TUPITSYN, I.F.; FRADKIN, G.M., nauchnyy red.; KOKOSOV, L.V., red.; VLASOVA, N.A., tekhn. red.

[Radioactive carbon C^{14}] Radioactivnyi uglorod - C^{14}. Moskva, Gos. izd-vo lit-ry v oblasti atomnoi nauki i tekhniki, 1961. 34 p. (MIRA 14:12)

(Carbon—Isotopes)

TUPITSYN, I.F.; FRADKIN, G.M., nauchnyy red.; KOKOSOV, L.V., red.; KORSHUNOVA, N.I., tekhn. red.

[Deuterium and tritium, heavy hydrogen isotopes] Tiazhelye izotopy vodoroda deiterii i tritii. Moskva, Gos. izd-vo lit-ry v oblasti atomnoi nauki i tekhniki, 1961. 36 p. (MIRA 14:11)
(Deuterium) (Tritium)

FRADKIN, G.M.; KULISH, Ye.Ye.; PCHELINTSEVA, G.M., red.; POPOVA, S.M., tekhn. red.

[Sourses of α, β, γ, and neutron radiation for the automation and control of industrial processes] Istochniki α-, β-, γ- i neitronnykh izluchenii dlia kontrolia i avtomatizatsii tekhnologicheskikh protsessov. Moskva, Gos.izd-vo lit-ry v oblasti atomnoi nauki i tekhniki, 1961. 86 p. (MIRA 15:1)
(Radicactive substances--Industrial applications)

S/194/62/000/001/028/066
D201/D305

AUTHORS: Fradkin, G. M. and Kulish, Ye. Ye.

TITLE: Sources of alpha-, beta-, gamma- and neutron-radiation for the control and automation of technological processes

PERIODICAL: Referativnyy zhurnal, Avtomatika i radioelektronika, no. 1, 1962, abstract 1-2-129 g (Radioakt. izotopy i yadern. izlucheniya v nar. kh-ve SSSR. T. I., M., Gostoptekhizdat, 1961, 95-109)

TEXT: The properties of artificial radioactive isotopes are considered, their characteristics given, ranges of applications shown and the classification of γ-, β- and neutron sources, as used in the USSR are given. 6 figures, 6 tables. /Abstracter's note: Complete translation./

Card 1/1

S/089/61/011/002/014/015
B102/B201

AUTHOR: Fradkin, G. M.

TITLE: Conference in Kiyev on the Use of Atomic Energy

PERIODICAL: Atomnaya energiya, v. 11, no. 2, 1961, 190-192

TEXT: The first respublikanskoye soveshchaniye po ispol'zovaniyu atomnoy energii (Republic Conference on the Use of Atomic Energy) took place in Kiyev in March, 1961. It was attended, among others, by delegates of the Gosudarstvennyy komitet Soveta ministrov SSSR po ispol'zovaniyu atomnoy energii (State Committee of the Council of Ministers USSR for the Use of Atomic Energy), the Gosudarstvennyy nauchno-tekhnicheskiy komitet (State Scientific and Technical Committee), and the Gosplan UkrSSR. Six lectures were delivered at plenary meetings, and 128 in the various sections. Lecturers were: Academician A. V. Palladin, President of the Ukrainskaya Akademiya nauk (Ukrainian Academy of Sciences) on the use of radioisotopes for studies in the field of biochemistry of nervous systems; Academician of the AS UkrSSR P. A. Vlasyuk, President of the Akademiya sel'sko-khozyaystvennykh nauk USSR (Academy of Agricultural Sciences UkrSSR) on the

Card 1/4

use of radioisotopes and nuclear radiations in agrophysiology; Academician of the AS UkrSSR I. P. Semenenko on age determination of ores from their radioactivity; Academician of the AS UkrSSR A. K. Val'ter on particle accelerators of medium energies (linear accelerators for protons of up to 100 Mev and for heavy ions of up to 20 Mev); M. V. Pasechnik, Corresponding Member of the AS UkrSSR on the structure of the atomic nucleus; P. S. Savitskiy on the present stage and the prospects of production and use of radioisotopes in national economy. Section for Nuclear Physics (28 lectures): The principal lectures were devoted to stripping reactions in the 12-14-Mev energy range, to elastic scatterings, and to the progress made in experimental technology. A. K. Val'ter, A. P. Klyucharov, M. V. Pasechnik, and others reported on studies conducted on the angular distribution of protons scattered by Zr and Ni isotopes as a function of their atomic weights M. V. Pasechnik, O. F. Nemets, et al. spoke on the interaction of neutrons and deuterons with nuclei. Section for Radiation Physics and Radiation Chemistry (20 lectures): Members of the Institut fiziki AN USSR (Institute of Physics of the AS UkrSSR) reported on gamma-induced conductivity of CdS and CdSe; A. P. Klyucharov and G. A. Blok et al. spoke on the strengthening of iron and steel surfaces by proton irradiation and on radioresistance

tests made on resins. Section for the Use of Isotopes in Science and Technology (25 lectures): Most of the lectures were devoted to the application of isotope methods in metallurgy and metal physics for the determination of optimum blast-furnace conditions, as well as to studies on diffusion. Ye. A. Markovskiy spoke on studies of the antifriction properties of cast iron. The heavy industry uses isotopes in the Khar'kov Factory imeni Malyshev, in the Yuzhnyy gornoobogatitel'nyy kombinat (Southern Ore Dressing Combine), as well as in the metallurgical plants of the Stalino administrative-economic rayon; isotopes are also used by thirty factories in the Stalino sovnarkhoz. Section for Automation: B. S. Kobyakov reported on a double-ray ash-meter developed by him for determining the ash content in coal; I. P. Polovchenko, V. N. Uzlyuk spoke on experience made in the application of isotopes in the metallurgical industry; O. I. Val'ter spoke on experience made in the application of isotopes under industrial conditions; G. M. Fradkin and Ye. Ye. Kulish on radiation sources for the control and automation of technological processes. Section for Radiation Biology (22 lectures): I. A. Medyanik, Ya. V. Oleynik et al. dealt with radiosensitivity and radioresistance of nervous systems; S. O. Grebinskiy et al. spoke on increasing the yield of various beet sorts by 1000-r dose irradiation (sugar beet:

30-48%); I. V. Gorbatyuk on determining the Pu^{239} content and uranium fission fragments in air and water. S. I. Pavlenko et al. spoke on the use of Au^{198} in the medical treatment of patients of the Hygienic Clinic of the Institut meditsinskoy radiologii (Institute of Medical Radiology). The proceedings of the conference will be published in 1961-1962.

SAVITSKIY, P.S., otv. red.; KULISH, Ye.Ye., red.; FRADKIN, G.M., red.; VORONOVA, A.I., red.; POPOVA, S.M., tekhn. red.

[Isotopes, radiation sources and radioactive materials; catalog]Izotopy istochniki izluchenii i radioaktivnye materialy; katalog. Izd.2., dop. Moskva, Gosatomizdat, 1962. 218 p. (MIRA 16:2)

1. Russia (1923- U.S.S.R.)Gosudarstvennyy komitet po ispol'zovaniyu atomnoy energii.

(Isotopes) (Radiation)

KAIPOV, R.L.; ZIV, D.M.; LEYPUNSKAYA, D.I.; SAVOSIN, S.I.; FEDOROV, V.V.; FRADKIN, G.M.; SHIMELEVICH, Yu.S.; BASIN, Ya.N.; KUKHARENKO, N.K.; SMESTAKOV, B.I.

Use of Ac - Be neutron sources in industrial geophysics. Atom energ. 16 no.3:269-270 Mr '64. (MIRA 17:3)

L 58939-65 EPA(s)-2/EWT(m)/EPF(n)-2/EWG(m)/T Pz-6/Pt-7/Pu-4 DS

ACCESSION NR: AP5014549 UR/0089/65/018/005/0545/0546

41
B

AUTHOR: Fradkin, G. M.; Kodyukov, V. M.; Ragozinskiy, A. I.

TITLE: "Beta-2" isotopic source of electric energy

19

SOURCE: Atomnaya energiya, v. 18, no. 5, 1965, 545-546

TOPIC TAGS: electric energy source, energy source, isotopic energy source, power supply

ABSTRACT: A new radioisotope thermoelectric generator, produced by the State Committee for the Use of Atomic Energy in the USSR, is briefly described. A photograph of the device is included. Called the "Beta-2," the 5—7-watt generator serves as a power source for unmanned weather stations in remote locations which relay data on temperature, wind velocity and direction, barometric pressure, precipitation, and sunshine over distances of up to 600 kilometers. A special conversion and storage system makes it possible to produce an output voltage of 32 v and to supply various instruments with 1000-watt pulses. The radiation dose 1 meter from the surface of the 150-kg generator is about 1 roentgen/hr. This can be reduced to 10 milliroentgen/hr when the device is transported in a supplementary container. Orig. art. has: 1 figure. [ZL]

Card 1/2

L 53979-65

ACCESSION NR: AP5014549

0

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: EE, NP

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4051

Card 2/2

L 11273-67 EWT(d)/EWT(m)/EWP(c)/EWP(k)/EWP(v)/EWP(l) IJP(c)
~~ACC NR~~ AP6031839 (N) SOURCE CODE: UR/0381/66/000/003/0009/0012

40

AUTHOR: Kodyukov, V. M.; Ostretsov, L. A.; Serebrennikov, I. Ya.; Fradkin, G. M.

