are often used to maintain at a constant ionic strength aqueous solutions being extracted with tributyl phosphate (TBP). The extraction of perchloric acid by TBP is generally regarded as negligible and for that reason disregarded. This assumption is far from being correct: there is a tendency toward HClO₄ - TBP complex formation which is comparable in magnitude with the tendency of nitric acid to form a complex with TBP.

The distribution of uranyl perchlorate and of perchloric acid between water and an organic solution containing TBP was investigated. It was found that the transfer of UO₂(ClO₄)₂ and of perchloric acid into TBP is determined by the ionic strength of the aqueous solution, the concentration of TBP in the organic phase, the nature of the organic solvent with which TBP is diluted, and also (in the case of uranyl perchlorate) the salting-out effect of alkali metal cations. It was demonstrated that the graphic method of determining the composition of the complex compound extracted by TBP is inapplicable in the cases of uranyl perchlorate and of perchloric acid.

21. Extraction of Perchloric Acid in Connection With Separation of Zirconium by Means of Tributyl Phosphate

"Extraction of Perchloric Acid With Tributyl Phosphate," by N. S. Povitskiy, A. S. Solovkin, and I. V. Shilin; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 222-224

In work done earlier by A. S. Solovkin on the extraction with tributyl phosphate (TBP) of zirconium from nitrate solutions containing perchloric acid, it had been found that some perchloric acid is also extracted (cf. Zhurnal Neorganicheskoy Khimii, Vol 2, No 2, February 1957, p 611). The distribution of perchloric acid between water and an organic solvent phase consisting of TBP and kerosene was investigated. It was established that at an ionic strength of the solution amounting to ~ 3 , the equilibrium constant of the reaction of formation of a complex between perchloric acid and TBP equals $(6.7 \pm 0.5) \times 10^{-2}$. It was also established that the formation of a third phase in the system $\text{HClO}_4 - \text{H}_2\text{O} - \text{TBP} - \text{kerosene}$ takes place in an extensive concentration range of TBP (0.25 - 2 M).

22. General Relationships Pertaining to Viscosity of Liquid Metals

"Thermodynamic Similarity and the Viscosity of Molten Metals," by A. N. Solov'yev; Moscow, Atomnaya Energiya, Vol 3, No 12, Dec 57, pp 550-552.

An attempt has been made to define the viscosity-temperature relationships applying to groups of thermodynamically similar metals when these metals are in a liquid state. Correlations were established between the thermodynamic groups and the arrangement of the metals according to subgroups of the periodic system as well as on the basis of crystal-chemical structural characteristics. Plotting of the dependence of $\ln \frac{\eta}{\eta_m}$

(where η is the viscosity and η_m the viscosity at the melting point on the ratio of the temperature of melting to the temperature for Na, K, Li, Rb, Cs, Sn, Hg, Sb, Bi, and Ga resulted in two curves (corresponding to two groups), of which one expresses the dependence for the alkali metals except lithium and the other for all remaining metals. In plotting these curves, data from the literature and original experimental results were used. Cu, Ag, Zn, and Pb were not considered, because the available data on their viscosities were either incomplete or unreliable.

Within the limits of a group, one can calculate the viscosity of any metal at any temperature on the basis of the viscosity at the melting point and the melting temperature.

[SIR Note: The results obtained are of value in connection with the use of liquid and molten metals as reactor coolants.]

23. Concentration of Niobium With Ion-Exchange Resins

"Application of Ion Exchange in the Investigation of the State of Substances in Solution, Part 3 -- Investigation of the Forms in Which Niobium Is Present in Sulfuric and Perchloric Acid Solutions," by V. I. Paramonova and S. A. Bartenev; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 74-81

On the basis of experimental results obtained in an investigation of the adsorption of niobium-95 from sulfuric and perchloric acid solutions by cation-active and anion-active resins, the following conclusions were made:

1. In 2N sulfuric acid solutions, 2N perchloric acid solutions, and mixtures of these solutions niobium is present in at least four different forms: cations, neutral complexes, anionic complexes, and a colloidal form.
2. Niobium-95 in a colloidal state was found to be present in all the solutions investigated. The quantity of colloids apparently decreases with increasing concentrations of sulfuric acid.
3. Niobium cations are present in 1-2 N HClO_4 + 1 N H_2SO_4 solutions.
4. Neutral niobium complexes are present in all ranges of sulfuric acid concentration.
5. The formation of anionic complexes of niobium with sulfuric acid is not very pronounced at sulfuric acid concentrations lower than 1 N. At concentrations above 1 N the formation of such complexes becomes significant.
6. The method of adsorption curves makes it possible to determine the regions in which niobium-95 cations and neutral and anionic complexes of niobium-95 exist, although the composition of the compounds and/or complexes in question is not known.
7. On the basis of a graphic representation of cationic adsorption, anionic adsorption, and relative adsorption (ratio of absolute adsorption to maximum adsorption) of niobium-95, the region in which colloidal forms of niobium exist could be determined.
8. The presence of colloidal forms of niobium did not have any influence on the general type of distribution of cations and neutral and anionic complexes in the solutions studied.

24. Soviets Extract Uranium From Pacific

"Uranium From Ocean Water" (unsigned article), Budapest,
Nepakarat, 18 Dec 57, p 4

After prolonged research, Soviet scientists have succeeded in extracting uranium from ocean water. Their procedure was successfully tested in several parts of the Pacific Ocean.

Organic Chemistry

25. Esters of Ethylthioarsenous Acid Synthesized

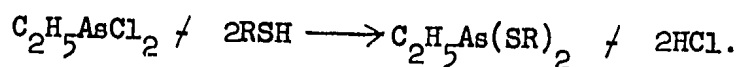
CPYRGHT

"Concerning Alkyl Esters of Ethylthioarsenous Acid," by Gil'm Kamay and N. A. Chadayeva; Moscow, Doklady Akademii Nauk SSSR, Vol 115, No 2, Jul 57, pp 305-307

"The esters of thioarsenous, alkyl- and arylthioarsenous acids have been sparsely investigated. [1] [Bracketed numbers refer to appended bibliography.] The patent literature [2] describes some esters of arylthioarsenous acid as substances having therapeutic activity.

"In the present work, the synthesis and properties of alkyl esters of ethylthioarsenous acid of the general type $C_2H_5As(SR)_2$ are described.

"In our investigations we first studied the direct reaction of ethyldichloroarsine with corresponding mercaptans according to the equation:



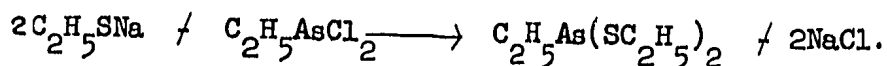
"Experiments on the first method were conducted as follows. The required amount of mercaptan was placed into an Arbuzov distillation column to which ethyldichloroarsine was added dropwise from a separatory funnel. The vigorously released hydrogen chloride was displaced by a stream of dry carbon dioxide. After the ethyldichloroarsine was all added, the mixture was heated slowly first to the boiling point of the mercaptan and then gradually to a temperature of 190-200° over a period of 3 hours. The reaction products were then distilled under vacuum. In this way, we synthesized the ethyl, n-propyl, n-butyl, and isoamyl esters of ethylthioarsenous acid.

"By a second method, i.e., the reaction of ethyldichloroarsine with the corresponding mercaptan in an ether medium and in the presence of anhydrous pyridine, we prepared the ethyl, n-butyl, and n-hexyl esters of ethylthioarsenous acid.

"It should be noted that the purest products are obtained if the filtrate is quickly washed with ice water after the pyridine hydrochloride salt is separated from the initial mixture.

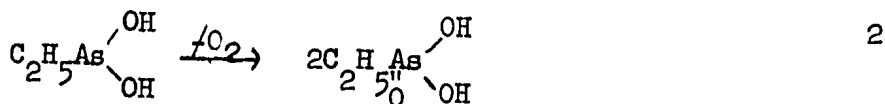
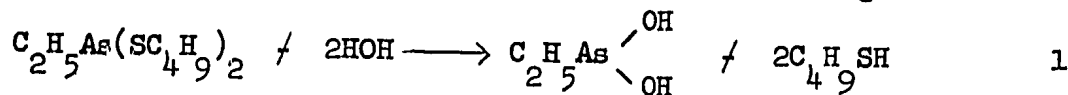
CPYRGHT

"The ethyl ester of ethylthioarsenous acid was also prepared by a third method according to the equation:



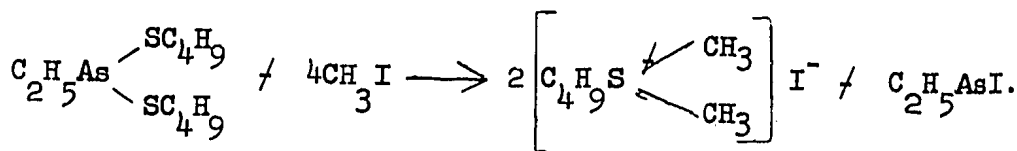
"The physical constants for the thioesters we isolated are listed in the table [below]. The alkyl esters we synthesized are clear, colorless liquids that have an unpleasant persistent odor and that are readily soluble in many organic solvents.

"Hydrolysis of alkyl esters of ethylthioarsenous acid in the cold and at room temperature takes place rather slowly; on standing in the air, a white residue is formed. Ethylarsenic acid was separated out after the n-butyl ester of ethylthioarsenous acid was heated with water. Its formation can be readily explained with the aid of the following reactions:



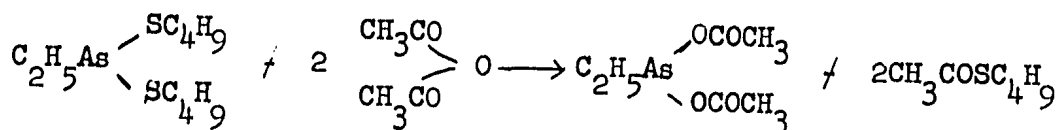
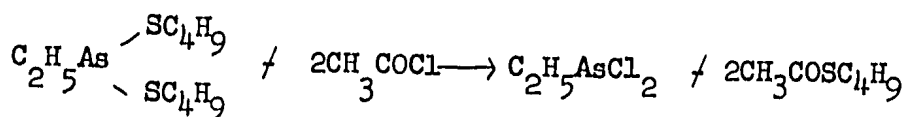
Equation (1) is identical to the equation for the hydrolysis reaction for analogous compounds as reported by Waters and Williams. [3]

"Next, we studied the reaction between n-butyl ester of ethylthioarsenous acid using the iodine method. After an equimolecular mixture methyl iodide and the n-butyl ester of ethylthioarsenous acid was left standing for 13 days at a temperature of 20-22°, white crystals were separated out. They were readily soluble in water and alcohol, but insoluble in ether. According to the analysis data, this substance was dimethyl-n-butylsulfonium iodide. The formation of the latter can be explained by the following equation:



Thus, it was shown that alkyl esters of ethylthioarsenous acid do not form arsonium-type compounds under the action of methyl iodide, and owing to the presence of the more reactive centers at the sulfur atoms the As-S bond ruptures with the formation of sulfonium compounds.

"We also studied the reactions between the n-butyl ester of ethylthioarsenous acid with acetyl chloride and with acetic anhydride. In both cases a double exchange reaction occurs that is analogous to reactions studied earlier between acid chlorides and anhydrides of carboxylic acids with esters of arsenous and alkylarsenous acids [4] by the following equations:



Both reactions require prolonged heating for 5-18 hours at a temperature of 150-160°. The S-butyl ester of thioacetic acid which we separated out by these reactions is in the form of a colorless clear liquid with a sharp odor, somewhat similar to the odor of butyl acetate. The ester is readily soluble in organic solvents but is insoluble in water. The boiling point is 89°/74 mm; d_4^{20} 0.9441; n_D^{20} 1.4598.

CPYRGHT

Table

Formula	Method of Prep.	Boiling Point in °C/mm	d_4^{20}	n_D^{20}	MR _D Found	R _D Arsenic	As, %		S, %		Yield, %
							Found	Calc'd	Found	Calc'd	
C ₂ H ₅ As (SC ₂ H ₅) ₂	I	80-82/2	1.2555	1.5750	59.54	10.412	33.51	33.11	28.65	28.35	30.4
	II	81-82/2	1.2593	1.5747	59.34	10.21	32.92	33.11	28.65	28.35	35.5
	III	75-77/1.5	--	1.5749	--	--	33.28	33.11	28.9	28.35	41.9
C ₂ H ₅ As (SC ₃ H ₇) ₂	I	101-102/2	1.1906	1.5565	68.70	10.34	29.38	29.45	25.58	25.22	40.3
C ₂ H ₅ As (SC ₄ H ₉) ₂	I	122-123/2	1.1400	1.5442	78.19	10.69	26.61	26.53	23.26	22.71	54.7
	II	122-123/2	1.1374	1.5441	78.37	10.97	26.12	26.53	22.96	22.71	59.4
	IIa	120-123/2	1.1396	1.5442	78.23	10.63	26.38	26.53	22.51	22.71	43.5
C ₂ H ₅ As (SC ₅ H ₁₁) ₂ ^u	I	135-136/2	1.0957	1.5324	87.33	10.99	24.07	24.14	20.99	20.66	43.2
C ₂ H ₅ As (SC ₆ H ₁₃) ₂	II	163-164/1.5	1.0778	1.5280	96.62	10.55	21.84	22.13	18.78	18.95	31.3

"Bibliography

1. M. P. Classon, Bull. Soc. Chim. (2) 25, 185 (1876); R. Klement, R. Reuber, Ber., 68 1761 (1935). W. A. Waters, J. H. Willams, J. Chem. Soc. (1950), 18; H. J. Bielig, G. Lutzel, A. Reidies, Ber., 89, 3, 775 (1956).
2. E. Urbschat, USA Pat., 2 644 005, June 30, 1953; Chem. Abstr., 47, 3343e (1953); E. A. H. Friedheim, Brit. Pat., 655 435, July 18, 1951; Chem. Abstr., 47, 144 (1953); L. A. Sweet, E. W. Tillitson, USA Pat. 2566 382 (1951); Chem Abstr., 46, 2576 (1952); Takakhasi, Ueda, American Patent 2 701812, 8 II 1955; RZhKhim, No 4, 10777 P. 1956.
3. W. A. Waters, J. H. Willams, J. Chem. Soc., (1950), 18.
4. Gil'm Kamay, N. A. Chadayeva, Zhur Obshch Khim, 26, 2468 (1956); Gil'm Kamay, N. A. Chadayeva, Dok Akad Nauk SSSR, 95, 81 (1954); Gil'm Kamay, Z. L. Khisamova, Zhur Obshch Khim, 26, 411 (1956)."

[For additional information on organic chemistry, see Items No 81 and 82.]

Radiochemistry

26. Prevalent Trends in USSR Work in Radiochemistry and Future Developments in This Field

"Introduction to Published Papers Presented at the First All-Union Conference on Radiochemistry," by I. Ye. Starik, Corresponding Member, Academy of Sciences USSR, chairman of the Organizational Committee, First All-Union Conference on Radiochemistry; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 3-5

The First All-Union Conference on Radiochemistry, held in March 1957 at Leningrad, was actually not the first but the second conference on this subject, because one already had been held in 1932 at Leningrad on the initiative of the Radium Institute. It was called the First Conference on Radioactivity and covered to a considerable extent subjects discussed at the conference held in March 1957.

However, during the past 25 years a major change has taken place in radiochemical research because of the discovery of nuclear energy. Radiochemistry, which in the 1930s was only a minor field of theoretical science,

has penetrated into all nooks and crannies of theory and practice and forms at present a very precise method of investigation, the role and significance of which cannot be overestimated. It is not surprising under the circumstances that the number of radiochemists grows very rapidly. A great number of young specialists in this field has appeared. These specialists do excellent work on the tasks with which they are faced. In organizing the first All-Union Conference on Radiochemistry, the organizational committee started from the premise that at meetings held in recent years problems pertaining to the application of tracer atoms were discussed for the most part, while insufficient attention was paid to the basic problems of radiochemistry. Without a study of these problems, the method of tracer atoms cannot be successfully applied. It was decided to select a limited number of the most important problems in radiochemistry for immediate attention and cover work on other problems at subsequent conferences.

The following problems of theoretical radiochemistry were discussed at the conference:

1. The state in which small quantities of radioactive substances occur in solutions and solids.
2. The laws governing the coprecipitation of microquantities of radioelements with crystalline precipitates formed in solutions and melts.
3. The adsorption and chromatography of radioactive substances.
4. The distribution of microquantities of radioactive elements between two liquid phases.
5. Methods for the isolation of carrier-free radioactive elements.
6. The chemistry of some radioactive elements (promethium, technetium, protoactinium, neptunium, americium, and curium).

The conference noted with satisfaction that there has been further progress in branches of radiochemistry which are traditional for USSR work in this field, i.e., the theory of states in which substances occur in solutions and solids and the investigations of the laws of coprecipitation. In addition, work in new subdivisions of radiochemistry has advanced to a considerable extent. The conference recognized as desirable more extensive participation of specialists in the fields of crystal chemistry, X-ray analysis, and thermodynamics in work on the theory of coprecipitation. Furthermore, the conference recommended that more extensive investigations be conducted on solubilities, vapor tensions, densities, and other aspects of phenomena involved in research on extraction processes.

It has been proposed that conferences on radiochemistry be called every 3 years. At the next conference, the following subjects should be considered: (a) the chemistry of hot atoms, (b) the radiochemistry of radioactive elements, (c) the application of radiography in radiochemistry, and (d) the chemistry of individual elements. It has been proposed to conduct a permanent seminar on coprecipitation and adsorption between the conferences. A seminar on the state in which microquantities of radioelements occur in solutions and on the laws of the behavior of these elements is planned for the end of 1957 at Leningrad. It has been decided to conduct a seminar on the theory of extraction in Moscow in 1958.

To assure future progress of Soviet radiochemistry, the conference regarded it is necessary to make the following recommendations:

1. The Department of Chemical Sciences, Academy of Sciences USSR, should be requested to organize at one of the institutes of the academy a special laboratory for the synthesis of organic solvents and complex-formers to be employed in extractions and chromatography.
2. To assure further expansion of work on chromatography, the Commission on Chromatography, Department of Chemical Sciences of the Academy of Sciences USSR, should be requested to take measures for increasing the number of available ion-exchange resins. Furthermore, prototype models of automatic laboratory equipment should be designed, constructed, and distributed.
3. There should be more extensive investigations of methods for the separation of carrier-free radioisotopes, particularly methods involving the application of organic compounds for this purpose. The Department of Chemical Sciences, Academy of Sciences USSR, and other organizations should be requested to take measures which will assure a supply of radiochemically pure preparations.
4. The Ministry of Higher Education USSR should be requested to introduce the instruction of radiochemistry as a compulsory subject at chemical higher educational institutions.
5. In view of the ever-increasing volume of work in radiochemistry, the Presidium of the Academy of Sciences USSR should be requested to initiate in 1958 the publication of a new periodical devoted to this subject and entitled "Radiochemistry."

6. The Department of Chemical Sciences, Academy of Sciences USSR, should be requested to organize a permanent committee the task of which will be organization of conferences on radiochemistry. A number of papers presented at the first All-Union Conference on Radiochemistry are being published in Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, January 1958. Other papers presented at this conference have already been published. It had not yet been possible to publish some of the reports given at the conference: they will appear later in Zhurnal Neorganicheskoy Khimii.

27. Migration of Natural Radioactive Isotopes

"The Problem of the Behavior of Natural Radioactive Isotopes," by V. I. Baranov, A. M. Babeshkin, and K. B. Zaborenko, Laboratory of Radiochemistry, Chemical Faculty, Moscow State University, Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 16-19

To investigate the mechanism of the migration of isotopes of radium and thorium, the behavior of these isotopes on interaction with solutions of compounds the crystal lattices of which are isomorphous with radium compounds was studied. It was established that the behavior of thorium isotopes does not depend so much on the crystal form of the initial compounds as on the chemical characteristics of thorium: this must be considered in evaluating the migration capacity of thorium isotopes in nature. The effect of the recoil energy (length of free path) on the accumulation and distribution of recoil atoms in solids has been investigated and a mechanism of the phenomena involved proposed. It has been demonstrated that the ratio of radium isotopes depends on the number of layers of solid which enter into exchange with the solution. The mechanism proposed was found to explain satisfactorily the experimental results.

28. Improved Method for Determination of Khlopin's Constant

"Determination of V. G. Khlopin's Distribution Constant by the Method of Partial Recrystallization of the Solid Phase," by V. I. Grebenshchikova and R. V. Bryzgalova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 36-39

A method has been developed for the determination of V. G. Khlopin's constant D by a procedure that involves partial recrystallization of the solid phase and application of radioactive tracers. The method that has

been proposed is as precise as those already used. It is considerably more rapid than that in which equilibrium is reached from above or from below: hours, rather than weeks or months, are needed for the determination of the crystallization coefficient. The method described is also preferable to that of separation of the solid phase from supersaturated solutions, because it can be applied in the case of difficultly soluble salts and is suitable for determinations at any temperature up to the boiling point of the solution. In the work described, lanthanum oxalate functioned as the macrocomponent, Am^{241} as the microcomponent, and La^{140} as the radioactive tracer.

29. Investigation of Coprecipitation of Lanthanum, Cerium, and Americium With Aid of Radioactive Isotopes and Determination of Type of Mixed Crystals Formed

"Coprecipitation of Lanthanum, Cerium, and Americium With Potassium Sulfate," by V. I. Grebenshchikova and V. N. Bobrova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 40-45

The coprecipitation of Am^{241} , La^{140} , and Ce^{141} with K_2SO_4 was investigated with the use of the radioactive isotopes La^{140} and Ce^{141} . On the basis of the results obtained, it was concluded that the systems $\text{K}_2\text{SO}_4\text{-La}_2(\text{SO}_4)_2\text{-0.5HNO}_3$, $\text{K}_2\text{SO}_4\text{-Ce}_2(\text{SO}_4)_3\text{-0.5HNO}_3$, and $\text{K}_2\text{SO}_4\text{-Am}_2(\text{SO}_4)_3\text{-0.5HNO}_3$, which had been investigated, form anomalous mixed crystals which do not have a lower limit of miscibility.

30. Distribution of Microcomponents in the Crystallization of Inorganic Salts

"Concerning the Limits of Applicability of the Linear Law of Distribution in Aqueous Salt Systems With True Isomorphous and Isodimorphous Components," by G. I. Gorshteyn, All-Union Scientific Research Institute of Chemical Reagents; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 51-58

Work done during 1950-1957 at the All-Union Scientific Research Institute of Chemical Reagents on the combined crystallization of true isomorphous and isodimorphous substances from aqueous solutions is summarized. The work in question has a bearing on practical problems arising in connection with the industrial purification of inorganic salts. In the experimental research described, Khlopina's constant D (called variously the

coefficient of distribution, the coefficient of crystallization, and occasionally also the coefficient of isomorphous mixing or the coefficient of fractionation) was determined at various temperatures in different concentration ranges. The question in regard to the continued validity of the distribution laws following transition from microconcentrations to macroconcentrations was studied. It was found that the linear law of distribution is applicable in a much more extensive range than had been originally assumed: in a number of systems that have been studied, the coefficient of distribution remains nearly constant at any micro- or macroconcentrations of the salt components as long as a solid phase with a definite structure remains stable.

In a system consisting of two isomorphous components A and B, the two Khlopin constants $D_{(B)A}$ and $D_{A(B)}$ are related inversely at microconcentrations of both components, i.e., $D_{(B)A} = 1/D_{A(B)}$.

Ideal systems (i.e., systems in which D is constant) with a $D = 1$ are denoted as congruent. In some systems, although considerable deviations from ideal behavior were exhibited, the values of D were found to remain approximately constant (within a limit of 5%) on transition from microconcentrations to rather extensive ranges of macroconcentrations. These systems may be designated as semi-ideal. The reasons for the ideal and semi-ideal nature of systems are discussed.

The experimentally established retention of the linear law of distribution on transition from microconcentrations of isomorphous and isomorphous components to macroconcentrations is of considerable practical importance in connection with work on problems related to the fractionation of salts, specifically salts of rare-earth elements and other rare elements.

Radioactive isotopes were used extensively in the work described.

31. Isolation of Radioactive Isotopes From Carbonyls

"The Use of Carbonyls for the Isolation of the Radioisotopes Cr^{51} , Mo^{99} , W^{187} , Tc^{99m} , and Re^{188} ," by V. D. Nefedov and M. A. Toropova; Moscow, Zhurnal Neorganicheskoy Khimii, No 3, No 1, Jan 58, pp 175-180

Methods have been developed for the enrichment of the radioactive isotopes Cr^{51} , Co^{60} , and W^{187} by using hexacarbonyls of these elements as initial compounds. The enrichment factors for Cr^{51} , Mo^{99} , and W^{187} were found to be 1.8×10^4 , 3×10^4 , and 0.7×10^4 , respectively, with yields of radioactive atoms amounting to 30%, 34%, and 55% after the enrichment.

It was established that the radioactive chromium which has been extracted with water from a chloroform solution of chromium hexacarbonyl is predominantly in the trivalent state.

It was also established that the radioactive tungsten which has not been extracted by water remains in the form of the initial compound, i.e., of tungsten hexacarbonyl. It is assumed that the radioactive atoms of chromium and molybdenum are also retained in the form of the carbonyls of these elements.

Methods have been developed for the isolation of carrier-free Tc^{99m} and Re^{188} with the use as initial compounds of molybdenum carbonyl and tungsten carbonyl containing the radioactive isotopes Mo^{99} and W^{188} .

It was found that the retention of Re^{188} after extraction with water is considerably greater in the case when the radioactive isotope has been allowed to accumulate in tungsten hexacarbonyl crystals (these crystals were dissolved in chloroform before extraction) than in the case when accumulation has taken place in chloroform solutions of the carbonyl. This result indicates that a considerable amount of retention occurs because of reactions of hot atoms with molecules of the initial compound.

