

OSINTSOVA, M.S.; RAKOVSKAYA, M.V.; SISAKYAN, N.M.

Activity of some enzymes of phosphorus metabolism in chloroplasts
isolated from a nonaqueous medium. Biokhimiia 28 no.4:616-
621 J1-Ag '63. (MIRA 18:3)

1. Institut biokhimi imeni Bakha AN SSSR, Moskva.

EEZINGER, E.N.; MOLCHANOV, M.I.; KOTOVSKAYA, A.P.; SISAKYAN, N.M., akademik

Isolation and characteristics of lipoproteins from bean chloroplasts.

Dokl. AN SSSR 151 no.3:722-724 J1 '63. (MIRA 16:9)

(Lipoproteins) (Chromatophores)

PINUS, Ye.A.; SISAKYAN, N.M., akademik

Availability of mitochondrial ATP for the phosphofructokinase
reaction of glycolysis. Dokl. AN SSSR 151 no.4:963-966 Ag
'63. (MIRA 16:8)

1. Institut biokhimii im. A.N.Bakha AN SSSR.
(Phosphofructokinase) (Adenosine triphosphatase)
(Glycolysis)

BEKINA, R.M.; SISAKYAN, N.M., akademik

Activity of photosynthetic phosphorylation. Dokl. AN SSSR 152
no.2:467-470 S '63. (MIRA 16:11)

1. Institut biokhimi im. A.N. Bakha AN SSSR.

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FILIPPOVICH, I.I.; SVETAYLO, E.N.; ALIYEV, K.; SISAKYAN, N.M., akademik

Heterogeneity of chloroplast ribosome fractions. Dokl. AN
SSSR 153 no.6:1443-1446 D '63. (MIRA 17:1)

SISAKYAN, N. M.

B3

Protein metabolism in chloroplasts

N. M. SISSAKIAN (Bakh Institute of Biochemistry, U.S.S.R. Academy of Sciences, Moscow, U.S.S.R.)

Experimental data obtained in our laboratory indicate that chloroplasts possess several biochemical functions and the earlier idea that these structures were important only in photosynthesis now appears to be too limited. Different types of plastid showed appreciable enzymic activity so that during the period 1948-1951 we began to investigate not only the localization of different enzymes in chloroplasts but also the possibility that they formed a site of protein synthesis.

Plastid proteins are very complex and are mainly encountered as proteids (lipo-, nucleo-, chromo-, and glyco-proteins). Their electrophoretic properties and amino acid composition change during the ontogenetic development of the organism. The changes of amino acid composition are of such basic character that they suggest an appreciable renewal of the chloroplast protein during development.

The major nucleic acid fraction of the chloroplasts consists of RNA, containing all the main functional types. Smaller quantities of DNA are present. The nucleotide composition of the chloroplastic DNA shows essential differences from that of nuclear DNA. Nucleotide-peptide complexes were also isolated from chloroplasts.

report submitted for the 1st Meeting European Federation of Biochemical Societies,
London UK, 23-25 Mar 1964

SISAKYAN, N. M.

"Protein Synthesis in Chloroplasts."

report submitted for 6th Intl Biochemistry Cong, New York City, 26Jul-1 Aug 1964.

SISAKYAN, Norayr Martirosovich, akademik; SEVERIN, Sergey Yevgen'yevich; PARIN, Vasiliy Vasil'yevich; EL'PINER, Isaak Yefimovich, doktor biol. nauk; KUZIN, Aleksandr Mikhaylovich; ISAYEV, I.B.; SOROKO, Ya.I., red.

[Biology and its allies] Biologiya i ee soizuzniki; sbornik. Moskva, Izd-vo "Znanie," 1964. 77 p. (Novoe v zhizni, nauke, tekhnike. VIII Seriya: Biologiya i meditsina, nos.17-18) (MIRA 17:10)

1. Deystvitel'nyy chlen AMN SSSR (for Severin, Parin). 2. Chlen-korrespondent AN SSSR (for Kuzin).

L 33606-65 EEO-2/EWG(a)/EWG(c)/EWG(j)/EWG(r)/EEG(k)-2/ENG(v)/EWT(l)/FS(v)-3/FSF(h)/
 EWA(d)/FSS-2 Pe-5/P1-4/PG-4/PQ-4/Pac-4/Pas-2 TT/DD/GW
 ACCESSION NR AM1011422 BOOK EXPLOITATION

76 31
 Br/

Sisakyan, N. M. (Academician); Yazdovskiy, V. I. (Professor), eds.

The first space group flight; scientific results of medical and biological investigations carried out during the group orbital flight of "Vostok-3" and "Vostok-4" satellites (Pervyy gruppovoy kosmicheskoy polet; nauchnyye rezul'taty medikobiologicheskikh issledovaniy, provedennykh vo vremya gruppovogo orbital'nogo poleta korabley-sputnikov "Vostok-3" i "Vostok-4"), Moscow, Izd-vo "Nauka", 1964, 153 p. illus., biblio. Errata slip inserted. 4,000 copies printed.

TOPIC TAGS: space environment simulation, space physiology, space capsule, weightlessness

TABLE OF CONTENTS [abridged]:

- Introduction -- 5
- Ch. I. Study of astronauts during the preflight period -- 7
- Ch. II. Flight conditions and mission -- 54
- Ch. III. Methods of physiological research and medical examination in the space flight -- 72

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L 33606-65

ACCESSION NR AM4044422

Ch. IIII. Results of investigations in the flight -- 81
Ch. V. Postflight examination -- 104
Conclusion -- 150
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SUBMITTED: 13Jan64

SUB CODE: IS, PH

NO REF SOV: 048

OTHER: 006

Card 2/2

SISAKYAN, N. M.

"Biology and cosmonautics. Present status and perspectives of bioastronautics research. Introductory remarks."

report submitted for 15th Intl Astronautical Cong, Warsaw, 7-12 Sep 64.

SISAKYAN, N. M., GAZENKO, O. G., and ANTIPOV, V. V. (Acad. Sci. USSR)

"Satellite Biological Experiments" (Major Results and Problems)

Report presented at the COSPAR, 5th Intl Space Science Symposium, Florence,
Italy, 8-20 May 1964

SISAKYAN, H.M.; BEKINA, R.M.

Chemism of photosynthetic phosphorylation. Izv. AN SSSR Ser.
biol. no.2:257-267 Mr-Ap'64 (MIRA 17:3)

SISAKYAN, N.K.; PARIN, V.V.; ANTIFOV, V.V.; BOBNIK, N.N.; BAKSONOV, F.P.

Some conclusions and future development of the radiobiological
research in space. Izv. AN SSSR. Ser. biol. no.3:341-351 My-
Je '64. (MIRA 17:5)

S/0205/64/004/003/0337/0343

ACCESSION NR: AP4039713

AUTHOR: Sisakyan, N. M.; Antipov, V. V.; Saksonov, P. P.; Yazdovskiy, V. I.

TITLE: The biological action of cosmic radiation under space flight conditions

SOURCE: Radiobiologiya, v. 4, no. 3, 1964, 337-343

TOPIC TAGS: manned space flight, cosmic radiation, Vostok, radiobiology

ABSTRACT: The article reviews the historical development of experiments concerning the effects of cosmic radiation on the organism and concentrates on results of the latest Soviet space probes. The mean intensity of cosmic radiation registered by means of various dosimetric devices was 10 ± 2 mrad per day on Sputniks 2, 4, and 5, and on Vostoks 1, 2, 3, and 4. The bone marrow cells of mice, seeds of plants, lysogenic bacteria, and Tradescantia microspores all exhibited small but significant alterations as a result of exposure to conditions of space flight and cosmic radiation.

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BEZINGER, E.N.; MOLCHANOV, M.I.; SISAKYAN, N.M.

Role of lipid compounds in biosynthesis of chloroplast proteins.
Blokhiimia 29 no.4:749-758 JI-Ag '64.

(MIRA 18:6)

1. Institut biokhimii imeni Bakha AN SSSR, Moskva.

SISAKYAN, N.M., akademik

Principal achievements in the fields of the natural and social sciences in 1963; report of the Chief Scientific Secretary of the Presidium of the Academy of Sciences of the U.S.S.R., Academician N.M.Sisakian. Vest. AN SSSR 34 no.3:13-90 Mr '64. (MIRA 17:4)

1. Glavnyy uchenyy sekretar' prezidiuma AN SSSR.

KALACHEVA, V.Ya.; SISAKYAN, N.M., akademik

Efficiency of oxidation phosphorylation by plant mitochondria.
Dokl. AN SSSR 154 no.5:1198-1201 F'64. (MIRA 17:2)

1. Institut biokhimii im. A.N. Bakha AN SSSR.

MOSOLOVA, I.M.; SISAQYAN, N.M., akademik

Effect of light on the oxidation of succinate by mitochondria
of green and etiolated pea plants. Dokl. AN SSSR 156 no. 3:
702-705 '64. (MIRA 17:5)

REZINGER, E.N., and GILBERT, V.S.; HASKELL, M.W., 1964

Lipidic acid compounds of chloroplasts. *Plant Cell* 1964 16
no. 6: 1174-1180. O¹⁶. MIA 17-100

L. HASKELL, HASKELL, M.W., A.N. BACHA AN 1964.

MARCH 1968, N.Y. ...

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... (NYR 10412)

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BEZINGER, E.N.; MOLCHANOV, M.I.; SISAKYAN, N.M., akademik

Inclusion of C^{14} amino acids into the phosphatide fraction separated
by alkaline hydrolysis from a chloroplast lipoproteid. Dokl. AN
SSSR 159 no.2:446-448 N '64. (MIRA 17:12)

1. Institut biokhimii im. A.N. Bakha AN SSSR.

L 55944-65
ACCESSION NR: AP5018498

UR/0020/64/159/003/0664/0667

AUTHOR: Bekina, R. M.; Mosolova, I. M.; Alekseyeva, T. I.; Sisakyan, N. M. 12
(Academician) B

TITLE: Activation of photosynthetic phosphorylation by organic acids

SOURCE: AN SSSR. Doklady, v. 159, no. 3, 1964, 664-667

TOPIC TAGS: photosynthesis, plant chemistry, phosphorylation

Abstract: The effect of organic acids (added in the form of neutral Na salts to the incubation medium) on photosynthetic phosphorylation by isolated chloroplasts from pea plants 1-2 week old was studied. The magnitude of the effect was determined on the basis of the difference between the reduction of the amount of inorganic P in the photosynthesized reaction and that during the reaction in the dark. The highest effect (15-37% activation) was produced by succinate, alpha-ketoglutarate, and fumarate. Pyruvate and malonate exerted a moderate activating effect (9-11%). Citrate had a lower effect (4.2%). Malate was almost inactive (0.6%) and acetate, completely inactive. Addition of mitochondria did not increase the activating effect of succinate - i.e., this effect was not due to the presence of traces of mitochondria in the chloroplast fraction. There was additivity of the action of malonate

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ACCESSION NR: AP5018498

+ succinate and of succinate + alpha-ketoglutarate, but the additivity effect was not always reproducible, because the degree of activation varied with the age of the plants from which the chloroplasts were derived. Malonic acid did not reduce the activating effect produced by succinate, but this effect was slightly decreased by ethylenediaminetetraacetic acid. The most probable explanation of the activating effect of organic acids, which resulted in a higher rate of formation of ATP, is inhibition of the activity of ATP - ases, specifically photo-ATP-ase, the activity of which amounts to approximately 25% with reference to the rate of phosphorylation in the presence of succinic acid. Orig. art. has 1 graph and 2 tables.