ORG: None

TITLE: A spectrometric method of gamma-ray flaw detection

SOURCE: Defektoskopiya, no. 3, 1966, 9-12

TOPIC TAGS: flaw detection, gamma spectrometer, collimation, radioactive source

ABSTRACT: The authors point out one of the possible uses of applied nuclear spectrometry in flaw detection for the case where the hardest gamma quanta are used as the source of information. Electronic methods may be used in the proposed application to produce a narrow beam for the best resolution. It is shown that the use of differential spectrometric methods for recording gamma radiation is effective in raising the utilization factor with respect to the radiation source and thus eliminating the necessity for a double collimation system (i. e. collimation of both source and detector). Measurements indicate an increase in the utilization efficiency by a factor of more than 2 which means an increase in the quantity of information in comparison with methods using collimated beams for identical radioactivity of the source. Orig. art. has: 2 figures, 4 formulas.

SUB CODE: ~~20~~ 18 13/ SUBM DATE: 23Sept65/ ORIG REF: 005

Card 1/1 jb UDC: 620.179.152

ACC NR: AP6034102 (A) SOURCE CODE: UR/0089/66/021/004/0298/0300

AUTHOR: Andryushin, N. F.; Bulatov, B. P.; Fradkin, G. M.

ORG: none

TITLE: Certain characteristics of the field of back-scattered gamma radiation inside working spaces

SOURCE: Atomnaya enegiya, v. 21, no. 4, 1966, 298-300

TOPIC TAGS: gamma radiation, gamma scattering, radiation dosimetry, radiation hazard, model test

ABSTRACT: The authors have verified results obtained by model tests on the doses of scattered γ radiation in rooms and their distribution, and checked them in a real chamber intended for work with powerful γ radiation, with a wall thickness of 100 cm and dimensions 440 x 320 x 260 cm. The source was Co^{60} with activity 1.9 μcurie and Cs^{137} with activity 14 μcurie. The detector was a gas-discharge STS-5 counter tube. The scattered γ radiation was measured against the background of the primary radiation by using lead foils as filters. A table of the γ ray energy accumulation factors for different scattering substances (water, concrete, aluminum, iron, lead) is presented. The results confirm the earlier results, obtained with the models, that the accumulation factors increase with increasing chamber dimensions and reach the limiting values, equal to the accumulation factors when reflected from flat barriers, at linear dimensions larger than 4 - 6 mean free paths of the primary radiation quanta in the wall

Card 1/2 UDC: 539.122: 539.121.72: 621.039.58

ACC NR: AP6034102

material. The accumulation factor is defined as the ratio of the γ radiation flux densities measured with and without the scatter. Orig. art. has: 4 figures, 3 formulas, and 1 table.

SUB CODE: 18/ SUBM DATE: 11Apr66/ ORIG REF: 005/ OTH REF: 003

Card 2/2

FRADKIN, G.S.

Extension of Permian deposits to the territory of the Vilyuysk syneclise. Nauch. soob IAFAN SSSR no.1:44-48 '58. (MIRA 17:1)

FRADKIN, G.S.

Middle and upper Paleozoic sediments in the western Vilyuy Lowland.
Geol. i geofiz. no.8:11-22 '60. (MIRA 14:2)

1. Yakutskiy filial Sibirskogo otdeleniya AN SSSR.
(Vilyuy Lowland—Petroleum geology)

MENYAYLOV, A.A., doktor geol.-mineral.nauk; ANODIN, T.I.; FRADKIN, G.S.

Relationship between basalts and sedimentary rocks in the Appaya Basin (Yakutia). Nauch.soob.IAFAN SSSR no.4:3-11 '60. (MIRA 14:12)
(Appaya Valley--Basalt)
(Rocks, Sedimentary)

FRADKIN, G.S.

Devonian halogenous formations in the Siberian Platform. Geol. i geofiz. no.11:3-15 '64. (MIRA 18:4)

1. Yakutskiy filial Sibirskogo otdeleniya AN SSSR.

FRADKIN, G.E.

The role of the aggregate condition of the intercellular substances in the permeability of the tissues and capillaries. G. E. Fradkin. *Otkrytii po Sosudistoi Pronitsaemosti* (Moscow: Medgiz) 1955, 27-40(1956); *Referat. Zhur., Khim., Biol. Khim.* 1957, No. 5240.—The expts were performed in vivo with rabbits. Trypan blue was injected into the skin of rabbits and the rate of permeability through the intercellular amorphous substances was judged by the extent of the dye distribution as shown by the size of the [illegible] skin zone. Results showed that [illegible] lowered the viscosity of colloids in vitro [illegible] The use of these substances in season with [illegible] treatments is recommended for the increase in the tissue permeability to the drug penetration. [illegible]

USSR/Human and Animal Physiology. The Effect of Physical Factors T-14

Abs Jour : Ref Zhur - Biol., No 14, 1958, No 65832

Author : Fradkin G.Ye.
Inst : -
Title : The Problem of the Mechanisms of the Processes of Accumulation Within the Organism and Elimination from it of Radioactive Isotopes of the Alkaline-Earth, Rare-earth and Heavy Elements

Orig Pub : Med. radiologiya, 1957, 2, No 2, 13-18

Abstract : The isotopes of Th and Po, the slats of which have quite a pronounced tendency toward hydrolysis with the formation of colloid hydroxides, are retained in the organism as a result of phagocytosis. The isotopes of the alkaline-earth (Sr,Ba), rare-earth (Y, Ce, etc.) and heavy (Pu) elements are accumulated in the bones as a result of the breakdown in bone tissue of complex compounds of these elements with hydroxy and aminoacids. For the same reason, Y, Ce and Pu may be partially retained in the liver. Thechemical interaction of the radioelements with proteins and anionic residues is possible

Card : 1/2

USSR/Human and Animal Physiology. The Effect of Physical Factors T-14

Abs Jour : Ref Zhur - Biol., No 14, 1958, No 65832

in the presence of radioactive cations in the free state. If these elements enter into the composition of stable complex compounds which dissociate only slightly , then they lose this capacity. The complex compounds of these elements can undergo destruction in the organism, primarily in the bones and liver.--E.B. Glikson

Card : 2/2

ROMANTSEV, Yevgeniy Fedorovich,; SAVICH, Aleksey Vladimirovich,; FRADKIN, G.Ye., red.; BOGACHEVA, Z.I., tekhn. red.

[Chemical protection from the action of ionizing radiation] Khimicheskaia zashchita ot deistviia ioniziruiushchei radiatsii. Moskva, Gos. izd-vo med. lit-ry, 1958. 142 p. (MIRA 11:12)
(RADIATION PROTECTION)

21(3) PHASE I BOOK EXPLOITATION SOV/1210

Balabukha, Vera Sergeyevna and Fradkin, Gerts Yefimovich

Nakopleniye radioaktivnykh elementov v organizme i ikh vyvedeniye (Accumulation of Radioactive Elements in the Body and Their Excretion) Moscow, Medgiz, 1958. 182 p. 7,500 copies printed.

Ed.: Zakutinskiy, D.I.; Tech. Ed.: Bul'dyayev, N. A.

PURPOSE: This book is intended for biologists, doctors and scientists interested in problems of radiobiology.

COVERAGE: This book is divided into two parts. The first part (by G. Ye. Fradkin) reviews general rules governing the specific nature of the exchange of radioactive isotopes of alkaline-earths, rare earths and heavy elements. The second part (by V.S. Balabukha) gives detailed information and evaluations of data concerning the behavior of different types of osteotropic radioactive isotopes in the body. The authors do not offer an exhaustive treatment of problems related to radioactive isotopes in the body because a number of questions thus far have not received sufficient experimental substantiation.

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TABLE OF CONTENTS:

PART II.