It was established that the fraction of processes of the decay of W^{188} which lead to the formation of Re^{188m} comprises less than 1-2% of the total number of transformations. Thus the decay of W^{188} proceeds for all practical purposes directly to the ground level of Re^{188} (half life = 16 hours).

32. Isolation of Carrier-Free Technetium-99m

"Isolation of Carrier-Free Technetium-99m by the Method of Breakage of Chemical Bonds During beta-Decay," by V. D. Nefedov and M. A. Toropova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 231-234

A new method for the isolation of carrier-free Tc^{99m} has been developed in which the Tc^{99m} is extracted with water from a chloroform solution of radioactive molybdenum hexacarbonyl containing Mo^{99} that forms Tc^{99m} by beta-decay. The extraction was found to be practically complete.

33. Theory of Retention in Szilard-Chalmers Process

"Concerning the Problem of Primary Retention in the Szilard-Chalmers Process," by Kritian Svoboda, Institute of Nuclear Physics (Prague), Czechoslovak Academy of Sciences, and Institute of Geochemistry and Analytical Chemistry imeni Vernadskiy, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 187-194

While extensive experimental work has been done on the Szilard-Chalmers process with regard to different elements present in various compounds, the theoretical aspects of the underlying phenomena were not studied adequately. An attempt has been made, therefore, to develop a theory of primary retention occurring in this process. Four types of retention have been considered together with the effects which bring them about. A formula has been derived which expresses the correlation between the individual types of retention and the total retention. Expressions have also been formulated by means of which the primary retention can be determined in cases when one, two, three, or a greater number of gamma-quanta is emitted. The effect of inner non-elastic collisions in increasing the primary retention has been considered.

34. Mechanism of Adsorption of Radioactive Isotopes on Aluminum Hydroxide

"The Adsorption of Radioactive Isotopes by Aluminum Hydroxide," by S. A. Voznesenskiy, V. V. Pushkarev, and V. F. Bagretsov. Ural Polytechnic Institute imeni S. M. Kirov, Sverdlovsk; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 3, No 1, Jan 58, pp 235-239

The adsorption by aluminum hydroxide precipitates of cesium-137, strontium-89, strontium-90, ruthenium-106, and cerium-144 present in micro-concentrations was investigated. It was found that the adsorption of strontium, cerium, and ruthenium reaches a maximum value at a definite pH characteristic for every element: 7.0 for ruthenium, 7.5 for cerium, and 9.0 for strontium. Cesium was not adsorbed under the experimental conditions used. On the basis of the behavior of the isotopes which was observed, the conclusion is drawn that ruthenium and cerium are adsorbed by an ion-exchange mechanism, while strontium is adsorbed because of the formation of an aluminate. The significance of the results obtained from the standpoint of the purification of radioactive laboratory effluents is discussed.

35. Method of Spectrophotometric Analysis of Actinium

"The Spectral Analysis of Small Samples of Actinium," by N. I. Kaliteyevskiy and A. N. Razumovskiy; Moscow, Atomnaya Energiya, Vol 3, No 12, Dec 57, pp 548-550

A procedure for the spectrophotometric analysis of actinium is described in detail. Lanthanum and gallium were used as standards. The content of boron, aluminum, calcium, magnesium, manganese, barium, lead, sodium, iron, and silicon present as impurities was determined. In the determination of the majority of the elements mentioned a precision of ~0.1% was reached, while in the case of some of the impurities including manganese the precision could be brought to 0.03% even when very small samples (15-30 micrograms) were used for analysis.

36. USSR Work on Application of Radioactive Isotopes and Ionizing Radiation in Recording and Control of Industrial Processes

"Application of Radioactivity in Methods for the Recording and Control of Industrial Processes," by P. S. and N. L.; Moscow, Atomnaya Energiya, Vol 3, No 12, Dec 57, pp 553-554

A scientific-technical conference on applications of radioactivity in the recording and control of industrial processes was held 4-7 September 1957 at Riga. This conference was called by the Main Administration on the Utilization of Nuclear Energy at the Council of Ministers USSR, the Council of the People's Economy, the Academy of Sciences Latvian SSR, and the Central Administration of the Scientific-Technical Society of Radio Engineering and Electrical Communications imeni A. S. Popov.

The conference was opened by K. K. Plaude, Active Member of the Academy of Sciences Latvian SSR.

The conference covered two principal fields: theoretical research on the refining and development of devices the operation of which is based on the application of radioactive isotopes and the practical application of such devices in various fields of the people's economy.

In a review paper presented by Prof. N. N. Shumilovskiy, Doctor of Technical Sciences, and L. V. Mel'tser, Candidate of Technical Sciences, the work was summarized that has been done by Soviet scientists and industrial specialists on the theory, designing, and utilization in the industry and science of devices the operation of which is based on the application of radioactive isotopes and which are to be used for the recording and control of technological processes.

A number of reports and communications presented at the conference dealt with new methods for the indication of ionizing radiation and new devices developed for this purpose.

Engineers I. D. Konozenko and V. I. Ust'yanov (Physics Institute, Academy of Sciences Ukrainian SSR) developed the technology of the preparation of vacuum monocrystalline and polycrystalline cadmium sulfide pickup cells sensitive to gamma radiation in the range from 10^{-3} to 5×10^{-3} microamperes/microrentgens x second as well as pickups of the mosaic [multifacet] type with a sensitivity reaching 10^{-3} microamperes/-microrentgens x second. They investigated various parameters of cadmium sulfide pickups (stability of the sensitivity, potential-current dependence, dosimetric and relaxation characteristics, etc).

Engr A. A. Arkhangel'skiy and G. D. Latyshev, Corresponding Member, Academy of Sciences Ukrainian SSR, reported in a paper which originated at the Leningrad Institute of Railroad Transportation the results of an investigation of new types of electron multipliers that have been developed by various organizations.

In a report presented by the Main Administration on the Utilization of Nuclear Energy at the Council of Ministers USSR, the basic principles of the organization and designing of laboratories in which work on radioactive isotopes is to be conducted were discussed. Standard plans of laboratories of this type, designed for work with open and closed sources of radioactivity of different intensity, were demonstrated. On the basis of the principles which have been set forth, standard laboratories are being designed. In these laboratories, work with the use of radioactive isotopes will be conducted in different fields of the people's economy.

Engr L. S. Eyg reported on new self-quenching and nonquenching halogen counters for the recording of radiation of high intensity emitted by radioactive substances. These counters have a practically unlimited life, small dimensions, and operational characteristics which do not vary greatly with temperature. However, they are not suitable for precise measurements, because they do not have a region of proportional indication and their characteristics depend on the potential.

A. A. Akhromenkov, engineer at the All-Union Scientific Research Institute on the Conversion of Petroleum and Gas and the Production of Synthetic Liquid Fuel, presented on behalf of a team of workers a communication of gamma-densimeters which have been developed and which have passed industrial tests. The application of these devices enables rapid and precise determination of the boundaries between different petroleum products that are pumped successively through pipelines, automatic direction of every product into the appropriate tank, and prevention to a considerable extent of the mixing of petroleum products which occurs at present with the result that the quality of the products is lowered and redistillation is necessary.

Engr U. S. Zaslavskiy and others reported on a new device for keeping at a constant level the separation boundary between phases at installations for the conversion of petroleum. This device has successfully passed tests at a cracking installation.

Engineers V. K. Latyshev and V. V. Lyndin, Central Scientific Research Institute of Ferrous Metallurgy, reported on the development of procedures for the automatic control of the level of liquid metal in crystallizers during continuous pouring of the metal and also on a system for the stabilization of the control processes involved. The application of the methods in question in connection with the continuous casting of pipes at the Plant imeni 1 May at Kalinin and at the Sinarsk Pipe Plant increased the production of pipes of good quality 40-50% in addition to simplifying the work of operators. K. K. Shpor (chief engineer of the Tallin Indicator and Controller Plant), V. E. Banashek, and others reported on a method developed by them for the automatic control of the density of liquids. In the method in question a radioactive isotope is deposited on the areometer. The radiation emitted by the isotope is recorded by a radioactivity relay equipped with a halogen counter, which is connected with the circuit of an automatic device that controls the production process. When the density changes, the device activates the appropriate mechanisms and restores the necessary density. This method is being applied at food and chemical plants as well as at other branches of the industry.

V. E. Banashek, chief engineer of the Dzintari Plant at Riga, told about devices for the control of the rate of addition of liquid substances by a method based on the reduction of the intensity of beta radiation by the surface layer of the liquid. In Banashek's report, data were given illustrating the advantages of this method over other, older methods for measuring the level of liquids. The rate of addition of friable substances can be controlled without contact with these substances, i.e., by recording the position of the pointer of a balance.

Extensive work has been done at the Krasnyy Metallist (Red Metal Worker) Plant at Konotop on the application of gamma relays for the automatization of industrial processes in the coal industry. A report on the subject described the gamma relays with crystal triodes [transistors] supplied by this plant. These relays operate on alternating current. A report on this subject was given by A. V. Chashchinov, an engineer at this plant.

More than 400 persons participated in the conference and more than 30 papers were presented.

37. Radiation Methods for Control of the Pumping of Petroleum Products Through Pipelines

"Control by Means of a gamma-Densimeter of the Successive Pumping of Petroleum Products Through Pipelines" by A. A. Akhromenkov, Yu S. Zaslavskiy, A. A. Vargin, A. N. Kornilayev, and V. P. Lapin, All-Union Scientific Research Institute of the Petroleum Industry; Moscow, Neftyanoye Khozyaystvo, Vol 35, No 12, Dec 57, pp 60-63

Two methods for the control with the aid of radioactive isotopes of the successive pumping of petroleum products through pipelines are possible: (a) injection of a radioactive tracer compound into the pipeline (usually triphenylstibine tagged with Sb^{124} -- cf. US work on the subject); and (b) measurement of the reduction of the intensity of radiation of a radioactive isotope as a result of the passage of this radiation through the petroleum products being pumped (gamma-densimetry). The first method has the following drawbacks: (a) the radioactive substance is being used up continuously; (b) the head pumping station may be contaminated with the radioactive isotope; (c) there is danger to the personnel in connection with the filtration of the radioactive solution and its filling into ampules; (d) it is difficult to evaluate the radioactive wave curve, because the intensity of radiation rather than the concentration in the mixture is recorded; and (e) the radioactive tracer compound must be injected precisely into the boundary between the liquids being pumped.

Control by means of the gamma-densimeter GP-1 developed at the All-Union Scientific Research Institute of the Petroleum Industry is devoid of these shortcomings. An FEU-19 scintillation counter with a NaI crystal is employed in this densimeter. Co^{60} is used as a source of gamma-radiation. By using the GP-1 densimeter, the density of successively pumped petroleum products can be determined with a precision reaching 0.002 gram per cubic centimeter.

This densimeter has been tested at an intermediate pump station of the Groznyy-Trudovaya trunk pipeline located at a distance of 425 km from the head pump station.

It was established that it is possible to transmit a signal at a distance when a small change in the density of the liquid takes place and thus exercise remote control over the passage of the zone of mixing through the pipeline.

38. Application of Radioactive Tracers for Detection of Damage to Cable Lead Sheaths

"News Items (USSR)" (unsigned article), Moscow, Atomnaya Energiya, Vol 3, No 12, Dec 57, p 566

A method for the detection with the aid of radioactive substances of damage to lead sheaths of communication cables has been developed in 1956 at the Laboratory of Line and Cable Constructions, Kiev Division of the Central Scientific Research Institute of Communications. This method was introduced into practical use in 1957. In the vicinity of the place where the damage has occurred, a radioactive gas (radon or Br^{82} in the form of methyl bromide) is introduced into the cable by injecting it with compressed air. The radioactive gas moves in the cable in the direction of the leak and diffuses into the soil at the place where the damage to the sheath has occurred. After diffusing from a depth of 0.8-1.5 meters, the gas reaches the surface within 1.2 hours. It is detected at the surface by gamma radiometers of the field type. The velocity of the propagation of the gas in cables of different types does not exceed one kilometer per 1.7 hours; for that reason the search for the location where the damage has occurred is conducted on the day following the introduction of the tagged gas into the cable. The method has been checked on trunk cables in actual operation and is recommended as one of the most effective methods for the detection of damage, particularly when the cables are in swampy or frozen subsoil. To facilitate the work of the operator, a new gamma radiometer has been developed which is combined with a semiconductor cable searching device. The new apparatus is light in weight and has small dimensions.

39. Nuclear Energy Exhibition at Riga

"News Items (USSR)" (unsigned article), Moscow, Atomnaya Energiya, Vol 3, No 12, Dec 57, p 566

The Main Administration on the Peaceful Utilization of Nuclear Energy at the Council of Ministers USSR and the Academy of Sciences Latvian USSR organized at Riga an exhibition on peaceful uses of nuclear energy. More than 100 different devices, appliances, installations, and models were exhibited. Measuring devices were shown which are applied in the investigation of the properties of and measurement of the intensity of radiation emitted by radioactive substances. These included gas discharge counters, ionization chambers, and electromechanical pulse counters. Many exhibits illustrated applications of radioactive isotopes in the industry. Work

done by the Physics Institute of the Academy of Sciences Latvian USSR was represented to a major extent at the exhibition. Among exhibits illustrating the work of this institute were the following devices that operate on the basis of radioactivity effects: a thermostat, a counter of objects moving on a conveyer, and an indicator of markings on steel that is being rolled.

40. Research Indicates Neutron Irradiation of Na²³Cl Gives Rise to Na²⁴Cl, P³², and S³⁵

"A Study of the Composition of Na²⁴Cl Preparations," by F. S. Zavel'skiy, Moscow Scientific Research Institute of Sanitation and Hygiene imeni F. F. Erisman; Moscow, Meditinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 82-86

Since at present the radioisotope of sodium (Na²⁴) is extensively used in medicine and biology and for other purposes, any radioactive contamination (due to P³² and S³⁵) of Na²⁴Cl preparations will exert significant effects on the irradiated objects.

Various diagrams and tables are presented to illustrate neutron irradiation of Na²³Cl, percentage contamination (with time as a factor), changes in the value of irradiation dose, and curve for disintegration of Na²⁴Cl.

The author concludes that the relative activity of this admixture (P³² and S³⁵), at first, equals 0.6% that of the Na²⁴Cl, but that this activity increases with time. The presence of P³² and S³⁵ isotopes which have longer life is an important fact which should be taken into consideration in biology and in medicine.

41. Hungarian Specialists Study Use of Radioactive Isotopes in USSR

"Which Industrial Leaders Have Gone Abroad" (unsigned article), Budapest, Muszaki Elet, 9 Jan 58, p 2

Mrs Laszlo Vajta, director of the Petroleum Quality Control Institute (Asvanyolaj Minosegellenorzo Intezet), and Ervin Kerenyi, a MAFKI (Magyar Asvanyolaj- es Foldgaz Kiserleti Intezet, Hungarian Petroleum and Natural Gas Research Institute) department chief and chemical engineer, studied the use of radioactive isotopes in the USSR.

[For additional information on radiochemistry, see Items No 17 and 23.]

Miscellaneous

42. G. Yu. Dobropistsev, Soviet Chemist, Dies

"G. Yu. Dobropistsev" (unsigned article), Moscow, Promyshlenno-Ekonomicheskaya Gazeta, No 25, 26 Feb 58, p 4

On 24 February 1958, Gleb Yur'yevich Dobropistsev, director of the State Institute for Planning Enterprises of the Oxygen Industry (Gosudarstvenny Institut po Proyektirovaniyu Predpriyatiy Kislorodnoy Promyshlennosti), died at the age of 62. Dobropistsev had worked in the chemical industry since 1928 and became director of the above institute in 1946 when it was organized. His awards include two Orders of the Labor Red Banner and medals of the Soviet Union.

43. Soviet Academician Visits Hungarian Nitrogen Works

"Daily Chronicle" (unsigned article), Budapest, Magyar Nemzet, 9 Nov 57, p 6

N. M. Zhavaronkov, Soviet academician and director of the Moscow Chemicotechnological Institute imeni D. I. Mendeleev, visited the Pet Nitrogen Works in Hungary (Peti Nitrogenmuvek) on 8 November 1957.

44. Orbit Scientists Participate in Silicate Industry Research Workers Conference in Hungary

"Fourth Conference of Silicate Industry Research Workers" (unsigned article), Budapest, Muszaki Elet, 28 Nov 57, p 12

M. Gregor, Czechoslovak academician; Figus, Czechoslovak professor; A. I. Kitaygorodskiy and P. P. Budnikov, Soviet academicians; Yu. Yu. Lur'ye, a Soviet professor and director of "Giprotsement"; Francke, a professor from Weimar; Solacolu and Nadasan, two Rumanian professors; and Winogradow, a Polish professor, are among the foreign experts who will participate in the Fourth Conference of the Silicate Industry Research Workers, which will be held at the Hungarian Academy of Sciences (Magyar Tudomanyos Akademia), 5-7 December 1957. The Technical and Scientific Department of the Hungarian Academy of Sciences and the Construction Materials Scientific Association (Epitoanyagipari Tudomanyos Egyesulet)

are arranging the conference. Almost 40 reports on the results of the research work done in the cement, concrete, glass, and pottery industries during the past 2 years and on the results achieved by theoretical researchers will be delivered at the conference.

45. Czechoslovak Academician Is 80 Years Old

"Academician A. Hamsik 80 Years Old" (unsigned article), Prague, Lidova Demokracie, 14 Jan 58, p. 3

Academician Antonin Hamsik, professor of medical chemistry in Charles University, will be 80 years old on 15 January 1958. Academician Hamsik is a distinguished experimental researcher in the area of biochemistry and is the founder of Czech medical chemistry in the area of blood pigmentation.

IV. EARTH SCIENCES

46. New Geophysical Instrument Used in Prospecting

"Aerogeophysical Station," by L. Grinilev, Engineer; Moscow, Nauka i Zhizn', No 12, Dec 57, p 47

One of the most ideal air-borne prospecting instruments is the new "aerogeophysical station," the ASG-38, which was exhibited at the All-Union Industrial Exhibition. This instrument is intended for the detection of rocks possessing radioactive, weak magnetic, and magnetic properties. The ASG-38 differs from models produced earlier in that its gamma-ray transducer is provided with a scintillation counter in place of a gas-filled Geiger-Muller counter tube. This results in a 2 1/2-3 times greater sensitivity of the measurements of radioactivity and almost completely eliminates the effects of cosmic rays on the instrument. The high sensitivity of the gamma-ray channel made it possible to introduce into the system a so-called discriminating device by which manifestations of uranium ore can be distinguished from those of thorium.

The apparatus, weighing a total of 160 kilograms, consists of a magnetic transmitter mounted in the nacelle or fastened to the fuselage or wing of an aeroplane, a gamma-ray transducer, and an instrument panel which records the total gamma field and the readings of a radioaltimeter, magnetometer, and gamma-ray channel after discrimination. Only one operator is required for the ASG-38.

The ASG-38 has been extensively used by Soviet geologists in prospecting for diamond deposits ("Kimberly pipes"). This is possible because kimberlite possesses increased magnetic susceptibility and lowered radioactivity while its surrounding rocks has opposite properties.

This method of prospecting for diamonds is one 35th as expensive as the use of ground surveys. The use of the former method resulted in the discovery of a number of diamond "pipes" in the region of the Yakutsk deposits. In 1956, 45 anomalies were detected using the ASG-38, and a subsequent ground survey showed that they were "Kimberly pipes."

47. Poles Study Circulation Indexes at Sea Level and at 700 mb Level

"Correlation Between Circulation Indexes at Sea Level and at the 700 mb Level," by Tomashenko, Polish State Meteorological Institute, Acta geophys. polon., Issue 4, No. 1, 1956, pp 52-55 (from Referativnyy Zhurnal -- Fizika, Geofizika, No 2, Feb 57, Abstract No 1070)

The index of circulation (defined as the difference of mean air pressures in a given time at two parallels: 40° and 60° north latitude) at sea level and at the 700 mb level is given. The mean air pressure, calculated for the region bounded by the meridians at 40° East and 40° West longitude are compared. Graphs of the changes of the mean 5-day circulation indexes in the course of several months show that the index of circulation at sea level almost completely agrees with the changes at the 700 mb level. The coefficient of correlation between these two circulation indexes is equal to approximately 0.90 (regardless of the time of year). It is noted that during the summer, when it is difficult to depict the zonal circulation at sea level based on synoptic charts, it is possible to use the circulation indexes at the 700 mb level for this purpose.

48. Geology Institute Seeks Head of Sector

[Position vacancy notice] (unsigned article), Frunze, Sovetskaya Kirgiziya, 27 Nov 57

The Institute of Geology, Academy of Sciences Kirgiz SSR, announces a competition for the position of head of a sector in tectonics and stratigraphy. The applicant must be a Doctor or Candidate of Geologicomineralogical Sciences.

V. ELECTRONICS

Communications

49. All-Union Competition of Young Radio Amateurs

"30 March -- All-Union Competition of Ultrashort-Wave Amateurs" (unsigned article); Moscow, Radio, No 2, Feb 58, p 15

The Second All-Union Competition of young microwave (ultrashort-wave) amateurs will be held on 30 March 1958 between 0700 and 1300 hours, Moscow standard time. The participants in the competition will operate on the 2- or 7-m radio band (38-40 Mc or 144-146 Mc). The age of the participants will be from 12 to 18.

50. Recent Soviet Patents in Electronics and Communications

"Authorship Certificates" (unsigned article); Moscow, Elektrosvyaz, No 1, Jan 58, p 78

Class 21a, 3567, No 106716. I. S. Pograd and L. B. Gal'perin. Device for Protecting the Break Contacts From Burning.

Class 21a¹, 1102, No 106177. G. U. Osipenko and M. A. Kudryashov. The Keyboard of Start-Stop Telegraph.

Class 21a¹, 1102, No 106362, G. U. Osipenko and K. F. Retnev. Wedge Type Linkage for the Start-Stop Telegraph.

Class 21a¹, 1102, No 106363. G. U. Osipenko. The Printing Mechanism of Start-Stop Telegraph With Standard Wheel.

Class 21a¹, 1102, No 106408. M. F. Maslyakov. Automatic Bracket for Holding of Control Paper Ribbon in ST-35 and STA Start-Stop Telegraphs.

Class 21a¹, 3241, No 106800. T. F. Kazorina and G. G. Kulikovskiy. Device for Compensation of Dark Current of Photodiode.

Class 21a¹, 3510, No 106307. R. A. Kudryavtsev. Device for Forced Synchronization of Facsimile Telegraph.

Class 21a², 1604, No 106122. A. I. Kugashev. Device for Restoration of Voice Frequencies.

Class 21a², 1850, No 106608. G. V. Butakov. Method of Matching Single-Element Unidirectional Condenser Microphone.

Class 21a², 34₀₁, No 106827. I. E. Birenberg, Yu. V. Kosin, M. P. Chubukov and V. A. Polyakov. Voice Frequency Ringing Device for Central and Local Battery Telephone Systems.

Class 21a², 34₀₁, No 106867. I. Ye. Finkler. Lever Selector for Central Battery Telephone.

Class 21a², 34₀₁, No 107106. V. P. Bonich, B. M. Furmanov and B. V. Shirayayev. Batteryless Telephone With Induction Ringing.

Class 21a², 3613, No 106699. N. N. Solov'ev. A Method of Measuring Mismatch Attenuation (Reflection Factor).

Class 21a², 4101, No 106317. A. Ye. Znamenskiy. Regulated Artificial Line.

Class 21a³, 49₂₀, No 106309. A. N. Yuzhakov. Alarm Signalization Device Through the Busy Wires of the Automatic Telephone Station.

Class 21a⁴, 8. No 106825. F. A. Vodop'yanov. Wide-Band Tube Oscillator.

Class 21a⁴, 8₀₁, No 106941. A. N. Radchenko. Accord Frequency Oscillator.

Class 21a⁴, 8₀₂, No 106774. A. A. L'vovich. Thermostat for Elements Stabilizing the Frequency of Tube Oscillators.

Class 21a⁴, 10. No 106175. P. G. Pozdnyakov and V. G. Androsova. A Method of Deposition of Dispersed Silver on Quartz Plates.

Class 21a⁴, 35₁₄, No 107189. A. G. Dombrovskiy and P. G. Serdyuk. Direct Current Voltage Vibrating Converter.

Class 21a⁴, 42. No 106798. F. A. Bodop'yanov. Detection Method of Frequency-Modulated Oscillations.

Class 21a⁴, 42. No 106965. N. A. Kukin. Peak Detector.

Class 21a⁴, 46₀₁. No 106234. S. I. Nadenenko and R. V. Gurevich. Short-wave Multiple-Band Antenna.

Class 21a⁴, 49. No 107104. L. A. Korobkov. Device for Time-Division Multiplex Telephone Communication.

Class 21a⁴, 54. No 106407. N. T. Petrovich. A Method of Telephone Communication by Uniform Binary Code and Phase Keying.

Class 21a⁴, 68. No 106140. L. I. Rabkin. Variable Inductance Coil.

Class 21a⁴, 69. No 106141. B. S. Voynov. Meter and Decimeter Wave Oscillatory Circuit.

Class 21a⁴, 71. No 106073. N. N. Konyakhin. Centimeter Range Panoramic Wide Band Wavemeter With Direct Reading of the Wave Length.

Class 21a⁴, 71. No 106696. V. I. Chernyshov. Laboratory Reflectometer for Measuring the Modulus Coefficient of Reflection in Symmetrical Lines.

Class 21a⁴, 74. No 106193. N. I. Arhamicheva, K. P. Yegorov, V. G. Krasin'kov, L. D. Paramonkova, and L. V. Reyman. A Method of Manufacturing Small Transformers.

Class 21b, 202. No 107274. I. I. Koval' and V. A. Barilenko. A Method of Increasing the Life and Capacity of Lead Storage Batteries.

Class 21b, 71. No 106313. Yu. N. Fedorov. A Method of Controlling the Brightness of Cathode-Ray Tube in Oscillograph With Driven Sweep.