ASSOCIATION: Institut biokhimi im. A. N. Bakha Akademii nauk SSSR
(Institute of Biochemistry, Academy of Sciences, SSSR)

SUBMITTED: 31Jul64

INCL: 00

SUB CODE: LS, OC

NO REF SOV: 003

OTHER: 015

JPRS

JR
Card 2/2

VOLYNKIN, Yu.M.; ARUTYUNOV, G.A.; ANTIPOV, V.V.; ALTUKHOV, G.V.;
BAYEVSKIY, R.M.; BELAY, V.Ye.; LUYANOV, P.V.; BRYANOV, I.I.;
VASIL'YEV, P.V.; VOLOVICH, V.G.; GAGARIN, Yu.A.; GEMIN, A.M.;
GORLOV, F.D.; GORSHKOV, A.I.; GUROVSKIY, N.N.; YESHANOV, N.Kh.;
YEGOROV, A.D.; KARPOV, Ye.A.; KOVALEV, V.V.; KOLOSOV, I.A.;
KORESEKOV, A.A.; KAS'YAN, I.I.; KOTOVSKAYA, A.R.; FALIBERDIN,
G.V.; KOPANEV, V.I.; KUZ'MIROV, A.P.; KAKURIN, L.I.; KUDROVA,
R.V.; LEBEDEV, V.I.; LEBEDEV, A.A.; LOBZIN, P.P.; MAKSIMOV,
D.G.; MYASNIKOV, V.I.; MALYSHKIN, Ye.G.; NEUMYVAKIN, I.P.;
ONISHCHENKO, V.F.; POPOV, I.G.; PORUCHIKOV, Ye.P.; SIL'VESTROV,
M.M.; SERYAPIN, A.D.; SAKSONOV, P.P.; TEREENT'YEV, V.G.; USHAKOV,
A.S.; UDALOV, Yu.F.; FOMIN, V.S.; FOMIN, A.G.; KHLEBNIKOV, G.F.;
YUGANOV, Ye.M.; YAZDOVSKIY, V.I.; KRICHAGIN, V.I.; AKULINICHEV,
I.T.; SAVINICH, F.K.; STIMPUHA, S.F.; VOSKRESENSKIY, O.G.;
GAZENKO, O.G., SISAKYAN, N.M., akademik, red.

[Second group space flight and some results of the Soviet
astronauts' flights on "Vostok" ships; scientific results of
medical and biological research conducted during the second
group space flight] Vtoroi gruppovoi kosmicheskii polet i neko-
torye itogi poletov sovetskikh kosmonavtov na korabliakh
"Vostok"; nauchnye rezul'taty medikobiologicheskikh issledovaniy,
provedennykh vo vremia vtorogo gruppovogo kosmicheskogo poleta.
Moskva, Nauka, 1965. 277 p. (MIRA 18:6)

L 48341-65 EWT(d)/EWT(1)/EWT(a)/EWG(v)/EWP(c)/FCC/EWA(d)/EWP(v)/EEG(t)/T/EWP(t)/
EWP(k)/EWP(h)/EWP(b)/EWP(1)/EWA(c) Pe-5/Pq-4/Pf-4/Pae-2 IEP(c) JD/JG/GW

ACCESSION NR: AP5009497

S/0030/65/000/003/0011/0094

AUTHOR: Sisakyan, N. M. (Chief scientist-secretary of Presidium AN SSSR, Academician)

64
58

TITLE: Principal achievements in natural and social sciences in 1964

SOURCE: AN SSSR. Vestnik, no. 3, 1965, 11-94

TOPIC TAGS: agriculture, astronomy, biology, biochemistry, chemistry, mathematics, physics, geology, geochemistry, geophysics, philosophy, economics, jurisprudence

ABSTRACT: This report, delivered at the yearly meeting of the Academy of Sciences SSSR by the chief scientist-secretary of the Presidium N. M. Sisakyan, lists briefly the main achievements of different sciences and describes the role of the Academy of Sciences in the organization and coordination of scientific research. In the field of mathematics the emphasis was placed on a wide application of algebraic methods. Important results were obtained in the intermediate regions between the algebra and the theory of numbers; between the function analysis, topology, algebraic geometry, and the complex set theory; between the theory of automation and the algorithm theory. A new analytical theory of statistical tests was developed, transforming any type of problems to the

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ACCESSION NR: AP5009497

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variational problem of a known type. A number of algorithms were worked out for complex problems in mathematical physics, meteorology, and hydrodynamics of viscous fluids. Departments of nuclear physics accelerated their research in the fields of high energies, elementary particles, atomic nucleus, cosmic rays, acceleration techniques, and experimental technology. The study of elastic nuclear scattering in small angles proved the existence of a material part of the scattering amplitude at high energies; a number of the multi-particle resonances were discovered. In the radiation capture of polarized neutrons in nuclei, the asymmetry of angular distribution of gamma-quanta was noted for the first time. Experiments with an ionization calorimeter revealed an increase in the cross section of inelastic reaction between the cosmic radiation particles and nuclei with the increase in energy from 10^{10} to 10^{12} eV. Very important results were obtained in the study of the isomeric state of silver-107. The construction of a linear electron accelerator is in its final stage. Electron accumulation was realized in a device for the study of electron-electron collision. An assembly for experimenting on counter electron-positron beams has been designed. Quantum theory of solid state matter was still the central problem in the field of general physics. A new version of the theory of electromagnetic properties of superconductors was developed, explaining the diffusive scattering of electrons by a metal surface. A theory of mutual reaction between dislocations and

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ACCESSION NR: AP5009497

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point defects was developed. Nonmetallic ferromagnetic compounds were synthesized, as were new ferrites with a rectangular hysteresis loop for high-temperature instruments. A new effect of magnetic resistivity oscillation in semiconductors was studied theoretically and experimentally. Progress in quantum electronics was reflected in the new types of semiconductor quantum generators. Investigations in nonlinear optics were centered on obtaining of light-oscillation harmonics. Applied spectroscopy research resulted in the design of a number of instruments for emission spectrum analysis of difficultly fusible and superconductive alloys and for automatic control of metallurgical processes. Technology of luminescence analysis was improved. Superior x-ray screens, "Simul'tan-1" and "Simul'tan-2," were invented. Experimentation with the physics of ultrasound and, in particular, with nonlinear acoustics, led to the discovery of intensive currents in acoustical fields in gaseous media. In the field of physical electronics, the study of the statistics of secondary electron emission for a metal, a dielectric, and a semiconductor was carried on. A new trend in the research of plasma physics was developed. Astronomers completed their 15-year series of photographic observation of small planets. Fine structure and strong nonhomogeneous magnetic fields were discovered in the active solar areas; contrary to common belief, the existence of a general magnetic field of the sun as a dipole field or an evenly magnetized sphere was not sustained.

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The compilation of a catalog and the construction of the spectra of discrete cosmic radiation sources in the decameter wave region are being continued. In the field of energetics, the main stress was put on study of the energy balance of fuels, the design of new types of plants, the search for a direct transformation of thermal into electrical energy, and atomic energy. New technical procedures for the production of structural materials for temperatures up to 3000C are ready. Special attention was given to the study of stability and turbulency mechanism in plasma. Important achievements were made in the theory of automatic control and information transfer. In the field of earth sciences, a general theory of tides and oscillations of the earth was developed. A theoretical basis was worked out for the development of long-term hydrodynamic methods of weather forecasting for the entire globe; "polar" equations of hydrodynamics were derived for short-term weather forecasts. Progressively greater areas were covered by detailed geological and oceanological exploration; geochemical research was improved by the introduction of new analytical methods. Geographers completed the compilation of a three-volume climatic atlas of the SSSR. Cybernetic research was directed toward further development of its theoretical basis and its application to different branches of agricultural, scientific, and social activity. Logical language for the presentation of synthesis algorithms and the design of corresponding programming systems were worked out. The study of the

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impulse activity of nerve cells at different evolutionary stages sustained the hypothesis of the probability-statistical organization of neuron elements in the functional system of the brain. Principal achievements and trends in chemical sciences were toward further development of the theory of chemical structure, kinetics, reaction capacity and catalysis, studies of pure substances, physico-chemical analysis of micro-admixtures, semiconductors, their surface properties and organic semiconductors were continued. The results obtained in the study of structure and properties of biopolymers were of great theoretical importance for the concept of the biosynthesis of nucleic acids and proteins in living cells. Research in multiple, periodical fermentative reactions resulted in the development of a general theory of rhythmic reactions in living systems. Research in photosynthesis revealed the formation of triplet and radical forms of chlorophyll and its analogs under the action of light. Special attention was given to the study of the effect of different extreme actions on human and animal physiological functions. Ecological physiology was developed. Further progress was made in the study of motion coordination--a complex phenomenon of the integrative activity of the central nervous system; experiments revealed certain biomechanical peculiarities of the motion apparatus which predetermined the functional structures of the motion regulation systems. Certain modern trends and achievements of mathematics were applied successfully in these

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investigations. The 10th Convention of the All-Union Physiological Society im. I. P. Pavlov was held; among the 22 symposia, 3 were dedicated to the use of mathematical methods and the modeling of physiological functions. The generalized topic for research in social sciences in 1964 was "Regularities in the development of socialism and transition toward communism." Philosophers studied the establishment of communist morale and proceedings in natural and social sciences and wrote a criticism on modern capitalist philosophies and social concepts. A number of works were dedicated to the gnoseological, philosophical, and social basis of the present reformism and to the Lenin stage in the Marxian philosophy. Research in jurisprudence went along the lines of the scientific basis for government, the development of socialist society and law, the problems of the capitalist law, and the criticism of capitalist political and judicial ideology. The treatises on economics were concerned with the improvement of methods and indices for governmental planning, application of scientific and mathematical methods, economic competition of socialist-capitalist countries, and the aspects of this competition in the underdeveloped countries. In conclusion, the importance of international scientific exchange is stressed, and the names of the Soviet and foreign scientists who participated in the exchange in 1964 are presented.