Accumulation of Radioactive Elements (Cont.) SOV/1210

AVAILABLE: Library of Congress

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TM/gmp
4-20-59

TIMAKOV, V.D., prof.; GOL'DFARB, D.M., doktor med.nauk; FRADKIN, G.Ye., kand. med.nauk

Some aspects of the utilization of the bacteriophage for radiobiological research. Vest.AMN SSSR 14 no.8:61-67 '59. (MIRA 12:11)

1. Institut epidemiologii i mikrobiologii imeni Gamalei.
2. Deystvitel'nyy chlen AMN SSSR (for Timakov).
(BACTERIOPHAGE)
(RADIOLOGY)

"Khimicheskaya Zashchita Organizma ot Ionizirovashchikh Izlucheniy (Chemical Protection of the Organism From Ionizing Radiation)," edited by V. S. Balabukha; Moscow, Atomizdat, 1960, pp 1-151

The volume consists of a table of contents (attached), an introduction in which the author outlines the purpose of the book, and two sections. The first section deals with the problem of the chemical protection of the organism from penetrating radiation. A brief analysis is given of the contemporary state of the problem, data obtained in experiments are cited, and the theories of the mechanism of the protective action of some chemicals (aminothiols and pyrimidine derivatives) are examined.

The second section deals with the problem of the elimination of radioactive isotopes from the organism. The effectiveness of certain chemicals which, when introduced into the organism, have the capacity to form with the isotopes stable compounds which would be readily eliminated from the organism is examined.

FRADKIN, G. Ye., GOLDFARB, D. M. and VINETSKIY, Yu. P.

"Effects of Ionizing Radiation on Bacterial Viruses and on the Ability of Bacteria to Reproduce Phage"

paper presented at the Symposium on Biological Effects of Ionizing Radiation at the Molecular Level (IAEA), 2-6 July 1962, Brno, Czech.

FRADKIN, G.Ye.; GOL'DFARB, D.M.; IL'YASHENKO, B.N.; AVDEYEVA, A.V.; VINETSKIY, Yu.P.

Mechanism of radiation injury of the bacteriophage under the indirect action of ionizing radiation. Med. rad. 5 no.12:36-42 '60. (MIRA 14:3)

(BACTERIOPHAGE) (ESCHERICHIA COLI)

FRADKIN, G.Ye.

On various trends in the search for protective compounds with the aid of model experiments. Med.rad. 5 no.10:47-51 '60. (MIRA 14:2)

(RADIATION PROTECTION)

S/020/60/132/05/64/069
B011/B002

AUTHORS: Fradkin, G. Ye., Vinetskiy, Yu. P.

TITLE: The Nature of Damage of a T_4 Bacteriophage Inactivated by Gamma Radiation

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 5, pp. 1204-1205

TEXT: The authors wanted to investigate the action of ionizing radiation on the morphology of bacteriophage and on that of its various elements (protein membrane and inner DNA spiral). The suspensions of a T_4 phage were irradiated with γ-rays (doses 25000, 50000, and 100000 r, source Co^{60}, dose 400 r/min) in the synthetic Adams medium (titer 10^{10} particles per ml). It was found that irradiated virus particles are inactivated and lose their reproducing function. Inactivation is quickest at 100000 r. No more than 1-2 conserve their reproducing function out of 10000 particles. Fig. 1 shows electron-microscopic preparations of the phage. The virus particles were fixed in osmium tetraoxide vapors, sprinkled with palladium

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and gold under an angle of 15-18°, and examined by the electron microscope of the type УЭМ-100 (UEM-100). The number of morphologically perfect particles was the same both in irradiated and non-irradiated preparations. It follows therefrom that the inactivation of bacterial viruses caused by radiation is not accompanied by morphological disintegration. On the strength of these data the authors believe that the disturbance of the reproducing function of irradiated phages is caused by radiation damage of the high-polymer components of the virus particles, with the morphological integrity remaining unaffected. Moreover, the authors extracted the DNA-containing threads from the phage heads by means of temperature shock (Fig. 2). The authors found no differences in the structure of DNA threads on comparing the latter in irradiated and non-irradiated phages. In these experiments, they froze out suspension droplets (about 40 μ in diameter) down to -196°C, and thereupon sublimated them in vacuum on electron-microscopic preparations. On the strength of their results the authors reach the conclusion that the genetic material of the virus particle is not endangered by irradiation. Consequently, functional perfection of phage corpuscles is guaranteed by

The Nature of Damage of a T_4 Bacteriophage Inactivated by Gamma Radiation

S/020/60/132/05/64/069
B011/B002

the injury of individual high-polymer components of the particles in the molecular range. The authors mention papers by A. Ye. Kriss, V. I. Biryuzova, and M. A. Zolkover (Ref. 1). There are 2 figures and 7 references: 3 Soviet, 1 Swiss, 1 Czechoslovakian, and 2 American.

PRESENTED: February 12, 1960, by I. L. Knunyants, Academician

SUBMITTED: February 5, 1960

Card 3/3

VINETSKIY, Yu.P.; FRADKIN, G.Ye.

Action of gamma radiation on the structure of resting particles of a bacteriophage. TSitologiia 3 no. 2:176-182 Mr-Ap '61.
(MIRA 14:4)

1. Akademiya meditsinskikh nauk SSSR, Moskva.
(GAMMA RAYS--PHYSIOLOGICAL EFFECT) (BACTERIOPHAGE)

FRADKIN, G.Ye.

Reproduction of phage in irradiated nonviable (incapable of division) cells. Dokl. AN SSSR 137 no. 1:196-198 Mr-Ap '61. (MIRA 14:2)

1. Predstavlono akademikom I.I. Knunyantsem.
(Bacteriophage) (Gamma Rays--Physiological effect)

EWT(m)/BDS/ES(b)--AFFTC/ASD--RM/K
L 10778-63
ACCESSION NR: AP3003936 S/0205/63/003/004/0582/0586 59 58

AUTHOR: Skavronskaya, A. G.; Fradkin, G. Ye.; Borisova, N. B.; Zamchuk, L. A.; Gol'dina, L. P.

TITLE: Influence of the intensity of synthesis of nucleic acids and albumin on the lethal and mutagenic effects of gamma radiation 19

SOURCE: Radiobiologiya, v. 3, no. 4, 1963, 582-586

TOPIC TAGS: gamma radiation, nucleic acid, albumin, mutagenesis, synthetic process intensity, radiation, DNA, RNA

ABSTRACT: The influence of the intensity of synthesis of nucleic acids and albumin on the lethal and mutagenic effects of gamma radiation was examined by reproducing the process of mutability and varying the intensity of the synthetic processes. In this way the role of individual cell components in determining and changing the hereditary traits of microorganisms was examined. Experiments were conducted with *E. coli* B cultures in a glucose salt "minimal" medium, using a Co^{60} gamma-ray source. Levomycetin was used to vary the intensity of the synthetic processes in the cell. It was found that the lethal and mutagenic

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L 10778-63
ACCESSION NR: AP3003936

effects of radiation increase under the action of gamma rays against a background of an almost complete block of albumin synthesis and of retarded nucleic acid synthesis. Irradiation of the culture under conditions of retarded albumin synthesis and negligibly stimulated DNA and RNA synthesis leads to some lessening of these effects. The presence of a correlative relationship between the intensity of DNA and RNA synthesis, on the one hand, and mutagenic and lethal action of gamma irradiation, on the other, confirms the genetic role of nucleic acids and attests to the dynamic character of the functioning of the cellular genetic structures. Orig. art. has: 1 figure and 2 tables.

ASSOCIATION: Institut epidemiologii i mikrobiologii im. akad. N. F. Gamaleya AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, AMN SSSR)

SUBMITTED: 17Jul62 DATE ACQ: 15Aug63 ENCL: 00

SUB CODE: AM NO REF SOV: 001 OTHER: 005

Card 2/2

SKAVRONSKAYA, A.G.; FRADKIN, G.Ye.; BORISOVA, N.B.; ZAMCHUK, L.A.

Effect of gamma irradiation on the auxotrophic mutants of Escherichia coli under the conditions of changing synthetic activity. Radiobiologiia 3 no. 6:858-865 '63. (MIRA 17:7)

1. Institut epidemiologii i mikrobiologii imeni akademika N.F.Gamaleĭ, Moskva.

ACCESSION NR: AP4022727 S/0020/64/155/002/0457/0460

AUTHOR: Fradkin, G. Ye.