Class 21c, 101. No 106426. Yu. I. Vidmanov. Null Galvanometer of Magnetolectric System.

Class 21c, 212. No 105700. E. A. Kososs and Ye. G. Fedoseyeva. A Method of Manufacturing Insulation Tape for Repair of Polyethylene Insulation of Cables.

Class 21c, 412. No 106420. G. N. Ter-Gazaryan and G. G. Kostanyan. A Method of Elimination of Induction Effect of Two-Circuit High-Voltage Line on the Communication Lines.

Electromagnetic Wave Propagation

51. Cophasal Antennas

"Cophasal Multiple-Tuned Short-Wave Antennas," by G. Z. Ayzenberg, V. D. Kuznetsov, and L. K. Olifin; Moscow, Elektrosvyaz', No 1, Jan 58, pp 15-21

Two types of multiple-tuned short-wave cophasal antennas, namely, a cophasal antenna with an adjustable reflector and a cophasal antenna with aperiodic reflector, were studied.

The antennas were of four-tier type, with a 0.5 wave-length spacing between the elements. The radiation patterns in the horizontal and vertical planes of both types of antennas were experimentally obtained. The dependence of the antenna gain and directivity factor on the wave length were determined.

The investigation has disclosed that for the antenna feed having a phase shift the traveling-wave ratio was greater than for the case of cophasal feeding of antenna elements.

Laboratory Instruments and Equipment

52. Method of Computing Focusing Temperature in Roentgen Tubes

"Calculation of Focusing Temperature of Power Tube Anodes and Hollow Anodes," by P. V. Poshekhonov, Tr. Ryazansk. radiotekh. in-ta., 1956, 1, pp 70-84. (from Referativnyy Zhurnal -- Elektrotehnika, No 6, May 57, Abstract No 13086)

CPYRGT

"Heat reaches the anode of roentgen tubes only through the focusing area; the heat beam is dispersed evenly throughout the entire area only at a certain distance from the surface; usually, in computations, this distance for a solid copper anode is taken equal to its diameter. At the same time, for improving the heat transfer in continuous operating tubes which use a circulating liquid for cooling the anode, attempts are made to decrease the thickness of the copper beneath the surface to 0.1-0.3, and in tubes with hollow extended anodes, to 0.05 of the radius. Therefore, the existing method of computation does not meet the actual conditions. The author takes as the limiting conditions for the internal surface of the end plane of the anode $\lambda \geq \frac{\delta T_2}{\delta z} = a T_2$, applicable to an end

plane of any thickness; next, he determines the temperature in the center of focus, in the center of the division plane of the tungsten surface and copper portion of the anode, and in the center of the inner cooled surface. The thickness of the end plane, at which the temperature on the division plane of the tungsten and copper is the least, is shown to equal 0.5R. The example of the computation gives results which satisfactorily coincide with the data from experimental tests. Graphs are provided to facilitate computation."

Computers and Automation

53. New Soviet Electronic Regulating Devices

"Reliably and Effectively," by V. Trapeznikov, Corresponding Member of the Academy of Sciences USSR, director of the Institute of Automatics and Telemechanics of the Academy of Sciences USSR; Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 1 Jan 58, p 3

An electronic computer device is installed at one of the welded pipe mills of the Moscow Pipe Plant. This device establishes the relation between pipe wall thickness and seam temperature, which determines the quality of welding. This is the first time such a device has been used in the Soviet Union, the author notes. It was developed by members of the Institute of Automatics and Telemechanics of the Academy of Sciences USSR -- A. Chelyuskin, A. Lerner, V. Ivanov, and other engineers. Work on this system is still in progress, but the first tests have shown the correctness of the technical ideas on which it is based. These ideas are of interest not only for pipe welding. A new principle for building automatic control systems used in numerous technical processes has been found and confirmed. The new system is capable of finding all relations in the process and of selecting only those parameters which are necessary for best operating conditions.

During the coming year, the institute will continue to improve this system and expand its field of application. Use of this system in all fields where technical processes require perfect automatic control will be investigated.

In 1958, the "Teplopribor" Plant in Chelyabinsk will start the series production of contactless electric regulators. The motors of these regulators, developed at the institute, are controlled by magnetic and electronic amplifiers ensuring high sensitivity. These regulators allow effective and reliable control of many technical installations.

54. New Digital Computer

"Electronic Computer, SESM" (unsigned article); Moscow, Izvestiya, 2 Mar 58, p 3

CPYRGHT

"Experimental operation has begun in the Computation Center of the Academy of Sciences Ukrainian SSR with the electronic computer, SESM. It is the first specialized digital computer in the USSR and Europe

CPYRGHT

developed for solving systems of linear algebraic equations having a large number of unknowns (up to 400). Using this computer it is possible to perform complicated hydrotechnical, architectural, and machine-building design computations and to solve problems in geodesy and mathematical physics.

"The work performed by the 'SESM' in the course of one shift is equivalent to a month's work done by 20 men using ordinary calculators."

55. Friction-Type Integrators

"The Accuracy of Friction-type Integrators in Dynamics," by A. V. Shchetnikov; Schetno-reshayushchiye Pribory (collection of articles), Moscow, Oborongiz, 1955, pp 13-72 (from Referativnyy Zhurnal -- Elektrotehnika, No 6, May 57, Abstract No 12889)

CPYRGHT

"A study is made of the effects on the contact surface of friction mechanisms of the disk type (with roller and ball) and the mushroom type from the viewpoint of accuracy of solution. Each mechanism is examined under two conditions: when the driven element is stationary and when the driven element is in motion. The effect of a dynamic load on error is shown separately, and behavior under considerable overload is discussed. The expression of errors in multiplication, differentiation, and integration operations is shown in relation to friction slippage. Curves are developed for determining the magnitude of slippage in the functioning of the load moment for real disk friction clutches with various values of structural parameters; curves are provided for the slippage of ball- and mushroom type friction clutches as a function of tightening force. In conclusion, a numerical example of a check computation of a friction smoothing mechanism with the calculation of dynamic loads is given."

56. Block Diagrams for Computer Amplifiers

"Basic Formulas For Computing Block Diagrams of Computer Amplifiers," by I. N. Gratsianskiy; Tr. Mosk. Energ. in-ta., 1956, No 18, pp 297-309 (from Referativnyy Zhurnal -- Elektrotehnika, No 6, May 57, Abstract No 12890)

CPYRGHT

"The article presents a general block diagram and table of concrete block diagrams of computer amplifiers for performing operations of scale conversion, inversion, differentiation, summation, and complex operations of differentiation or integration with simultaneous summation. Computed expressions are given for the transmission coefficient, input and output impedance of the amplifier operating in a negative feedback system as a scale amplifier, differentiator, integrator, and summator with sinusoidal

COPYRIGHT

form of input voltage. Misalignment is also given for integrating and differentiating amplifiers. The errors of the amplifier are also pointed out, in connection with the instability of the dc amplifier's zero. The order for computing the elements of the differentiator and integrator circuits is described. Several recommendations are made for selecting and computing the elements of a negative feedback amplifier circuit. A block diagram of the amplifier is described, having minimum zero drift due to the inclusion of an auxiliary amplifier with an electromagnetic rectifier, and a method is given for computing the amplification factor and zero drift potential of an amplifier with minimum zero drift."

57. Conference on Computer Mathematics and Use of Computer Equipment

"Conference on Computer Mathematics and Use of Computer Engineering Equipment," Azerbaydzhan Telegraph Agency (AzTAG); Baku, Bakinskiy Rabochiy, 5 Feb 58, p 2

A Conference on Computer Mathematics and Use of Computer Engineering Equipment, convoked by the Academy of Sciences Azerbaydzhan SSR and the Computation Center and Institute of Automatics and Telemechanics of the Academy of Sciences USSR, was opened in the Great Hall of the Academy of Sciences Azerbaydzhan SSR on 3 February 1958. In attendance were scientists of the RSFSR, Ukraine, Kazakhstan, Uzbekistan, Georgia, Armenia, Latvia, Lithuania, Estonia, and Azerbaydzhan; representatives of the Academy of Sciences USSR and a number of its institutes; the State Planning Commission USSR; Moscow State University; and others.

The conference was opened by Z. I. Khalilov, vice-president of the Academy of Sciences Azerbaydzhan SSR.

Academician A. A. Dorodnitsyn, chairman of the Commission on Computer Engineering under the Presidium of the Academy of Sciences USSR, spoke on the status of work and problems in the field of computer mathematics and engineering.

Greetings were extended from the State Planning Commission USSR by V. I. Loskutov, from Moscow State University and the Division of Mathematics of the Academy of Sciences USSR by Prof M. R. Shura-Bura, and from the Computer Design Bureau of the State Planning Commission by V. V. Aleksandrov.

At the first plenary session papers were read by Z. I. Khalilov, Academician of the Academy of Sciences Azerbaydzhan SSR, on the growth of mathematical sciences in Azerbaydzhan; and by S. A. Aleskerov, Candidate of Technical Sciences, on the results of scientific research at the Computation Center of the Academy of Sciences Azerbaydzhan SSR on the use of computer engineering equipment.

Section meetings began on 4 February, and the conference was to last for several days.

Magnetic, Dielectric and Semiconductor Materials

58. Surface Charge of Semiconductors

"The Change of Surface Charge of a 'Thin' Piece of Semiconductor," by V. E. Lashkarev, V. I. Lyashenko, and N. S. Chornaya, Dopovidi AN URSR, 1956, No 3, pp 251-252 (from Referativnyy Zhurnal -- Elektrotehnika, No 6, May 57, Abstract No 11945)

CPYRGT

"The article describes the experimental verification of a theory, developed by one of the authors, of the electrical conductivity of a 'thin' piece of semiconductor (such as shielding). According to the theory, a change in the charge on one surface of a thin sample causes a change in the surface charge on the other surface. A test of the theory was performed on thin layers of Te (approximately 10^{-6} cm) deposited on mica. The surface charge of the facing side could be decreased by means of an absorption of molecules which was determined by increase of the resistance of the sample. A change in the charge on the rear surface was observed when a change was made in the shielding of the external field, perpendicular to the surface of the sample."

VI. ENGINEERING

59. New Soviet Rolling Mill Equipment Planned in 1958

"To a Higher Level," by A. Tselikov, Corresponding Member of the Academy of Sciences USSR, chief of the Design Bureau at the Central Scientific Research Institute for Technology and Machine Building; Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 1 Jan 58, p 2

During the new year, construction of cluster-type rolling mills designed by the institute will be started. These new rolling mills will have only three stands, instead of the usual 10-12, and will thus permit continuous operations. The institute will also make improvements on equipment used for cold rolling of thin-walled pipes.

60. New Power Cables With Aluminum Sheathing

"Power Cables With Treated Paper Insulation in Pressed Aluminum Sheathing," Novaya Tekhnika [a collection of articles], No 1, Moscow, 1956, pp 74-76 (from Referativnyy Zhurnal -- Elektrotekhnika, No 6, May 57, Abstract No 11899)

CPYRGT

"The article describes the construction and designation of new power cables in pressed aluminum sheaths conforming to the standards of GOST (State All-Union Standard) 6515-53. The cables are manufactured with three or four conductors with cross sections varying from $3 \times 6 \text{ mm}^2$ to $3 \times 95 \text{ mm}^2 + 1 \times 50 \text{ mm}^2$. These cables are designed for transmission and distribution of electrical energy at voltages not exceeding one kv and at a continuous permissible conductor temperature of +80 degrees. The types of cable are as follows: AG (copper conductors in aluminum sheathing), AAG (aluminum conductors in aluminum sheathing), ABG (copper conductors in aluminum sheathing, enclosed in two steel bands covered with a bituminous compound), AABG (same as ABG but with copper conductors) [Note: should be aluminum conductors], APG (copper conductors in aluminum sheathing, enclosed in flat steel-plated wire), AAPG (same as APG but with aluminum conductors), and others. An example of the conventional designation for a three-conductor cable with aluminum conductors having a cross section of 95 mm^2 in aluminum sheathing 250 m in length is AAG 3x95-250 GOST 6515-53."

VII. MATHEMATICS

61. US Book on Mathematical Machines Reviewed

Digital Differential Analyzers, by G. F. Forbes (2d edition, Part I -- Elements); reviewed by N. Ya. Matyukhin; Moscow, Novyye Knigi za Rubezhom, Seriya A, No 4, Apr 57, pp 15-17

The reviewer describes the contents of Forbes' book objectively and then concludes as follows:

"On the whole, the book is a very fine mathematical supplement to technical descriptions of digital differential analyzers and mechanical integrators. Unfortunately, the circle of readers, engineers, and scientific workers for whom the book represents major interest is quite restricted in the Soviet Union owing to the limited distribution of this type of machines."

CPYRGHT

VIII. MEDICINE

Bacteriology

62. Unusual Cultures Isolated From Human Brucellosis Patients

"Unusual Cultures Isolated From Brucellosis Patients," by A. A. Uvarov, Zhivyye Vaktsiny (Live Vaccines), Moscow, 1956 pp 225-229 (from Referativnyy Zhurnal -- Biologiya, No 20, Oct 57, Abstract No 85703, by G. Ye. Frumkina)

CPYRGHT

"Twenty unusual cultures sometimes accompanied by typical cultures of Brucella were isolated from the blood of brucellosis patients or from various organs of humans who had died from brucellosis. When grown on MPA or MPB containing glucose or blood, these unusual cultures consisted of poorly developed, polymorphic bacteria of low viability which took the Gram stain nonuniformly. The author considers the microorganisms isolated by him to be an intermediate or atypical form of some other species of microorganisms, but all belonging to a single species. The isolation of these cultures from the blood of patients or the organs of cadavers before, after, or simultaneously with the isolation of typical Brucella is indicative of the existence of a connection between the microorganisms observed and the Brucella."

63. V- and W-Form Brucella melitensis

"Characteristics of the Properties of V- and W-Form Brucella melitensis," by M. S. Drovhevkina, Tr. Rostovsk. N.-D. Gos. N.-I. Protivochumm. In-ta (Works of the Rostov-na-Donu State Scientific Research Anti-plague Institute), No 10, 1956, pp 354-369 (from Referativnyy Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract No 89409, by G. N. Chistovich)

CPYRGHT

"Two strains of Brucella melitensis were divided into V- and W-variants. The W-forms were found to be identical with typical Brucella strains. The V-forms had somewhat larger cell dimensions, cloudy colonies formed on solid media, and cloudiness and sediment and a certain amount of H₂S developed in the bouillon. They precipitated on heating, were agglutinated by tripaflavine, were highly sensitive to Vi-phage, and were lysed by O-phage, although more weakly than W-forms. V- and W-forms had thermostabile antigens both general and differentiated in both variants. In addition, the V-forms contained thermolabile Vi-antigens which prevented O-agglutination. The existence of V-forms have been taken into account for a long time in diagnosing Brucella and in preparing specific prophylactics against brucellosis."

64. Filterable Forms of Brucella

"Filterable Forms of Brucella. Report 2. Filterable Forms of Brucella and the Animal Organism," by G. A. Balandin, V. M. Uraleva, and Z. D. Khakhina, Tr. Rostovsk, N.-D. Gos. N.-I. Protivochumn. In-ta (Works of the Rostov-na-Donu State Scientific Research Antiplague Institute), No 10, 1956, pp 317-332 (from Referativnyy Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract No 89464, by G. P. Kalina)

CPYRIGHT

"On passage of filtrates from bouillon and agar cultures through white mice, regeneration of a secondary culture the characteristics of which completely corresponded to the initial culture was successfully obtained in three cases (filtrates of bouillon cultures). Filterable forms (FF) even of virulent strains of Brucella were weakly virulent and were not subjected to further passage after regeneration, subsequently forming weakly virulent or avirulent cultures. At the same time, FF are capable of existing independently in the organisms of white mice and guinea pigs, not being transferred in a visible form of existence, and are passed in such a form from animal to animal. FF cause an allergic condition in animals infected with them, increase the phagocytic activity of the leukocytes and sometimes occasion the formation of agglutinins."

65. Immunogenicity of Filterable Forms of Brucella

"Filterable Forms of Brucella. Report 3. Immunogenicity of Filterable Forms of Brucella," by G. A. Balandin and V. S. Uraleva, Tr. Rostovsk.-N.-D. Gos. N.-I. Protivochumn. In-ta (Works of the Rostov-na-Donu State Scientific Research Antiplague Institute), No 10, 1956, pp 333-338 (from Referativnyy Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract No 89465, by G. P. Kalina)

CPYRIGHT

"A large group of white mice were immunized with autoclaved and nonautoclaved filtrates of Brucella bouillon cultures, and immunity was tested at varying times after immunization. It was shown that the filtrates had immunogenic characteristics which did not depend on whether they were autoclaved or not. Regeneration of filterable forms in the organisms of immunized animals was not observed. Immunity was related to and depended both on the duration of the period between immunization and infection and on the infecting dose."

66. Growth of Plague Pathogen Stimulated

"Growth and Proliferation of the Plague Pathogen on a Medium With Lysate of Microorganism-'Feeders,'" by K. S. Karzuzidi and L. N. Mekarovskaya, Tr. Rostovsk. N.-D. Gos. N.-I. Protivochuum. In-ta (Works of the Rostov-on-Donu State Scientific Research Antiplague Institute), No 10, 1956, pp 44-53 (from Referativnyy Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract No 89471, by G. P. Kalina)

CPYRGHT

"A 'lysate' of *Sarcina*, which serve as 'feeders' for plague and several other microorganisms, was proposed as a growth factor for stimulating the growth of plague pathogen following seeding with a minimum amount of cells. The addition of lysate to the medium in the amount of 0.1-5% made it possible to obtain bacterial growth following introduction of one microbial cell into the medium. The addition of lysate shortened the growth phase and accelerated the onset of the maximum stationary phase (the M-concentration)."

67. Survival of *Rickettsia prowazeki* in Guinea Pigs With Typhus

"Survival of *Rickettsia prowazeki* in the Organs of Guinea Pigs Suffering From Typhus," by K. M. Sinyak, Sb. Nauch. Rabot. L'vovsk. N.-I In-t Epidemiol., Mikrobiol., i Gigiyeny (Collection of Scientific Works of the L'vov Scientific Research Institute of Epidemiology, Microbiology, and Hygiene), L'vov University, 1956, pp 31-35 (from Referativnyy Zhurnal -- Biologiya, No 21, 10 Nov 1957, Abstract No 89355, by V. A. Yablonskaya)

CPYRGHT

"The blood, lungs, liver, spleen, and brains of guinea pigs suffering from experimental typhus verified by the agglutination reaction were investigated during the period of convalescence (1-518 days of apyrexia). Lice (100-150) were infected with suspensions of the organs by Weil's method and were subsequently examined for the presence of *Rickettsia prowazeki* (RP). RP was observed in the blood on the 7th day of apyrexia in isolated cases. RP was observed in the spleen and kidneys on the 39th day; in two cases, RP was observed only in the kidneys on the 45th and 71st days of apyrexia. The concentration of RP in the organs late in convalescence is extremely insignificant (one insect out of 120-140 lice treated became infected). RP isolated from guinea-pig kidneys on the 71st day were found to be identical with laboratory strains."

68. Serial Passage Method for Tularemia Research

"The Serial Passage Method of Detecting Tularemia," by L. A. Pomanskaya, Tul'skaya Oblast Sanitary-Epidemiological Station; Moscow, Laboratornoye Delo, Vol 4, No 1, Jan/Feb 58, pp 34-36

Experiments in which the expediency of the serial passage method of detecting tularemia was tested are described. The survival rate of bacteria on grain and straw artificially infected with a suspension of a bacterial culture, ground tissue from rodents which had died of tularemia, or excrement from sick mice was determined. Highly virulent strain No 58 of *B. tularensis* isolated from a natural focus during a winter epizootic was used; a certain lethal dose for white mice (subcutaneous introduction) consisted of one microbial cell according to the standard of the State Control Institute of Vaccines and Sera, and for white rats, 100 million microbial cells. The infected grain and straw were checked periodically by injecting washings from them into white mice subcutaneously. Death of the mice from tularemia confirmed the presence of pathogen in the washings.

CPYRGHT

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

"1. For the purpose of detecting the latent form of tularemia in rodents, 57 white mice which survived after contact with infected feed or after the subcutaneous introduction of washings from infected substrates were investigated by the serial passage method. The appearance of tularemia in the second, third, and further passages was not observed.

"2. White mice are highly sensitive to tularemia. The disease has an acute course with a lethal outcome; a chronic course was not observed.

"3. The serial passage method should not be used in an investigation for tularemia. One passage is sufficient for white mice if they are kept for 20 days, or two passages if they die on the 10th day."

Epidemiology

69. Epizootiology of Tularemia

"The Epizootiology of Tularemia in Alin Rayon," by O. V. Ovasapyan, Izvestiya Akademii Nauk Armyanskoy SSSR, 1956, No 9, 12, p 23-31 (from Meditsinskiy Referativnyy Zhurnal Part IV, No 5, May 57, p 55)

CPYRGHT

"The author observed the epizootiology of tularemia, found in aquatic and ordinary voles, forest mice, Asia Minor gophers, Persian gophers, and others. The primary source of the infection was the forest vole from whose organs the tularemia microbe was cultured by biological methods. Tularemia cultures were also isolated from ticks and fleas collected from the Kavkaz lithoidol marten. An outbreak of tularemia was registered among lambs and sheep which were infected because of close contact with rodents, their dead bodies and ectoparasites while being pastured in epizootic areas. The animals were also watered in this area. Three strains of the tularemia microbe were isolated from the organs of the sheep. The animals were infested by ticks from which 34 strains of the tularemia microbe were isolated by biotests. The author investigated the blood serum of a child whose mother had been infected by tularemia during the ninth month of pregnancy. During the first few days after birth, the blood gave a positive agglutination reaction of 1:2,000; the agglutination titer fell gradually and after the third month a negative reaction was obtained. During the third and fourth month, an allergy test with tularemia was attempted, and negative results were obtained."

70. Water Foci of Tularemia Studied

"Study of Water Foci of Tularemia," by V. B. Plakhova, Trudy Tomskogo Instituta Vaktsin i Syverotok (Works of the Tomsk Institute of Vaccines and Sera), 1956, No 7, pp 202-205 (from Meditsinskiy Referativnyy Zhurnal, Part IV, No 5, May 57, p 55)

CPYRGHT

"Bacteriological tests were conducted on animals in two rayons of Altay Kray; 415 specimens (18 species) in one region and 220 (14 species) in the other. The tularemia pathogen was isolated from *Arvicola terrestris* L. and *Rattus nervegicus*. The role of the latter in the epizootiology of tularemia has not been sufficiently studied and will require further observation. In addition, *B.tularensis* was isolated from two rivers. According to the author, under natural conditions in Altay Kray, the water factor should be considered most important in the spread of tularemia."

71. Water as Source of Tularemia Infection

"Concerning Water as a Source of Tularemia Infection," by N. Z. Yakobson, Trudy Tomskogo Instituta Vaktsin i Syvorotok (Works of the Tomsk Institute of Vaccines and Sera), 1956, No 7, pp 199-201 (from Meditsinskiy Referativnyy Zhurnal, Part IV, No 5, May 57, p 55)

CPYRGHT

"The author describes an outbreak of tularemia which he observed in June 1954. The infection occurred mainly because of contact with animals (in skinning and processing the skin). The sickness, also occurred after bathing in the river, especially in stagnant water areas. On the shores of the river and in the brushwood, there were many slow-moving and dead (*Arvicola terrestris* L. The disease began to appear during the high-flood stage of the river."

72. Foci of Tick-Borne Rickettsiosis

"Foci of Tick-Borne rickettsiosis in Novosibirskaya Oblast," by N. V. Voshchakina, M. S. Shayman, M. N. Yerokhina, K. G. Lonzinger, and A. I. Bellendir, Trudy Tomskogo Instituta Vaktsin i Syvorotok, (Works of the Tomsk Institute of Vaccines and Sera), 1956, No 7, pp 153-159 (from Meditsinskiy Referativnyy Zhurnal, Part IV, No 5, May 57, p 52)

CPYRGHT

"Diseases caused by tick-borne rickettsiosis were observed in the Toguchinskiy Rayon of Novosibirskskaya Oblast mainly between April and October, with maximum peak during May. Sometimes the maximum peak of the disease occurs in September. The disease is connected with the extent of activity of the people in the fields. In these endemic foci, the hosts during the undeveloped stage of the tick are the following rodents: the field vole, field mice, gophers, hamsters, and others, all of which maintain the natural foci of tick-borne rickettsiosis. The carriers of the disease appear to be the following ticks: *Dermacentor silvarum*, *Dermacentor pictus*, and *Ixodes persulcatus*. In May, June, August, and September 1954, strains of the organism were isolated from infected humans, ixodidic ticks (*Dermacentor Silvarum*), and their eggs, as well as from gammacipic ticks and rodents (hamsters, voles, field mice, and gophers). The isolated strains, when introduced into guinea pigs, rabbits, and white mice, produced the characteristic clinical and pathological picture of experimental tick-borne rickettsiosis."

73. Virology of Tick-Borne Encephalitis in Tomskaya Oblast Foci

"Virological Investigation of Tick-borne Encephalitis in Tomsk Foci," by M. K. Tyushnyakova, Trudy Tomskogo Instituta Vaktsin i Syvorotok (Works of the Tomsk Institute of Vaccines & Sera) 1956, No 7, pp 53-61 (from Meditinskiy Referativnyy Zhurnal, Part IV, No 5, May 57, p 58)

CPYRGH

"The purpose of the virological investigations was to isolate and confirm the specificity of tick-borne encephalitis foci in various areas of Tomskaya Oblast. Ixodes persulcatus ticks collected from cattle, the brains of wild animals, and the spinal fluid and blood of patients were investigated. From 1948 until 1954, 83 strains of tick-borne encephalitis were isolated. The most virulent strains were the ones isolated from ticks. In relation to their specificity, the antigenic and immunogenic properties of the Tomsk strains of the virus, isolated from ticks, rodents, and people, were the same. However, the most valuable, in relation to their antigenic and immunogenic capabilities, were the strains of viruses isolated from ticks. All the strains isolated were somewhat similar to the Far Eastern, Ural, and Alma-Ata virus strains, but they possessed a different specific activity."