ASSOCIATION: none

Card 6/7

WANG, SAKI, SHAN, S.S., KONCHAROV, V.F., SASAKIAN, N.M.

Method of measuring enzymes of the chloroplasts of higher plants.
(MIRA 18:6)

1. Institut biokhimiya imeni Bakha AN SSSR, Moskva.

KALACHEVA, V.Ya., SISAKYAN, N.M.

Uncoupling of oxidation and phosphorylation in mitochondria of
green plants following X-ray irradiation. Biokhimiya 30 no.4:
858-863 J1-Ag '65. (MIRA 18:8)

1. Institut biokhimiya imeni A.N. Bakha AN SSSR, Moskva.

SIMAKOVA, I.M.; SISAKYAN, N.M., akademik

Nucleopeptides in plants. Dokl. AN SSSR 161 no.4:971-974 Ap '65.
(MIRA 18:5)

! Institut biokhimii im. A.N.Bakha AN SSSR.

L 58524-65 EWG(j)/EWT(m)

ACCESSION NR: AP5014857

UR/0020/65/162/003/0691/0693

AUTHOR: Sapezhinskiy, I. I.; Silayev, Yu. V.; Sisakyan, N. M.

TITLE: Effect of radioprotective agents on protracted afterglow of irradiated serum albumin solutions

SOURCE: AN SSSR. Doklady, v. 162, no. 3, 1965, 691-693

TOPIC TAGS: radioprotective agent, serum protein, mercury lamp, radiobiology, cysteine, ultraviolet irradiation

ABSTRACT: Using a continuous-flow apparatus, the authors studied the effect of various kinds of radioprotective agents on the kinetics of the protracted afterglow produced when solutions of serum albumin in phosphate buffer are irradiated with a PRK-4 mercury lamp. Intensity of luminescence decreased sharply when oxygen was removed from the solution. Addition of cysteine after irradiation increased the rate of change in intensity of the afterglow. The magnitude of the effects noted were characterized by the ratio K/K_0 and parameter $\alpha = (K - K_0) K_0$, (where K_0 is the constant of the rate of protracted afterglow and K is the rate with the addition of a radioprotective agent). The constant increased linearly with an increase in concentration of cysteine and of the inhibitors of free-radical processes, viz.,

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ACCESSION NR: AP5014857

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2,6-di-*tert*-butyl-4 α -aminoethylphenol and 2-propyl-6-methyl-3-hydroxypyridine. The values of α were determined for 13 substances with a protein concentration of 0.133% in phosphate buffer, pH 7, at 25°. Other protective agents studied included reduced glutathion, β -mercaptoethylamine, thiourea, propylgallate, sodium thiosulfate, aniline, sodium sulfite, ascorbic acid, glucose, and hydroxylamine (all in a concentration of $3.3 \cdot 10^{-3}$ m/liter). Those with marked protective action (the sulfur-containing substances, phenol type) had the most potent effect on the kinetics of protracted afterglow. The effect was even more pronounced when they were used prior to irradiation. "In conclusion, the authors thank N. M. Emanyel' for discussion of the work." Orig. art. has: 4 figures, 1 table.

ASSOCIATION: Institut khimicheskoy fiziki, Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR)

SUBMITTED: 03Jun64

ENCL: 00

SUB CODE: LS

NO REF SOV: 007

OTHER: 004

bjp
Card 2/2

BERIDZE, T.G.; ODINTSOVA, M.S.; SISAKYAN, N.M., akademik

Properties of deoxyribonucleic acid of chloroplasts. Dokl. AN SSSR
162 no.5:1188-1190 Je '65. (MIRA 18:7)

1. Institut biokhimi im. A.N.Bakha AN SSSR.

SISAKYAN, N.M.

Nucleic acids, synthesis of protein and chlorophyll in chloroplasts,
Mikrobiol. zhur. 37 no.5:640-649 '65.

(MIRA 18:10)

1. Institut biokhimi im. A.N.Bakha AN SSSR, Moskva.

L 9831 -66 EWT(m)

ACC NR: AP5028287

SOURCE CODE: UR/0020/65/165/002/0427/0430

AUTHOR: ^{44.55} Barakine, N. F.; ~~Manushevskaya, M. I.~~; ~~Sisakyan, N. M.~~ (Academician) ⁴⁵

ORG: IMZHANS ^{44.55} ~~44.55~~ ^B

ORG: Institute of Animal Morphology im. A. N. Severtsov AN SSSR (Institut morfologii zhivotnykh im. A. N. Severtsova AN SSSR) ^{44.55}

TITLE: Chromosomes of bone marrow cells remotely affected by ionizing radiation

SOURCE: N SSSR. Doklady, v. 165, no. 2, 1965, 427-430 ^{55, 1?}

TOFIC TAGS: radiation protection, experiment animal, bone marrow, chromosome

ABSTRACT: Under the effect of radiation chromosomes develop two kinds of damage: 1) structural changes as a result of local exposure; 2) damage originating in the exposed cells and manifested by deformation (lumpiness, swelling, stickiness). To investigate the influence of ionizing radiation on the chromosomes of bone marrow cells, experiments were conducted on type C57BL mice of both sexes weighing 18-20 g. X-ray exposure conditions were: 210 kw, 15 ma, filter 0.75 mm Al, 0.5 mm Cu,

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UDC: 577.391

L 9831-66
AGC NR: AP5028287

dose rate 50 r/min. The animals were divided into three groups. In the first group, only one rear limb was exposed at a dose rate of 700 r. All other parts were shielded. In the second group, surgically exposed intestines were subjected to a dose rate of 700 r. The bodies of the animals were shielded. In the third group, the intestines were exposed at a dose rate of 3000 r. The shielding consisted of 5-8 mm plates. The animals were destroyed after 2 and 6 hours, and 1, 2, 3, and 5 days after exposure. The shielded thigh bones were fixed in Carnoy's fluid. Small pieces of bone marrow were strained, pressed and frozen. Mitosis damage was checked during the late anaphase and telophase. The damage (chiefly bridges) originated not only in the exposed sections but also in the shielded sections of the hemogenic system. They were produced by humoral influences (usually appearing two hours after exposure) coming from exposed tissues, proved by the presence of broken chromosomes in bone marrow cells, in the same quantity and time, as in the case of local exposure of the small intestines, or in the case of injected extracts from the bone marrow cells or intestines of exposed mice. Orig. art. has: 2 tables and 2 figures.

SUB CODE: 06/ SUBM DATE: 07Jan65/

NR REF SOV: 009/ OTHER: 013

HW
2/2

L 9871-66 EWT(m)

ACC NR: AT5026992

SOURCE CODE: UR/0020/65/164/005/1171/1174

AUTHOR: Eyrlus, L. Kh.; Otarova, G. K.; Sisakyan, N. M. (Academician)

ORG: IBFANS

ORG: Institute of Biological Physics, AN SSSR (Institut biologicheskoy fiziki AN SSSR)

TITLE: Screening of macromolecules from latent radiation damage

SOURCE: AN SSSR. Doklady, v. 164, no. 5, 1965, 1171-1174

TOPIC TAGS: gamma ray, radiation damage, enzyme, myology

ABSTRACT: Under the influence of ion-emission the inactivation of many enzymes proceeded in two stages. First, a latent damage was developed in the albumin molecules, and then the latent damage was converted into an apparent damage under the action of heat and oxygen. This process was associated with a partial expansion of the molecules accompanied by a loss in shape, depending on the enzymic condition of the albumin. If the conditions preventing the expansion of molecules could be

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UDC: 557.391

L 9871-66

ACC NR: AP5026992

found, then these could also eliminate radiation damage. Such conditions could be created synthetically. The experiments were conducted with solutions of myosin (M) in 0.5M KCl, irradiated by Co⁶⁰ γ-rays. In a first series of experiments ATP (adenosine triphosphate) was added to a myosin solution in amounts of 0.1-0.5%. The solutions were incubated at 37 C. These experiments proved that in the presence of ATP the activity of the intact albumin as well as nearly all the albumin with latent damage was not disrupted. However, the assumption that ATP might repair the latent damage was not confirmed, as ATP only prevented the development of latent damage. The screening effect of admixtures was produced because their molecules were absorbed on the albumin, preventing the partial expansion of damaged molecules in the second stage of inactivation. Orig. art. has: 4 diagrams.

SUB CODE: 06/ SUBM DATE: 10Dec64/

NR REF SOV: 007/ OTHER: 003

PC
2/2

L 9831-66 EWT(m)

ACC NR: AP5028287

SOURCE CODE: UR/0020/65/165/002/0427/0430

AUTHOR: Barakine, N. F.; Yanushevskaya, M. I.; Sisakyan, N. M. (Academician)

ORG: IMZHANS

ORG: Institute of Animal Morphology im. A. N. Severtsov AN SSSR (Institut morfolo-
gii zhivotnykh im. A. N. Severtsova AN SSSR)

TITLE: Chromosomes of bone marrow cells remotely affected by ionizing radiation

SOURCE: M SSSR. Doklady, v. 165, no. 2, 1965, 427-430

TOPIC TAGS: radiation protection, experiment animal, bone marrow, chromosome

ABSTRACT: Under the effect of radiation chromosomes develop two kinds of damage:
1) structural changes as a result of local exposure; 2) damage originating in the
exposed cells and manifested by deformation (lumpiness, swelling, stickiness). To
investigate the influence of ionizing radiation on the chromosomes of bone marrow
cells, experiments were conducted on type C57BL mice of both sexes weighing 18-20
g. X-ray exposure conditions were: 210 kv, 15 ma, filter 0.75 mm Al, 0.5 mm Cu,

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UDC: 577.391

L 9831-66

ACC NR: AP5028287

dose rate 50 r/min. The animals were divided into three groups. In the first group, only one rear limb was exposed at a dose rate of 700 r. All other parts were shielded. In the second group, surgically exposed intestines were subjected to a dose rate of 700 r. The bodies of the animals were shielded. In the third group, the intestines were exposed at a dose rate of 3000 r. The shielding consisted of 5-8 mm plates. The animals were destroyed after 2 and 6 hours, and 1, 2, 3, and 5 days after exposure. The shielded thigh bones were fixed in Carnoy's fluid. Small pieces of bone marrow were strained, pressed and frozen. Mitosis damage was checked during the late anaphase and telophase. The damage (chiefly bridges) originated not only in the exposed sections but also in the shielded sections of the hemogenic system. They were produced by humoral influences (usually appearing two hours after exposure) coming from exposed tissues, proved by the presence of broken chromosomes in bone marrow cells, in the same quantity and time, as in the case of local exposure of the small intestines, or in the case of injected extracts from the bone marrow cells or intestines of exposed mice. Orig. art. has: 2 tables and 2 figures.

