GAZDAROV, V. M.

Gazdarov, V. M.

"Age Changes in Protein of the Blood of Horses." Moscow Veterinary Academy, Min Higher Education USSR. Chair of Organic and Biological Chemistry. Moscow, 1955.
(Dissertation for the degree of Candidate in Biological Sciences)

SO: Knizhnaya letopis' No. 27, 2 July 1955

GAZDAROV, V.M.

SHUMNIKOV, N.A.; TARANOV, M.P.; GAZDAROV, V.M.

Age characteristics of protein substances in the blood of horses. Trudy Inst. morf. zhiv. no.22:243-248 '57. (MIRA 11:4)

1. Institut konevodstva.
(Horses) (Blood proteins)

GAZDAROV, V.

Q-2

USSR/Farm Animals - Large Horned Cattle.

Abs Jour : Ref Zhur - Biol., No 18, 1958, 83330

Author : Mel'nikova, T., Gazdarov, V.
Inst : -
Title : Feeding Preserved Feeds to Cows.

Orig Pub : Molochn. i myasn. zhivotnovodstvo, 1958, No 1, 22-25.

Abstract : The first group of cows was fed cars ensiled by the usual method, the second group of cows was fed cars preserved by the S-2 preparation, and the third group was fed cars preserved by the AIV preparation. These cars were fed to the cows twice daily in amounts of 25-28 kg each time, after they were fed concentrated feeds and before they were fed hay. During a period of 70 days, total milk yields amounted to 761 kg from control cows whereas they averaged about 829 kg from test group cows. Expenditure of concentrated feeds amounted to 289 gr and 265 gr per 1 kg of 4 percent milk, and to 0.94 and 0.90 of food units,

Card 1/2

GAZDAROV, V.M

COUNTRY : USSR
CATEGORY : Farm Animals.
General Problems.
ABS. JOUR. : RZhBiol., No. 3 1959, No. 11950

AUTHOR : Shumenkov , N. A.; Tarenov, M. T.; Gaziarov,
INST. : -
TITLE : Feeding Cows and Horses with Fodder Preserved by Mineral Acids.

ORIG. PUB. : Vestn. s.-kh. nauki, 1958, No 2, 59-72

ABSTRACT : By preserving fodder with acid preparations, the retention of nutritive substances and vitamins is largely assured. When feeds which were preserved with K2 and AIV preparations were fed to animals in quantities corresponding to the usual silage norms, an adverse effect on the animals' condition and production was not established. Mares digested rations containing preserved feeds not less well than nutritive substances contained in the usual rations and young animals digested them even

Card: 1/3

*V. M.; Chalyuk, Ye. A.; Mel'nikova, T. S.; Kostromina, V. P.; Marina, M. A.

COUNTRY : USSR
CATEGORY :
ABS. JOUR. : RZhBiol., No. 1959, No.

AUTHOR :
INST. :
TITLE :

ORIG. PUB. :

ABSTRACT : a little better. Cellulose digestion in a ration which contained preserved corn was 7 percent higher than in a ration containing corn silage, N, Ca and P balance was positive in horses and cows which were given preserved feeds. The full biological value of protein in preserved lucerne amounted to 51 percent, of corn to 43.5 percent, and in controls to 44.5 and 39.8 percent, correspondingly. A disturbance of the general metabolism and physio-

CARD: 2/3

GAZDARU, C.

Analysis of the causes of defects in parts of steel molds. p. 16.
(METALURGIA SI CONSTRUCTIA DE MASINI. RUMANIA. Vol. 8, no. 5, May 1956.)

SO: Monthly List of East European Accessions (EEAL) LC, Vol. 6, no. 7, July 1957. Uncl.

GAZDARU, C

GAZDARU, C.

GAZDARU, C. Specific metal consumption for parts stamped by drop hammers. p. 70.

Vol. 8, no. 11, Nov. 1956
METALURGIA SI CONSTRUCTIA DE MASINI.
TECHNOLOGY
RUMANIA

So: East European Accession, Vol. 6, No. 5, May 1957

25(1) RUM/9-59-7-5/52

AUTHOR: Găzdaru, Costache, Engineer

TITLE: Deformation Work in Die Forging

PERIODICAL: Metalurgia şi construcţia de maşini, 1959, Nr 7, pp 576-579 (Rumania)

ABSTRACT: The author points out that the problem of calculation of the power needed for die forging often appears in various processes for determination of the characteristics of the equipment. In the case of existing die forging equipment, the calculation of the deformation-mechanical work gives indications on the number of phases or active strokes of the machine needed for the forging of a certain part. On this basis, the productivity of the die equipment can be determined. It is the only scientific method concerning the determination of the effective working time and the correct establishment of the production capacity of the forging equipment. The author presents a mathematical determination of the mechanical work based on the

Card 1/4

Deformation Work in Die Forging

laws of plasticity. In the case of die forging, the metal volume is submitted to plastic deformation during the approaching stroke of the two die surfaces which compress the work. The plastic deformation occurs in a body that is first submitted to elastic deformation. Therefore, the movement of the die surface produces a state of tension within the metal mass which is submitted to plastic deformation within the empty space of the die. The limit tension state on the tool surface gives a resultant which together with the deplacement of the die surface gives the mechanical work performed by the machine. Evidently, the mechanical work is equal to the mechanical work of the interior forces, tensions and deformations, existing in the mass of the deformed body. Starting from an infinitesimal volume element, the author arrives at a system of 14 equations with 14 unknown quantities. The three limit conditions must be added however, so that the solving of the equations

mentioned is almost impossible. Subsequently, the author takes as a basis of calculation the case of the deformation of a parallelopiped with the notations as given in Fig 2. He determines a curve (Fig 3) the integral of which represents the specific mechanical work. By supposing that the resistance of deformation is constant, the integral can be solved.