74. Clinical Picture of Q Fever in Belorussia

"The Problem of the Clinical Picture of Q Fever in Belorussia," by A. N. Filippovich, Clinic of Infectious Diseases, Minsk Medical Institute; Minsk, Zdravookhraneniye Belorussii, Vol 3, No 12, Dec 57, pp 39-40

Two case histories of patients undergoing therapy at the Minsk Clinical Hospital of Infectious Diseases in October-December 1956 are given in this article; one of the patients presented a typical clinical disease course, and the other, an atypical course of the vesiculosis-rickettsial pox type. Both cases were sporadic and are described in detail. It is said in conclusion that Q fever must be considered a sporadic disease in the Minsk region and probably in other parts of the Belorussian SSR. It is proposed that the cases described were connected with the processing of raw materials, and with cattle infected with *Rickettsia burneti* brought in from areas threatened with this type of rickettsiosis.

75. Q Fever and Other Rickettsial Diseases in the USSR

"The Present State of the Q-Fever Problem," by M. A. Mastenitsa, Trudy Tomskogo Instituta Vaktsin i N. Syvorotok (Works of the Tomsk Institute of Vaccines and Sera), 1956, No 7, pp 141-152 (from Meditssinskiy Referativnyy Zhurnal Part 4, No 5, May 57, Moscow, p 52)

CPYRGHT

"The author says that the following forms of rickettsial diseases are found in the Soviet Union; Marseilles Fever, European murine and tick-borne typhus, rickettsial pox, Q fever, paroxysmal tick-borne rickettsiosis, and trench fever. The epidemiology of Q fever is described in detail, as are the microbiological properties of the rickettsial and the clinical forms of the disease."

76. Chinese Study Scrub Typhus in Fukien Province

"Study of the Status of Natural Infection With Tsutsugamushi Rickettsia of Mites and Domestic Animals in Fukien Province," by Yu En-shu (于恩舒) and Lin Shih-ching (林師敬), Fukien Institute of Infectious Diseases; Peiping, Wei-sheng-wu Hsueh-pao (Acta Microbiologica Sinica), Vol 5, No 4, 1957; pp 425-432

This article presents data obtained in a "complete" survey of the vectors and reservoirs of Rickettsia tsutsugamushi in certain districts of Fukien Province, namely, Foochow, P'ing-t'an, and P'u-t'ien representing a coastal area; and Chien-yang, representing a hilly area. The 4-year survey was made during the period 1954-1957. Various species of mites and animals from which strains of the rickettsia were isolated are mentioned. The epidemiology of the disease in Fukien Province and other areas is discussed briefly.

Strains of the rickettsia which were isolated in Fukien Province were studied biologically and the results reported in the article. The information includes data on changes in the virulence of scrub typhus rickettsia maintained for several generations in the abdomen of white mice: comparison of reactions to various methods of artificial infection, and the effect of various diluents on the virulence of the organism.

Cultural experiments proved that mouse brain passage of the organism by intracerebral inoculation could be successful for as many as 30 generations. It was found that the number of days between the intracerebral inoculation and the death of the mice decreased from 16-18 in the fourth generation to a stabilized 10-11 after the 11th generation. The scrub typhus rickettsia grown on mouse brain tissue had a lower LD50 with respect to white mice than that grown in an ascitic fluid spleen medium. The age of the mice did not seem to be a factor in the value of the LD50 when rickettsia were introduced intracerebrally.

No adaptation took place when the organism was subjected to serial passage through chick embryos. In fact, the rickettsia soon disappeared. However, when white mice were used in alternate passages, better results were obtained. Rickettsiae were then recovered from the liver, brain, and heart tissues of chicks hatched from the eggs used in the alternate passages.

Hematology

77. Complement Titer in Frozen Guinea Pig Serum

"Duration of Preservation of Complement Titer in Frozen Guinea Pig Serum," by V. G. Il'yin; Moscow, Laboratornoye Delo, Vol 4, No 1, Jan/Feb 58, pp 27-28

In a description of a chemical method for preserving complement proposed by V. I. Kalinin and S. I. Ginsburg, it is said that the addition of 5 g of sodium sulfate and 4 g of boric acid to 100 ml of guinea pig complement will preserve the activity of the complement for 6-12 months. According to S. S. Rechmenskiy, B. M. Dobrov, and others, lyophilization will preserve the activity of complement for 4-5 years. V. S. Milovidov has observed that complement frozen at winter temperatures of -18 to -42° C and thawed slowly at room temperature can be used for the complement fixation reaction for 1 1/2-2 months. Steps in the preservation method tested by the author involving the use of chemically pure magnesium sulfate and guinea pig serum are given in the article. It is mentioned that the majority of laboratories in the USSR use dry complement. Results of testing complement frozen at various temperatures and under different conditions are reported. It is concluded on the basis of these investigations that freezing in lightproof containers and subsequent storing in a frozen state constitute a prospective and readily available method of preserving complement in localities with long-term and constant low temperatures during the winter months.

Immunology and Therapeutics

78. Vaccine Immunity Against Infection by Inhalation Studied

"The Role of Vaccine Immunity in the Protection of an Organism Against Infection by Inhalation. Report I," by V. M. Nikitin, Chair of Microbiology, Military Medical Academy imeni S. M. Kirov; Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, No 12, Dec 57, pp 90-93

CPYRGHT

"The importance of active immunization as specific protection of the organism against infection by the air-borne route has not been determined up to the present. Existing literary data on this subject (Smorodintsev, Shishkina, Shtiben, Pokrovskaya, Trillat, Wright, and others are insufficient.

"Considering the importance of the problem, we conducted investigations designed to study the role of vaccine immunity in the protection of the animal organism against infection by inhalation.

"A Breslau infection in white mice, which, as is well-known, occurs cyclically in them similarly to typhoid fever in man and frequently has a fatal outcome, was used as an experimental model.

"To produce inhalation infection in the animals, A. M. Yakovlev and I designed an experimental apparatus which made it possible to perform such experiments while maintaining necessary safety measures in the surrounding area and with which it was possible to record the conditions of the experiment and the infecting dose received by the animals via the inhalation route. The experimental apparatus consists of a hermetically sealed chamber with a volume of 134 liters, inlet and exhaust air tubes, an aerosolizer, a compressor, recording and metering devices, and a system for disinfecting the air.

"The animals are placed in the chamber, which is then hermetically sealed. Next, a bacterial suspension previously poured into the Yelkin-Eydel'shteyn aerosolizing system is aerosolized by introducing air at the rate of 40 liters per minute at a pressure of 0.5 atmosphere. To infect the white mice we used the washings from a day-old agar culture of Breslau bacilli in physiological solution.

CPYRGHT

"The size of the aerosol particles generated by our aerosolizer as determined by a micrometric method varied within a range of 0.5-10 microns. The quantity of the aerosolized suspension was determined by noting the difference in the weight of the aerosolizer containing the suspension before and after aerosolization.

"Exhaust air from the chamber was decontaminated by passing it through a 5% solution of carbolic acid and the flame of a gas burner. After completion of the experiment, the air in the chamber was disinfected by blowing in pure air and dispersing triethyleneglycol in it. Triethyleneglycol in small doses, as is well-known, has no harmful effect on animal organisms (Vashkov). After this, the access port was opened and the animals were extracted from the chamber. In performing the experiments on infection by inhalation, the problem of dosage presented significant complications. We achieved a constant infecting dose by maintaining identical conditions when performing the experiments and by the simultaneous infection of a sufficiently large number of animals.

"Initially, experiments were conducted to study the effect of Breslau bacilli in an aerosol state on the organisms of the white mice and to determine the lethal dose. The results of the experiments indicated that, after a short incubation period averaging 3-4 days, visible disease symptoms developed, i.e., the mice became sluggish and moved little, their fur looked disheveled, and their appetites decreased (they did not eat their daily bread ration). Thus the picture of the infection process which developed differed in no respect from the picture of a Breslau paratyphoid infection in mice produced by any other method of infection. The animals began to die on the 5th to 7th day. In inhalation infection of the animals, the bacterial aerosol unavoidably falls on the mucous membrane of the oral cavity which may give rise to the fatal infection. However, investigations conducted by us in this regard demonstrated the absence of microorganisms in the small intestine immediately and for the first few days after infection, thus making it possible to exclude the possibility of lethal infection per os.

"To determine the lethal doses, we divided the mice into several groups (five per group) and subjected them to infection with different doses by aerosolizing increasing concentrations of the bacterial suspension. The experiments were conducted at 17-23⁰C with a relative humidity of 30-75%.

"The results obtained are presented in Table 1. Table 1 gives the number of the experiment, the density of the aerosolized suspension in millions of microbial bodies, the number of mice in the experiment, the experimental conditions including the amount of the aerosolized suspension in grams and the number of minutes of exposure, the outcome -- number that died/ number that survived -- and the LD. These were, respectively, 1, 1, 5, 2, 20, 2/3, LD₄₀; 2, 10, 5, 2, 20, 3/2, LD₆₀; 3, 50, 5, 2, 20, 5/10, 1 Dcl; 4, 100, 5, 2, 20, 5/10, 2 Dcl; and 5, 500, 5, 2, 20, 5/0, 10 Dcl.

"Five hundred white mice weighing 16-18 grams were used in the experiments designed to study the stability of active immunity to air-borne infection. A formalinized vaccine consisting of a suspension of a day-old agar culture killed by formalin by the usual method was prepared to immunize the animals; 250 mice were immunized subcutaneously with this formol-vaccine. Immunity was produced by three injections at 5-day intervals. The vaccine was administered in 0.2-ml doses containing 200 million microbial bodies in the first dose, and 400 million in the second and third doses.

"We determined the state of immunity dynamically on the 15th and 30th day after the last vaccine injection on the basis of the following criteria: (a) the agglutinin titer, (b) the susceptibility of the white mice to infection with a 2 Dcl dose of Breslau bacilli per os, and (c) the susceptibility to a 2 Dcl dose by inhalation infection.

"After 15 days the agglutinin titer in the immunized animals proved to be 1: 1,200; after 30 days, 1: 800.

"The susceptibility of the immunized and control animals to 2 Dcl of Breslau bacilli was determined by the following method: the night before the experiments were performed the mice were placed in separate containers without food or water. After 16-18 hours of starvation, each mouse was fed a cube of wheat bread which had previously been saturated with 2 Dcl (200 million microbial cells) of a day-old culture of Breslau bacilli. The infected animals were observed for 15 days.

"When infected after 15 days all the immunized mice died, but, when infected after 30 days, 3 of the 5 mice died. In both instances 100% of the control mice died.

COPYRIGHT

"The degree of immunity of the animals to inhalation infection was determined by the procedure described above; 50 immunized and 50 control mice were infected simultaneously. The animals being infected had been placed in the chamber in a special metallic cell grid. Two experiments were performed under identical conditions. The animals were observed for 15 days.

"As can be seen from Table 2, after inhalation infection both immunized and control mice began dying after a short incubation period (averaging 5-6 days). Deaths increased rapidly, reaching a maximum 9-10 days after infection. Almost 100% of the control animals died in the experiments (98 and 92%). In the first experiment, 93% of the immunized animals died, i. e., no expressed immunity could be noted in the vaccinated animals. In the second experiment 79% of the animals died; consequently, the organisms of the mice demonstrated a poorly manifest resistance to a developing paratyphoid infection.

"By comparing the dynamically obtained results of agglutination reactions and infection per os and by inhalation, it can be seen that the maximum agglutinin titer was attained on the 15th day after vaccination and was only slightly diminished by the 30th day, while the resistance of identical groups of animals to inhalation and enteral infection had only begun to manifest itself weakly 30 days after the last vaccine injection."

"Conclusions

"1. The inhalation method of infecting white mice with a culture of Breslau bacilli makes it possible to reproduce the paratyphoid infection process under experimental conditions.

"2. The mice immunized subcutaneously with a formol vaccine and subsequently infected by the inhalation of Breslau bacilli became ill in the same manner as the controls did.

"3. When infected 15 and 30 days after vaccination, no expressed resistance to inhalation infection with a culture of Breslau bacilli could be detected in the immunized mice."

CPYRGHT

"Bibliography

1. V. I. Vashkov, Trudy Tsentral'nogo Desinfektsionogo Instituta (Works of the Central Disinfection Institute), Moscow, 1949, No 5, pp 118-120
2. I. I. Yelkin, S. I. Eydel'shteyn, Aerosoli Antibiotikov, ikh Polucheniye i Klinicheskoye Primeneniye (Aerosols of Antibiotics, Their Production and Use), Moscow 1955
3. M. P. Pokrovskaya, Osnovy Immuniteta (Fundamentals of Immunity), Moscow, 1956, pp 273-283
4. A. A. Smorodintsev, Arkhib Biologicheskikh Nauk, 1938, Vol 52, No 1, pp 3-19
5. A. A. Smorodintsev and O. I. Shishkina, Arkhib Biologicheskikh Nauk, 1940, Vol 59, No 1-2, pp 3-18
6. O. I. Shishkina, Arkhib Biologicheskikh Nauk, 1938, Vol 52, No 1, pp 108-125
7. V. D. Shtiben, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, 1947, No 9, pp 83-88
8. A. Trillat and R. Kaneko, Compt. red. Acad d. Sc., 1921, Vol 173, pp 109-111
9. A. Trillat, Bull. Acad. de Med., 1933, Vol 109, pp 591-595
10. G. G. Wright, T. W. Green, and R. G. Kaneko, J. immun., 1954, Vol 73, No 6, pp 387-391

79. Combined Brucellosis-Tularemia Vaccine Tested

"Experimental Study of Immunization With Combined Brucellosis-Tularemia Vaccine on Guinea Pigs," by Ye. A. Gubina, Institute of Epidemiology and Microbiology imeni Gamaleya; Moscow, Zhurnal Mikrobiologii, Epidemiologii, i Immunobiologii, Vol 28, No 11, Nov 57, pp 107-111

This article reports a continuation of research on the possibilities of immunizing with a live combined brucellosis-tularemia vaccine begun by the brucellosis and tularemia laboratories of the Institute imeni Gamaleya in 1953. Data are presented on bacteriological, immunological, and morphological studies of the vaccine process following cutaneous immunization. Comparative results of testing the intensity of immunity against brucellosis conferred by subcutaneous and cutaneous introduction of the combined vaccine are also given. The experiments described were performed on the following three groups of guinea pigs: animals vaccinated cutaneously with one dose of 5 billion vaccine strain *Brucella* and 100 million vaccine strain tularemia bacilli, animals vaccinated cutaneously with a vaccine containing one million microbial cells of both brucellosis and tularemia pathogens, and control pigs vaccinated with only the brucellosis vaccine (5 billion microbial cells). The associated vaccine contained the NIIEG vaccine strain of *B. tularensis* and two *Brucella* vaccine strains -- *Br. abortus* VA and M, immunogenic to the same extent. Vaccination methods are described in detail. Three tables show results of the immunizations.

CPYRGHT The following conclusions were drawn on the basis of results obtained:

"1. The vaccination process in guinea pigs immunized with cutaneous live combined brucellosis-tularemia vaccine is characterized by:

a. Early development of a generalized vaccine process, i.e., a vaccine culture of *Brucella* was isolated from all organs; *Brucella* disappeared from the organisms of the animals toward the end of the second month.

b. Immunological reconstruction of the organisms of the guinea pigs immunized with live combined vaccine with respect to brucellosis lagged somewhat in comparison with separate vaccinations with these vaccines, i.e., 5 months after vaccination immunological reaction was maintained in 100% of the animals vaccinated with only the brucellosis vaccine, and in 80.7% of the animals vaccinated with the combined preparation.

c. Morphological data confirmed the occurrence of a benign vaccine process, the development of which was not accompanied by degenerative changes and at the end of which no pathological changes remained.

CPYRGHT

"2. Comparative data from testing the intensity of immunity showed that the cutaneous method of vaccination produced the same effect as the subcutaneous. Moreover, the intensity of immunity following vaccination with the live combined vaccine was somewhat more weakly expressed than it was following separate vaccinations with the same vaccines. This difference, however, was not significant.

"A strong immunity following cutaneous vaccination with the combined vaccine was retained in 81.6% in the 7th month."

80. Agglutination Reactions With Rickettsial and Protein Antigens in the Diagnosis of Typhus

"The Study of Agglutination Reactions With Rickettsial and Protein Antigens for an Early Diagnosis of Typhus, "Sbornik Nauchnykh Rabot Lvovskogo Nauchno-Issledovatelskov Instituta Epideminologii, (Collection of Scientific Works of the Lvov Scientific Research Institute-Epidemiology) Mikrobiologii i Gigieny, 1956, 12-17, (From Meditsinskiy Referativnyy Zhurnal, Part IV, No 5, May 57, p 51).

CPYRGHT

"For an early diagnosis of typhus, the author investigated agglutination reactions with rickettsial protein antigens. The specificity of the microagglutination reaction of rickettsial antigens from the intestines of lice was determined. With the same goal in mind, he conducted 972 microagglutination reactions including 553 Weil-Felix Reactions with a serum of typhus patients and 419 microagglutinations reactions with the serum of patients suffering other types of fevers. The results of these experiments indicated the high specificity of the microagglutination reactions with rickettsial antigens from lice. The author points out that the main advantages of rickettsial antigens over the OX₁₉ antigens is not only their specificity, but the earlier appearance of antibodies."

[For additional information on immunology and therapeutics, see Items No 65, 86, and 104.]

Pharmacology and Toxicology

81. Organophosphorus Compounds Used in Medicine

"The Founder of the Largest School of Organic Chemists," by V. S. Abramov Candidate Chemical Sciences, Kazan Chemico-technological Institute imeni S. M. Kirova, Moscow, Priroda, No 9, Sep 57, p 39

Organophosphorus compounds are now being applied in medicine. Most investigators believe that the toxic action of organophosphorus compounds is brought about as a result of cholinesterase inhibition. This property can be widely used in medicine in a variety of diseases. Thus tetraethylmonothiopyrophosphate, pharmacologically known as "phosarbin," was found to be very effective against glaucoma, and in its therapeutic value exceeds that of many other preparations used for this purpose.

At the Kazan Chemicotechnological Institute, a group under the direction of A.I. Razumov synthesized a preparation called armin which is also effective against glaucoma and has subsequently been approved by the Ministry of Health USSR for production and has been released on the market. Recently, armin underwent other clinical testing as an oxytocic and apparently will find wide use in this field of medicine. A new organophosphorus preparation, armuzin, also underwent preliminary testing, which indicated that its therapeutic activity is significantly greater than that of armin, while its toxicity is less than one tenth that of armin.

82. Dependence of Toxicity and Anticholinesterase Properties on Chemical Structure

"The Dependence of Toxicity and Anticholinesterase Properties on Chemical Structure in the Alkylamide Series of Di-Dialkylphosphoric Acids," by I. A. Frankov, Khimiya i Primeneniya Fosfororganikh Soedineniy, Moscow, Academy of Sciences USSR, 1957, pp 366-371. (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 20, 25 Oct 57, Moscow, p 110, Abstract No 23053)

CPYRGHT

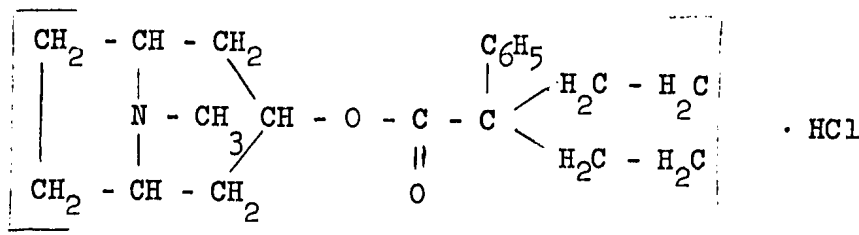
"Toxicity (in mice) and anticholinesterase activity (in Vitro of the amido esters of phosphoric acid were investigated. Increasing the number of C in the radicals of the monomethylamide series in relation to the P, as well as changes in the unbranched chains of these radicals by isogroupings, produces lowered toxicity to approximately one half) without changing the anticholinesterase activity. Such changes in the monomethylamide series markedly (to less than one fiftieth) reduce toxicity and simultaneously reduce to less than one tenth cholinesterase activity. Increasing the number of C in the radical in relation to the N produces increased toxicity and anticholinesterase properties by affecting the isogrouping in these radicals; increasing the number of C in the unbranched chains reduces the activity. All the compounds studied were unstable in water. It was suggested that exchanging the O for S increases the stability of the compounds."

83. Effect of Tropentane on Cholino- and Adrenoreactivity

"The Effect of the Chlorhydrate of Tropine Ether of Phenyl Cyclopentane Carbonic Acid (Tropentane) on the Cholino- and Adrenoreactive Systems of an Organism," by K. A. Zaytseva, Department of Pharmacology (chief, Prof M. D. Mashkovskiy), All-Union Scientific Research Chemicopharmaceutical Institute imeni S. Ordzhonikidze; Moscow, Farmakologiya i Toksikologiya, No 5, Sep/Oct 57, pp 55

Tropentane, which has been synthesized by M. N. Vanina at the experimental pilot plant of the All-Union Scientific Research Chemicopharmaceutical Institute, the author explains, is a white crystalline powder with a melting point of 220-222° and easily soluble in water.

Its chemical structure, which is given below, is similar to tropacine:



Tropentane

After studying the effect of various doses of tropentane on the peripheral and central m- and n-cholinoreactive and adrenoreactive systems of rabbits, cats and frogs, the author presents the following conclusions:

CPYRGHT

"1. The tropine ether of 1-phenylcyclopentanecarbonic acid -- tropentane -- is a pharmacologically active preparation.

"2. It is similar to tropacine in the character and strength of its pharmacological action. Like tropacine, it has a marked effect on the peripheral and central m- and n-cholinoreactive systems, lowering their sensitivity.

"In its ability to counteract nicotenic hyperkineses, tropentane is similar to tropacine, but at the same time it displays a much stronger central arecholinolytic action."

84. Toxicology of Camphor Vapors

"A Toxicological Evaluation of Camphor Vapors," by I. I. Nikola-yova, Chair of Medical Hygiene, Permsk Medical Institute; Moscow, Gigiyena i Sanitariya, No 11, Nov 57, p 83

On the basis of experiments in which rabbits and white mice under glass were subjected to various concentrations of camphor vapors for 30 minutes to 3 hours, the author presents the following results:

"1. Radical experiments, involving the use of camphor vapors on white mice, were fatal, depending on the dosage, or produced convulsive epileptiform attacks or stimulation.

"2. After chronic experiments, in which white mice were exposed to various concentrations of camphor vapors, 0.21 to 0.35 mg/l for one month, and rabbits were exposed to concentrations of 0.13 to 0.38 mg/l for one month and 0.033 to 0.21 mg/l for 1 1/2 months, no external effects were observed.

"3. All the animals which were subjected to chronic exposure developed histological changes; mainly respiratory changes in white mice; while in rabbits not only respiratory changes, but changes in other organs as well."

85. Toxicology of Galowax

"The Characteristics of Galowax as an Industrial Poison," by E. A. Kankayev, Doctor of Industrial Sanitation, Republic Sanitary Epidemiological Station, Bashkir ASSR; Moscow, Gigiyena i Sanitariya, No 11, Nov 57, p 79

Galowax, a mixture of trinitrochloronaphtaline ($C_{10}H_3Cl_3$) and tetrachloronaphtaline ($C_{10}H_4Cl_4$), the author explains, is used in the electrical industry to coat condensers. Recently, the author adds, he was afforded an opportunity to treat some patients who were exposed to toxic doses of galowax while working for an electric plant (unidentified) where the concentration of galowax had reached a high proportion owing to the lack of a sound and effective sanitary regime.

The author describes the clinical and laboratory picture of eight patients admitted to the hospital along with a description of the therapy, to which all the patients responded satisfactorily.

Finally, the author suggests sanitary steps which should be taken to make the use of galowax in industry more feasible, and even goes so far as to suggest that a less toxic substance be found as a substitute for galowax.

86. Chinese Isolate Carcinostatic Antibiotic

"Actinomycin K -- a Carcinostatic Substance," by Ts'ai Jun-sheng (蔡俊生), Hsu Tzu-yuan (胡子元), Pao Ch'in-chu (包钦楚), Liang Sou-fang (梁寿芳), Shen Li-chun (沈立春), Wu Shu-yun (吴舒云), Wu Te-cheng (吴德成), Liu Ming-chang (刘明昌), Ch'u Chun-ch'ing (褚春庆), and Hsu Pin (许品), Institute of Materia Medica, Academia Sinica, in collaboration with W. Kulilowicz, Antibiotics Research Institute, Ministry of the Chemical Industry, Warsaw, Poland; Peiping, K'o-hsueh T'ung-pao (Scientia), No 23, 12 Dec 57, pp 717-718

An antibiotic actinomycin which inhibits the growth of tumor cells in vitro and in vivo was extracted from a "new species" of Streptomyces isolated in Kweilin. The authors claim that it has properties different from those of other actinomycins described in the literature and have named it Actinomycin K. Cultures of the mold, Streptomyces melanochromogenes No 1779, are described as "yellow with grayish-white spots and capable of producing black pigment. The mycelium is long, straight, and branched, and the spores are spherical."

A summary of fermentation and extraction procedures and the results of chemical, physical, and pharmacological analyses, as reported, follow.

Fermentation and Extraction

The fermentation broth of Streptomyces melanochromogenes No 1779, cultivated in shake flasks and also in a 30-liter fermentor, attained titers of 600-800 units per milliliter (as compared with streptomycin) in fermentation periods of 36-48 hours. The antibiotic was extracted from the filtrate with phenol and from the mycelium with acetone. The phenol solution of the antibiotic was subsequently passed through an aluminum oxide column and then recrystallized several times from ethyl acetate. Actinomycin K forms red, diamond-shaped crystals and has a melting point within a range of 250-252 degrees centigrade.