SUB CODE: 06/ SUBM DATE: 07Jan65/

NR REF SOV: 009/ OTHER: 013

HW
Card 2/2

BEZINGER, E.N.; MOLCHANOV, M.I.; OTSARYAN, N.M., akademik

Biosynthesis of protein and nucleic acid in lamellae of bean
chloroplasts. Dokl. AN SSSR 166 no.3:738-741 Ja '66.

(MIRA 19:1)

1. Institut biokhimi im. A.N.Fakha AN SSSR. Submitted
September 24, 1965.

MANOLAVA, I.M.; BEKINA, P.M.; MEYHAILOVA, Ye.D.; VISHNYAN, V.N., akademik

O_2 absorption by chloroplasts under illumination in the presence
of malic acid. Dokl. AN SSSR 164 no.5:1179-1182 0 '65.

(MIRA 18:10)

1. Institut biokhimi im. A.N.Bakha AN SSSR.

SOURCE CODE: UR/0209/66/000/005/0022/0026

ACC NR: AP6014997

AUTHOR: Sisakyan, N. (Academician)

ORG: none

TITLE: The birth and development of space biology

SOURCE: Aviatsiya i kosmonavtika, no. 5, 1966, 22-26

TOPIC TAGS: space biology, hypothermia, animal physiology, human physiology, manned space flight, UV radiation, environment simulation, anabiosis, biologic acceleration effect, cytology, radiation biologic effect, lunar environment, vacuum research, temperature adaptation

85
75
B

ABSTRACT: The recently deceased author reviewed the state of Soviet space biology in one of his last publications. Attention is focused on those areas of space biology most germane to future, prolonged manned orbital flights and flights to the moon and other planets.

Special importance is accorded to studies concerning the reaction of living organisms and their cells to low and very low temperatures. Soviet research in this area has made possible the artificial inducement of total anabiosis to preserve organisms without damaging the viability of individual cells. In all likelihood, deep-freezing will not prove a barrier to the preservation of bacteria, yeasts, and invertebrate organisms. Study to determine values for safe and reversible deep-freezing of living systems is under way. Serious attention will be given to the molecular and cellular mechanisms of resistance to deep and very deep freezing. In terms of space biology, techniques for freezing higher animals in order

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ACC NR: AP6014997

to induce artificial hypothermia and hibernation are being studied. Since it is known that cooled organisms better resist hypoxia, radiation, and other deleterious factors, it is possible that this approach may find application in the manned spaceflight program.

The effects of vacuum in a space environment are no less important. A. Imshenetskiy and his associates have revealed the high resistance of some organisms to this factor. Some algae have been found to withstand a 10^{-8} — 10^{-9} mm Hg vacuum.

Cytological studies of the effects of shortwave UV radiation are also of practical importance to space biology. Research has shown that infusoria can act as dosimeters of the biological effects of UV. UV starvation is also an area of concern relative to prolonged spaceflights and its proper dosage must be determined.

The work of L. Lozina-Lozinskaya concerning the tolerance of certain organisms to a simulated Martian environment has shown that certain organisms can survive and even reproduce under these severe conditions. Infusoria, for example, can successfully withstand temperatures of -78° C, which has led to the speculation that a similar type of one-celled organism may inhabit the soil or plant cover of Mars. The ability of infusoria to withstand freezing is attributed to its ability to withstand desiccation.

Research concerned with the physiological effects of acceleration and weightlessness is being widely pursued by a large number of experts. Ya. Vinnikov and V. Yeliseyev are reconsidering changes in the structure and function of the cells of various organs during acceleration. P. Vasil'yev and associates have found that acceleration alters the

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L 42087-66

ACC NR: AP60 997

sensitivity of animals to a number of pharmacological agents. This opens up the possibility of using various therapeutic agents to modify the effects of acceleration on the organism. Determining the proper dose of these preparations will also facilitate understanding of the pathogenesis of disorders caused by acceleration. Of particular significance are studies aimed at determining the tolerance of the organism to acceleration following prolonged weightlessness.

Preparing for lunar exploration and the construction of lunar laboratories presents biology and medicine with a wide range of problems which are presently receiving attention. The most important problem now being studied is the construction of lunar life-support systems, spacesuits, and structures on the lunar surface. The psychophysiological aspects of a lunar laboratory are also being considered. The effects of lunar gravity (1/6 G) on the organism and the biomechanics of unknown movement on the lunar surface will be of particular interest. At the present time, it is impossible to assess the future role of the lunar observatory. Its prospective construction is a concern of such organizations as the International Astronautical Federation (IAF) and the International Astronautical Academy, in which Soviet experts are participating. [ATD PRESS: 4257-F]

SUB CODE: 06/ SUBM DATE: none/

Card 3/3 af

L 03772-07 FSS-2/ENT(1)/ENT(m)/FCC/T SCIB/IJP(c) II/DD/ER
ACC NR: AN6030515 SOURCE CODE: UR/9003/66/000/050/0006/0006

AUTHOR: Sisakyan, N. (Academician); Pravetskiy, V. (Candidate of medical sciences);
Yegorov, B. (Cosmonaut)

ORG: none

TITLE: Biological laboratory in orbit

SOURCE: Izvestiya, 01 Mar 66, p. 6, col. 5-7

TOPIC TAGS: biologic space flight, dog, cardiovascular system, reflex activity,
bioelectric phenomenon, space biologic experiment, dosimetry, space telemetry

ABSTRACT: The article cited below gives exceptional detail on the program
of research carried out by launching of the specialized biological satel-
lite "Kosmos-110." The objective was study of the neuro-reflex regula-
tion of the cardiovascular system. This was done by measurement of
arterial pressure by a probe inserted in the arteries of an animal; the
same probe was used for introducing pharmacological preparations, making
possible evaluation of the functional state of the reflex regulation of
the blood circulation apparatus. In addition, there was recording of
bioelectric currents of the heart by inserted electrodes and registry
of the mechanical activity of the heart (seismogram) and respiration.
Electrodes also were applied to the peripheral nerves, making it possible
to evaluate the activity of the central formations of the brain respon-

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ACC NR: AN6030515

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sible for regulation of vascular tone. The satellite had two separate cabins for holding the experimental animals -- the dogs "Veterok" and "Ugolek." "Veterok" was the principal experimental animal, with the other serving as a control. The cabin for the first differed from the cabin for the second in having a pharmacological container and a pneumatic system operating on compressed gas servicing both cabins for supplying food and pharmacological substances from corresponding containers. The animals were fed food in a paste form from plastic containers holding specific amounts; the food was fed pneumatically directly into the stomachs of the animals. The feeding schedule was programmed. The satellite has the following systems: air conditioning and air regeneration for the cabins, ventilation, collection of liquid and solid waste, feeding, introduction of pharmacological substances, regulation and control, telemetry. Air conditioning and air regeneration systems have been improved since previous flights with dogs. Data on all parameters of reactions of the dogs were sent to earth by the telemetric system. In this experiment for the first time the orbit of the satellite was selected in such a way that for a long time it remained in zones of high radiation (protons of the earth's radiation belts). Other studies on this satellite included: study of the radiosensitivity of different biological objects and its change under space flight conditions; investigation and checking of the method for designing protection of spaceships and protection of biological objects against cosmic radiation; study of

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ACC NR: AN6030515

distribution of doses and the composition of cosmic radiation within the satellite cabin; measurement of the doses of radiation imparted to the dogs and other biological objects; testing of a number of kinds of biological dosimeters. The most suitable biological objects were selected: different types of yeasts; samples of blood serum; preparations of various serums; some types of Chlorella; some types of lysogenic bacteria. Note: Considerable additional detail is given on the various aspects of this flight. [JPRS: 36,553]

SUB CODE: 06, 22 / SUBM DATE: none

Card 3/3 *ellh*

ACC NR: AP6012864

SOURCE CODE: UR/0030/66/000/003/0021/0024

AUTHOR: Sisakyan, N. N. (Academician; Chief Scientific Secretary of the Presidium; Deceased)

ORG: none

TITLE: [Soviet achievements in general and applied physics during 1965. Paper presented at the Annual Meeting of the Academy of Sciences USSR held in Moscow from 7 to 8 February 1966]

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 21-24

TOPIC TAGS: crystallography, x ray diffraction, crystal lattice structure, molybdenum, laser beam, ferromagnetic material, plasma wave, luminescence, molecular spectroscopy, atomic spectroscopy, ultrasonics

ABSTRACT:

Sisakyan's report to the General Assembly lists a number of Soviet achievements in general and applied physics, particularly in radio-physics and radio engineering.

The field of general and applied physics is apparently confined mainly to solid-state studies, conducted at a number of institutions.

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ACC NR: AP6012864

The Institute of Atomic Energy has initiated a new line of theoretical investigations dealing with collective coherent effects in nuclear resonant interactions in crystals. The Institute of Theoretical Physics, AS USSR, has established the possibility of "cooperative" phenomena in linear structures, which are considered important in connection with the development of high-temperature superconductors.

The Physicotechnical Institute, AS UkrSSR, has been credited with the discovery of a new phenomenon, the "electron transition," caused by very fine topological changes in the Fermi level. Certain optical anomalies in single crystals of the V, VI, and VII groups of the periodic table and the so-called mechano-optical effect (shift of the absorption edge under hydrostatic pressure) in SbSI crystals have been discovered at the Institute of Crystallography, AS USSR. The same institute has also been credited with the discovery of tube-type formations with monomolecular walls in the crystallization process of catalase proteins.

The Institute of Physics of Metals, AS USSR, has developed an x-ray diffraction and fine beam spot analysis method for estimating the degree of perfection of crystal lattices, and a hydro-extrusion method for improving the strength and plasticity of molybdenum. In theoretical work, the Institute has found an explanation for the behavior of impurity

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ACC NR: A76012864

spins in a ferromagnetic matrix, calculated new rotation effects of the polarization plane of the ultrasound reflected from a magnetically polarized material, and calculated the reflection of electromagnetic waves at the impact of acoustic waves under similar conditions.

The Institute of Semiconductors, AS USSR, has investigated the types of imperfections and their mechanism of formation and interaction occurring on the diffusion of boron and phosphorus into silicon. The results are said to have yielded an approach to a theory of image formation. In common salt and similar crystals, the radius of the distorted zone around the impurity ions was found to exceed greatly the dimensions of the lattice and to determine, among other things, the cross section of phonon scattering on the impurity centers. The same institute has also investigated the interaction of spin waves with the lattice in ferrite mono-crystals.