TITLE: On the stability of functionally non-homogenous parts of DNA (deoxyribonucleic acid) to ionizing radiation

SOURCE: AN SSSR. Doklady*, v. 155, no. 2, 1964, 457-460

TOPIC TAGS: deoxyribonucleic acid code, DNA structural code, DNA regulatory code, DNA irradiation, DNA stability, phage lambda, phage mutation, phage lysogenicity, target theory, lethal radiation

ABSTRACT: Starting from the cybernetic concept of stability of a non-homogenous system in which some parts may be unstable while the system as a whole is stable, the author discusses the stability of the genetic code including excess of information affording increased probability of its transmission, invariant character and the possibility of some variability in protein structure without loss of functional activity (thus of some distortion in the structural code) which points towards bond elasticity between code and protein. In contrast to the mechanism of retention and realization of structural information, the parts of the regu-

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ACCESSION NR: AP4022727

latory mechanism are connected by solid bonds (coherent dependence) which do not permit changeability. Its limit is determined by the single value of the repressor (blocking) function of structural information. It is logical to assume that the code determining the repressor synthesis should differ from the structural code determining synthesis of specific proteins by the absence of excessive information (degeneration). Such may be the reason for less functional stability of the genome's regulatory mechanism. This hypothesis was tested by studying the radiation sensitivity of the structural and regulatory mechanism of DNA of the attenuated phage λ. Its stability was determined by the appearance of virulent mutants, caused by radiation injury to the regulatory mechanism which determines blocking of the structural cystrons. These mutants are incapable of lysogenicity, and thus are easily differentiated from attenuated ones in a lysogenic culture of E. coli K-12 (λ), since, in contrast to the latter, they can multiply in such a medium. This was determined after irradiation of the attenuated phage by a cobalt source (400 roentgen/minute) for 1 1/2 and 3 hours, using as indicator the natural logarithm of the ratio of virus particles before and after irradiation. The appearance of mutants was found to depend directly upon the radiation dose.

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ACCESSION NR: AP4022727

The specific results are graphed. The importance of this finding for the target theory is discussed, the lethal effect of radiation depends on the coding character in the non-homogenous parts of the DNA macromolecule rather than the size of the target. The assumption of varying stability of these parts affords a basis for evaluating mutation probabilities. Orig. art. has 1 figure.

ASSOCIATION: Institut biofiziki Ministerstva zdravookhraneniya SSSR (Institute of Biophysics, Ministry of Health SSSR)

SUBMITTED: 03Sep63 DATE ACQ: 08Apr64 ENCL: 00

SUB CODE: NS,BC NO. REF. SOV: 002 OTHER: 008

Card 3/3

FRADKIN, G.Ye.

Some results of the use of free phage and a phage-bacterium system for analyzing the mechanism of the primary biological effect of ionizing radiation. Izv. AN SSSR Ser. Biol. 30 no.1: 44-52 Ja-F '65. (MIRA 18:2)

1. Institut biologicheskoy fiziki Ministerstva zdravookhraneniya, Moskva.

L 23539-66 EWT(1)/EWT(m)/T JK

ACC NR: AP6013986 SOURCE CODE: UR/0216/65/000/001/0044/0052

AUTHOR: Fradkin, G. Ye. — Fradkin, G.E.

ORG: Institute of Biophysics, Ministry of Public Health, Moscow (Institut biologicheskoy fiziki Ministerstva zdravookhraneniya)

TITLE: Some results of use of the free phage and the phage-bacterium system in analyzing the mechanism of the primary biological effect of ionizing radiation

SOURCE: AN SSSR. Izvestiya. Seriya biologicheskaya, no. 1, 1965, 44-52

TOPIC TAGS: ionizing radiation, radiation biologic effect, DNA, gamma ray, bacteriophage, biologic metabolism

ABSTRACT: The functional organization of the genome of the phage lambda reflects very clearly the structure of the cell DNA of any living organism; therefore, the DNA of this phage can serve as a convenient model for the experimental analysis of the resistance to ionizing radiation of functionally noninhomogeneous parts of the genetic code: the programming structure and the controlling structure. This experimental investigation of the temperate phage lambda and of the phage-E coli K-12 lambda system, on their indirect exposure to gamma-rays showed that, as the radiation dose increases, the rate of the conversion of the temperate phages to virulent mutants also increases. The controlling structure of the phage RNA is more radio sensitive than the

Card 1/2 UDC: 612.014.48: 576.8

L 23539-66

ACC NR: AP6013986

programming structure. The high radiation susceptibility of the controlling structure of the DNA of the temperate phage is due to the absence of the code expression determining the structure of the blocking agent. It follows that the mechanisms regulating the processes of cell metabolism may be easily disturbed by the primary injury, induced by indirect radiation, of the part of the DNA macromolecule containing the controlling structure. Orig. art. has: 2 figures. [JPRS]

SUB CODE: 06 / SUBM DATE: 21Nov62 / ORIG REF: 011 / OTH REF: 003

Card 2/2

83998

S/004/60/000/007/003/003
A104/A029

10100 1512 only

AUTHORS: Gil'berg, L.; Fradkin, I. [redacted] 4

TITLE: The Design of KA-10 (KA-10)

PERIODICAL: Znaniye-Sila, 1960, 35 No. 7, p. 54

TEXT: In No. 4, 1959, of this periodical the article "Soviet Gyroplanes" was published. Many readers wrote to the editor asking for details on the design and operation of Ka-10, the smallest Soviet helicopter designed by Nikolay Il'ich Kamov. These requests are complied with in this article. Ka-10 is a single-seat coaxial helicopter with two carrying propellers which are placed above each other and rotate in opposite directions thus ensuring the stability of the plane. Their diameter is 6.13 m. The fuselage consists of thin-walled welded steel tubes and there is no plating, no covered cockpit and no stabilizer. There is a vertical bearing at the tail and the carrier column is attached to the fuselage. The propellers are driven by an AM-4Г (AI-4G) motorcycle engine of 55 hp at 4,500 rpm. Beneath the fuselage are two rubberized inflated balloons which ensure smooth landing on land and water. The helicopter can remain airborne for two hours, its flying range is 195 km and its maximum speed 116 km/h.

Card 1/2

83998

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A104/A029

The Design of KA-10 (KA-10)

One of the main features of its driving system is the automatic autogyro control designed by B.N. Yur'yev in 1911 (Photograph on Page 54). Figure 1 shows the propeller hub and, above, the vertical ascent of the helicopter, as well as the propeller at an angle to the vertical climb. The helicopter requires a minimum of landing space and during a flying exhibition in Tushino landed on the platform of a truck. There are 2 figures.

Card 2/2

FRADKIN, I.M.

Problem of xanthomatosis in children. Pediatriia 39 no.2:75-78 Mr-Ap '56. (MLRA 9:8)

1. Iz detskogo otdeleniya (zav. I.M.Fradkin) Zaporozhskoy oblastnoy bol'nitsy (glavnyy vrach M.I.Kosenkov)
(LIPOIDOSIS, in infant and child, xanthomatosis, case reports (Rus))

FRADKIN, I.M.

Leukemoid reactions of the eosinophilic type in children. Probl. gemat.i perel.krovi no.11:21-23 '62. (MIRA 15:11)

1. Iz detskogo otdeleniya (zav. I.M. Fradkin) Zaporozhskoy oblastnoy bol'nitsy (glavnyy vrach M.I. Kosenkov).
(EOSINOPHILES) (BLOOD—EXAMINATION)

BESKOV, B.A.; GERONIMUS, B.Ye.; DAVYDOV, V.N.; KREST'YANOV, M.Ye.; MARKVARDT, G.G.; MININ, G.A.; Prinimal uchastiye TAMAZOV, A.I.; VAYNBLAT, E.G., inzh., retsenzent; KRUGLYAKOV, F.Ye., inzh., retsenzent; KUCHMA, K.G., kand. tekhn.nauk, retsenzent; LOMAZOV, D.V., kand. tekhn. nauk, retsenzent; SLUTSKIY, Z.M., inzh., retsenzent; FRADKIN, I.S., inzh., retsenzent; YUSHKOV, P.K., inzh., retsenzent; PERTSOVSKIY, L.M., inzh., red.; USENKO, L.A., tekhn. red.

[Design of electric railroad power supply systems] Proektirovanie sistem energosnabzheniia elektricheskikh zheleznykh dorog. [By] B.A.Beskov i dr. Moskva, Transzheldorizdat, 1963. 470 p. (MIRA 17:2)

FLEYSHMAN, S.M., kand.tekhn.nauk; TSELIKOV, F.I., inzh.; FRADKIN, I.Z., inzh.

Protection of the road bed in the proximity of reservoirs. Put' i put.khoz. 4 no.3:12 Mr '60. (MIRA 13:5)
(Railroad engineering)

FRADKIN, I.Z.; SOLOPOV, I.I.

Protection of the roadbed against washouts. Put' i put.khoz. 4 no.9: 6-8 S '60. (MIRA 13:9)

1. Nachal'nik geofizicheskoy stantsii g.Novosibirsk (for Fradkin).
2. Starshiy gidrometeorolog geofizicheskoy stantsii g.Novosibirsk (for Solopov).