The yield of actinomycin K was 4.4 grams per 10 liters of fermentation broth -- 2.6 grams from the mycelium and 1.6 grams from the filtrate. Data showing how this compares with the amounts of antibiotic substances obtained from other strains of Streptomyces under the same fermentation conditions are given in Table 1, below.

Chemical and Physical Properties

Analysis of actinomycin K by paper chromatography was performed in a combination of solvents comprising a 1: 1:2 ratio of ethyl acetate, n-butyl ether, and 2% beta-naphthol sulfonic acid. The paper strips, tested on Bacillus subtilis plates, developed inhibition zones of three different R_f values. Fractions of the antibiotic represented by $R_f = 0$ and $R_f = 0.5$ are arbitrarily called A and B fractions, respectively. The percentages of A and B fractions contained in actinomycin K as compared with other antibiotics derived from related Streptomyces are shown in Table 1. The fraction represented by $R_f = 1$ was too scanty for photometric estimation.

Acid hydrolysis of actinomycin K yielded five amino acids: threonine, proline, sarcosine, valine, and another which appeared to be isoleucine. Elementary analysis revealed carbon 57.72 percent, hydrogen 7.57 percent, and nitrogen 14.06 percent. The ultraviolet light absorption spectrum in methanol solution showed two absorption peaks at approximately 240 and 440 millimicrons, respectively.

Pharmacology

Actinomycin K inhibited the growth of Gram-positives in vitro. Data on its inhibition of bacterial growth are presented in Table 2.

Its LD₅₀ with respect to white mice was found to be 745 micrograms per kilogram body weight when administered intra-abdominally. Daily intra-abdominal injections of 44 micrograms per kilogram for 18 days caused no appreciable change in the blood picture, urine, or body weight of experimental mice. Nor did 500 micrograms per kilogram injected intravenously have any appreciable effect on the blood pressure and respiration of anesthetized cats.

In vitro antitumor experiments demonstrated that 8 micrograms per milliliter of actinomycin K exerted a suppressive effect on Ehrlich's ascitic oncocytes. The effect was more pronounced when the dosage was increased. In vivo experiments showed that daily intra-abdominal administrations of 25-50 micrograms per kilogram inhibited the growth of ascitic tumors, prolonging the lives of experimental mice for about 15 days. As shown in Table 3, 50 micrograms per kilogram daily also suppressed the growth of Ehrlich's ascitic tumors of the subcutaneous solid

CPYRHT

Table 1. Actinomycin Production From Various Streptomyces

<u>Actinomycin</u>	<u>Producing Organism</u>	<u>Total Yield (grams/10 liters)</u>	<u>Frac- tion A (%)</u>	<u>Frac- tion B (%)</u>
K	Streptomyces melanochromogenes No 1779	4.4	31.3	68.7
23-21	Strep. No 23-21	0.43	25.7	74.3
39	Strep. No 39	0.86	19.7	80.3
C	Strep. chrysomallus No 3657	0.3	14.0	86.0
D	Strep. parullus Z-8	Trace	0	100.0

CPYRGHT

Table 2. Minimal Bacteriostatic Concentrations of Actinomycin K Crystals in Vitro

<u>Organism</u>	<u>Millimicrograms Actinomycin K per Milliliter Medium</u>
Staphylococcus aureus 209-P	0.15
S. lutea 1001	0.08
B. subtilis 6633	0.08
E. coli 50	100
Myobact. 607	25
C. albicans	50

Table 3. Effect of Actinomycin K on Ehrlich Ascitic Tumors of the Solid Subcutaneous Type

<u>Daily Dosage for 7 Days (micrograms/kilograms)</u>	<u>No of Mice</u>	<u>Average Weight of Tumors ± Margin of Error (kilograms)</u>
25	9	844±300
50	10	382.132
Control (saline)	10	869±265

87. Hungarians Prepare Sex Hormones

"Successful Experiments of Our Chemists in the Preparation of Sex Hormones," by J. J.; Budapest, Nepakarat, 18 Dec 57, p 8

The Kobanya Pharmaceutical Plant will make sex hormones from the seeds of Australian Nightshade (*Solanum aviculare*) in accordance with a process evolved by Pal Tuzson, Doctor of Chemical Sciences, at the Pharmaceutical Industry Research Institute (Gyogyszeripari Kutato Intezet).

Experiments were begun in 1952 when seeds of the plant, which is indigenous to India, Australia, and New Zealand, were imported. Experiments proved the plant to be a suitable basic material for the preparation of a major part of the hormones. Sex hormones prepared from this basic material can be used successfully to combat sterility and cancer.

88. New Hungarian Pharmaceutical Products

"New Products of the Hungarian Pharmaceutical Plants," by Istvan Vig; Budapest, Magyar Nemzet, 8 Sep 57 p 6

A new product of the Kobanya Pharmaceutical Plant is "Secadol," which is used in the treatment of migraine. The factory also makes "Gyonofort" and "Neo-Gyonofort," ergot preparations used to reduce postdelivery hemorrhage. This drug, says the author, was developed by research engineers Rezso Konig of the Chinoin factory and Tibor Kovacs and Bela Spargely of the Kobanya factory. This product will soon be on the market in quantities sufficient to meet all domestic demands.

Within the next 2 months the Kobanya factory will put ACTH in injection form on the market. It was prepared chiefly by Mrs Aladar Torok, a department head of the Pharmaceutical Industry Research Institute (Gyogyszeripari Kutato Intezet).

Another new drug, "Tensatrin," which reduces blood pressure, was developed by Engr Kalman Szasz and will be on the market this year.

The Chinoin factory of Ujpest is producing or will soon produce the following new preparations:

"Degranol," for the treatment of malignant tumors and malignancies of the hemopoietic system, developed under the direction of Dr Laszlo Varga, Academician, director of the Pharmaceutical Industry Research Institute; "Bucarban," a tablet seven times more potent than its predecessor, developed for the treatment of diabetes in persons over 40 years of age by Doctors Kalman Lanyi and Laszlo Forgacs; "PAS," in dragee form, developed by Gyorgy Szilagyi of the Chinoin laboratory; "Stigmosan," a preparation for combating postoperative paralysis of the intestines; "Rostivol" tablets for high blood pressure and complete lack of hydrochloric acid in the stomach; and an as yet unnamed antidote for phenobarbital.

"NA 66 - NA 90," (unsigned article); Budapest, Magyar Nemzet, 28 Sep 57, p 5

Karoly Nador, Candidate of Chemical Sciences and member of the Institute of Pharmacology (Gyogyszertani Intezet), Budapest Medical University, is the discoverer of "gastropin," a preparation used to combat illnesses of the stomach and intestines, which is especially effective in the treatment of ulcers.

Two other new preparations evolved by Nador will soon go on the market: NA 66 is a respiratory stimulant to be used in cases of poisoning, in paralysis of the respiratory system, for reviving the newborn, and to stimulate breathing after operations; NA 90 is a compound used in the cure of nervous diseases, especially Parkinson's disease.

At present, the institute is investigating the structure of muscarine, which is the effective agent in fly agaric.

The Institute of Pharmacology is under the direction of Dr Bela Issekutz, Academician.

[For additional information on pharmacology and toxicology, see Item No 94.]

Physiology

89. Injection of Lymphatics by Weak Silver Nitrate Solutions Proves That Lymphatic System Is Closed System In Its Flow

"Functional Anatomy of Lymphatic Capillaries," by A. A. Sushko, Nov. Khir. Arkh. (The New Surgical Archives), No 4, 1956, 47-55 (from Meditinskiy Referativnyy Zhurnal, Section 2, No 2, Feb 57, p 3)

Injecting the lymphatic vessels with weak solutions of silver nitrate proves that the lymphatic system is a closed system in its flow.

Tests proved that the silver was deposited in the cytoplasm of the endothelium; therefore, the endothelium must be considered as of syncytial structure. The endothelium of the venous capillaries, judging from the distribution of argyrophil plasma, is more akin to the endothelium of the lymphatic capillaries than to that of the arterial capillaries. The lymphatic capillaries are distinguished from blood capillaries by the presence of basal membrane in their structure.

Public Health and Sanitation

90. Conference on Toxicology of Insecticides

"First All-Union Scientific Conference on Hygiene and Toxicology of Insectofungicides," by K. G., Moscow, Khimicheskaya Promyshlennost', No 6, Sep 57, pp 383

The First All-Union Scientific Conference on Hygiene and Toxicology of Insectofungicides was called in Kiev, 25-29 July 1957, by the newly created Committee for the Regulation of Poisonous Chemicals of the Main State Sanitation Inspection USSR (Glavnaya Gossaninspektsiya SSSR). The conference was attended by over 250 physicians, scientific and practical plant protection workers, chemists, and toxicologists working with new agricultural chemicals.

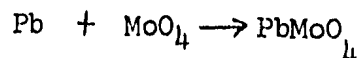
L. I. Medved' acted as chairman of the conference and delivered a paper on the aims and problems of scientific research on the hygienic and toxicological appraisal of insectofungicides. About 80 papers in all were presented. It was pointed out that in recent years a greater volume of research on toxic chemicals has been done at the medical organizations than was the case previously. At present, about 20 medical organizations are participating in this work. Significant success has been attained in the treatment of mercury compound poisonings with the new therapeutic preparation unitol. New compounds, such as tropacene and pentaphene, are recommended for treatment of poisoning with organophosphorus compounds.

91. Amperometric Titration of Lead

"The Determination of Lead in Air by the Amperometric Method," by I. P. Grigorova, Sverdlovsk Scientific Research Institute for the Protection of Labor, All-Union Central Council of Trade Unions; Moscow, Gigiyena i Sanitariya, No 11, Nov 57, p 94

Because of the shortcomings (low sensitivity reaction, difficulties in measuring turbidity, subjective factors, time spent in collecting samples, etc.) of the nephelometric method currently used in industrial sanitation chemistry for determining lead in air, the author, on the basis of data he presents, proposes the use of the amperometric method.

This quantitative analysis is based on the amperometric titration of acetic acid lead solutions by ammoniated molybdenum oxide.



As a result, the author points out, determinations of $10 \cdot 10^{-6}$ mgs of lead in a 10 ml solution are possible.

[For additional information on public health and sanitation, see Item No 85.]

Radiology

92. Ionizing Radiation Inhibits Hepatic Acetylation and Decreases Coenzyme A Content

"Acetylation Function of Coenzyme A System in Radiation Sickness," by V. N. Filippova and I. F. Seyts, Leningrad Scientific Research Institute for Blood Transfusion, Moscow, Doklady Akademii Nauk SSSR, Vol 114, No 5, 11 Jun 57, pp 1076-1079

The purpose of the present research was to study the influence of radiation energy on one of the most important functions of the coenzyme A system, i.e., the processes of acetylation, and to assay the hepatic coenzyme A content.

Experiments were conducted on the liver of nonirradiated and irradiated pigeons. A total of 388 tests were run.

Results indicate the existence of profound effects of ionizing radiation on compounds engaged in the transfer of the acyl groups. This affects both the protein and the nonprotein (coenzyme) components of the enzyme system of acetylation in the liver. Thus, irradiation inhibits enzyme acetylation activity and reduces the quantity of coenzyme A in the liver.

The authors conclude that, since coenzyme A participates in numerous reactions and processes which exert vital significance, one may consider that the disturbance of the function of this enzyme system is important in the genesis and in the development of radiation syndrome.

93. Effects of Ionizing Radiation Attributed to Changed Functional Condition of Central Nervous System Rather Than to Changes in Specific Organs

"Concerning the Reflex Mechanism of the Effect of X Rays,"
by M. A. Movsesyan, S. G. Shchukuryan, and A. Ye. Agababyan,
Izv. AN ArmSSR, Biol. i S. -Kh. N. 1956, Vol 9, No 3, 149-156
(Arm.) (from Referativnyy Zhurnal -- Biologiya, No 11, 10 Jun
57, Abstract No 48157, p 456)

Irradiation of rabbits at the hepatic region by 100 r caused increased blood sugar, increased pseudoeosinophils, and decreased lymphocytes (tests were conducted 20 minutes and 2 hours after irradiation). After the administration of caffeine to rabbits, irradiation of the hepatic region did not cause increased blood sugar or change the leukocyte formula. Bromine administration in conjunction with irradiation caused decreased blood sugar, a slight increase of pseudoeosinophils, and decreased number of lymphocytes.

The authors conclude that changes in blood composition are conditioned not by the direct effect of X rays on the formed elements of the blood or on hepatic glycolysis, but on the reflex influences on blood-distributing mechanisms, hemopoietic organs, and on sugar metabolism. Furthermore, this final effect depends on the functional condition of the central nervous system.

94. Hungarians to Test Properdin as Antiradiation Agent

"Experiments With Properdin at the Institute of Oncology," by
G.N.Z.; Budapest, Esti Budapest, 30 Nov 57, p 6

The Institute of Oncology (Onkologiai Intezet) is about to undertake experiments to determine the extent to which properdin is effective in protecting organisms from cancer. Experimental animals whose production of properdin has been stimulated by injections of polysaccharide will be subjected to lethal doses of radiation.

The polysaccharides which are to be used were obtained as the result of work by the young Hungarian research worker, Dr Istvan Nagy, who has been investigating agents which stimulate the system to produce properdin.

Polysaccharides were found to be the best stimulants, but Nagy felt that it was too difficult to obtain these polysaccharides from animals. Subsequently, he found that he could extract the desired polysaccharides from small tumors occurring on the stems of white poplar leaves. When experimental animals were inoculated with this extract, they all responded by producing large quantities of properdin within a few days.

According to the article, Dr Nagy was in Frankfurt at the Medical Clinic at the time when Dr Gonssel, director of the clinic, proved that animals which had been inoculated with substances which stimulated the system to produce properdin could survive lethal doses of radiation.

95. Tagged Atoms and Their Extensive Practical Use in Biology and Medicine Reviewed

"Tagged Atoms and Their Practical Use in Biology and Medicine,"
by Prof V. A. D'yachenko (Moscow); Moscow, Meditsinskaya Sestra,
No 12, Dec 57, pp 24-28

The use of radioactive substances has made it possible to study many very complicated biological processes proceeding in cells. Such studies have proved, for example, that permeability does not depend on diffusion, or dialysis, but in the result of specific active processes in cells, and that these processes are regulated by enzymes. The life span of various blood elements has been determined by tagged elements, for example, erythrocytes 100-120 days, platelets 8-12 days, granulocytes 3-5 days, and lymphocytes not more than 12 hours.

In general, the use of tagged atoms may be summed up in the following fields:

Biochemistry -- study of the processes of absorption, and the synthesis, destruction, and transformation of proteins, fats, carbohydrates, and minerals. It was thought for 100 years that carbohydrates are formed only by leaves which take up carbon dioxide, but tagged atoms prove that carbohydrates are formed also by roots through the uptake of carbon dioxide gas and through the transformation of carbonates from the soil.

Microbiology -- study of tagged microorganisms, toxins, antigens, and tagged viruses.

Pharmacology -- study of the uptake of drugs (tagged penicillin is an example), their movement, excretion, and effects on organisms.

Hygiene, especially in industrial hygiene, and in epidemiology.

Clinical use -- study of blood volume and rate of circulation in determining the functional condition of the cardiovascular system.

Examples of the specific use of radioactive elements are use of radioactive iodine in thyroid gland studies, especially when the pathological conditions bear no clinical symptoms, and for the localization of certain brain tumors.

Beta therapy has certain special advantages chiefly because beta ray penetration is superficial compared with gamma rays and X rays, and so is preferred in skin therapy. In addition, beta therapy is preferred for certain locations, the eye, for example, where it is not possible to protect it from secondary radiation from the bones following gamma or X ray radiation. Beta therapy is especially important in the treatment of polycythemia.

96. Ionizing Radiation Delays Wound Healing and Bone Callus Formation

"Certain Data on the Effect of Ionizing Radiation (Average Doses) on Open Injuries of the Mandible of Rabbits (Preliminary Report)," by M. A. Pliner and S. I. Volkov; Moscow, Stomatologiya, No 6, Nov/Dec 57, pp 39-42

The aim of this research was to study the course and the healing process of fractures of the mandible of rabbits subjected to average doses (600 r) of X rays. Tests were conducted on 16 rabbits, 6 of which were controls.

Results indicate that (a) the combined injuries of the jaws due to irradiation by average doses belong to the group of severe injuries, and that (b) the healing of wounds and the development of bone calluses in combined injuries of the jaws are slow and the fractures are often complicated by osteomyelitis.

97. Special Liquid Emulsions for Clearer Histoautoradiograms

"A Method of Using Special Liquid Emulsions for Histoautoradiography," by Ye. V. Erleksova; Moscow, Meditsinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 77-82

The author describes a modified method for getting clearer histological autoradiograms. Steps described include the application of the underlayer and of histological sections on the microscope slide, method for the application of liquid photoemulsions on the histological sections, methods for the development of the plates, fixation, and also a method for staining of the histological sections in the photoemulsions.

The author concludes that photoemulsions of type A₂ and R were developed at the Roentgenographic Laboratory of the "NIKFI" (Scientific Research Cinephotographic Institute), and may be used for examination and microlocation of radioactive elements in histological sections. A clearer histoautoradiogram is obtained owing to good contact of the surface of the section with the photoemulsion following adequate exposure, development, and fixation of the preparations.

98. Effects of Ionizing Radiation on Course of Pregnancy

"Conference on the Effects of Ionizing Radiation on the Course of Pregnancy, on the Development of the Fetus, and on the Condition of the Infant," By N. A. Kalinina: Moscow, Meditinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 87-89

A conference was held at Leningrad, 5-7 March 1957, at the Institute of Obstetrics and Gynecology of the Academy of Medical Sciences USSR. The theme of the conference was the effects of ionizing radiation on the course of pregnancy, the development of the fetus, and the condition of the newborn infant. The conference was sponsored by the Institute of Obstetrics and Gynecology of the Academy of Medical Sciences USSR, the Central Scientific Research Roentgenoradiological Institute of the Ministry of Health USSR, and the Scientific Research Institute of Obstetrics and Gynecology of the Ministry of Health RSFSR. Fifteen reports were heard.

The conference opened with a report by N. A. Kalinina whose topic was "The Effects of Ionizing Radiation on the Course of Pregnancy, and on the Condition of the Newborn Infant." The author reviewed experimental and clinical data from literature and analyzed her own personal studies of the subject. It was proved that certain morphological biochemical, hematological, etc., changes in radiation sickness become more aggravated during pregnancy.

A. A. Kulikovskaya reported on the comparative study of the morphological changes arising in nonpregnant and pregnant animals irradiated at various periods of their pregnancies. Her results indicate that changes in nerve endings in pregnant animals arise sooner and are more pronounced than in nonpregnant animals, and that degenerative changes in the heart, liver, etc., also, are more pronounced in pregnant animals.

Ye Ya. Gilinskiy and A. A. Kulikovska reported that pathological changes in the pia mater, the vascular system, and the cerebral substance of irradiated animals are more pronounced in pregnant than in nonpregnant animals.

L. V. Funshteyn and G. V. Ochinska compared the course of acute radiation sickness in nonpregnant and pregnant animals irradiated at various periods of pregnancy. The authors concluded that the acute form of radiation sickness has no special features during pregnancy, but that the duration of life differs when irradiation is inflicted at various stages of pregnancy.

V. P. Baskakov's report was on the "Changes in the Higher Nervous Activity of Irradiated Nonpregnant and Pregnant Animals." Results indicate that changes occurring in the higher nervous activity of irradiated pregnant animals arise significantly sooner and remain longer in pregnant than in nonpregnant animals.

O. L. Nemtsova and Ye. I. Andreyeva also reported on the changes in the higher nervous activity of pregnant animals and their offspring. Their results indicate difficulty in the propagation of conditioned reflexes, the weakening of the processes of stimulation and inhibition, and poor sensitivity of the offspring.

Among those reporting on changes in the peripheral blood of pregnant animals were N. M. Andriyasheva, who reported that leukemia was more acute and remained longer in pregnant animals irradiated toward the end of their pregnancy than during the middle part of their pregnancy, and that anemia was graver in irradiated pregnant than in nonpregnant animals. A. Yu. Svirgis reported that changes in the peripheral blood and in the hemopoietic organs of the fetus paralleled those of the pregnant animal.

T. A. Ivanova, S. P. Voskresenskiy, and A. P. Novikova reported on the condition of the offspring of dogs subjected to the products of uranium fission. Their results indicate disturbance of bone-marrow hemopoiesis and inhibition of lymphocytosis and that puppies of the first generation are retarded in their development (but this latter trait depended to a considerable degree on decreased lactation of the experimental dogs).

N. M. Pobedinskiy reported on the influence of hemorrhage on the course of radiation sickness in pregnant animals. It was proved that hemorrhage in pregnant animals was more serious than in nonpregnant ones.

Ye. A. Kakushkina and L. A. Plodovska presented a study of the effects of X rays on the sex function of the offspring of irradiated dogs. It was proved that the effect of irradiation on the sex function of dogs was more pronounced if irradiation occurred during embryogenesis than if the animals were fully grown. A higher percentage of sterility, per litter of dogs, occurred if irradiation was inflicted during the period of embryogenesis than if irradiation was inflicted when the offspring were fully grown (just before parturition).

The conference adjourned after making the following recommendations:

1. To conduct a thorough study of the pertinent problems with the participation of biologists and physicians in their various fields of specialties, i.e., physiologists, biochemists, morphologists, and clinicians, and to pay special attention to the mechanism of injury to offspring.
2. To increase the range of studied doses, and to pay close attention to the chronic effects of small doses of ionizing radiation and to the deleterious effects of radioactive isotopes.
3. To conduct detailed studies of the various sequelae of irradiation of women during pregnancy.
4. To intensify the study of the sequelae of irradiation of pregnant women by doses used in roentgenodiagnosis and to restrict indications requiring the use of X rays for diagnostic purposes.

99. Early Symptoms Following Prolonged Contact With Radioactive Substances Evident in Hepatic Protein Formation Function

"Hepatic Functional Condition in People Coming in Contact With Radioactive Substances," by Ye. A. Denisova, Biophysics Laboratory (head, Prof M. N. Fateyeva), Institute of Therapy (director, Prof A. L. Myasnikov, Active Member of the Academy of Medical Sciences USSR), Academy of Medical Sciences USSR; Moscow, Meditsinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 44-49

The purpose of this study was to evaluate the effect of chronic contact with ionizing radiation on the protein formation function of the liver.

Various tests were conducted on 297 people who were classified into groups according to degree of exposure and type of radiation they came in contact with.

Results indicate that initial signs of disturbances in hepatic protein formation function appear rather early and are most apparent in people who are in constant contact with ionizing radiation of a magnitude of 2-10 times the permissible dose of radiation. As contact with these radioactive substances continues, disturbances become greater.

100. Treatment by Blood Transfusion More Effective in Milder Phases of Acute Radiation Sickness

"Treatment of Acute Radiation Sickness in Dogs by Drip Blood Transfusion," by A. N. Gamaleya, A. A. Gyurdzhian, A. A. Zhgun, and P. V. Simonov, Department of Radiation Therapy (chief, A. N. Gamaleya) and Experimental Laboratory (deputy chief, A. A. Gyurdzhian, Candidate of Medical Sciences) the main Military Hospital imeni Academician N. N. Burdenko of the Ministry of Defense USSR; Moscow, Meditsinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 56-61

Blood transfusion has been used as basic therapy for various forms of radiation symptoms. Early fractionated transfusion of preserved blood during the development of radiation sickness has often prevented the onset of radiation sickness following massive prolonged periods of irradiation. These beneficial effects of hemotransfusion have been attributed to the stimulation of hemopoiesis by the transfused blood, desensitization, detoxication, and finally the normalization of metabolism.

The purpose of the present research was to study the degree of this therapeutic effect of blood transfusion and its influence on the course of acute radiation sickness.

Tests were conducted on 24 dogs, 12 of which served as controls. All dogs were subjected to total irradiation by 600-650 r from X rays. Starting 3-4 hours after irradiation, only the experimental dogs received daily drip transfusions of 200-250 ml for 7 days.

Results indicate no essential differences in the survival rate and in the average life duration of the two groups of dogs. Among the dogs that survived, the course of radiation sickness was milder in the treated dogs than in the controls.

The author concludes that therapy by blood transfusion of dogs injured by penetrating radiation is more effective in the milder phases of acute radiation sickness.

101. Radiologists Recommend Use of Fibrinous Membranes Over Radiation-Induced Skin Lesions

"The Question of the Use of Fibrinous Membranes Following Radiation Lesions of the Skin," by S. A. Papoyan, S. N. Allaverdyan, I. G. Demirchoglyan, and I. A. Yerzinkyan, Scientific Research Institute of Roentgenology, Radiology and Oncology, Ministry of Health Armenian SSR, and the Scientific Research Institute of Blood Transfusion, Ministry of Health Armenian SSR; Moscow, Meditinskaya Radiologiya, Vol 2, No 6, Nov/Dec 57, pp 61-65

This article was presented at the jubilee of the Scientific Session of the Institute of Blood Transfusion commemorating the 25th anniversary of the organization of the Blood Service in Armenia.

Radiation lesions of the external coverings of the parietal region and abdomen were induced by the application of radioactive Co⁶⁰ tubes. The application of fibrinous membranes over such ulcerated areas proved highly therapeutic. Good therapeutic results following therapy by fibrinous membranes of surfaces injured by radiation included a shortened healing period, gradual decrease of bleeding, decrease of the size of inflamed foci, and prevention of secondary infections.

In conclusion, the authors recommend the use of fibrinous membranes as essential therapeutic preparations for lesions of the skin in radiation sickness, owing to the possibility of preserving these preparations for long periods without loss of therapeutic effectiveness, ease of transportation, and the simplicity of the technique of their application.