The Institute of Metal Science and Physics of Metals has found that the tendency toward brittle destruction in metals at low temperatures can be reduced by alloying with other metals having a body-centered cubic lattice.

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ACC NR: AP6012864

The Physicotechnical Institute, AS USSR, has shown that the strength of polymers depends on the kinetics of the accumulation of radicals in them as a result of the breaking of chain molecules. In the process of improvement of the strength of sheet glass by tempering and pickling, the same institute has established that a strength level of 300—400 kg/mm² can be achieved by eliminating the moisture film from the glass surface. The Institute has also experimented with the effect of laser beams on transparent dielectrics and found that the destruction occurs within a time period shorter than the duration of the light pulse. This makes it possible, by using giant pulses, to investigate destruction processes of very short (of the order of a nanosecond) duration.

Moscow State University has developed new methods and instruments for x-ray structural investigations of ionic and polycrystals in a wide temperature range. The University has also created a magneto-optic device for the microspot (up to 1 μ²) investigation of ferromagnetics.

The possibility of the quantitative rating of the effects of flaws in the structure of glass by introducing artificial defects in the surface layer was demonstrated by the Institute of Physical Chemistry, AS USSR.

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ACC NR: AP6012864

The Institute of Nuclear Physics, AS KazSSR, has developed a new approach to the explanation of the interatomic bonds in the transition-group metals (niobium, zirconium). Study of the emission spectra has shown that a considerable portion of valence electrons (2,6 in Zr and 3,9 in Nb per atom) participate in the covalent bond, in agreement with the fusion curves of these metals.

A cycle of investigations in the theory of x-ray and slow neutron scattering in metals and alloys with distorted lattices was carried out by the Institute of Physics of Metals, AS UkrSSR. The theory is said to contribute to the effectiveness of these methods as applied to solid-state studies.

The Institute of Physics of High Pressures, AS USSR, is credited with the development of a process for producing artificial diamonds with properties equal to those of natural stones.

The Institute of Problems of Physics, AS USSR, has observed coupled oscillations of electron and nuclear spins "for the first time."

A theory of nonlinear superhigh-frequency ferromagnetic resonance

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ACC NR: AP6012864

(taking internal modulation into account) has been developed by the Institute of Radio Engineering and Electronics, AS USSR.

Phonon spectra of metals in a quantizing magnetic field have been investigated at the Institute of Radiophysics and Electronics, AS UkrSSR.

Numerous achievements are claimed in certain specific fields, such as low-temperature and semiconductor physics, radiophysics, etc., mostly as the result of the coordinated efforts of several institutions.

In low-temperature physics, the Institute of Problems of Physics, AS USSR has claimed the experimental discovery of the so-called Landau damping effect in the propagation of magnetic plasma waves in bismuth, the theoretical anticipation of the quantizing effect of the electron spectrum, and the first observation of the movement of the superconducting layer (both in superconductors in the transitional state). The same institute has also demonstrated experimentally the possibility of producing ultralow temperatures (below 0.02K) by means of the adiabatic crystallization of liquid He³.

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ACC NR: A76012864

In the semiconductor field, a quantum theory of thermomagnetic phenomena in semiconductors and metals has been developed by the Institute of Semiconductors, AS USSR. The mechanism of indirect optical transitions in interaction with free carriers in semiconductors has been investigated by the Physicotechnical Institute, AS USSR. The two institutes, together with the Physics Institute, AS USSR, have carried out a series of investigations toward the development of light sources using gallium arsenide, gallium phosphide, and silicon carbide. The Physics Institute is also credited with production of directed emission from cadmium selenide single crystals at 6950 \AA by fast electron stimulation and spontaneous coherent emission from cadmium telluride at 7920 \AA by electron pulse stimulation at 150 keV and a current density of 3 amp/cm^2 . Coherent emission from gallium selenide single crystals was obtained in the Physics Institute, AS USSR and the Physics Institute, AS AzSSR.

The Physicotechnical Institute, AS USSR, has observed recombination luminescence in indium antimonide single crystals at room temperature under concentration of current carriers near the surface by application of a magnetic field. Tunneling of electrons in gallium arsenide diodes was investigated and the effect of transition of ohmic

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ACC NR: AP6012864

contacts to superconductivity explained in the Institute of Problems of Physics and the Physics Institute, AS USSR.

The Institute of Radio Engineering and Electronics, AS USSR, has discovered a new phenomenon, the so-called acoustic-electric parity effect, in zinc sulfide crystals under the action of ultra-sound waves, consisting in a constant emf independent of the direction of the sound wave.

A series of new semiconductor power devices, among them a two-way silicon voltage limiter, has been developed in the Physicotechnical Institute, AS USSR.

In atomic and molecular spectroscopy, a wide range of experimental and theoretical investigations of the exciting cross sections resulting from electron-atom collisions has been carried out at a number of institutions (Physics Institute, AS USSR; Physics and Mathematics Institute, AS LitSSR; Physics Institute, AS LatSSR; the Latvian, Leningrad, and Uzhgorod Universities; and the Physicotechnical Institute of Tomsk University).

A new effect, stimulated light scattering of the Rayleigh line wing

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ACC NR: AF6012864

in liquids, has been discovered at the Physics Institute, AS USSR. Stimulated Mandel'shtam-Brillouin scattering in overcooled amorphous solid bodies has been observed at the same institute.

Emission spectrum analysis of a wide range of materials has received wide application.

In the field of luminescence, investigations of inter-cellular kinetics aiming at the detoxication of protein preparations derived from oil products by microbiological methods have been carried out at the Institute of Molecular Biology, AS USSR.

Inorganic phosphors, yielding 25% more light, have been developed for luminescent light sources, and phosphors for the detection of IR radiation have been developed by various institutions.

In ultrasound physics, a fusing method of polymer films has been developed and is being introduced in industry by the Acoustics Institute. The Institute of Radiophysics and Electronics, AS UkrSSR has developed a method for generating hypersonic waves in solid bodies, and has attained frequencies up to 1.4×10^{10} cps.

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ACC NR: AP6012864

In the area of atomic collisions, systematic investigations have yielded new data concerning the production of highly-excited hydrogen atoms by charge reversal. The cross sections of the excitement of fast hydrogen atoms produced in the proton charge-reversal process in gases were measured in connection with projects to obtain high-power, high-excitement beams of hydrogen atoms (Physicotechnical Institute. AS USSR). [FSB: v. 2, no. 6]

SUB CODE: 20 / SUBM DATE: none

Card 10/10

ACC NR: AP6012865

SOURCE CODE: UR/0030/66/000/003/0024/0025

AUTHOR: Sisakyan, N. N. (Academician; Chief Scientific Secretary of the Presidium; Deceased)

ORG: none

TITLE: [Some Soviet achievements in radiophysics and radioengineering during 1965. Paper presented at the Annual meeting of the Academy of Sciences USSR held in Moscow from 7 to 8 February 1966]

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 24-25

TOPIC TAGS: laser beam, crystal laser, laser R and D, strong magnetic field, radio wave propagation, electron emission, semiconductor research

ABSTRACT:

A special section of the report deals with Radiophysics and Radio-engineering. The following achievements are among those listed.

In quantum electronics, light emission has been obtained from a number of new semiconductor materials by means of fast electron stimulation. Radiating mirror lasers with increased power and good directivity have been developed. The effects of strong magnetic fields

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ACC NR: AF6012865

on the operation of lasers have been investigated theoretically. Investigations of the passage of a powerful light flux through an amplifier showed that the shape of the output pulse depends on its initial form. A methodology for obtaining supershort light pulses has been developed. Characteristics of the hydrogen atom laser beam have been studied in detail. New mixed-system laser crystals have been synthesized and their operation characteristics investigated. All these developments were carried out at the Physics Institute, AS USSR.

A model laser with an output tunable within a 600 \AA range around the 1μ wavelength has been completed at the Physics Institute, AS UkrSSR. Moscow State University has produced an experimental device for the realization of the principle of parametric amplification and generation of coherent optical radiation, which is the basis for tunable lasers.

In the field of electronics, a theory of electron heating in polar semiconductors has been developed which accounts for the change of electron effective mass as a function of its energy, and explains the mechanism of emission of hot electrons from semiconductors (Physics Institute and the Institute of Semiconductors, AS UkrSSR).

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ACC NR: A76012865

The possibility of using the phenomenon of field photoemission of germanium-silicon alloy cathodes for extending the sensitivity range of amplifier phototubes up to the 9 μ wavelength has been demonstrated. Photoelectron field emission has been observed in a metal-dielectric system, which would also open the possibility of extending the sensitivity range toward longer wavelengths (Institute of Radio Engineering and Electronics, AS USSR and Physics Institute, AS UkrSSR).

The Institute of Radio Engineering and Electronics has also observed, for the first time, quantum oscillations of the Hall conduction coefficient and the reluctance in bismuth thin films as functions of film thickness.

In radio wave propagation problems, the inhomogeneities and fluctuations of the refractive index within the ground layer of the atmosphere have been investigated by the Institute of Radio Engineering and Electronics to furnish data for the design of large antennas and radio telescopes.

The Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation, Siberian Department, AS USSR has developed a coding device for automation of the processing of ionospheric observation data.

Card 3/3 [FSB: v. 2, no. 6] SUB CODE: 20 / SUBM DATE: none

L 08160-67 EWT(1) GW
ACC NR: AP7001856

SOURCE CODE: UR/0030/66/000/003/0025/0026

AUTHOR: Sisakyan, N. M. (Academician; Chief Scientific Secretary of the Presidium;
Deceased)

52
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B

ORG: none

TITLE: [Soviet achievements in astronomy, radio astronomy, and investigations of
cosmic space during 1965]

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 25-26

TOPIC TAGS: solar magnetic field, climatology, mars planet, venus planet, space probe,
lunar surface / Electron space probe, Zond-2 space probe, Venera-2 space probe, Venera-
3 space probe

ABSTRACT:

Asymmetry of the solar magnetic field on the level of the photo-
sphere was detected (Crimean Astrophysical Observatory).

The evolution of the terrestrial orbit during 30 million years was
computed. Perturbed values for the eccentricity, the longitude of the
earth's perihelion, and the inclination of the ecliptic to the equator were
determined for the 30-million-year period up to 1900. These
results are very important for studies of climatological changes and

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ACC NR: AT7001856

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geological periods (Institute of Theoretical Astronomy).

The inversion of polarization in the martian atmosphere depending upon the wavelength was studied on the basis of the phase dependence of polarization. The atmospheric pressure on the martian surface was found to be 10 ± 8 mb (Main Astronomical Observatory).

Many weak blue objects have been detected, including many quasi-star galaxies (Byurakan Astrophysical Observatory).