(Shore protection) (Railroads--Track)

FRADKIN, I.Z.; SOLOPOV, I.I., starshiy gidrometeorolog (g.Novosibirsk)

Snow guards with irregular slots. Put' i put.khoz. 4 no.10; 17-19 O '60. (MIRA 13:9)

1. Nachal'nik geofizicheskoy stantsii, g. Novosibirsk.
(Railroads--Snow protection and removal)

MISHATKIN, G.M.; FRADKIN, I.Z.

Line and station protection. Put' i put. khoz. 5 no.3:12-14 Mr '61. (MIRA 14:3)

1. Glavnyy inzhener sluzby puti, g. Novosibirsk, Tomskaya doroga (for Mishatkin). 2. Nachal'nik geofizicheskoy stantii, g. Novosibirsk (for Fradkin).
(Railroads—Snow protection and removal)

FRADKIN, I.Z.; SOLOPOV, I.I.

Time has come to create new types of tree belts. Put' i put.khoz. 7 no.8:43-44 '63. (MIRA 16:9)

1. Nachal'nik geofizicheskoy stantsii sluzhby puti Zapadno-Sibirskoy dorogi, Novosibirsk (for Fradkin). 2. Starshiy meteorolog geofizicheskoy stantsii, Novosibirsk (for Solopov).

SHLYK, A.A.; PRUDNIKOVA, I.V.; GAPONENKO, V.I.; FRADKIN, L.I.

Conditions for determining the specific radioactivity of chlorophyll in infinitely thin preparations. Dokl.AN BSSR 3 no.12:484-487 D '59. (MIRA 13:4)

1. Predstavleno akademikom AN BSSR T.N.Godnevym.
(Radioactivity--Measurement) (Chlorophyll)

SHLYK, A.A.; FRADKIN, L.I.

Isotope-kinetic analysis of the possibility of successive biosynthesis of chlorophylls a and b. Biofizika 6 no.4:424-435 '61. (MIRA 14:7)

1. Laboratoriya biofiziki i izotopov AN Belorusskoy SSR.
(CHLOROPHYLL)

SHLYK, A.A.; FRADKIN, L.I.

Rate of chlorophyll metabolism in green plants. Biofizika 7 no.3:281-291 '62. (MIRA 15:8)

1. Laboratoriya biofiziki i izotopov AN BSSR, Minsk.
(CHLOROPHYLL)

SHLYK, A.A.; FRADKIN, L.I.; VLASENOK, L.I.

Nature of the protochlorophyll phase of chlorophyll metabolism in a green plant. Vestsi AN BSSR. Ser. biial. nav. no.2:116-118 '64.
(MIRA 17:11)

3/269/63/000/003/007/036
A001/A101

AUTHORS: Ginzburg, V., Kurnosova, L., Razorenov, L., Fradkin, M.

TITLE: An orbital laboratory. Some outer space studies by means of satellites and rockets

PERIODICAL: Referativnyy zhurnal, Astronomiya, no. 3, 1963, 25, abstract 3.51.204 ("Aviatsiya i kosmonavtika", 1962, no. 6, 13 - 22)

TEXT: The authors present principal results of studying primary cosmic rays, obtained by means of satellites and rockets, and the tasks of further investigations. It has been established, by means of Cherenkov counters, that abundance of lithium, beryllium and boron in cosmic rays exceeds hundred-fold that expected; it follows thereof, that cosmic rays passed a layer of interstellar gas during their path in the solar system. The spectrum of all nuclei is independent of the ordinal number in Mendeleyev's table; the flux of nuclei with numbers greater than 30 is less than the flux of nuclei with numbers greater than 15 by a factor of at least 10,000. The second space rocket launched towards the Moon and the third space ship recorded a sharp increase of the number of nuclei

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An orbital laboratory. Some outer...

S/269/63/000/003/007/036
A001/A101

with atomic numbers 15 and higher. It is assumed that the nuclei recorded are of solar origin, which is confirmed by the analysis of data on other manifestations of solar activity during the same time. Earth's radiation belts were discovered. The lower part of the radiation belts attains an altitude of ~ 200 km, although the belts are clearly pronounced only at higher altitudes (600 - 1,000 km and higher). It was discovered that radiation belts have "spurs", the lower of which are related to magnetic anomalies. The tasks of further investigations are studying Earth's radiation belts, the proton component of galactic and solar cosmic rays, "high-latitude cut-off" in the spectrum of cosmic rays, and electronic component of galactic and solar cosmic rays.

T. Kasimenko

[Abstracter's note: Complete translation]

Card 2/2

FRADKIN, M.I.

7411

ON THE QUESTION OF ANTIPROTONS IN THE COSMIC RAY PRIMARY FLUX. M. I. Fradkin (Lebedev Physics Inst.). PH

Zhur. Eksp. i Teoret. Fiz. 29, 147-50(1950) Aug (In Russian)

FRADKIN, M. I.

USSR

537.591.1

4662. The electron component and the origin of [illegible] V. L. GINZBURG AND M. I. FRADKIN, [illegible]

[illegible]

The presence of electrons in the primary cosmic ray [illegible] discussed in relation to interstellar [illegible] and it is concluded that the cosmic-ray [illegible] [illegible] gauss it is shown that [illegible] energy greater than $5 \cdot 10^{9}$ ev are likely [illegible] present in the primary flux. [illegible]

FRADKIN, M. I.

AMBARTSUMYAN, V.A., akademik, redaktor; GINZBURG, V.L., redaktor; LEYKIN, G.A., kandidat fiziko-matematicheskikh nauk, redaktor; MASSEVICH, A.G., kandidat fiziko-matematicheskikh nauk, redaktor; TERLETSKIY, Ya.P., doktor fiziko-matematicheskikh nauk, redaktor; SHKLOVSKIY, I.S., doktor fiziko-matematicheskikh nauk, redaktor; FRADKIN, M.I., redaktor; ALEKSEYEVA, T.V., tekhnicheskiy redaktor.

[Transactions of the Third Conference on Problems of Cosmogony, May 14-15, 1953. Origin of cosmic rays] Trudy...soveshchaniia...14-15 maia 1953 g.; proishkhozhdenie kosmicheskikh luchei. Moskva, Izd-vo Akademii nauk SSSR, 1954. 319 p. (MIRA 8:4)

1. Chlen-korrespondent AN SSSR (for Ginzburg).
(Cosmic rays)

FRADKIN, M. I.

BR

USSR/Astronomy - Cosmic rays

Card : 1/1

Authors : Fradkin, M. I.

Title : Origin of cosmic rays

Periodical : Nauka i Zhizn', 6, 20 - 23, June 1954

Abstract : The scientific viewpoint on the origin of cosmic rays is presented. The works of various Soviet scientists studying cosmic rays, particles and their energies are cited. The possible induction mechanism for the acceleration of cosmic rays by stars whose magnetic axes are inclined at an angle toward the axes of rotation is analyzed. The lack of a definite theory which would describe all known facts regarding the origin of cosmic rays and could prove it by experiments is mentioned. Illustrations, drawings.

Institution : Acad. of Sc. USSR, The P. N. Lebedev Physics Institute

Submitted : ....

FRADKIN, M. I.

USSR/ Physics - Cosmic radiation

Card 1/1 : Pub. 118 - 1/9

Authors : Fradkin, M. I.

Title : The primary component of cosmic radiation

Periodical : Usp. fiz. nauk. 53/3, 305-380, July 1954

Abstract : The general properties of primary cosmic radiation are described. In contrast to the early concept about cosmic radiation as a flow of neutral γ-rays, it is now considered to be a flow of charged particles of very-high energy levels. Two types of flows are distinguished: 1. flow of protons, and 2. flow of photon-electrons. A quantitative analysis of experimental data obtained by the methods described, shows that about 90% of the particles of a certain energy level are protons and about 9% of the same energy level are particles of chemical elements (mostly He). As to the photon-electron particles, their number seldom exceeds 6%. One-hundred-eighty-four references (1900-1954). Tables; diagrams; graphs; illustrations.

Institution : ...

Submitted : ...

FRADKIN, M.I.

FRADKIN, M.I.

Protons and neutrons. Nauka i zhizn' 22 no.2:10-13 F '55. (MLRA 8:3)

1. Nauchnyy sotrudnik Fizicheskogo instituta im. P.N.Lebedeva Akademii nauk SSSR.
(Protons) (Neutrons)

Fradkin, M. I.