Space Medicine

102. Radial Acceleration Effects Recorded

"Bioelectric Activity of Skeletal Muscles in Man Exposed to Radial Acceleration," by V. I. Babushkin, P. K. Isakov, V. B. Malkin, and V. V. Usachev; Moscow, Fiziologicheskiy Zhurnal SSSR, Vol 44, No 1, Jan 58, pp 10-13

While making a study of the mechanism of adjustment within the body to the effects of head-to-foot acceleration in November 1954, the authors of this article discovered that the greatest majority of published works seem to focus their attention on the activity of heart and blood vessels.

However, they found no discussion in the literature of any special experiments which would throw light on the activity of skeletal muscles during acceleration. They therefore performed several experiments, using ten healthy men between 20 and 30 years of age. To carry on those experiments they placed the subject of the experiment in a laboratory centrifuge in which head-to-foot acceleration of various intensity could be produced. Electromyogram recordings of reactions of various muscles of the abdomen, hips, and chest were made before, during, and after the centrifuge was halted. Respiration, pulse, and arterial blood pressure were also recorded simultaneously in some experiments.

Intensification of bioelectric activity of skeletal muscles was observed in all the men. An increase in the amplitude of biological electric currents in the muscles of the lower extremities and abdomen was as a rule, distinctly evident when acceleration reached 2-2.5g. Intensification of the current in intercostal muscles was usually noted when acceleration reached 3g. Analysis of electromyogram recordings, made during accelerations of various intensities, permitted the authors to establish that changes in the amplitude of biological electric currents in muscles were dependent on the intensity of acceleration. The increase in the amplitude of the biological electric current in muscles obviously has no direct arithmetic relation to the intensity of acceleration. The greatest increase in the amplitude of muscle currents was observed when acceleration was increased from 2g to between 4 and 5g. No increase in biological electric current amplitude was noted, in the majority of cases, when acceleration was further increased; in many experiments it decreased.

The duration of exposure to acceleration is very significant in the dynamics of changes in the biological electric current of muscles. Analysis of electromyograms showed that the biological electric current amplitude began to drop eventually if acceleration was constant. In a special series of experiments, recordings were made of biological electric currents in muscles of men who had the benefit of an anti-g suit during acceleration. It was discovered that creation of pressure in the suit compartments led to a sharp drop in the amplitude of the biological electric current in muscles of abdomen and hips; in some experiments it practically disappeared.

In evaluating the results of their experiments the authors of this article conclude that the increase in the bioelectric activity of skeletal muscles, observed during acceleration, depends on an increase in muscular tonus. They find justification for this conclusion in the experimental data of Wilhelm Einthoven (1926) which established that an increase in muscular stress was accompanied by an increase in the amplitude of the biological electric current of active muscles. Furthermore, that

conclusion was confirmed by the experiments of V. S. Gurfinkel (1955) and his co-workers who said that an increase within a definite range of isometric stress in skeletal muscles was always accompanied by an increase in the amplitude of muscular activity currents.

The authors also came to the conclusion that the increase in body weight and the reflex effects from proprioceptors, which are associated with it, are probably not the sole mechanism on which the increase in the tonus of the skeletal muscles depends during acceleration. Reflexes from baroreceptors of the carotid sinus zone, which occur due to a drop in blood pressure in the carotid artery during acceleration, evidently play a definite role in the mechanism of increased skeletal muscle tonus. In line with this they surmise that, when a study is conducted of the mechanism of adjustment of the organism to acceleration, the reflex increase in the tonus of skeletal muscles must be accepted as directly related to the vascular reactions that manifest themselves.

The natural changes in the tonus of skeletal muscles, pointed out above, may in the authors' opinion be used as a unique index for evaluating the effectiveness of various anti-g devices.

103. Testing of Vestibular Stability Described

"Continuous Recording of Physiological Functions of an Organism During Irritation of Its vestibular Analysor with the Aid of an Electric Rotating Chair," by S. S. Markaryan, Candidate of Medical Sciences (Moscow), Vestnik Otorinolaringologii, No 1, Jan-Feb 58, pp 103-105

CPYRGHT

"Physiological testing is often done by spinning a person in the Barany chair. The resulting vegetative and somatic reactions serve as an index of excitability of the vestibular analysor. Variations in intensity of manifestation of these reactions are often determined by inspection. Since graphic presentation of arterial pressure, pulse beats, and respiration offers a more accurate quantitative picture, a pneumatic method of physiological testing was devised and found wide application in many circles.

"A few reports have been published recently both in the Soviet Union and abroad which discuss improved methods of recording rotary and post-rotary nystagmus. M. V. Kulikova (in 1954) used a photoelectric cell in making her recordings; Hallpik and Hood (in 1953) used a complicated optic system; Portmann (in 1954) used an electric method.

CPYRGHT

"The disadvantage of the pneumatic, optic, or electric methods of physiological testing lies in the fact that recordings can be made of only one or two physiological functions."

The author of this article says that while he was doing special research he had an electric rotating chair built, during the spinning of which it was possible to record several physiological functions at the same time: electrocardiogram, electroencephalogram, electromyogram, nystagmus, arterial pressure, pulse, respiration, etc. This chair offers possibility of applying an exact dose of irritation to the vestibular analyzer without making it necessary to alter the required spinning speed. A photograph of the general view of the apparatus (1) and a diagrammatic representation of the electric rotating chair (2) are given in the source. The diagrammatic representation shows the following: the switch; the transmitting elements for blood pressure, respiration and pulse beats; electromyogram electrodes; electrocardiogram electrodes; and electroencephalogram electrodes. It also shows the following parts which are numbered: 1. rotating chair, 2. wire leading from collector rings to electric motor, 3. three-phase electric motor, 4. collector rings, 5. wire leading from disconnecting switch of the actuating motor to brushes, 6. disconnecting switch of the actuating motor, 7. electric circuit panel, 8. electrodes and transmitting elements to the block joint, 9. wire leading to collector rings from electrodes and transmitting elements, 10. wire leading from brushes of collector rings to amplifier, 11. amplifier, 12. oscillograph, 13. drive belt from electric motor to the stationary disc of the chair, and 14. stationary disk on the legs of the chair.

"To make the apparatus more compact the electric motor is fastened to the back of the seat of the chair. An alternating current serial electric motor with a 220-volt potential and frequency of 50 cycles is installed so that the chair can turn smoothly and in a uniform manner (with a speed of 0.5 revolution per second). A pulley with a wedge-shaped surface is attached to the axle of the worm motor reducer. The function of the pulley is to transmit rotations through the drive belt to the stationary disk. The latter is fastened to the middle part of the weight support of the chair. The diameter of the pulley and the reducer is 90 millimeters and the stationary disk is 330 millimeters in diameter. The general relationship between the worm and the drive belt is such that when the motor makes 2,800 revolutions per minute the chair makes 0.5 turn per second. The current is conducted from the electric circuit through safety devices and reversible tripolar disconnecting switch to the stationary brushes which are fastened to the stationary disk. Subsequently, the current is led to the electric motor through the collector rings, which are on the rotation axles of the chair, below

CPYRGHT

the stationary disk, into the flap of the axle of the chair. Several collector rings are situated above the stationary disk, on the axle of the chair. Signals are transmitted from the transmitting elements and electrodes to the amplifier and then to the oscillograph through the collector rings. This makes recording of physiological functions possible.

"The brass collector rings are attached to the insulated cylinder which is made of an organic glass. The cylinders are mounted on the axle of the chair and revolve with it. It takes half a second for angular velocity to gather momentum and it takes that long before the chair is halted (after the current is switched off); during that period of time the chair makes one sixth of a revolution.

"On the back of the seat there is a terminal block for connecting the transmitting elements with the rotating collector rings.

"The electrically driven rotating chair can be manipulated at a distance. It is possible to change the direction of rotation of the chair if necessary.

"Uninterrupted recording of the indicated physiological functions, during irritation of the vestibular analyzer, is made on a K4-58 oscillograph and on an ink writing apparatus. An AMK-3 instrument is used to record arterial pressure. The AMK-3 is manufactured by the 'Krasnogvardyets' factory. This instrument is mounted on the back of the chair.

"The electric rotating chair may be used successfully when studying the function of the vestibular analyzer both under clinical conditions and when conducting scientific research.

"Two photographs show oscillograph recordings made before, during, and after irritation (rotation) of the vestibular analyzer in man."

- (1) Photograph available in source, page 104, bottom
- (2) Diagram available in source, page 104, top

CIA/

7 APRIL 1958

UNCLASSIFIED- SCIENTIFIC INFORMATION
Approved For Release 1999/09/08 : CIA-RDP82-00741R000100020001-5
REPORT NUMBER 4

2 OF 2

Veterinary Medicine

104. Aluminum Hydroxide Anthrax Vaccine Tested

"Testing of Aluminum Hydroxide Anthrax Vaccine Under Farm Conditions," by S. G. Kolesov and N. A. Mikhaylov, Trudy Gosudarstvennogo Nauchno-Issledovatel'skogo Instituta po Vetpreparatam (Works of the State Scientific Research Institute for Veterinary Preparations), No 6, 1956, pp 242-249 (from Referativnyy Zhurnal -- Biologiya, No 20, Oct 57, Abstract No 88928, by M. P. Chumakov)

CPYRGHT

"The immunogenic properties of the aluminum hydroxide anthrax vaccine obtained from the Sh-15 strain were investigated. Sheep vaccinated with it maintained a stable immunity 6 1/2 months after vaccination. Immunity began 7 days after vaccination."

105. Sicista Found To Be Naturally Infected With Tularemia

"Observation of Sicista betulina and S. subtilis Infected With Tularemia Under Natural Conditions," by V. P. Romanova and M. G. Yakovlev, Trudy Rostovskogo-na-Dony Gosudarstvennogo Nauchno-Issledovatel'skogo Protivochumnogo Instituta (Works of the Rostov-na-Donu State Scientific Research Antiplague Institute), No 10, 1956, pp 231-233 (from Referativnyy Zhurnal -- Biologiya, No 20, Oct 57, Abstract No 87126, by T. N. Dunayeva)

CPYRGHT

"During a study of a tularemia focus in the Don delta (1946-1949), Arvicola terrestris L, cis-Caucasian hamsters, Microtus arvalis, house mice, gray rats, Sicista betulin, and S subtilis were found to be spontaneously infected with tularemia. In a group investigation of the organs of 14 specimens of Sicista betulina (using 11 passages) cultures were isolated. Using an inoculum composed of spleen and liver tissues, a culture was isolated from a single S. subtilis which had been caught in July in a meadow inhabited by Arvicola terrestris L. Pathological changes were noted in the inner organs of the Sicistae. Gamasidic ticks (Ixodes laguri laguri) and fleas (Ceratophyllus mokrzecky) were found on the Sicistae."

106. Chinese Immunize Yellow Cattle With Lapinized Rinderpest Virus

"Susceptibility of Rabbits to Lapinized Rinderpest Virus of Different Passages and Immunization of Yellow Cattle With This Virus," by Su Lin (苏林) and Chang Lin-p'eng (常林鹏), Ch'u-mu Shou-i Hsueh-pao (Acta Veterinaria et Zootechnica Sinica), Vol 1, No 1, 1956, pp 55-65 (from Referativnyi Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract

CPYRGHT No 89344, by N. V. Yaroslavskaya)

"The virus began to cause the death of a considerable number of animals only after 400 passages in rabbits. After 501-700 passages, 92.5% of the animals died. Pronounced changes in the mesenteric lymph nodes were noted in the animals that had died. Enlargement of the spleen, accumulation of blood, and hemorrhage in the mucous membrane of the small intestine were seldom observed. The minimum infective dose of lapinized virus became more constant after the 853d passage. The minimum effective dose of lapinized virus which conferred immunity in yellow cattle was not decreased from the 853d to the 965th passage. This dose was 1:10 per ml on immunization with virus-containing blood and 1:10,000 per ml on immunization with a suspension of lymph glands and spleen. Inoculations of yellow cattle with lapinized virus, with some exceptions, was only slightly reactogenic. Cattle inoculated subcutaneously with a one ml suspension (1:100) of lymph nodes and spleen containing lapinized virus were found to be immune to infection with highly virulent rinderpest virus in doses up to 1,000 ml."

107. Lyophilized Rabbit-Adapted Rinderpest Virus Studied by Chinese

"Study of Lyophilized Rinderpest Virus Adapted to the Rabbit Organism," by Su Lin (苏林) and Chang Lin-p'eng (常林鹏), Ch'u-mu Shou-i Hsueh-pao (Acta Veterinaria et Zootechnica Sinica), Vol 1, No 1, 1956, pp 45-54 (from Referativnyi Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract No 89343, by N. V. Yaroslavskaya)

CPYRGHT

"A comparative study of the virulence of various lyophilized rabbit organs containing adapted rinderpest virus showed that lymph node, spleen, and blood tissues were most virulent, suspensions of spleen diluted with physiological solution were somewhat less virulent, and diluted blood was least virulent. The majority of 44 samples of dried lymph node, spleen, and blood tissues prepared in previous years contained virus in titers higher than 10^{-4} , although nonuniform virulence was observed. Dried virus remained virulent at 37°, for less than 12 hours; at 20°, for 5-6 days; at 14-17°, for 15 days; at 10°, for 30-35 days; at temperatures from 0 to

CPYRGHT

-4°, for less than 240 days; and at -17 to -20°, for more than 360 days. One ml of dry virus diluted in a ratio of 1:100 is sufficient to confer stable immunity to rinderpest on cattle. In the author's opinion there exists a direct relationship between the degree of virulence of the virus for rabbits and its immunogenicity for cattle."

108. Crystal-Violet Hog Cholera Vaccine Studied by Chinese

"Observation of the Harmlessness and Activity of Crystal-Violet Vaccine Against Hog Cholera Under Field Conditions." by Kuo Ching-yu (郭 景 宇) and Chang Chi-shu (張 計 燾), Ch'u-mu Shou-i Hsueh-pao (Acta Veterinaria et Zootechnica Sinica), Vol 1, No 1, 1956, pp 97-103 (from Referativnyi Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract No 89349, by N. V. Yaroslavskaya)

CPYRGHT

"Vaccination caused a slight reaction in the animals for a few days, after which they rapidly recovered. Not one of the vaccinated hogs developed cholera or died after subsequent infection. In the author's opinion, the data obtained attest to the harmlessness of the vaccine. Vaccination conferred intense immunity in hogs against infection with highly virulent virus for 6-10 months. Six months after immunization, the hogs remained immune to infection with highly virulent virus in 100% of the cases. More than 87.5% of the hogs vaccinated subcutaneously with 2 and 3 ml of vaccine and also hogs vaccinated intracutaneously with one ml of vaccine remained nonsusceptible; 80% of the animals vaccinated subcutaneously with 2 and 3 ml of vaccine were nonsusceptible at this time."

109. Chinese Perform Neutralization Reaction With Rinderpest Virus

"Neutralization Reaction With Rabbit-Adapted Rinderpest Virus," by Su Lin (蘇 麟) and Chang Lin-p'eng (張 林 鵬), Ch'u-mu Shou-i Hsueh-pao (Acta Veterinaria et Zootechnica Sinica), Vol 1, No 1, 1956, pp 67-74 (from Referativnyi Zhurnal -- Biologiya, No 21, 10 Nov 57, Abstract No 89345, by N. V. Yaroslavskaya)

CPYRGHT

"Virus adapted to the rabbit organism was used in the neutralization reaction for determining antibodies in sera of cattle immunized against rinderpest. The experiments revealed a definite relationship between the level of neutralizing antibodies and the intensity of postvaccinal immunity. A correlation between the titer of virus-neutralizing antibodies and the strength of the rinderpest serum was noted."

Virology

[See items No 73 and 76.]

Miscellaneous

110. Scientific Research Institute of Epidemiology and Hygiene, Ministry of Health Turkmen SSR

"Scientific Works on Regional Pathology" (unsigned article), Moscow, Meditsinskiy Rabotnik, No 11 (1655), 7 Feb 58, p 1

The Scientific Research Institute of Epidemiology and Hygiene, Ministry of Health Turkmen SSR, has concluded ten major research works on regional pathology and considerable research in the struggle against grippe, malaria, and helminthosis. During the past year the institute has prepared ten physician-bacteriologists and 33 entomologists. The institute is currently expanding its research in the field of virology.

111. 30th Anniversary of Institute of Oncology, Academy of Medical Sciences USSR

"30th Anniversary of the Institute of Oncology, Academy of Medical Sciences USSR," by Prof A. I. Serebrov; Moscow, Vestnik Akademii Meditsinskikh Nauk, No 6, Nov/Dec 57, pp 96-98

On 15 October 1926, an Oncology Department of 100 beds was organized in Leningrad on the base of the Hospital imeni I. I. Mechnikov. In March 1927 an independent Scientific Practical Oncology Institute of the Leningrad City Public Health Division was organized on the base of this department. In 1935 the institute became subordinate to the People's Commissariat of Health RSFSR. In the postwar period the institute was given an independent base and increased its theoretical research. New buildings were built to house laboratories, the Roentgenology Department and the Radium Laboratory were enlarged, and the Organizational-Methodological Division was put into operation.

The following laboratories and departments constitute the present organizational structure of the institute:

Laboratory of Experimental Oncology (Laboratoriya Eksperimental'noy Onkologii), Prof L. M. Shabad, Corresponding Member, Academy of Medical Sciences USSR, head.

Pathologicomorphological Laboratory (Patologo-morfologicheskaya Laboratoriya), Prof M. F. Glazanov, Corresponding Member, Academy of Medical Sciences USSR, head.

Biochemistry Laboratory (Biokhimicheskaya Laboratoriya), Prof A. N. Pashin, head.

Laboratory of Experimental Morphology (Laboratoriya Eksperimental'noy Morfologii), Prof N. G. Khlopin, Active Member, Academy of Medical Sciences USSR, head.

Laboratory of Tumor Strains (Laboratoriya Opukholevykh Shtammov), Prof N. A. Krotkina, head.

Laboratory of the Experimental Therapy of Cancer (Laboratoriya Eksperimental'noy Terapii Raka), Prof L. F. Larionov, Corresponding Member, Academy of Medical Sciences USSR, head.

Clinical Laboratory (Klinicheskaya Laboratoriya), G. G. Ivanov, head.

Radium Laboratory (Radiyevaya Laboratoriya), N. D. Perumova, head.

Roentgenological Department (Rentgenovskoye Otdeleniye), Prof L. M. Gal'dshteyn, head.

Men's Surgical Department (Muzhskoye Khirurgicheskoye Otdeleniye), Prof A. I. Rakov, head.

Women's Surgical Department (Zhenskoye Khirurgicheskoye Otdeleniye), Prof S. A. Kholdin, Corresponding Member, Academy of Medical Sciences USSR, head.

Gynecology Department (Ginekologicheskoye Otdeleniye), Prof A. I. Serebrov, Active Member, Academy of Medical Sciences USSR, head.

112. 50th Anniversary Session of Scientific Research Psychoneurological Institute imeni V. M. Bekhterev

"50th Anniversary of the Psychoneurological Institute imeni V. M. Bekhterev" (unsigned article), Moscow, Meditatsinskiy Rabotnik, 18 Feb 58, p 4

A scientific session dedicated to the 50th anniversary of the Scientific Research Psychoneurological Institute imeni V. M. Bekhterev, held in Leningrad from 16 to 19 February 1958, was attended by over 300 Soviet and Soviet-Bloc scholars and physicians.

The session was opened by Prof V. N. Myasishchev, director of the institute. Over 60 reports were given on the work done by the institute, especially in the problems of treating neurosis, arterial and tumor diseases of the brain, traumatic injuries to the central nervous system, and epilepsy.

113. Ilija Djuricic, Yugoslav Physiologist

"Portrait of Ilija Djuricic," by Milos Petkovic; Belgrade, Politika, Vol 55, 12 Jan 58, p 20

Ilija Djuricic, one of the outstanding Yugoslav physiologists, was born on 18 July 1898 in Belgrade. He graduated from the Medical Faculty, Belgrade University in 1926. On graduation Djuricic became an assistant professor of physiology in the Physiology Institute of the Medical Faculty.

In 1936 he became full professor of normal and pathological physiology at the newly founded Veterinary Faculty. During World War II he worked as a physician at the Health Cooperative (Zdravstvena zadruga) in Azanja, Serbia. After the liberation, he returned to his former position.

Djuricic's scientific research and publications are extensive. His special fields include cortisone research and the pathogenesis of anaphylactic shock and allergic manifestations.

In 1947, Djuricic established the Institute for Industrial Physiology of the Serbian Academy of Sciences, which currently is the Department of Industrial Medicine of the Institute for Medical Research (Odeljenje medicine rada Instituta za medicinska istrazivanje) and of which he has been the director since its founding.

Djuricic was elected Corresponding Member of the Serbian Academy of Sciences in 1950 and an Active Member in 1956. He also has been awarded the Order of Labor First Class.

114. Corresponding Member of Czechoslovak Academy of Sciences Dies

"Frantisek Neuwirt, Corresponding Member of the Czechoslovak Academy of Sciences," by Academician Arnold Jirasek, Prague, Vestnik Ceskoslovenske Akademie Ved, No 9-10, Nov/Dec 57, pp 485-490

On 15 August 1957, Frantisek Neuwirt, Corresponding Member of the Czechoslovak Academy of Sciences, died at the age of 62 (he was born on 26 August 1895). His work in oral and dental surgery was considered outstanding.

The article presents a short biographical sketch and a list of his writings and speeches.

115. Hungarian and Soviet Physicians Meet

"20-21 November, Hungarian-Soviet Medical Days" (unsigned article), Budapest, Nepszabadsag, 20 Nov 57, p 8

The Department of Medicine and Hygiene of the Hungarian-Soviet Society was to hold Hungarian-Soviet medical conferences on 21 and 22 November 1957. The Soviets were to be represented by M. V. Khomutov, First Deputy Minister of Health, who was to lecture on "Forty Years of Soviet Health Affairs"; I. G. Lagunova, director of the Moscow Institute of Radiology, who was to discuss the results of the use of radioactive isotopes in Soviet therapy; and Prof E. Sh. Ayrapetyants, Doctor of Biological Sciences, who was to speak on the results of research on the relation between interoception and internal nerve function.

Hungarian speakers were to be Dr Istvan Simonovits, First Deputy Minister of Health, speaking on the health policy in Hungary; and Dr Jozsef Soos, university professor, on "The Effects of Changes in Environment on the Human System." Coreports were to be given by Dr Geza Hetenyi, Academician and by Dr Gyorgy Adam, Candidate of Medical Science.

IX. METALLURGY

116. Substitute for Krupp Reagent in Etching Cr-Ni Steels and Alloys

"Short Communications" (unsigned article), Zavodskaya Laboratoriya, No 7, Jul 56, p 833

K. N. Vasil'yev, an associate of a scientific research institute, suggests the use of a "cold" etching method for structural and quality control studies of heat-resistant steels and chrome-nickel alloys, instead of the standard etching method using the strongly acid Krupp reagent brought to boiling or heated to 80°C. Similar "cold" etching agents have been used previously in various laboratories for other purposes and in different concentrations. The author has used an etching solution having the following chemical composition: HCl - 500 cc; H₂SO₄ - 50 cc; CuSO₄ 5 H₂O - 100 gr and H₂O - 500 cc.

Stocks of the above etching solution are diluted with water or alcohol for etching purposes. This etching agent has a number of advantages over the Krupp reagent. At a temperature of 18°C, by causing an intercrystalline corrosion of the -solution of heat-resistant alloys, it clearly and quickly reveals their macro- and microstructure in the cast and deformed state. Etching proceeds smoothly without violent evolution of toxic acid vapors. Work with the "cold" etching agent is safe and easy. In addition, the "cold" etching method "makes it possible to avoid the use of nitric acid which is in short supply."

117. Soviet Developments in Welding Techniques

"In Collaboration With Production Workers," by B. Paton, director of the Institute of Electric Welding imeni Ye. Paton of the Academy of Sciences Ukrainian SSR, Corresponding Member of the Academy of Sciences, Ukrainian SSR, Laureate of the Lenin prize; Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 1 Jan 58, p 3

During the past year, members of the institute have tried to expand the field of application of the electroslag welding method developed at the institute and used in many Soviet enterprises. A technological method of electroslag welding of parts of great thickness made of titanium and high alloy steels has been worked out. Work at the institute in the field of seam welding was further expanded during 1957. For example, a highly

efficient method of build-up welding with a ribbon electrode was developed, which permits, in a single passage of the automatic machine, building up of a band of metal up to 100 mm wide. The introduction of this build-up welding with a ribbon electrode will open up new possibilities for fabricating bimetallic products.

In improving welding methods for nonferrous metals and alloys the institute has proposed a new technology for automatic multilayer welding of aluminum up to 100 mm thick, which is very important in the production of lightweight welded structures of aluminum alloys.

The main task facing the institute in 1958 is the further development of the theory of electric arc and electroslag welding. A number of research projects will be devoted to the development of technical processes for welding new grades of steel, nonferrous metals, and various alloys.

118. All-Union Conference of Workers of Tube Manufacturing Industry

"All-Union Conference of Workers of the Tube Manufacturing Industry" (unsigned article), Moscow, Promyshlenno-Ekonomicheskaya Gazeta, No 25, 26 Feb 58, p 1

The All-Union Conference of Workers of the Tube Manufacturing Industry was held in Dnepropetrovsk from 26 to 28 February 1958. Representatives of the petroleum, gas, and other fields of industry attended. The conference was opened by Yu. Matveyev, Candidate of Technical Sciences and representative of Gosplan USSR. Other speakers included S. Borisov, deputy director of the All-Union Scientific Research Pipe Institute; I. Fomichev, Doctor of Technical Sciences; B. Khakhalin, Candidate of Technical Sciences; P. Orro, Candidate of Technical Sciences; Engr L. Silakovskiy; and Engr A. Levin.