A sudden decrease in the earth's rotation started in 1963 and continued in 1965. The velocity of rotation diminished by 19×10^{-9} , which caused an increase of the day and night periods of 1.6 msec (All Union Scientific Research Institute for Physical, Radiotechnical, and Technical Measurements).

A pulsation theory was developed for variable stars which explains the observed facts (Scientific Research Radiophysical Institute, Gor'kiy University).

The radio brightness of ¹²Venus's disk and its polarization were investigated in cooperation with U. S. scientists: The surface of Venus

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ACC NR: AP7001856

was found to be hot, but with cooler polar regions (Institute of Physics, Academy of Sciences USSR).

The lunar surface cover was investigated and its proper radiation was observed in a large radio-wave range. Data on the surface structure at depths of several meters, and on the heat of this layer, were obtained (Scientific Research Radiophysical Institute, Gor'kiy University). 4

Processing of data from the Electron-2, Zond-2, Venera-2, and Venera-3 space probes confirmed the existence of an extreme zone of charged particles between the radiation zones and solar wind. Data from Soviet interplanetary stations proved that strong magnetic perturbations occur when the solar plasma stream contains $10^9/\text{cm}^2\text{sec}$ particles. This result differs from the U. S. data obtained by Mariner-2. New photographs of the far side of the moon were obtained by Zond-3 (Radiotechnical Institute). (FSB: v. 2, no. 6)

SUB CODE: 22 / SUBM DATE: none

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L 08144-67 EWT(d)/FSS-2/EWT(1)/EWP(m)/EWT(m)/EEC(k)-2/EWP(i)/EWP(1) IJP(c)
ACC NR: AP7001857 BE/TT/DJ/GG/RM/GW SOURCE CODE: UR/0030/66/000/003/0030/0035

AUTHOR: Siskayan, N. M. (Academician; Chief Scientific Secretary of the Presidium;
Deceased) 102
78.

ORG: none

TITLE: Soviet achievements in mechanics and control processes during 1965. Paper presented at the annual meeting of the Academy of Sciences held in Moscow from 7 to 8 February 1966

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 30-35

TOPIC TAGS: gas mechanics, fluid mechanics, plasticity, mechanics, cybernetics, automatic control theory, reliability theory

ABSTRACT:

The Conquest of Space. The flights of the Voskhod-2 and of the interplanetary stations Zond-3, Venera-2, and Venera-3 are considered to be the most important achievements in the conquest of space. The launching of the heavy satellites Proton-1 and Proton-2, a series of Kosmos satellites and the communication satellite Molniya-1 are considered important to the study of space and to the application of space technology to the solution of practical problems.

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ACC NR: AP7001857

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Fluid and Gas Mechanics. Studies in the general theory of models of a continuous medium with internal degrees of freedom have been carried out with the aid of the calculus of variations (Institute of Mathematics, Academy of Sciences USSR). Multi-component non-equilibrium flows in the boundary layer have been analyzed. Theoretical and experimental studies of the stability of laminar flows and the structure of turbulent streams have been conducted (Moscow State University; Central Institute of Aerohydrodynamics) and studies on hypersonic aerodynamics were continued (Moscow State University). Theoretical studies of flows of incompressible liquids with a free boundary and experimental studies of the laws of motion of liquid mixtures with suspended particles have been carried out (Academy of Sciences USSR, Siberian Branch). The phenomena of the breakdown and the heating of gases by laser beams have been studied (Institute of Mechanics, Academy of Sciences USSR). Studies on the magnetohydrodynamic boundary layer have been conducted in connection with designing magnetohydrodynamic generators (Moscow State University).

Mechanics of Solids and Polymeric Materials. Significant results have been obtained in the mathematical theory of plasticity, the non-linear theory of elasticity under non-steady, periodical, and random loadings, and the conditions of velocity flow and heating. A series of

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ACC NR: AF7001857

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important practical problems of the applied theory of plasticity and strength of materials have been studied; theoretical and experimental studies on creep and strength of materials at high temperatures have been carried out. Estimates of the strength of a series of structures at high temperatures under constant and variable loads have been derived (scientific institutions of the Academy of Sciences USSR, Ukrainian SSR, and Kirgiz SSR). New and important problems of the theory of three-dimensional thin-walled structures have been solved (scientific institutions of the Academy of Sciences USSR, Ukrainian SSR, and Georgian SSR). The most important studies in the mechanics of polymeric materials were concerned with establishing the relations between the structure of polymeric bodies and their properties (scientific institutions of the Academy of Sciences USSR), determining static and dynamic mechanical properties of glass-reinforced plastics (scientific institutions of the Academy of Sciences USSR, Latvian SSR, and Ukrainian SSR), the theory of friction and wear of polymeric materials (scientific institutions of the Latvian Academy of Sciences; Institute of the Theory of Machines), various engineering methods for designing polymeric goods (scientific institutions of the Academy of Sciences USSR, Latvian SSR, Ukrainian SSR, and Belorussian SSR; Ministry of Chemical Industries; Institute of the Theory of Machines; and others).

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ACC NR: AP7001857

General Mechanics. Further studies of the theory of vibratory machines and their design have been carried out. The designing of an automatically controlled, high-lifting-capacity electrohydraulic testing stand working on frequencies up to 300 cps has been completed. Methods for developing damping equipment have been proposed (Leningrad Polytechnic Institute). Studies have been completed in which the classical dynamics of solid bodies have been connected with the problems of the rotary motion of an artificial earth satellite, with gravitational stabilization, and control of rotary motions. New cases of the integrability of the equation of motion of a solid body with one fixed point have been established and the motion of a solid body rotating at high angular velocities has been studied (Institute of Mathematics, Academy of Sciences USSR; Electromechanical Institute). In the theory of the stability of motion, Lyapunov's methods have been developed further. In the theory of optimal control, the optimal automatic pursuit problem with constrained control action and the problem of the optimal stabilization of satellites with the aid of gyroscopes have been analyzed. A series of problems on selecting optimal trajectories of the motion of a point with variable mass in a central field have been solved and estimates of the effect of the internal motion of particles on the principal vector and the principal moment of the reactive force have been established

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ACC NR: A77001857

(Leningrad State University). The scientists belonging to the so-called Kazan' school of mechanics (a trend, not an institution) have continued their studies of analytic dynamics, optimum control, stability of processes in systems with distributed parameters, stability of the steady motion of conservative systems, and also gyrostats and unstable gyroscopic systems. Studies in the theory of oscillations, automatic control, and differential equations are successfully conducted in Gor'kiy and studies of the dynamics of holonomic and nonholonomic systems, integration of equations of motion (application of the Lie group and functional-operator series), the dynamics of solid bodies, and also stability theory and oscillation theory under seismic loadings were conducted in Tashkent.

The Theory of Automatic Machines and Systems of Such Machines.
Methods for the analysis and synthesis of mechanisms and machine automata have been developed, especially those which are of prospective importance to automation and machine design. Methods for the structural synthesis of sampled-data control systems have been developed on the basis of the theory of algorithms, logic algebra, and the theory of finite automata. A cycle of studies on the minimization of Boolean functions has been completed. The algorithmic unsolvability of the problem of recognizing the essential indefiniteness of a context-free language has

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ACC NR: AP7001857

been proved (Institute of Mathematics, Academy of Sciences USSR, Siberian Branch). Almost-periodic oscillations of quasi-linear systems have been studied and conditions for partial self-synchronization in conformity to vibratory machines have been derived. Significant results have been obtained in developing systems for bioelectrical control of machines. Methods for searching for the optimal parameters of control systems, and also algorithms and programs for automation of certain stages in designing and constructing machines have been developed (Institutes of the Theory of Machines and of Engineering Cybernetics, Belorussian Academy of Sciences).

Problems in Automatic Control (Engineering Cybernetics). Substantial results have been obtained in developing the general theory of automatic control, in particular the theory of sampled-data systems, the theory of complex multiloop systems with nonlinear characteristics, systems with variable and distributed parameters, the theory of relay systems, and finite automata. High-quality control systems for controlling complex manufacturing processes have been designed on the basis of theoretical results. In the theory of optimal processes, a series of important results have been obtained which can be considered classical examples of the application of mathematics to engineering problems

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ACC NR: AP7001857

(Institute of Automatics and Telemechanics; Moscow State University; Institute of Mathematics, Academy of Sciences USSR; Academy of Sciences USSR, Sverdlovsk Branch; Institute of Automatics, Kirgiz Academy of Sciences). Essential results have been obtained in the theory of self-aligning, self-adapting, and learning systems. The theory of a dual control has been developed and a series of new algorithms for calculating the performance of extremal control systems have been proposed (Institute of Automatics and Telemechanics; Institute of Electronics and Computing Technology, Latvian Academy of Sciences). A series of self-aligning control systems have been introduced into industry. Optimizers manufactured in series have been introduced into synthetic rubber plants. Optimal design of chemical reactors has been undertaken (Institute of Automatics and Telemechanics; Institute of Catalysis, Academy of Sciences USSR, Siberian Branch). Studies of pattern recognition have been considerably expanded. Theoretical studies were concerned with the exact formulation of problems, developing algorithms, and proving their convergence. The developed heuristic algorithms found their application in solving problems of medical diagnostics and geological and meteorological prediction. A great deal of attention has been paid to the construction of mathematical models of objects. Statistical methods, in particular, regression methods, have been widely

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applied to the construction of models (Estonian Academy of Sciences). Methods for constructing models of chemical processes in a many-dimensional phase space have been proposed. Methods for controlling chemical reactions by their thermal effects have been developed. In the theory of relay systems and finite automata, a great deal of attention has been paid to studies of the abstract synthesis of automata. Initiative has been shown in developing such new prospective trends in this field as the theory of block synthesis (Institute of Automatics and Telemechanics), the theory of microprogramming devices (Institute on Information Transmission Problems, Academy of Sciences USSR), mathematical models of relay devices (Institute of Automatics and Telemechanics and Institute of Information Transmission Problems, Academy of Sciences USSR), behavioral aspects of the theory of automata (Leningrad Branch of the Central Economicomathematical Institute; Institute of Mathematics and Institute of Information Transmission Problems, Academy of Sciences USSR). A series of effective methods for minimizing the structure of relay devices were developed in which heuristic methods for determining minimal solutions have been utilized. A good start has been made in determining so-called "optimal" structures. A special algorithmic language (LYaPAS) and a corresponding programming system have been developed. Programs have been written in this language for a number of algorithms of the abstract and structural

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synthesis. Important studies concerning statistical estimates of various algorithms of the synthesis have been initiated (Siberian Physicotechnical Institute). Initial experiments with the automatic synthesis of structures of general-purpose digital computer units have been carried out (Institute of Cybernetics, Academy of Sciences USSR). The problem of structural reliability has been essentially elaborated. The important problem of determining the structure of relay systems has been solved under the assumption that logical and delay units are failure-free and the inputs and internal elements are unreliable (Institute of Automatics and Telemechanics). The application of the method of stochastic approximations to the solution of some problems (pattern recognition, automatic control, and others) has been analyzed (Institute of Automatics and Telemechanics). Studies on the theory of organizing and controlling large systems have been carried out. A series of PERT systems have been developed and introduced into industry.