4001-Ent

7802

ON THE PROBLEM OF ANTI-PHOTONS IN THE PRIMARY STREAM OF COSMIC RAYS. M. I. Fradkin (P. N. Lebedev Inst. of Physics, U.S.S.R.). Soviet Phys. JETP 2, 37-41(1956) Jan. (In English). Zhur. Eksper. i Teoret. Fiz. 29, 47-50 (1955) Aug. (In Russian)

Analysis of data on the measurement of the east-west asymmetry of cosmic rays at high altitudes demonstrates that it is thoroughly impermissible to exclude the possibility of the presence of a certain proportion (up to 13%) of negatively charged particles in the primary flow. Computation shows that in the primary flow of cosmic rays, the proportion of anti-protons formed in interstellar space cannot exceed 0.2%, and apparently the presence of anti-protons cannot explain the results of measurement of east-west asymmetry. (auth)

ZHDANOV, G.B., redaktor; FRADKIN, M.I., redaktor; NAKHIMSON, I.G., redaktor; SHAPOVALOV, V.I., tekhnicheskiy redaktor.

[Primary cosmic radiation (composition, variation in intensity, and problems of its origin) a collection of articles. Translated from the English and German] Pervichnoe kosmicheskoe izluchenie; sostav, variatsii intensivnosti i problemy proiskhozhdeniia. Sbornik statei. Perevody s angliiskogo i nemetskogo. Pod red. G.B.Zhdanova i M.I. Fradkina. Moskva, Izd-vo inostrannoi lit-ry, 1956. 304 p. (MLRA 9:6)
(Cosmic rays)

GINZBURG, V.L., redaktor; LEVIKIN, G.A., kandidat fiz.-mat. nauk, redaktor; CHIKHACHEV, B.M., kandidat fiz.-mat. nauk, redaktor; SHKLOVSKIY, doktor fiz.-mat. nauk; FRADKIN, M.I., redaktor; MAKUNI, Ye. V., tekhnicheskiy redaktor.

[Proceedings of the Fifth Conference on Problems of Cosmogony; radioastronomy] Trudy piatogo soveshchaniia po voprosam kosmogonii; radioastronomiia, Moskva, 1956, Izd. Akademii nauk SSSR. 567 p. (MLRA 9:5)

1.Soveshchanye po voprosam kosmogonii. 5th, Moscow 1955.2.Chlen-korrespondent AN SSSR (for Ginzburg).
(Radio astronomy)

FRADKIN, M.I.

CARD 1 / 2 PA - 1665

SUBJECT USSR / PHYSICS
AUTHOR GINSBURG, V.L., FRADKIN, M.I.
TITLE On the Composition of Primary Cosmic Radiation.
PERIODICAL Žurn.eksp.i teor.fis, 31, fasc.3, 523-525 (1956)
Issued: 12 / 1956

This work investigates the problem of the chemical composition of primary cosmic radiation within the framework of the theory developed by V.I.GINZBURG (several works by whom are cited). The concentration $N_i(r,t)$ of the cosmic particles of the type i can be determined from the following system of equations:

$$\partial N_i/\partial t = \nabla (D_i \nabla N_i) - N_i/T_i + \sum_{j>i} P_{ij} N_j/T_j + q_i$$

Here $q_i(\vec{r},t)$ denotes the quantity of particles of the type i per volume unit, and time unit, which are emitted into the interstellar space by the sources of cosmic radiation (novae and supernovae), $D_i(\vec{r})$ - the diffusion coefficient of cosmic radiation in interstellar space, $T_i(\vec{r})$ the life of the particles of the type i up to their spallation on the occasion of collisions with the atomic nuclei of the interstellar medium (i.e. mainly with protons), P_{ij} - the quantity of particles of the type i created on the occasion of the spallation of a particle of the type j. In the case of nuclei collisions nearly in all cases will lead to the creation of nuclei of a different type, on which occasion the energy per nucleon is the same in the case of both primary and secondary nuclei. The above equation is suited for the investigation of protons of sufficiently high

Žurn.eksp.i teor.fis,31,fasc.3,523-525(1956) CARD 2 / 2 PA - 1665

energy but not of electrons.
In the case of an even distribution of the sources of cosmic radiation, diffusion is not essential and one finds $N_i = \sum p_{ij} N_j T_i/T_j + T_i q_j$;
$N_M/N_H = (T_M/T_H)(q_M/q_H + P_{MH}) = 3,2$; $q_M/q_H = 1,33$
$N_L/N_H = (T_L/T_H)[p_{LH} + p_{LM}(q_M/q_H + p_{MH})] = 1,8$; $N_L/N_M = 0,56$
Here $N_p, N_\alpha, N_L, N_M, N_H$ denote the concentrations of the protons, α - particles; of Li-,Be-,B-nuclei; of the nuclei of C,N,O,F, and the nuclei with $Z \geqslant 10$. Here $p_{LM}=p_{LH}=0,23$ and $p_{MH}=0,27$ as well as $q_L=0$ are assumed. At equilibrium it follows from these equations that $q_p/q_H = N_p T_H/N_H T_p \sim 30$. Thus it must be assumed that either the sources contain no hydrogen at all or that the acceleration of the protons is considerably below that of the particles. At N_L/N_M the above system of equations is in direct contradiction to experimental data. The solutions for N_H, N_M, and N_L are explicitly given for a punctiform source. In consideration of diffusion as well as of the character of the distribution of the sources of cosmic radiation the problem of the composition of cosmic radiation is solved within the framework of the theory investigated here. However, insufficient knowledge of various parameters (particularly of N_L/N_M) requires further investigations.

INSTITUTION: Physical Institute "P.N.LEBEDEV" of the Academy of Science in the USSR

FRADKIN, M. I.

USSR/Nuclear Physics C-7

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 11267

Author : Ginzburg, V.L., Fradkin, M.I.

Inst : Physics Institute, Academy of Sciences, USSR

Title : On the Composition of Primary Cosmic Rays.

Orig Pub : Actron. zh., 1956, 33, No 4, 579-587

Abstract : The authors consider the problem of the chemical composition of the primary rays at the earth. It is shown that if one takes into account the diffusion of cosmic particles in the interstellar matter, the available experimental data on the composition of cosmic rays can be reconciled with the concepts of the generation of these rays in the shells of supernova and nova stars.

Card 1/1

FRADKIN, M. I., Vernov, S. N., Ginzburg, V. L, Kurnosova, L. V., Razorionov, L. A.

"Study of the Primary Cosmic Radiation by Using Artificial Satellites of the Earth."

Paper prepared for the VIII International Astronautical Congress held in Barcelona, 6-12 October 1957.

Incl. No. 2, R-456-57, [redacted] Conf. File.

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FRADKIN, M.I.

Fifth conference on cosmogony. Vop. kosm. 5:245-278 '57.
(Cosmogony) (MLRA 10:8)

FRADKIN, M.I., kand.fiziko-matemat.nauk

Studying cosmic rays. Nauka i zhizn' [24] no.11:31-32 [N] '57. (MIRA 10:11)

(Artificial satellites) (Cosmic rays)

FRADKIN, M.I.

HIGH ENERGY PARTICLES. A. K. Dunaev and M. I. [illegible]

FRADKIN, M.I.

53-1a-9/18

AUTHOR VERNOV, S.N., GINZBURG, V.L., KURNOSOVA, L.V., RAZORENOV, L.A., FRADKIN, M.I.

TITLE The Investigation of the Composition of Primary Cosmic Radiation (Issledovaniye sostava pervichnogo kosmicheskogo izlucheniya. Russian)

PERIODICAL Uspekhi Fiz. Nauk, 1957, Vol 63, Nr 1a, pp 131 - Nr 1b, pp 148 (U.S.S.R.)

ABSTRACT According to the data available at present, cosmic radiation consists of protons, α-particles and, to a far less extent, of heavy nuclei. The distribution of the nuclei with $Z > 2$ has as yet not been investigated sufficiently well and also other problems are still to be solved. Rockets are not suited for such measurements because their time of flight outside the atmosphere is too short. By means of artificial earth satellites, however, the necessary statistical material for the investigation of rarely occurring heavy nuclei can be obtained. One of the most important problems concerns the numerical ratio between the currents of the light nuclei Li, Be, B and the nuclei C, N, O, F. By experimental determination of this ratio the various theories concerning the creation of cosmic radiation can be confirmed or rejected. If the particles of the cosmic radiation in the clouds of the supernovae are accelerated, a value $\geqslant 0{,}1$ is obtained for the ratio (Li, Be, B) / (C, N, O, F). In the case of this theory the ratio can also be somewhat higher, but never lower than 0,1. The data at present obtained for this ratio contradict each other. The problem whether or not nuclei with $Z > 30$ exist in cos-

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53-1a-9/18

The Investigation of the Composition of Primary Cosmic Radiation

mic radiation can also be solved by means of artificial earth satellites. The existence of such nuclei in cosmic radiation would, on account of its large interaction cross section and the short range in the interstellar space, indicate an exceptionally large amount of heavy elements existing in the sources of cosmic radiation.