119. Georgian Institute Seeks Specialist in Nonferrous and Rare Metals

[Position vacancy notice] (unsigned article), Tbilisi, Zarya Vostoka, 22 Nov 57

The Institute of Metal and Mining, Academy of Sciences Georgian SSR, announces competitive position vacancies for a senior scientific associate specializing in nonferrous and rare metals. Applicants must be Doctors or Candidates of Technical Sciences.

120. Soviet Mining Institute Announces Various Skilled Position Vacancies

[Position vacancy notice], (unsigned article), Alma-Ata,
Kazakhstanskaya Pravda, 27 Nov 57

The All-Union Scientific Research Mining and Metallurgical Institute of Nonferrous Metals announces competitive position vacancies for heads of laboratories in the development of ore deposits, mechanization of mine operations, boring operations and boring tools, mine ventilation, mineralogy-petrography, surveying, beneficiation of useful minerals, pyrometallurgy, hydrometallurgy, metallurgy of rare metals, automation, dust trapping, chemical and physical analysis methods, and the cleaning of sewage water.

Senior scientific associates are needed for the development of ore deposits, mechanization of mine operations, boring and blasting operations, the working and timbering of diggings, mine ventilation, mineralogy and petrography, surveying, beneficiation of nonferrous and rare metals, fine chemistry, automation, gas cleaning and dust trapping, industrial ventilation, analytical chemistry, physical methods of analysis, and the cleaning of industrial waste.

X. PHYSICS

Atomic Energy Development

121. USSR to Describe Thermonuclear Research at Next Geneva Conference

"Thermonuclear Energy: Source of Future Power," by I. V. Kurchatov, Moscow, Pravda, 28 Feb 58, pp 3-4

CPYRGHT

The following are excerpts from a newspaper article by I. V. Kurchatov describing the elements of a controlled thermonuclear reaction.

"...Heavy hydrogen and not ordinary hydrogen will be burned in thermonuclear reactors. A controlled thermonuclear reaction is most easily achieved with a mixture of equal parts deuterium and tritium. Tritium can be prepared in the required amounts by irradiating lithium with neutrons. This is an expensive process, however. Thermonuclear reactors which will operate on pure deuterium are of great significance for the future. ...We now produce deuterium industrially, by various methods. One of these that should be mentioned is the deep-cold method, in which deuterium is obtained at temperatures of -250 degrees. This progressive method was developed by the Institute of Physical Problems, Academy of Sciences USSR.

"...It is possible to directly obtain electrical energy in a thermonuclear reactor without the necessity of resorting to an intermediate heat cycle with its low efficiency. In 1954, at the Institute of Atomic Energy, Academy of Sciences USSR, G. I. Budker turned his attention to this problem and worked on one such reactor. The possibility is based on the fact that more than two thirds of all the energy in a deuterium plasma is released in the form of kinetic energy of charged particles. The charged particles are held by a magnetic field, and it is clearly possible to transform the kinetic energy of the particles into electrical. A pulsating electric current can be obtain in the following manner. Picture the plasma held by an external magnetic field. The field is created by the current in the winding around the thermonuclear generator. If we strengthen the field slightly, the plasma will be additionally compressed and its temperature and pressure will rise. The thermonuclear reaction will proceed at a faster rate and the plasma will be heated even more. The plasma will start to expand, thus cooling and forcing the magnetic field beyond the limits of the reactor. The magnetic lines of force will cross the winding, thus generating an electric current. Under specific operating conditions the energy of this current will be greater than the energy expended on contracting the plasma....

CPYRGHT

"Discharges in toroidal chambers (3) are also being studied in our country, but in a slightly different form than in England. We intend to describe this work at the Second International Conference on the Peaceful Uses of Atomic Energy, to be held in Geneva this year.

"...US physicists have observed neutron radiation in powerful impulse discharges, but the intensity of the radiation which they have noted in their articles is considerably less than that observed by physicists of the Institute of Atomic Energy, Academy of Sciences USSR...."

(3) Photograph on p 4 of source shows "one of the first toroidal chambers of the Institute of Atomic Energy, Academy of Sciences USSR."

122. Czechoslovak Commission for Nuclear Engineering Established

"Establishment of a Commission for Nuclear Engineering"
(unsigned article), Prague, Rude Pravo, 30 Jan 58, p 1

At an assembly of the council of scientific and technical societies of the Czechoslovak Academy of Sciences it was decided, for the benefit of the further development of atomic power utilization, that a commission for nuclear engineering should be established as a special organ.

The following reports were presented at the assembly: "Main Lines in the Development of Nuclear Power and Subsequent Tasks for Our Research, Development, and Production," by Dr Engr A. Sevcik; "Present Results and Further Tasks of the Institute of Nuclear Physics and Cooperation With the Joint Institute for Nuclear Research in Dubna," by Engr C. Simane; and "Goals and the Work Plan of the Commission," by Engr M. Fibiger.

The presidium of the commission was elected after the discussion, and the work plans were approved. Engr C. Simane, director of the Institute of Nuclear Physics, was elected chairman of the commission.

123. Slovak Newspaper Says Slovakia Will Construct Heavy Water Plant

"We Shall Construct a Heavy Water Plant" (unsigned article), Bratislava, Lud, 30 Jan 58, p 3

The article notes that, in view of the continually increasing consumption of electric power and the diminishing reserves of coal and natural gases, atomic energy is the key to uncovering new sources of power.

At the end of the Czechoslovak Fourth Five-Year Plan, according to the article, Czechoslovak atomic electric centrals are supposed to cover the total yearly increase of electric power in industry and cooperative endeavors. At present, costs per unit of electric power from plants are substantially higher than those in coal-burning plants. This ratio will gradually change, and it is estimated that in 1960 electric power produced in atomic electric power plants will be only slightly higher. In 1970 the costs will be lower than for electric power produced in coal-burning plants.

The article points out that the accelerated development of atomic electric power plants is dependent on a fuel base, in which Czechoslovakia is better situated than many countries, but that it is necessary to start production of heavy water, i.e., water enriched with the deuterium isotope, which is the best moderator for nuclear reactors. In addition, there is a need for new materials which would allow the construction of higher capacity reactors with smaller dimensions, which would allow the solution of many technological problems, and assure "disarming" of radioactive radiation.

124. Reactor Laboratory of Czechoslovak Institute of Nuclear Physics

"Reactor Laboratory" (unsigned article), Prague, Vestnik Ceskoslovenske Akademie Ved, No 9-10, Nov/Dec 57, pp 422-423

The first basic apparatus of the Czechoslovak Institute of Nuclear Physics is a reactor with a thermal output of 2,000 kilowatts, using 10 percent enriched uranium as fuel, and ordinary distilled water as the moderator, reflector, and coolant. The operational weight of the U 235 is about 4.5 kilograms at the beginning. The fuel in the reactor is in the shape of rods, with protective aluminum coating, with a 10-millimeter diameter and a length of about 500 millimeters. The core is cylindrically shaped with a 640-millimeter diameter and a height of about 500 millimeters. About 900 cubic meters of water per hour circulate through the cooling system. The outflow of the cooling circuit leads to special canals leading to decay tanks where the water is held until safe for release into the river.

The equipment is entirely experimental (there is no intent to produce power), and the reactor will serve primarily as a neutron source.

The technical work areas have walls and ceilings of special concrete which weighs up to 4.2 tons per cubic meter.

Theoretical Physics

125. Equations of Motion Derived for System of γ Bodies in a Gravitational Field

"On the Equations of Motion of Rotating Masses in General Relativity Theory," by A. P. Ryabushko, Belorussian State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1387-1395

CPYRGHI

"The purpose of this work is to derive the Newtonian equations of the forward and rotating motion for a spherically symmetrical rotating body of infinitely small dimensions on the basis of an approximation method developed by the Einstein school. We shall use as a point of departure the work of Infeld (Acta Phys Polonica, 13, 187, 1954), who proposed a relatively simple derivation for the Newtonian equations for the forward motion of bodies. In this treatment there was no rotation, and the bodies were represented as singularities of the gravitational field. The simplicity of the derivation here rests in the fact that Infeld departed from the tradition of the Einstein school to derive equation of motion from the field equations in a vacuum and employs in his derivation the condition that the divergence of the energy-momentum tensor is equal to zero. This tensor is a consequence of Einstein's gravitation equations wherein (and this is the novelty of the approach) Dirac δ -functions are introduced into the energy-momentum tensor. This is analogous to considering spherically symmetrical, infinitely small bodies. By 'smoothing out' the δ -functions we shall obtain a continuous distribution of the material, i.e., spherically symmetrical bodies of finite dimensions, as is repeatedly used in Infeld's work. Thus Infeld's work will serve as a link, in a sense joining the methods of Einstein and Fok."

126. Equivalence of Wave Equations of a Particle Shown

"On Allowable Transformations of Equations for Particles With Higher Spins," by E. Ye. Fradkin and S. V. Izmaylov; Moscow, Doklady Akademii Nauk SSSR, Vol 114, No 2, May 57, pp 277-280

A transformation of the following equation for a particle with spin $3/2$ is given

$$L^i \left(\frac{\partial}{\partial x_i} + i\chi \right) \psi (x_0, x_1, x_2, x_3) = 0,$$
where $\psi (x_0, x_1, x_2, x_3)$ is the wave function, which transforms according to a finite-dimensional complete Lorentz group; L^i ($i = 0, 1, 2, 3$) are square matrices; and χ is a real constant, different from zero.

The possible linear transformations of the wave function of the type $\psi(x_0, x_1, x_2, x_3) = S\psi(x_0, x_1, x_2, x_3)$ that do not change the properties of the particle equation are considered, and the form of the matrix S for allowable transformations is established.

By an allowable transformation is meant a transformation V which does not change the form of I^{jk} and T, where I^{jk} are the infinitesimal transformations of the corresponding representations of the proper Lorentz group and T is a transformation corresponding to a reflection $x^0 \rightarrow -x^0$, $x^i \rightarrow -x^i$ ($i = 1, 2, 3$) or, in other words,

$$V^{-1}I^{jk}V = I^{jk}, \quad V^{-1}TV = T \quad (j, k = 0, 1, 2, 3).$$

The general form of allowable transformations is given as $S = U_1 V U_2$, where U_1 and U_2 are arbitrary unitary transformations and V is an allowable transformation with a certain matrix representation.

The relation between the representations of the matrices L^i as given by Gelfand and Yaglom and by Petras and Gupta is indicated, and it is shown that the basic representations of the equation for a particle with spin 3/2 are equivalent according to the definition given for allowable transformations. The relation between the two matrices is given explicitly.

127. Magnetohydrodynamics of a Medium With Finite Conductivity Discussed

"Certain Problems of Magnetogasdynamics With Consideration of Finite Conductivity," by G. S. Golitsyn and K. P. Stanyukovich, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1417-1427

The system of equations of magnetogasdynamics is shown to become parabolically degenerate on consideration of finite conductivity. The system is replaced by an approximate, but purely hyperbolic system, and the characteristics of the system are found.

It is shown that the equations of stationary one-dimensional flow have a singularity when the flow velocity is equal to the local sound velocity. Conditions for the transfer of flow velocity through this critical value under the influence of a magnetic field are investigated. Small perturbations in the conducting medium, shock waves, and the structure of the shock-wave fronts are also discussed.

An explanation is given for a phenomenon observed by W. Marshall, who noted that all field changes occur ahead of the shock wave.

128. Magnetohydrodynamics Explained

"Basic Concept of Magnetohydrodynamics," by S. B. Pikel'ner; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 46-53

The underlying idea of magnetohydrodynamics, principally the effect of the motion of a medium (liquid or gas) in a magnetic field and the action of the field on the medium, is explained. This short review can be used as an introduction to the reading of other articles.

129. Minkowski Electrodynamics and the Field Theory

"Minkowski Electrodynamics as Result of a Field-Theory Investigation," by E. Schmutzer, Institute of Theoretical Physics, Rostock University; Leipzig, Annalen der Physik, Vol 20, No 7/8, 1957, pp 349-354

A general study is made of the combination of an electromagnetic and matter field as analogous to electrodynamics in media. A closed system is considered, which may consist of a "medium" and an electromagnetic field. For reasons of mathematical equivalence, the treatment at many points parallels nonlinear electrodynamics. It is shown that a separation of the two fields is logical only in the sense of Minkowski electrodynamics, whereby a minimum of assumptions are made. An energy tensor of the Abraham structure does not occur. On the basis of field theory, this might be considered evidence in favor of the Minkowski tensor for micro- as well as for macroconditions.

130. General Relativity Theory

"On Periodic Nonsingular Solutions in the General Relativity Theory," by A. Papapetrou, Berlin, Research Institute for Mathematics of the German Academy of Sciences; Leipzig, Annalen der Physik, Vol 20, No 7/8, 1957, pp 399-411

The question of the existence of nonsingular solutions of the field equations of general relativity theory, which depend periodically on time, is discussed with the aid of an approximation method for weak gravitational fields. Special attention is given to the case where the solution represents a gravitational field which is weak in the entire space. It is shown that there are no such periodic nonsingular solutions which, in the infinite, satisfy the boundary condition $g_{\mu\nu} \longrightarrow \eta_{\mu\nu}$. The more general case of a field which is not everywhere weak will be treated in a later article.

131. Unified Field Theory

"On the Compatibility of Field Equations, Laws of Conservation, and Equations of Motion in the Unified Field Theory," by J. Pachner, Physics Institute, Prague Advanced Technical School; Leipzig, Annalen der Physik, Vol 20, No 7/8, 1957, pp 368-380

The choice of Hamiltonian for the unified field theory of gravitation and electricity is discussed in detail. The compatibility of the field equations is then proved: There are 18 equations for 16 unknown components of the nonsymmetrical fundamental tensor $g_{\mu\nu}$, of which 4 + 1 + 1 identities are to be computed, so that only 12 equations remain independent, which corresponds exactly to the Einstein postulate of the general covariance of field equations. From a physical point of view, the four identities express the laws of conservation of momentum and energy, one additional identity expresses the law of conservation of electrical current density, and the last identity expresses the law of conservation of magnetic current density. The equations of motion of a sample particle are derived from the variation principle of the stationary particle effect and given explicitly for the case of the Newton-Maxwell approximation and for the case of the motion of a sample particle in the static spherosymmetric field.

132. Acoustical Theory of Turbulence

"Turbulence and Wave Excitation," by K. Schuster, Institute of Theoretical Physics, University of Jena; Leipzig, Annalen der Physik, Vol 20, No 7/8, 1957, pp 381-385

This article investigates, from an acoustical point of view, whether the phenomenon of turbulence can be connected with the appearance of transverse resonance. A laminar flow between two plane rigid walls is considered, which is superimposed by a wave process acting as an interference (arbitrarily selected as the first harmonic of the wave propagating in the direction of the x-axis). With the aid of Navier-Stokes equations, it is shown that waves with exponentially increasing amplitude ("undamped" waves) can propagate upstream in such a laminar flow. From the equation for the appearance of such waves a formula is derived for the critical value of the Reynolds number (from the "quality factor" of the transverse resonance). Additional experimentation must explain to what extent the concepts sketched here comply with real conditions of turbulence.

Atomic and Molecular Physics

133. Possible Frequencies for Molecular Generator Studied

"On Nonlinear Effects of the Interaction of Resonance Fields in a Molecular Generator and Amplifier," by V. M. Kontorovich and A. M. Prokhorov, Institute of Radiophysics and Electronics, Academy of Sciences Ukrainian SSR, and Physical Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1428-1430

The position of possible generation and amplification frequencies is studied on the basis of an analysis of the polarizability of a quantum system located in two resonance fields. Saturation of the auxiliary field is taken into account.

It is shown that the amplifier and generator can operate at two frequencies. These frequencies are a function of the amplitude and the frequency of the auxiliary field.

134. Higher Average Charge Found in Ion Beams Passed Through Celluloid Film

"Equilibrium Distribution of Charges in a Beam of Ions of Light Elements," by V. S. Mikolayev, I. S. Dmitriyev, L. N. Fateyev, and Ya. A. Teplova, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1325-1334

The equilibrium distribution of charges of ions of light elements with Z from 5 to 10 was determined after passing through hydrogen, air, argon, and celluloid film.

Ion speeds ranged from 3.5 to $8 \cdot 10^8$ cm/sec.

Average ion charge after passing through the film was 10-30% greater than in air. The difference of the average charge in the gases ranged from 10 to 20%. -- Author's abstract

135. Equations for Polarization of Molecular Beam Given

"On the Polarization of a Molecular Beam by an Alternating Field With Changing Amplitude and Phase," by G. F. Lyubimov and P. V. Khokhlov, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp. 1396-1402

Equations describing the polarization of a molecular beam acted on by an alternating field with changing amplitude and phase are derived. Solutions are given to the equations for the case of constant phase and the cases of slow and fast changes in the amplitude and frequency. An exact solution is given for the first case and an approximation solution for the last two cases.

It is asserted that the necessity of determining the polarization of a beam acted on by such a field arose in an analysis of all possible non-stationary processes in a molecular generator and in analysis of the stability of stationary oscillations. The expression obtained in the work can, the author comments, be applied directly in investigating quasiperiodic conditions in a molecular generator.

136. Transition Radiation of Particle Passing Through Two Media Calculated

"On the Theory of Transition Radiation," by G. M. Garileyan, Physical Institute, Academy of Sciences Armenian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1403-1410

A general expression for the transition and Cherenkov radiation which occurs when a charged particle passes consecutively through two media with different dielectric and magnetic properties is derived on the basis of field theory. Two particular cases are considered: that of a particle entering a medium from a vacuum and that of a particle entering a vacuum from a medium.

137. Universal Formula for Computing Molecular Forces

"A Grandiose Discovery" (unsigned article), Frankfurt (Oder), Neuer Tag, 9 Feb 58, p 10

CPYRGT

"The grandiose discovery of Soviet scientists, who proved theoretically and experimentally that the source of molecular forces is the reciprocal emission and absorption of electromagnetic waves, has, according to Western experts, possibly a greater significance than atomic fission and fusion.

CPYRGHT

"Dr Yevgeniy Lifshits derived the exact universal formula for computing molecular forces. He discovered that the strength of these forces is directly connected with the optical properties of the material. If the optical properties, the spectrum, of the material are known, then the molecular forces of attraction can be determined on the basis of the formula of Lifshits.

"The theoretical data obtained by Dr Lifshits are in complete agreement with the results of precise experiments conducted by Academician Boris Deryagin and Irina Abrikosova, Candidate of Physicomathematical Sciences. With the aid of a special microbalance these two measured for the first time, and with an accuracy of up to several millionths of a milligram, the molecular forces exerted between two bodies.

"Success was guaranteed through the fact that the microbalance used the system of reciprocal photoelectromagnetic linkage, which automatically keeps the distance between the two bodies constant. In these experiments the first successful attempt was made to measure the distances and the simultaneously occurring molecular forces."

Nuclear Physics

138. Experimental and Theoretical Distributions of Protons From $K^{39}(d,p)K^{40}$ Reaction Compared

"Investigation of $K^{39}(d,p)K^{40}$ and $Ca^{40}(d,p)Ca^{41}$ Reactions,"
by I. B. Teplov and B. A. Yur'yev, Moscow State University;
Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki,
Vol 33, No 6 (12), Dec 57, pp 1313-1320

The angular distribution of three proton groups from the $K^{39}(d,p)K^{40}$ reaction with 4.0 Mev deuterons and the long-range proton group from the $Ca^{40}(d,p)Ca^{41}$ reaction with 1.3, 2.2, and 4.0 Mev deuterons were obtained using nuclear emulsions.

The angular distributions of the protons groups from the $K^{39}(d,p)K^{40}$ reactions were calculated according to Butler's formula (Proc Roy Soc, A 208, 559, 1951), using 1, 2, and 3 as values for the orbital angular momentum of the captured neutron. A comparison of the experimental and theoretical distributions of the P_{01} and P_0 groups indicated that the neutron has an orbital momentum equal to 3 in the ground and first excitation states of K^{40} . Other conclusions concerning the lower excitation states of the K^{40} nucleus are drawn on the basis of the $Ca^{40}(d,p)Ca^{41}$ reaction.

It is noted that a correct description of the experimental results requires that both the coulomb and the nuclear interaction of the particles involved in the reaction be taken into account.

319. Mechanism of C^{12} Breakup Into Three α -Particles Studied

"On the Problem of C^{12} Breakup Into Three α -Particles by Fast Neutrons," by S. S. Vasil'yev, V. V. Komarov, and A. M. Popova, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1321-1324

The effective breakup cross section of C^{12} into three α -particles by fast neutrons is studied in the energy range from threshold ($Q = -7.28$ Mev) to 19 Mev. The relation between the breakup mechanism and the energy of incident neutrons is examined.

Over 500 stars of the breakup of C^{12} into three α -particles were studied, using photographic plates.

The excitation energies of the intermediate nuclei C^{12} , Be^9 , and Be^8 were calculated to explain the breakup mechanism. A table of the fraction of breakups through the levels of the intermediate nuclei is given in terms of the percent of the total number of breakups in a given energy interval of the incident neutrons. It is observed that a considerable fraction of the breakups occur without formation of intermediate nuclei.

A graph of the cross section for C^{12} breakup into three alpha particles agreed with the theoretical curve of M. Sacks (Phys Rev, 103, 671, 1956) in the lower half of the energy range but dropped off in the upper half from the theoretical curve. This is explained by the greater amount of direct interaction without formation of compound nuclei, particularly for neutron energies above 18 Mev.

140. Angular Correlation Between Uranium Fission Products Measured

"On the Angular Correlation Between Fragments and Charged Particles Emitted in Uranium Fission," by V. I. Ostroumov and R. A. Filov, Leningrad Polytechnical Institute, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1335-1340

The angular distribution of charged particles relative to the fragments in uranium fission by high-energy protons was obtained in a study of 3,200 uranium-fission events.

The angular distribution of the particles relative to the direction of the bombarding beam and the relative path-lengths of the fragments was measured.

It was observed that there was no correlation between protons and fission fragments and that α - particles and multicharged particles have a tendency to be omitted at large angles from the fragments.

Possible explanations of the observed correlations are discussed.

141. Coulomb Excitation of Tin Isotopes Measured

"Coulomb Excitation of Separated Isotopes of Tin,"
by D. G. Alkhazov, D. S. Andreyev, K. I. Yerokhina, and
I. Kh. Lemberg, Leningrad Physicotechnical Institute,
Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy
i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1347-
1358

Alpha particles of energy up to 14.5 Mev were used to study Coulomb excitation of the nuclear levels of tin, separated by isotopes.

A number of previously unknown excited states were observed for which the energy values were measured and the probability of transition from the ground state was determined.

The lifetime of the first excited states of even-even tin isotopes were calculated. The values obtained lie between $5 \cdot 10^{-13}$ sec (for Sn¹¹⁴) and $16 \cdot 10^{-13}$ sec (for Sn¹²⁴).

142. Possible Method of Verifying "Combined-Parity" Conservation Proposed

"A Possible Verification of the Law of Conservation of
'Combined Parity' For β -Interaction," by A. Z. Dolginov,
Leningrad Physicotechnical Institute, Academy of Sciences
USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy
Fiziki, Vol 33, No 6 (12), Dec 57, pp 1363-1370

The introductory remarks follow: "At present, the hypothesis of parity nonconservation in weak interactions, variations of which were proposed by Lee and Yang and by Landau, has obviously been verified in experiment. There arises in this connection the problem of the experimental verification of the concrete variations in the hypothesis, that is, the problem of verifying the law of conservation of 'combined parity', which on the strength of Pauli's theorem (W. Pauli, Niels Bohr and the Development of Physics, London, 1955) is equivalent to invariance of the theory relative to time inversion.

"Another important problem is that of the possibility of describing the neutrino, using a two-component equation.

"In this work we shall dwell chiefly on the first question. We shall consider the angular β - γ correlation of oriented nuclei. We shall show that if the nuclei are oriented by the Bleaney (Proc Phys Soc, A 64, 315, 1951) or Pound (Phys Rev, 76, 1410, 1949) method for aligned nuclei, the observation of β - γ correlation for allowed transitions can yield the following important information on the nature of β - interactions:

1. If there is no angular β - γ correlation, then the β - interaction is invariant with respect to time inversion, and the vector and pseudo-vector interactions make little contribution.

2. If β - γ correlation exists but decreases with increasing energy of the β -particles, then the β -interaction is invariant with respect to time inversion, but the vector or pseudovector interaction makes a large contribution.

3. An increase in the correlation with an increase in energy of the β -particles would lead solely to the conclusion of departure from invariance under time inversion, i.e., departure from the law of conservation of 'combined parity.'"

An expression is given for angular β - γ correlation and polarization correlation for oriented nuclei in β -transitions of any order of forbiddenness.

143. Decay Theory of Quasistationary States Studied

"Contribution to the Theory of the Decay of a Quasistationary State," by L. A. Khal'fin; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1371-1382

CPYRGHT The introductory remarks follow:

"Certain problems of decay theory, particularly of the decay of a quasistationary (almost stationary) state, are considered in this work. It is well-known that the theory of the decay of a quasistationary state is of great importance in studies of alpha decay and of the passage of particles through potential barriers, in nuclear theory for determining the distribution of energy levels, etc. The fundamental theorem in the theory of the decay of a quasistationary state was developed by Fok [Fock] and Krylov in a study of time and energy indeterminacy relations (Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 17, 93, 1947). They gave a theoretical proof of the observed exponential decay law and the well-known dispersion formula for the energy distribution of a decaying system.

CPYRGHT

"A further investigation of the theory of the decay of a quasistationary state is made in the present work. The investigation is based on the theory of Fourier transformation in the complex region. This theory was used previously in considering 'dispersion relations' (Khalfin, Doklady Akademii Nauk SSSR, 111, 2, 1956)."

The work is divided into four sections. The basic assumptions of decay theory of a quasistationary state and the results obtained in the work of Krylov and Fok are covered briefly. The general dispersion relations in decay theory are obtained in the second section. A criterion of physical feasibility in decay theory is formulated and studied in the third section, and some of the principal problems connected with this are discussed. The final dispersion relations are given in the fourth section, and they are investigated in detail.