Transmission of Information. Studies have been completed on developing economical methods for transmitting stationary black-and-white images by transmitting the values of the Laplace operator and determining its transform by integrating the Poisson equation. The results enabled investigators to study the possibility of constructing a global television system using artificial satellites (Institute on

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Information Transmission Problems, Academy of Sciences USSR).

Studies of the processes of transmitting and processing information in the neural systems of human beings and animals have been carried out (Institute on Information Transmission Problems, Academy of Sciences USSR). Unique methods for analyzing the performance of the organs of sight have been developed by joint efforts of mathematicians, physicists, and biologists.

Reliability Theory. New results pertaining to redundant systems with restorable elements, the analysis of restorable systems, and the synthesis of certain information and manufacturing processes have been obtained with the aid of the mathematical models of queueing theory (Moscow State University; Institute of Automatics and Telemechanics). An important phase of studies on the application of mathematical methods to reliability theory has been completed (Moscow State University). Redundant systems with a limited number of restorable elements have been studied. The results made it possible to use a better grounded approach to determining the necessary amount of the redundant equipment for the required reliability of the system (Scientific Council on Cybernetics, Academy of Sciences USSR). [FSB: v. 2, no. 6]

SUB CODE: 20,13 / SUBM DATE: none
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L 08158-67 EWT(1) GW

ACC NR: AP7001860

SOURCE CODE: UR/0030/66/000/003/0043/0043

AUTHOR: Siskyan, N. M. (Academician; Chief Scientific Secretary of the Presidium;
Deceased)

ORG: none

TITLE: Soviet achievements in hydrogeology during 1965. Paper presented at the annual meeting of the Academy of Sciences USSR held in Moscow from 7 to 8 February 1966

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 43

TOPIC TAGS: underground water, hydraulic engineering, surface water, drainage system

ABSTRACT: For the first time in Soviet hydrogeological practice, a method has been devised for predicting the presence of artesian basins and ground water. Maps of Kazakhstan compiled by this method are expected to be of value in the utilization and conservation of the water supply and in irrigating desert regions (Institute of Hydrogeology and Hydrophysics, AS KazSSR).

Long-term calculations of wind-wave parameters and the effects of winds on hydroengineering installations and shorelines have provided the basis for the development of a set of principles to be used in planning engineering projects on the shorelines of oceans, seas, lakes, reservoirs, and canals (Council on Problems of Water Economy, AS USSR).

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ACC NR: AP7001860

[FSB: v. 2, no. 7]

SUB CODE: 08,13 / SUBM DATE: none

Card 2/2 net

L 08159-67 EWT(1) GW

ACC NR: AP7001859

SOURCE CODE: UR/0030/66/000/003/0040/0043

AUTHOR: Sisakyan, N. M. (Academician; Chief Scientific Secretary of the Presidium; Deceased) 25
ORG: none 22

TITLE: Soviet achievements in geology during 1965. Paper presented at the annual meeting of the Academy of Sciences USSR held in Moscow from 7 to 8 February 1966 8

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 40-43

TOPIC TAGS: tectonics, petrology, terrestrial magnetism, seismic prospecting

ABSTRACT:

Geological maps compiled in 1965 include a new structural-tectonic map of the West Siberian Lowland, which shows producing and potential oil and gas fields, and paleogeographic and paleotonic maps, compiled by the Institute of Geological Sciences of the Kazakh Academy of Sciences, of the Riphean and Early Paleozoic in eastern Kazakhstan and adjacent areas.

An important series of geological and petrological investigations has been carried out to study the patterns of terrestrial magnetism throughout geologic time and their relationship to ore formation and to obtain additional

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information on the deep-seated structure of the earth's crust and upper mantle. The magnetic complexes of the Caucasus, central Kazakhstan, the [Soviet] Far East, and Central Asia were the subject areas. (Institute of the Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry, AS USSR).

Methods of conducting regional geophysical investigations involving the use of the energy of natural earthquakes have been developed and adopted by industry. Extensive use is now being made of magnetic-recording apparatus and devices developed by institutes to process observation results. Electromagnetic methods, in combination with seismic prospecting techniques, are also being widely used to accelerate the study of the geologic structures of oil-bearing formations (Scientific research institutes of the Ministry of Geology USSR).

Methods have been developed for predicting volcanic eruptions from seismic data observed above active volcanoes and from geochemical criteria. These methods have demonstrated that the volcano chambers are located below the earth's crust, and a theory has been proposed which reflects the development of volcanism in the upper mantle (Institute of Volcanology, Siberian Branch, AS USSR) [FSB: v. 2, no. 6]

SUB CODE: 08 / SUBM DATE: none
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L 08147-67 EWT(m)/EWP(j) RM

ACC NR: AP7001861

SOURCE CODE: UR/0030/66/000/003/0043/0047

AUTHOR: Sisakyan, N. M. (Academician; Chief Scientific Secretary of the Presidium; Deceased)

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8

ORG: none

TITLE: Soviet achievements in geophysics during 1965. Paper presented at the annual meeting of the Academy of Sciences USSR held in Moscow from 7 to 8 February 1966

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 43-47

TOPIC TAGS: seismology, seismicity, tectonics, earth crust, earthquake, upper mantle, geomagnetic field

ABSTRACT:

Progress has been made in systematizing seismic observations and standardizing the equipment of the seismic station network as a basic step in studying seismicity in the USSR and possibilities for predicting earthquakes. Apparatus with digital magnetic recording and special devices have been developed for direct input of magnetic earthquake records into computers. The positions of earthquake epicenters have been determined by computers, and the determination of the depths of earthquake spectra and foci has been started.

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ACC NR: AP7001861

Proposals have been prepared for establishing several control test areas in several seismically active regions of the USSR in which studies will be carried out to determine the possibilities for predicting the time, intensity, and location of earthquakes. 2

Detailed seismic and geological observations have been carried out, and the seismicity of the Western Sayan and Western Tuva areas has been evaluated. A seismic-tectonic map of Europe was compiled at the request of international scientific organizations (Institute of the Physics of the Earth).

As a result of studies of recent movements of the earth's crust and of the "living" tectonics of the interior regions of Asia, the types and rates of recent movements of the earth's crust have been investigated, and a seismic regionalization map of eastern Siberia was compiled and incorporated in the State Map of Seismic Regionalization of the USSR (Institute of the Earth's Crust, Siberian Branch, AS USSR). One of these

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seismic regions was the Talass Valley (Institute of Geology, AS KirgSSR).
Maps of seismic microregions included those for the cities of Nebit-Dag,
Krasnovodsk, and Cheleken (Institute of the Physics of the Earth and
Atmosphere, AS TurkmSSR), and of Tashkent (AS UzbSSR).

3

A theory of aftershocks has been developed which is based on assumption of elastic properties of the medium in the focal zone of an intense earthquake. The thermal effect of earthquakes has been investigated and an estimate made of the possible heating of the crust in highly seismic regions.

Investigations have been made of the seismic effects of earthquakes and explosions on structures and their foundations; the parameters of vibrations of rocky soils caused by short-delay explosions were studied (AS ArmSSR).

A new theory has been proposed for the structure and development of the earth's crust and the upper mantle of continents which is based on the combined analysis of basic geophysical, geological, and geochemical data.

The body waves generated by earthquakes in the Pamir-Hindu Kush

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the distribution of isobases in the Estonian SSR, compiled from repeated leveling data, shows that crustal movements are along block structures. Leveling run over individual lines for a third time confirmed the block structure and a general tendency toward uplift (AS EstSSR).

An approximate sketch was compiled showing the thickness of the earth's crust in the Belorussian SSR, and the interrelationship of deep-seated and surface structures was determined (AS BSSR).

Work was completed on the compilation of maps of the normal magnetic field (T and Z components) for 1965 with two types of smoothing for the entire USSR. The first type was the one generally used by organizations of the Ministry of Geology USSR in compiling maps of magnetic anomalies and the other, a new, less smoothed type which permits the compilation of only local magnetic anomalies of T and Z.

Several laboratory investigations were carried out to study the properties of materials under high pressures. A large amount of data was processed on earth tides in the USSR and certain other countries. The equation for the state of substances under pressures up to several

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millions of atmospheres was investigated theoretically, and the problem of the electric conductivity of the D layer of the earth at a depth of 1000 to 2900 km was considered.

Maps showing the strength of the geomagnetic field (T) of the entire earth (at scales of 1:10,000,000 and 1:50,000,000) were compiled for the first time in the USSR. New data used included observations made by the nonmagnetic schooner "Zarya," aeromagnetic surveys made in the United States on the "Magnet" project, by Canada, and by other countries. (Leningrad Division of the Institute of Terrestrial Magnetism, Ionosphere, and Propagation of Radio Waves, AS USSR). The absolute values of the electric field in the sea were measured for the first time.

Diminished magnetic activity in the middle latitudes of the western part of the USSR was established in connection with a decrease in solar activity (11-year cycle); an anomalous annual variation in magnetic disturbances was discovered with one maximum in July and a minimum in November (AS BSSR).

Studies were made of the correctness of a number of new propositions of the inverse problems of mathematical physics, in particular,

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certain inverse problems of electromagnetic and seismic fields. A number of uniqueness theorems in problems of determining the three-dimensional physical characteristics of the earth were proved on the basis of electromagnetic and seismic observation data. Some algorithms were formulated to numerically determine the magnetic susceptibility and propagation velocities of seismic waves to be used, particularly in determining large structures in contact zones.

A number of programs for solving dynamic problems in seismology and problems related to the study of potential fields were worked out and delivered to production organizations (Computing Center, Siberian Department, AS USSR).

Methods were developed for multidiscipline investigations on the surface and in boreholes to obtain detailed information on the structure of the medium and the nature of the wave field in it. These methods included ultrasonic logging, vertical seismic profiling, and registration of waves on the surface and in the medium to obtain reproducible records (Institute of Physics of the Earth, AS USSR).

Recommendations were given in regard to the use of the magneto-

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telluric sounding method in multidiscipline geological prospecting for oil in the Pripyat depression, and systematic experimental projects were conducted in the Rechitsa oil area (AS BSSR; Institute of Physics of the Earth, AS USSR). 2

Work was completed on an investigation and improvement of the three-day and 30-day schemes for harmonic analysis of earth tides. The accuracy of the new method is superior to any currently used either inside or outside the Soviet Union (Institute of Geophysics, AS USSR).