The experimental data on the composition of primary radiation: The results of the experiments carried out in 1952 - 1953 have already been published in form of a collection of articles. The respective results obtained within the last years have been compiled in two tables. The importance of the geographical location of the place of observation in the case of equal geomagnetic latitude is pointed out. From the point of view of determining the energy spectrum of the various nuclear groups in primary cosmic radiation, with the help of artificial earth satellites afford great possibilities, because in this way the intensity of the fluxes of the particles with various energies (even at different widths) can be determined by means of the same devices. This, naturally, will considerably increase the reliability of the data obtained concerning the energy spectrum of the primary nuclei. One of the most interesting problems of primary cosmic radiation is the determination of

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The Investigation of the Composition of Primary Cosmic Radiation

the amount of the nuclei of the group Li, Be, B. 53-1a-9/18

The experimental method for the study of the charge spectrum of nuclei in primary cosmic radiation. Such methods are of advantage as do not discriminate the particles with respect to their charge and mass. The use of particle counters in the case of which, on the occasion of the passage of a particle, the produced pulse depends upon the charge of the particle, forms part of this method. The application of such devices to an artificial earth satellite is, besides, of advantage in-so-far as the measured data can be telegraphed to the earth. The disadvantages of methods which are based upon the ionization of a medium by rapidly charged particles, are enumerated. The CHEREKOV counter is free from such disadvantages. The conditions to be fulfilled when measuring by this method, are enumerated. The apparatus is disdussed on the basis of a drawing. During the time of observation of one week about 1000 nuclei with $Z \geqslant 6$ cm, 7000 α-particles and a corresponding number of Li-, Be- and B-nuclei can be registered. For the experiments it is intended to register the differential spectrum of the nuclei with respect to Z in the interval from the α-particle up to oxygen. Such a method is realizeable only if the device is able to solve every peak belonging to the various values of Z. The use of artificial satellites offers new possi-

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53-1a-9/18

The Investigation of the Composition of Primary Cosmic Radiation

bilities for the investigation of the primary cosmic radiation; viz. measuring of the primary proton flux, explaining of the part played by the "albedo" of the atmosphere of the earth, the determination of the lower limit of the electron-positron components, the study of the interaction of the primary particles with matter and the variations with respect to time of intensity. (With 7 illustrations and 4 tables).

ASSOCIATION Not given

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Card 4/4

KURNOSOVA, L.V.; RAZORENOV, D.A.; FRADKIN, M.I.

Heavy nuclei in the primary cosmic radiation. Isk.sput.Zem. no.2:70-74 '58. (MIRA 12:5)
(Artificial satellites)
(Cosmic rays)

FRADKIN, M.I.

SOV-26-58-8-1/51

AUTHORS: Ginzburg, V.L., Associate Member of the USSR Academy of Sciences; Fradkin, M.I., Candidate of Physico-Mathematical Sciences

TITLE: The Origin of Cosmic Rays (Proiskhozhdeniye kosmicheskikh luchey)

PERIODICAL: Priroda, 1958, 47 Nr 8, pp 3-12 (USSR)

ABSTRACT: Cosmic rays were discovered more than 40 years ago, but radio-astronomical data permitted conclusions on their origin only in 1950-1953. Primary cosmic rays have an energy of 10^9-10^{10} ev with a small percentage reaching 10^{15}-10^{18} ev. The primary rays collide with the molecules of the atmosphere and form the secondary rays which consist of mesons, electrons, and photons. The primary rays can be observed at altitudes of 20 - 30 km by means of balloons, at 100 km by rockets, and at higher altitudes by artificial satellites. The intensity of the rays depends on the geomagnetic latitude. This latitude effect indicates that the cosmic rays consist of charged particles. The distribution of the particles according to energies (the energy spectrum) shows that the higher the energy, the lower the number of particles (Figure 1). The principal part of the primary rays is made up of protons.

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Their intensity for particles with an energy higher than $1.4 \cdot 10^9$ ev is equal to 1 proton per cm^2/sec. In the primary cosmic rays are also heavier particles, like the nuclei of helium, carbon, oxygen, silicon, iron, etc. The relative composition of the primary rays is given in Table 1. Electrons, positrons, and photons, could not yet be detected in the primary rays. The place of origin of the cosmic radiation is investigated by means of radioastronomy. The radiation of the Galaxy in the radio wavelengths is a general radiation and radiation of single sources. These cosmic radic waves are due to the radiation of relativistic electrons which move in interstellar magnetic fields. In interstellar space, magnetic fields are present with 10^{-15}-10^{-6} oersted. Electrons which move with an energy of 10^8-10^9 ev in this field emit a radiation in the radio wave length. The power of the magnetic field changes with the activity of the sun spots. The emitted radiation decreases the energy of the electrons. The energy of the particles with high energy changes to a greater degree than that of particles with low energy. The Galaxy is surrounded by a "corona" which emits radic waves. This may be observed in the nebula M31 in the Andromeda constellation which is in many respects similar to our own Ga-

laxy. The radio waves are emitted by an area which is considerably greater than the visible area (Figure 3) and has the form of a spheroid, whereas the nebula is optically a flat disc. In our Galaxy, the area covered by cosmic rays has a radius of 50,000 light years. The space is filled by interstellar gas with a concentration of 0.01 - 0.03 particles per cm^3. In some "clouds" it reaches a concentration of 10 particles per cm^3. In collisions with the gas, the protons lose energy and form mesons. The fission of heavy nuclei leads to the formation of Li, Be, and B nuclei, the concentration of which near the earth's surface supplies information on the number of collisions at higher altitudes. The high energy of the cosmic particles is explained by the statistic mechanism. If heavy particles with high speed collide with light particles, the latter are accelerated by a transition of the energy from the heavy particles to the light ones. The single radio sources in the universe could be identified by galaxies or accumulations of galaxies. The radiations of these sources are caused by relativistic charged particles moving in the magnetic fields of the nebulae. The nebulae are the residues of super-novae. The energy of the electrons in their magnetic fields is 10^{45}-10^{48} erg. Every 30 years, a

super-nova arises in the Galaxy. The power of the electrons generated then reaches 10^{36}-10^{39} erg/sec. The energy lost by the electrons for the emission of radiowaves is 10^{38} erg/sec. It can be seen that the energy for radio emission is supplied by the super-nova. It is shown that the super-nova is also the source of protons and nuclei in the cosmic rays. The novae, one hundred of which arise every year, must also be considered as a source for cosmic rays. The novae and super-novae are accumulated principally near the center of the Galaxy. The cosmic rays are scattered by the chaotically distributed magnetic fields, so that they reach the earth from all sides. It is possible that a part of the cosmic rays, especially with an energy of more than 10^{15} ev, is of metagalactic origin.
There are 2 graphs, 2 tables, 1 photo and 1 Soviet reference.

1. Cosmic rays--Sources 2. Cosmic rays--Analysis 3. Cosmic rays --Properties 4. Radio astronomy--Applications

KURNOSOVA, L.V.; LOGACHEV, V.I.; RAZORENOV, L.A.; FRADKIN, M.I.

Studying cosmic rays during the flight of the second cosmic rocket to the moon. Isk.sputn.Zem. no.5:30-37 '60. (MIRA 13:5)

(Cosmic rays) (Lunar probes)

KURNOSOVA, L.V.; LOGACHEV, V.I.; RASORENOV, L.K.; and FRADKIN, M.I.

"Cosmic Ray Investigation by the Second Cosmic Rocket Landed on the Moon." report presented at the First International Space Science Symposium, Nice, France, Jan 1960. Academy of Sciences, Moscow, USSR.

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AUTHORS: Kurnosova, L.V., Razorenov, L.A., and Fradkin, M.I.