It is shown that an exponential decay law cannot hold for all $\Gamma t/\hbar$. Corrections to the exponential decay law are computed under the most simple assumptions. The dispersion relations between the modulus and phase of the function $p(t)$ are obtained and studied. The density of the energy distribution is then determined analytically on the basis of knowledge of the decay law $p(t)$. The results rest only on the general assumptions of quantum theory and are independent of the model of the decaying system.

CPYRGHT

144. Formula for Bremsstrahlung of Polarized Mu-mesons Obtained

"Internal Bremsstrahlung of a Polarized Mu-Meson and Parity Nonconservation," by I. G. Ivanter, Institute of Scientific Information, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1383-1386

Formulas for the angular and energy distributions of the inner Bremsstrahlung accompanying the disintegration of a polarized mu-meson are derived under the assumption of combined-parity conservation.

145. Relation Between Particle Emission in Nuclear Reactions and Excitation Energy Derived

"Emission of Particles by Excited Nuclei," by M. Z. Maksimov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1411-1416

A formula for relating the cross section of a nuclear reaction involving the emission of several particles to the energy of the incident nuclei is obtained on the basis of statistical theory of the nucleus and Bohr's representation of nuclear reactions.

The following background remarks are made:
CPYRGHT

"It is well-known that an excited nucleus emits various particles (n, p, α , γ , etc.) in transition to the ground state. The energy distribution of these particles is approximately a Maxwell distribution. It follows from this that the average energy borne by the emitted particles is much less than the excitation energy of the nucleus. A single particle, therefore, cannot remove the excitation if the excitation energy is sufficiently great.

"Theory and experiment show that the probability of emission of a single particle decreases with an increase of the excitation energy of the nucleus. In transition to the base state such a nucleus will consequently emit several particles, the number of which depends on the initial excitation energy and the binding energy of particles in the corresponding nuclei.

"In the present article, the probability for the formation of the final nucleus through the consecutive emission of several particles is calculated approximately as a function of the excitation energy. Since excited nuclei are a result of nuclear bombardment, it is not difficult to find the relation between the desired probability and the energy of the incident nuclei...."

The formula obtained in the work is used to calculate the cross sections of nuclear reactions with the emission of 1, 2, 3, and 4 neutrons from Bi²⁰⁹ and I¹²⁷, when the incident nuclei are p, d, and α -particles. The dependence of nuclear entropy on excitation and mass number is determined on the basis of the gas model of the nucleus. Satisfactory agreement between the calculations and experimental results is claimed.

146. Phase Shifts of S-Matrix for Three-Particle System Determined

CPYRGHT "Determination of Phase Shifts of Matrix Elements of the S-Matrix," by V. N. Gribov, Leningrad Physicotechnical Institute, Academy of Sciences USSR; Moscow Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 33, No 6 (12), Dec 57, pp 1431-1436

"...The consequences of unitarity of the S-matrix and invariance of the theory with respect to time inversion are usually considered with the aid of the so-called K-matrix. Namely, S is written in the form

$$S = (1 - iK)/(1 + iK),$$

and it is shown that, on the strength of properties of the S-matrix, the K-matrix is real and symmetric in representation on which projections of the spins do not enter into the set of quantum numbers determining the state of the system. If there are n channels, this indicates that the matrix elements of the S-matrix are expressed in terms of $n(n + 1)/2$ independent real numbers. The matrix elements of the K-matrix are not, however, quantities which can be measured directly. The quadratures of the moduli of the matrix elements of the T-matrix are directly measurable.

"The matrix elements of T are complex, however. It would be interesting, therefore, to express the phase shifts of the matrix elements of the T-matrix in terms of the quadratures of their moduli. This can be done in many cases.... It is especially inconvenient to use the K-matrix if states containing more than two particles are considered. In such cases it is better to depart directly from the condition of unitarity of the S-matrix.

"In the present work the phase shifts of the matrix elements of the T-matrix are determined in terms of the scattering phase and transition probabilities for two and three channels. It is shown that the phase shifts may also be determined when there are three particles, whose energy relative to the motion is low, in one of the channels. The imaginary part of the amplitude for tau-meson decay into three pions is expressed in terms of the real part of the scattering amplitude for a pion on a pion. It is also shown that interaction in the final state changes the angular distribution of decay products considerably. Corrections are determined for the phase shifts of the matrix elements defining angular distribution and polarization in $p + p \rightarrow D + \pi^+$ reactions caused by interaction in the final state.

Solid State Physics

147. Ion Conductivity and Hole Concentrations

"On the Dependence of the Ion Conductivity of Silver Bromide on the Prehistory of the Crystal," by M. Hoehne, Institute of the Physics of Crystals, Berlin-Adlershof; Leipzig, Annalen der Physik, Vol 20, No 7/8, 1957, pp 412-424

The influence of the prehistory of AgBr crystals on the ion conductivity was investigated with alternating and direct current within the temperature range 20-200 deg C. Special attention was given to the effect of oxygen in the air. At high temperatures, oxygen diffuses into the AgBr lattice. The increase of conductivity at room temperature is especially great in quenched crystals. The excess conductivity disappears during storage at room temperature, and likewise decreases rapidly under illumination. Comparative measurements on S-doped and Se-doped as well as quenched and additionally plastically deformed crystals, support the view that the slow dissipation represents an equalization of hole concentrations and that interstitial silver ions are the predominant current carriers at room temperature and above. No satisfactory explanation is given for the special properties of oxygen-doped crystals.

148. Photocathode Sensitivity and Temperature

"The Temperature Dependence of the Photoeffect of Sb-Cs Photocathodes in the Temperature Range Minus 170°C to Plus 20°C," by Zs. Naray, Department of Cosmic Radiation, Central Research Institute of Physics (Budapest), Leipzig, Annalen der Physik, Vol 20, No 7/8, 1957, pp 386-389

Photocathodes were chosen which, because of their high sensitivity, are used for many different purposes and which show a relatively high sensitivity change with temperature. The change of sensitivity of these cathodes averages two to fourfold, and a few changes amount to as much as tenfold. The studies were made in the vicinity of the limiting wavelength of the photocathodes at $\lambda = 6,250 \text{ \AA}$, and at several shorter wavelengths for the purpose of control. In the vicinity of the limiting wavelength the sensitivity was found to decrease uniformly with decreasing temperatures. At shorter wavelengths the sensitivity is independent of temperature within a wide temperature range; only at the lowest temperatures was there a sharp drop in sensitivity.

The test results agree qualitatively with the temperature dependence of the photoeffect of alloys predicted by Vonsovskiy, Sokolov, and Veksler (Uspekhi Fizicheskikh Nauk, 56, 477, 1955).

Mechanics

149. Stability of Nonlinear Systems With Two Degrees of Freedom

"Conditions of Stability and Instability in Linear Systems With Two Degrees of Freedom," by V. Ya. Anderson, Uch. za. Gor'kovsk. un-t, 1957, 35, pp 202-219 (from Referativnyy Zhurnal -- Mekhanika, No 10, Oct 57, Abstract 11243, by N. V. Putenin)

CPYRGHT

"Self-excitation conditions of linear systems with two degrees of freedom are examined in a critical analysis of the assertions by Rocard (J. Rocard, Dynamique Generale des Vibrations, Paris 1948). The forces acting on the system are classified as conservative, dissipative, and active. The active forces refer to the forces of negative dissipation and the directional couplings.

"The corresponding graphs of Vyshnegradskiy are constructed for the separation of the regions of stability and instability. It is shown that appearance of instability is possible owing to negative dissipation or in the presence of feedback.

"Conditions of stability and instability in systems approaching the linear conservative force are studied separately.

"It is shown that the connective values play the basic role in the appearance of instability (L. I. Mandel'shtam, Polnoye Sobraniye Trudov [A Full Collection of Works], Vol 4, IZd-vo AN SSSR, 1955). A large number of numerical examples are given to illustrate the work."

150. Effect of Elastic Elements on Small Oscillations in Certain Gyroscopic Systems

"Effect of Elastic Elements With Nonlinear Characteristic on Small Oscillations in Certain Gyroscopic Systems," by Yu. O. Mitropol'skiy, Nauk. zap. Kiyvs'k. un-t, 1954, 13, No 8, pp 107-114 (from Referativnyy Zhurnal -- Mekhanika, No 10, Oct 57, Abstract No 11250, by D. R. Merkin)

CPYRGHT

"Equations are derived for small oscillations of a flexible shaft with a disk in the presence of elastic elements with a nonlinear characteristic. The author asserts it is possible to produce various resonance effects in the presence of the nonlinear members."

151. Three-Dimensional Boundary Layer in Compressible Gas

"Equations of a Three-Dimensional Boundary Layer in a Compressible Gas for an Arbitrary Surface," by V. V. Strumin-skiy; Moscow, Doklady Akademii Nauk SSSR, Vol 114, No 2, 11 May 57, pp 271-274

A previous work of the author (Doklady Akademii Nauk SSSR, Vol 108, No 4, 1956) presented a rigorous derivation of equations of a three-dimensional boundary layer for an arbitrary surface in a viscous, noncompressible liquid and presented various transformations which simplify the structure of the three-dimensional equations and reveal the influence of the main curvature of the surface.

This article gives a rigorous derivation of equations of a three-dimensional boundary layer in a viscous compressible gas for an arbitrary surface and presents transformations which reduce these equations into a form analogous to the equations of a three-dimensional layer in a viscous noncompressible liquid.

The system of equations affords the possibility of studying a thermal boundary layer in a compressible gas in the vicinity of an arbitrary surface. The inertia terms in the equations of motion and the continuity equation are converted into a form analogous to the corresponding equations of a noncompressible medium for a flat plate.

152. Stability of Nonlinear Control Systems

"On the Stability of Nonlinear Control Systems," by Ye. N. Rozenvasser; Moscow Doklady Akademii Nauk SSSR, Vol 117, No 4, 1 Dec 57, pp 582-585

This note, based on the theorem of A. I. Lur'ye (Nekotoryye Nelineynyye Zadachi Teorii Avtomaticheskogo Regulirovaniya [Certain Nonlinear Problems of the Theory of Automatic Control], Moscow-Leningrad, 1951) derives satisfactory general conditions of stability for certain nonlinear control systems described by differential equations of the fifth and sixth order. The criteria obtained afford the possibility of solving the general stability problem of a steady motion in a number of practically important automatic control systems. These stability criteria are the most general obtainable with the aid of the Lur'ye theorem for the systems under consideration.

153. Neglect of Radiation in Problems of Gas Dynamics Results in Errors

"Introduction of Radiation in the Problem of Gas Dynamics," by E. Larish and I. Shekhtman, Institute of Applied Mechanics and Institute of Atomic Physics of the Academy of the Rumanian People's Republic, Bucharest; Moscow, Doklady Akademii Nauk SSSR, Vol 113, No 5, Apr 57, pp 1010-1012

In the majority of works dealing with solution of problems of gas dynamics the influence of radiation is not considered. In neglecting this influence, the authors will refer either to the fact that under the existing density the temperature is too low or to the exceptionally complicated equations of motion.

In the above work it is proved that not considering the influence of radiation frequently leads to large errors.

The main purpose of the work is the exposition of a very simple method where the influence of radiation is taken into account without conversion of the equation of adiabatic motion.

154. Bending of a Toroidal Shell

"Concerning Infinitely Small Bendings of a Toroidal Shaped Shell," by Sh. S. Metskhovrishvili, Tbilisi Mathematics Institute imeni A. M. Razmadze; Tbilisi, Soobshcheniya Akademii Nauk Gruzinskoy SSR, Vol 18, No 5, May 57, pp 521-527

The problem of an infinitely small bending of a thin shell is reduced to the differential equation.

$$\frac{1}{AB} \left(\frac{\partial}{\partial \xi} \right) \left(\frac{B}{A} R_1 \frac{\partial V}{\partial \xi} \right) + \frac{\partial}{\partial \eta} \left(\frac{A}{B} R_2 \frac{\partial V}{\partial \eta} \right) + 2 HV = 0$$

where H is the mean curvature of the surface while the components of displacement are related to the function V by the equations

$$v = \frac{1}{AB} \left(\frac{\partial U_2}{\partial \xi} \right) - \frac{1}{A} \frac{\partial A}{\partial \eta} U_1 - \frac{1}{B} \frac{\partial B}{\partial \xi} U_2 =$$

$$- \frac{1}{AB} \left(\frac{\partial U_1}{\partial \eta} \right) - \frac{1}{A} \frac{\partial A}{\partial \xi} U_1 - \frac{1}{B} \frac{\partial B}{\partial \xi} U_2.$$

and A^2 and B^2 denote the coefficients of the first fundamental quadratic form relative to the system of coordinates in lines of curvature; R_1 and R_2 are the principle radii of curvature; U_1 and U_2 are the covariant components of displacement; and W is the normal component of displacement.

The cases considered in the article are (a) a shell the mean surface of which is a circular torus, (b) infinitely small bending of a circular torus, (c) infinitely small bendings of a toroidal shell the boundary of which is fastened to plates and (d) infinitely small bending of a band of a toroidal shell the boundary of which is rigidly secured.

155. Equation of Motion of a Particle on a Moving Plane Derived

"Theory of the Motion of a Physical Particle on a Rotating-Oscillating Plane," by V. A. Mikhalovskiy, Nauch. tr. Ukr. s.-kh. akad., No 8, 1956, pp 387-392 (from Referativnyy Zhurnal -- Mekhanika, No 11, Nov 57, Abstract No 12379, by V. S. Novoselov,

A differential equation of the motion of a particle on a plane performing an oscillating circular motion around a fixed axis is set up. The author, assuming that the particle is not thrown off, reduces the problem to the integration of a second order linear equation with periodic coefficients. The equation is solved by a power series in terms of time.

156. Reports Topics of Special Chinese Interest at Fluid Mechanics Conference in Poland

"Note of Participation in the Conference on Fluid Mechanics in Poland," by Lin T'ung-chi (林同驥), Institute of Mechanics, Academia Sinica; Peiping, K'o-hsueh T'ung-pao (Scientia), No 24, 1957, p 767

This article presents highlights of the 3-14 September 1957 Conference on Fluid Mechanics, held in a southern city of Poland, which the author attended as a delegate of the Academia Sinica.

The author comments briefly on 17 of the more than 30 scientific papers presented at the conference. In addition, he notes that two symposiums were of special interest to him because the topics discussed had direct bearing on research undertaken at the Institute of Mechanics of the Academia Sinica. He gives the following information on these two symposiums:

"In the Symposium on Jet Wing Flaps, a professor from France presented a hypothesis for the utilization of a wing tip of noncontinuous surface, using electricity as an analogy. This method can be used when the jet coefficient [coefficient of discharge] is relatively large. A Polish instructor resolved the problem by using point sources added to the cross section of the wing tip. This method is applicable when the jet coefficient [coefficient of discharge] is relatively small. The Institute of Mechanics of the Academia Sinica has used single and distributed sources, convergent flows, and doublets in the treatment of this subject. This method permits adjustment of the intensity and distribution of the jet as well as of the angle of the jet.

"In the Symposium on Experimental Facilities for the Study of Rarefied-Gas Kinetics, Academician Lung-tz'u [name transliterated from Chinese] of Poland approved of the two-phase wind tunnel introduced by the Chinese, and suggested that we solve our problem by using iodine isotopes to determine the speed. He expressed the hope that he will be able to work closely with the Chinese on research work on rarified gases."

The author says he presented a paper which dealt with a fundamental equation for rarefied-gas.

XI. MISCELLANEOUS

157. Siberian Branch of Academy of Sciences USSR Under Construction

"At the Construction Site of the Scientific Center of Siberia" (unsigned article), Moscow, Izvestiya, 12 Feb 58

The new scientific center, i.e., the headquarters of the Siberian Branch of the Academy of Sciences USSR, is located in an area southeast of Novosibirsk near the new Ob "sea" (reservoir) and the Seyatel' railroad siding. The construction of the buildings for the center has begun, i.e., for the 12 institute buildings and the university. The center will be serviced by a branch line of the Turkestan-Siberian Railroad. During 1958, 200 million rubles will be spent on the construction of the center.

158. New Departments Formed in Academy of Sciences Georgian SSR

"New Departments of the Academy of Sciences Georgian SSR" (unsigned article), Tbilisi, Zarya Vostoka, No 35, 11 Feb 58, p 4

Two new departments have been formed in the Academy of Sciences Georgian SSR: the Department of Biological Sciences and the Department of Medical Sciences. The Department of Biological Sciences consists of the Institute of Paleobiology (Institut Palebiologii), the Institute of Physiology imeni I. S. Beritashvili (Institut Fiziologii imeni I. S. Beritashvili), the Institute of Zoology (Institut Zoologii), the Institute of Botany (Institut Botaniki), the Institute of Forestry (Institut Lesa), and three botanical gardens -- Tbilisi (Central), Sukhumi, and Batu.

The Department of Medical Sciences consists of the Institute of Experimental Morphology (Institut Eksperimental'noy Morfologii), the Institute of Experimental and Clinical Surgery and Hematology (Institut Eksperimental'noy i Klinicheskoy Khirurgii i Gematologii), the Institute of Clinical and Experimental Cardiology imeni M. D. Tsinamdzgvrishvili (Institut Klinicheskoy i Eksperimental'noy Kardiologii imeni M. D. Tsinamdzgvrishvili), and the Institute of Experimental and Clinical Neurology (Institut Eksperimental'noy i Klinicheskoy Nevrologii).

159. Candidates' Dissertations Defended in Czechoslovak Academy of Sciences

"Candidates' Dissertations Defended in Czechoslovak Academy of Sciences" (unsigned article), Prague, Vestnik Ceskoslovenske Akademie Ved, No 9-10, Nov/Dec 57, pp 483, 484

In the second quarter of 1957, the degree of Candidate of Sciences was awarded to the following persons by the various institutes of the Czechoslovak Academy of Sciences, on the basis of a successful defense of their dissertations.

In the Mathematics and Physical Sciences Section

Jindrich Necas, "The Solution of the Biharmonic Problem for Convex Polygons", Institute of Mathematics.

Alois Marek, "Generalized Multivariable Convex Functions", Institute of Mathematics

Zdenek Malek, "The Influence of Plastic Deformation on the Coercive Force of Magnetically Soft Materials," Institute of Physics

In the Chemical Sciences Section

Pavel Masiar, MD, "Comparison of Arginine and Histidine Peptides of Partially Acidic Hydrolysate of Horse and Swine Hemoglobin," Institute of Chemistry

Engr Jiri Vanecek, "Comparison of Basic Peptides From Partial Hydrolysates of Chymotrypsinogen and Trypsinogen," Institute of Chemistry

Josef Peizker, Doctor of Natural Sciences, "The Influence of Current, Passing Through the Polarographic Measuring Circuit, on the Results of Polarographic Measurement and the Automatic Compensation of the Resulting Errors," Institute of Polarography

Zdenek Spurny, "A Study of the Effects of Ionizing Radiation on Cystincystein, With the Help of Polarography," Institute for Physical Chemistry

Dusan Papousek, "A Study of the Adiabatic Compressibility of Liquids, Institute for Physical Chemistry

In the Biological Sciences Section

Jiri Ludvik, Doctor of Natural Sciences, "A Study of Cell Morphology of Trichomonads by an Electron Microscope," Institute of Biology

Jan Arpai, PhMr [Master of Philosophy?], "Selection of Products of Itaconic Acid," Institute of Biology

Jaroslav Drobnik, "Utilization of the Biochemical Method in Soil Microbiology," Institute of Biology

Zdenek Lodin, MD, "A Contribution to the Study of the Pathophysiology of Epilepsy Induced by Methioninsulfoximin," Institute of Physiology

Jiri Widimsky, MD, "Juvenile Hypertension," Institute of Physiology

In the Technical Sciences Section

Dr Engr Anselm Kovar, "Theory of Torsion," Institute of Theoretical and Applied Mechanics

Engr Vratislav Kafka, "Theory of Elasticity of a Stratiform Medium," Institute of Theoretical and Applied Mechanics

Engr Milik Tichy, "Statically Indeterminate Constructions of Prestressed Concrete," Institute of Theoretical and Applied Mechanics

Engr Milos Vorlicek, "Determination of the Strength of Concrete by Mathematical Statistics Methods," Institute of Theoretical and Applied Mechanics

Engr Milos Novak, "On the Nonlinearity of the Vertical Oscillation of Solid Bodies on a Base," Institute of Theoretical and Applied Mechanics

Dr Engr Evzen Weiner, "The Lipno Water Installation," Institute of Theoretical and Applied Mechanics

Engr Jan Svec, "The Endosmosis of Water From Permeable Pipes With a Trapezoid Profile," Institute for Water Management

Engr Oldrich Hora, "Research on Magnetic Heat Sensitive Materials and Their Practical Utilization," Institute for Electrical Engineering

Engr Frantisek Vlnar, "The Transfer of Impact From the Low-Voltage Side to the High-Voltage Side in a Double Wound Transformer," Institute for Electrical Engineering

Engr Mirko Zapletal, "A Contribution to the Question of Territorial Distribution of Waves With Territorially Located Junctions and Dam Hydrocentrals," Institute for Electrical Engineering.

160. Academicians, Scientists, Professors at General Assembly of Hungarian Academy of Sciences

"General Assembly of the Hungarian Academy of Sciences" (unsigned article) Budapest, Nepszabadsag, 17, 18, 19, 20 Dec 57, pp 2, 3.

The general assembly of the Hungarian Academy of Sciences convened in a joint session in Budapest on 15 December 1957. The presidium was occupied by Istvan Rusznyak, president of the academy; Geza Bognar, deputy secretary-general; Gyula Hevesi, Lajos Janossy, and Mate Major, academy secretaries; and Istvan Soter, Corresponding Member of the academy.

The opening address was delivered by Istvan Rusznyak. Other speakers on 15 December and subsequent days were as follows:

Corresponding Member Istvan Soter spoke on Janos Arany, the Hungarian poet.

Corresponding Member Laszlo Boka of the Department of Language and Literature discussed the work of the Institute of Linguistics.

Academician Imre Szabo of the Department of Social and Historical Sciences discussed the activities of the Institute of Philosophy, which is now working on the concept of quality in dialectical logic, and the background of the French Revolution.

Academician Gyorgy Hajos of the Department of Mathematics and Physics discussed the work of the Mathematical Research Institute (Matematikai Kutato Intezet) and said that the Institute of Mathematics, Szeged University, took part in planning the logic machine [computer?] which is now being made.

Academician Gyorgy Alexits gave a commemorative talk on Farkas Bolyai, Hungarian mathematician.

Academician Andras Somos of the Department of Agriculture discussed the work of the department and said that the institutes of the department now employ 97 research workers and 57 assistants.

Corresponding Member Pal Gomori of the Department of Biology and Medicine discussed recent research and said that the Institute of Child Psychology (Gyermeklelektani Intezet) examines 1,800 children per year.

Academician Gyorgy Ivanovics lectured on the biology and antigen structure of the anthrax bacillus.

Miklos Melczer, Doctor of Medical Sciences, lectured on the early recognition of melanoblastomas.

Academician Sandor Geleji of the Department of Technical Sciences said that the department is conducting research work costing an annual 9 million forints at 63 [university] departments.

Corresponding Member Karoly Szechy discussed experiments conducted with tubular piles.

Academician Laszlo Erdey of the Department of Chemical Sciences discussed the department's accomplishments and problems.

Janos Balogh, Doctor of Biological Sciences, spoke at the Department of Biology on the achievements and problems of research in soil zoology.

Gabor Ubrizsy, Doctor of Biological Sciences, addressed the same department on conological research on the symbiosis of weeds in agrarian areas in view of the flora-altering effects of chemical weed killers.

Academician Lajos Janossy discussed the status of physics in Hungary.

Academicians Gyula Moravcsik and Karoly Maroth of the Department of Language and Literature discussed the life and poetry of Ovid.

Janos Harmatta, Doctor of Linguistics, announced that the Society for the Study of Antiquity (Okortuományi Tarsasag) would be formed in 1958.

Jozsef Bognar, university professor, lectured before the Department of Social and Historical Sciences on the structure of consumption of goods and trade.

At a session of the Biological Group, Academician Imre Toro reported on some of the findings of biological research.

Academician F. Erdei of the Department of Agriculture spoke on the need for intensive agriculture.

Academician Lajos Janossy and Zsolt Naray lectured before the Department of Mathematics and Physics on their investigations concerning the duality of light.

Academician Sandor Szalay, director of the Nuclear Research Institute (Atommag Kutato Intezet), Debrecen, spoke of his success in photographing the repellent action of the neutrino.

On Wednesday, 18 December, Academician Istvan Kniezsa of the Department of Language and Literature spoke on the problem of Hungarian Slavistics.

Corresponding Member Jozsef Waldapfel lectured on Gorky and Madach.

Corresponding Member Dr Laszlo Gillemot of the Department of Technical Sciences said that, since the introduction of the concept of contraction in grading a material, the quality of a material can be expressed by a single figure instead of four, as was previously the case.

Academician Dr Mihaly Freundof, Department of Chemical Sciences, lectured on "The Effects of High-Voltage Electric Fields on Hydrocarbons."

At a session of the Biological Group, Academician Imre Toro lectured on the tissue structure of the thymus gland.

Dr Laszlo Haranghy, Doctor of Medical Sciences, spoke on age changes in the spleen and bone marrow.

On Thursday, 19 December, the Slavistic days were continued, and Corresponding Member Laszlo Hadrovics spoke of the origins of the South Slav-type Sandor Nagy novel.

Corresponding Member Imre Razso of the Department of Agricultural Sciences lectured on the mechanization of agriculture.

Janos Di'Gleria, Doctor of Agricultural Sciences, spoke on the present and future role of radioactive isotopes in agriculture.

Corresponding Member Geza Bognar lectured at the Department of Technical Sciences on the development of microwave radio communications and the results of local research on microwave and broad band radio communications.

* * *