Development of Geophysical Apparatus

A new set of seismic apparatus with a magnetic memory has been built which ensures automatic registration of seismic phenomena on heat-sensitive or photographic paper with no intersecting lines on the record.

A simulator of the UTsS type for coding seismograms was developed and built in a special design bureau. This apparatus permits automating the input of data on seismograms into electronic digital computers (Insti-¹²

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tute of Physics of the Earth, AS USSR).

The accuracy of measuring absolute values of the vertical Z-component with a proton magnetometer under field conditions has been increased five-fold. These instruments, the first models of which will be manufactured in 1966, can be recommended for series production. Their introduction will permit studying minute geomagnetic phenomena (Institute of Terrestrial Magnetism, Ionosphere, and Propagation of Radio Waves, AS USSR). [FSB: v. 2, no. 7]

SUB CODE: 08 / SUBM DATE: none

Card 9/9 nst

1. 08197-69 EMT(m)/ENP(1) IJP(6) MM/PM
ACC NR: AP7001865 SOURCE CODE: UR/0030/66/000/003/0056/0060

AUTHOR: Sisakyan, N. M. (Academician; Chief Scientific Secretary of the Presidium; Deceased)
ORG: none

61
43
B

TITLE: Soviet achievements in structural chemistry, kinetics, reactivity, and catalysis during 1965. Paper presented at the annual meeting of the Academy of sciences USSR held in Moscow from 7 to 8 February 1966.

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 56-60

TOPIC TAGS: spin lattice relaxation, quantum chemistry, Mossbauer spectrum, nuclear magnetic resonance, photochemistry

ABSTRACT:

The year 1965 saw the appearance of a number of important papers in quantum chemistry. A rigorous, general spin-lattice relaxation theory was presented, and a number of EPR problems were examined from a unified point of view. An explanation was given for the independence of the spin-lattice relaxation time from the frequency of the transition phenomenon. The spin-lattice relaxation time was calculated for various free radicals in the solid state.

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It was demonstrated on the example of the benzene-free radical-carbanion that in certain cases the spin interaction of the unpaired electron with oscillations of the lattice depends substantially on the nature of the electron interaction of the carbanion with the lattice. A method was proposed to determine from the spin-lattice relaxation data the degree of delocalization of the unpaired electron in free radicals containing conjugated systems (Institute of Chemical Physics):

Important work was done on the theory of the electronic structure of molecules. A simple, approximate method was proposed for the calculation of energetic effects in molecules, which does not require that the initial and the final state of the system be known. The increased use of computers for molecular calculations should be noted; the extent of their application, however, is still insufficient.

The rates of excitation and deactivation of alkali metals in an inert gas atmosphere were calculated for a general case. The problem of excitation transfer in atomic resonance interaction was solved.

The Moessbauer spectra of a large number of iron and tin complexes of various types were studied. In a similar manner, the phenomenon of

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indirect induction of magnetic fields in the nuclei of nonmagnetic atoms was discovered (Institute of Chemical Physics). Manifestations of conjugation in saturated chains were detected (Institute of Organic Chemistry). 4

Valuable data concerning organic and heteroorganic compounds were obtained by NMR and nuclear quadrupole resonance methods. The geometric structure and the conformation of a number of molecules were analyzed.

There has been a noticeable shift toward the determination of rate constants of elemental reactions, that branch of kinetics which is of greatest interest to the chemical industry and the new technologies. EPR methods are applied to the determination of concentrations of labile intermediates of a number of reactions, as well as to the investigation of kinetics and mechanisms of reactions of atomic hydrogen with transition metal ions in the solid phase. The latter reactions can serve as models of many important reactions, including those of biological systems (Institute of Chemical Kinetics and Combustion). The enolization of acetone in aqueous acids served as the model for the study of the effect of solvation on the kinetics of heterolytic reactions (Tartu University).

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A great deal of work was motivated by the current awareness of the importance of complex formation, often involving the catalyst, to reactions taking place at room temperatures at appreciable rates and with relatively few side reaction byproducts.

The application of the Moëssbauer effect in conjunction with tagged atoms found wide use in kinetic and structural investigations. Electron exchange was thus demonstrated in solids at 78° K. Similarly, one of the alternate structures of ferricinium ferrichloride was confirmed.

Photochemical excitation was shown to decrease the affinity of naphthanene and anthracene molecules for electrophilic particles, such as protons, by some 10 to 30 orders of magnitude (Moscow State University). Analysis of NMR spectra and isotope exchange data showed that the heptamethylbenzenium ion is a molecular form in which a constant displacement of the seventh methyl group along the six carbon atoms of the benzene molecule takes place. It was proposed to control the stereospecificity of some reactions by changing the polarity of the medium, or by conducting the reactions in the presence of lithium halides (Institute of the Chemistry of Naturally Occurring Compounds).

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The feasibility of an intramolecular Diels-Alder reaction leading directly to the formation of aromatic compounds was demonstrated on the example of quaternary ammonium salts with two unsaturated radicals (Institute of Organic Chemistry). 4

Work bearing on the theory of catalysis was performed at the Institute of Physical Chemistry, the Institute of Catalysis, the Institute of Organic Chemistry, and the Physico-Chemical Research Institute. The cybernetic theory of complex catalytic processes, and the cybernetic functions of catalysts were successfully developed (Institute of Chemical Physics).

A series of efforts dealing with the scientific basis of catalysis has been completed. This laid the groundwork for designing optimized catalyst systems. Work on the preparation of a basic reference text *Kataliticheskiye svoystva veshchestv* [Catalytic Properties of Substances] is nearing completion (Institute of Physical Chemistry, AS UkrSSR).

An EPR spectrometer has been developed and made ready for small-series production; it operates at the temperature of liquid helium (SKB special design office) for scientific instrument building of the Institute of Organic Chemistry). The development of two new mass-spectrometers

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has been completed; one serves for the investigation of molecular structure and energetics, while the other is used for the study of thermodynamic properties of solids. Neither instrument has any counterpart in world production (SKB for analytical instrument building of the AS USSR and Leningrad State University). 3

A pH meter/automatic titrimeter was developed, which has an accuracy of 0.005 pH units (SKB of the Institute of Organic Chemistry AS USSR).

An instrument was produced for rapid oxygen analysis in titanium-aluminum alloys, carbides, nitrides, and other materials (Institute of Geochemistry and Analytical Chemistry AN SSSR).

A universal, automated laboratory distillation aggregate was designed and constructed with a fractionating capacity of up to 100 theoretical plates (SKB of the AS EstSSR):

These, and many other developments were reported by Academician Sisakyan. Some represented new trends, others were extensions and refinements of older work. [FSB: v. 2, no. 7]

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L 08148-67 EWT(m)/EWP(r)/EWP(j) IJP(c) WM/DJ/RM
ACC NR: AP7001867 SOURCE CODE: UR/0030/66/000/003/0061/0062

AUTHOR: Sisakyan, N. M. (Academician; Chief Scientific Secretary of the Presidium;
Deceased) 62
ORG: none 35
B

TITLE: [Soviet achievements with macromolecular compounds during 1965. Paper presented at the annual meeting of the Academy of Sciences USSR held in Moscow from 7 to 8 February 1966]

SOURCE: AN SSSR. Vestnik, no. 3, 1966, 61-62

TOPIC TAGS: conjugated polymer, polyaryl plastic, organic synthetic process, petrochemistry, polymerization

ABSTRACT:
At the institutes of Chemical Physics, and Petrochemical Synthesis (both of the AS USSR) and at the Physicochemical Scientific Research Institute new approaches were made to solving the problems of the formation of polymer chains of a definite structure. A large number of prospective heat-resistant substances with conjugated bond system or heteroatoms in the backbone were synthesized. New heat resistant polymers were synthesized based on an investigation of the relationship between the structure and the heat resistance; stabilization was studied of polymers at high temperature by the presence of polyconjugated systems in their structure.
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At the Institute of Macromolecular Compounds of the AS USSR a series of highly heat resistant (over 300°C) aromatic polyimides were prepared from anhydrides of aromatic tetracarboxylic acids and aromatic diamines; the polyimides have good electroinsulating and some other valuable properties. Modification of nitron fiber synthesis was proposed which imparts to the fiber a considerably improved thermal stability and susceptibility to dyes.

At the Institute of Heteroorganic Compounds further developments of polyarylates include new heat resistant fibers, castings and self-lubricating antifrictional materials, while heat-resistant polymers with heteroatoms, such as silicon, boron, etc., received further improvement.

At the Physicochemical Scientific Research Institute, new rigid chain polymers, heat-resistant polybenzoxazoles, were synthesized which are stable in air up to 400°C. Films and fibers are being prepared from these polymers.

Considerable achievements in the field of thermostable polymers were attained at institutes of local departments and branches of the AS USSR,

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U. S., at the Institute of Chemistry of the Urals Branch, and at the Institute of Chemical Kinetics and Combustion and the Novosibirsk Institute of Organic Chemistry, both of the Siberian Department of the AS USSR, and at several other scientific establishments of union and republic academies. 10

At Moscow State University and at the Institute of Petrochemical Synthesis of the AS USSR, theoretical research was devoted to a new trend of polymerization in complexes or in ordered state, which may be of great practical importance by expanding the selection of monomers and opening new possibilities for creating some bispolymer models. Synthesis of some silicon-containing polymeric hydrocarbons which have a combination of valuable chemical, mechanical and electric properties and which can be used as elastomers, and of some diene stereopolymers was also achieved at the Institute of Petrochemical Synthesis. [BN]

At the Institute of Organic Chemistry, AS USSR, rubbers have been synthesized which are based on vinyl butyl ether and its copolymers; the rubbers have good adhesion to metals and high cohesion.

At the Institute of Physical Chemistry, AS USSR, new water extendable

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ACC NR: AP7001867

Film-forming materials with high protective properties have been developed. 5

At the Institute of Petrochemical Processes, AS AzerSSR, a high-efficiency process has been developed for the oxidative dehydration of butylene to butadiene, and a continuous process for the separation of cyclopentadiene from pyrolysis products.

At Moscow State University, at the Physicochemical Scientific Research Institute, and at the Institute of High-Molecular-Weight Compounds, AS USSR, new achievements have been attained in development of the theory of the structure of amorphous polymers; development of direct study methods of solution structures provides a base for modification of properties of polymeric substances.

At the Physicochemical Scientific Research Institute, the mechanism was clarified of the action of artificial nuclei in structure formation; studies were made of the mechanism of polymerization processes, of polymerization under the effect of alkali metal compounds, of the influence of the metal, monomer, medium and temperature on the reaction mechanism.

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