TITLE: Short-period increases associated with solar activity in the intensity of the nuclear component of cosmic rays

PERIODICAL: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli. No. 6, Moscow, 1961. pp. 132-138

TEXT: The nuclear component of cosmic rays was investigated with an apparatus set up on the second Soviet space rocket. This apparatus was described by the present authors and V.I.Logachev in Ref.1 (same journal, No.5, izd-vo AN SSSR, 1960, p.30) and consisted of two independent Cherenkov counters which recorded nuclei moving with relativistic velocities. During the flight of the rocket the number of recorded nuclei with $Z \geqslant 15$, 5 and 2 was 100, 3000 and approximately 30 000 respectively. The counting rates, averaged over long periods of time, were found to be practically constant after the rocket left the outer radiation belt. However, sudden departures of the counting rate from the average value were noted over short time intervals. The most

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Short-period increases associated with...

pronounced of these cases of sudden increase in the intensity of the nuclear component was recorded on September 12 at 11 h 27 min UT. In this case the counting rate of both detectors showed an increase which continued for approximately 17 min. This case is illustrated in Fig.1 which shows the intensities of the various groups of nuclei as functions of time. The first three graphs show the intensity of nuclei with $Z \geqslant 2$, 5 and 15 respectively (the intensity is plotted in particle/min along the vertical axis and the time along the horizontal axis). The fourth figure shows a graphical representation of chromospheric flares. They are represented by triangles whose bases correspond to the interval between the beginning and the end of the flare and whose apexes indicate the position of the maximum brightness of the flare. The fifth graph shows the average intensity of the solar radio emission on 810 Mc/s and the last graph shows the solar radio emission on 208 Mc/s (the intensity is plotted in $wm^{-2}cps^{-1} \times 10^{22}$). Other similar changes in the intensity of the nuclear component were also recorded, for example, on September 12 at 12 h 57 min and at 15 h 23 min on the same day. Statistical analysis of these results leads the present authors to conclude that these rapid increases

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in the intensity of the nuclear component are real and appear to be associated with solar activity. A somewhat similar effect has been reported by H.R. Anderson (Ref.5: Phys. Rev., V.116, 461, 1959), who noted short-period increases in the total intensity of cosmic rays. The variations in the nuclear component are characterized by the fact that the most clearly defined changes occur in the intensity of the heavy nuclei. The present authors suggest that it may be that there is some mechanism on the sun whereby nuclei are accelerated to energies in excess of 1.5×10^9 ev/nucleon and, apparently, the heavier nuclei are preferentially accelerated. The accelerated nuclei leave the sun and move in space in compact groups. However, in order to establish this, further satellite and space rocket experiments are necessary. Acknowledgments are made to Professor V.L. Ginzburg who directed this work, Professor N.A. Dobrotin and Professor G.T. Zatsepin for discussing the results obtained, and E.I. Mogilevskiy for supplying radio data.
There are 3 figures and 8 references: 6 Soviet and 2 English.
The English language references read as follows:
Ref.5: as quoted above.
Ref.6: P. Meyer, Phys. Rev., V.115, 1734, 1959.
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FRADKIN, M. I., GINZBURG, V. L., KURNOSOVA, L. V., [illegible]

"The results of measurements of nuclear component of cosmic rays of solar origin with Sputniks and Lunniks."

report to be submitted for the IAU Symposium on the Corona, Cloudcroft, New Mexico, 28-30 Aug 1961.

PHASE I BOOK EXPLOITATION SOV/4282

Akademiya nauk SSSR

Iskusstvennyye sputniki zemli, vyp. 5 (Artificial Earth Satellites, No. 5) Moscow, Izd-vo AN SSSR, 73 p. Errata slip inserted. 7,000 copies printed.

Resp. Ed.: L. V. Zhurnosova; Ed. of Publishing House: M. I. Fradkin; Tech. Ed.: G. M. Gus'kova.

PURPOSE: The booklet is intended for scientists and engineering and scientific personnel working in the field of space travel and satellite flight.

COVERAGE: The collection of 10 articles deals with problems of satellite orbits, magnetic measurements, radiation, the visibility of space vehicles, the upper atmosphere, and meteoric substances. No personalities are mentioned. References accompany some of the articles.

AVAILABLE: Library of Congress

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9,9100 (also 1046, 1060)
3,1800 (1041, 1062, 1178)

AUTHORS: Kurnosova, L.V., Razorenov, L.A., and Fradkin, M.I., Candidates of Physics and Mathematics

TITLE: The Sun's Cosmic Radiation

PERIODICAL: Priroda, 1961, No. 1, pp. 94-96

TEXT: The article lists some results of studies of the sun's primary radiation. On 12 September 1959 the Cerenkov counters on board the second Soviet space rocket recorded an 11.8-fold increase in the number of atomic nuclei with an atomic number $Z \geqslant 15$. The increase lasted for 17 minutes, after which the counters registered a normal radiation intensity. At the same time the incidence of nuclei with $Z \geqslant 2$ and $Z \geqslant 5$ increased by approximately only 1.3 and 1.5-fold respectively. Analysis showed that the rise in $Z \geqslant 5$ nuclei was due almost entirely to the increase in nuclei with $Z \geqslant 15$. The probability that this phenomenon was a statistical fluctuation is in the order of 1:100,000. At the same time ground stations on earth recorded radio-frequency emission flares. The Krakovskaya observatoriya (Krakov Observatory) noted a brief flare at 810 Megacycles lasting for 0.3

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The Sun's Cosmic Radiation

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minute. The probability that the two phenomena are coincidental is less than one percent. On the same day at 1137 hr. the observatory of the Institut zemnogo magnetizma (Institute of Geomagnetism) near Moscow noted a solar radio flare at 208 Megacycles and an intensity of $170 \cdot 10^{-22}$ watt meter^{-2} · cycle^{-1}, compared to an average intensity in this band from 9-12 hr. of $15 \cdot 10^{-22}$. Two further instances of increased nuclear activity ($Z \geqslant 15$) were recorded on the same day at 1257 and 1523 hr. Indications are that on the sun there occur processes whereby nuclei are accelerated to energies exceeding $1.5 \cdot 10^9$ ev/nucleon; such processes favor heavy nuclei. Upon leaving the sun the accelerated nuclei flow as compact groups in space. There are 5 graphs and 1 photo.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva AN SSSR (Physical Institute im. P.N. Lebedev, AS USSR), Moscow

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AUTHORS: Kurnosova, L. V., Razorenov, L. A. and Fradkin, M.I.

TITLE: Investigation of the nuclear component of cosmic rays with the third space rocket

PERIODICAL: Akademiya nauk SSSR, Iskusstvennyye sputniki zemli, 1961, No.8, pp.87-89

TEXT: The nuclear component of the primary cosmic rays was investigated with a Cherenkov counter mounted on the third space rocket and was similar to that employed on the second rocket (Ref.1: L. V. Kurnosova, V. I. Logachev, L. A.Razorenov and M. I. Fradkin. Iskusstvennyye sputniki Zemli, No.5, izd-vo AN SSSR, 1960, p.30). The counter was placed inside a hermetically sealed container, whose thickness was equivalent to 1 g/cm^2 of aluminium. The screening of the counter by neighbouring instrumentation was roughly the same as in the case of the second space rocket. A record was made of nuclei with charges greater than or equal to 2, 14-15 and 28-30. The average number of counts in the $Z \geqslant 2$, $Z \geqslant 14$-15 and $Z \geqslant 28$-30 channels was found to be 10.3±0.2, 0.09±0.02 and 0.013±0.001 per min, respectively. Analysis of the

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FRADKIN, M. I.

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AUTHORS: Kurnosova, L. V., Kolobyanina, T.N., Logachev, V.I., Razorenov, L.A., Sirotkin, I.A. and Fradkin, M.I.

TITLE: Detection of anomalies in the radiation above the southern part of the Atlantic Ocean at altitudes between 310-340 km

PERIODICAL: Akademiya nauk SSSR, Iskusstvennyye sputniki zemli, 1961, No.8, pp.90-93

TEXT: The second Soviet satellite carried a counter telescope designed to record the total cosmic ray intensity. This telescope was a part of a more complex device whose function was to record the nuclear cosmic ray component. A brief description of the apparatus was given by S. N. Vernov, V. L. Ginzburg, L. V. Kurnosova, L. A. Razorenov, M. I. Fradkin (Ref.1: UFN, 63, No.1b, 131, 1957). The present paper is concerned only with the anomalously large counting rates obtained while the satellite was passing over certain regions of space. The telescope consisted of two groups of counters with effective areas of 120 and 25 cm^2. The distance between them was 35.8 cm. The amount of matter between the two groups of counters was about 4 g/cm^2 (largely perspex).

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Thus, the telescope recorded electrons with energies > 8 MeV and protons with energies > 60 MeV. The particle flux recorded by the telescope was greater than the cosmic ray flux at all the points where the measurements were recorded. In the region of the equator the average flux was 1.2 particle cm^{-2} sec^{-1}, while at high altitudes the figure was 3.3 particle cm^{-2} sec^{-1}. Another unexpected result was the discovery of regions with anomalously large intensities. Among these regions was that above the southern part of the Atlantic Ocean where on August 19, 1960 there was an increase in the counting rate every time the satellite passed through the region. This is indicated by Fig.1 which shows the counting rate as a function of local Moscow time. The three peaks (1,2,3) correspond to the passage of the satellite through the anomaly. The anomaly lies between 25 and 50° S and 0 and 55° W. A further anomaly was discovered between 50 and 65° S and 30° W and 40° E. A third anomaly was found in the northern hemisphere between 60 and 65° N and 137 and 170°E. It is suggested that the northern anomaly may be associated with the outer radiation belt and is affected by solar flares. The South Atlantic and Southern anomalies may be associated with the existence in the southern