The mechanical work is $L = Vk_f \ln \frac{h_o}{h_1}$. V is the volume lbh (Fig 2) k_f the resistance of deformation. According to the author, this result has a practical significance as it can be used for the calculation of the deformation work in die forging. Correction coefficients are available as established by the Soviet Institute of Automobile Industry Research (VTOPROM). In continuation, the author defines the degree of deformation ε as represented in Fig 4. The resistance of the metal at the flow limit in the sense of the stress at usual forging temperatures is established in conformity with Table 1. Finally the author presents an

Deformation Work in Die Forging RUM/9-59-7-5/52

example of calculation for a forging represented in Fig 5. There are 3 diagrams, 2 graphs and 1 table.

Card 4/4

GAZDARU-ADAMESTEANU, CI; GERANIU, E.; BEGNESCU, P.

Method of preparing thrombin. p. 207. COMUNICARILE. Bucuresti. Vol. 5, no. 1, Jan. 1955

Source: East European Accessions List, (EEAL), Lc, Vol. 5, No. 3, March 1956

8 (5)

SOV/112-57-5-10224

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1957, Nr 5, p 93 (USSR)

AUTHOR: Gazdayka, P. P.

TITLE: Method of Recording the Short-Circuit Characteristic of an Induction Motor (Metod fotograficheskoy zapisi kharakteristiki korotkogo zamykaniya asinkhronnykh dvigateley)

PERIODICAL: Dokl. L'vovsk. politekhn. in-ta, 1955, Vol 1, Nr 2, pp 119-123

ABSTRACT: Because the short-circuit characteristic of an induction motor is non-linear, the short-circuit test is usually continued up to the rated voltage. However, the winding heating distorts the measurement results and the transient electromagnetic phenomena that accompany each energizing of the motor, and make it difficult to take simultaneous and sufficiently accurate instrument readings. To eliminate the above shortcomings and to restrict the short-circuit test to 10 sec duration, it is suggested that the active and reactive components of the short-circuit current be recorded by a photographic method;

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SOV/112-57-5-10224

Method of Recording the Short-Circuit Characteristic of an Induction Motor

a coordinate instrument with permanent-magnet measuring units is used. The motor under test is connected to the line via an autotransformer whose sliders are moved by a servomotor. The control-voltage phase can be made coincident either with the active-current-component phase or with the reactive-current-component phase. The current components permit determining the short-circuit characteristic, power, current-voltage phase shift angle, and the short-circuit parameters.

A.I.M.

Card 2/2

GAZDAYKA, P.P.

Translation from: Referativnyy Zhurnal, Elektrotekhnika 1957, Nr 3, p. 107 (SSR) 112-3-5803D

AUTHOR: Gazdayka, P.P.

TITLE: Current Diagram And Characteristics of Induction Machines with Variable Parameters (Diagramma tokov i kharakteristiki asinkhronnykh mashin s peremennymi parametrami)

ABSTRACT: Bibliographic entry on the author's dissertation for the Degree of Candidate of Technical Sciences, presented to the Kiyev Polytechnical Institute (Kiyevsk. politekhn. in-t), L'vov, 1956.

ASSOCIATION: Kiyev Polytechnical Institute (Kiyevsk. politekhn. in-t)

Card 1/1

GAZDAYKA, P.P., kand. tekhn. nauk

Analysis of some elements of the circle diagram of an asynchronous machine based on 70 years of its development and newest experimental data. Izv. vys. ucheb. zav.; energ. 7 no.9:7-14 S '64.
(MIRA 17:11)

1. L'vovskiy politekhnicheskiy institut. Predstavlena kafedroy teoreticheskoy i obshchey elektrotekhniki.

GAZDAYKA, P.P., kand. tekhn. nauk

Method for determining the torque curves of asynchroncus machines. Izv. vys. ucheb. zav.; energ. 8 no.1:109-112 Ja '65.
(MIRA 18:2)

1. L'vovskiy politekhnicheskiy institut. Predstavlena kafedroy teoreticheskoy i obshchey elektroniki.

GAZDZICKI, J.

The influence of angular connections on the reduction of longitudinal errors of points of a typical polgonal traverse.

p. 19 (Warsaw. Instytut Geodezji i Kartografii. Prace. Proceedings. Warszawa, Poland. Vol. 4, no. 1, 1956.

Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 2, February 1958

GAZDZICKI, J.

Controlling the composition of equations of corrections.

P. 243. (GEODEZJA I KARTOGRAFIA) (Warszawa, Poland) Vol. 6, no. 4, 1957

SO: Monthly Index of East European Accession (EEAI) LC Vol. 7, No. 5, 1958

5333 526.913.1:519.281

Gaździcki J., Janusz W. Simultaneous Adjusting of Nodal Elements in Polygonal Nets, „Jednoczesne wyrównanie azymutów i współrzędnych węzłowych w siatkach poligonowych". (Prace Inst. Geod. i Kartogr. No. 3), Warszawa, 1957, PPWK, 42 pp., 18 figs., tabs.

The adjustment of extensive polygon nets by the method of the least squares being very laborious, the approximating methods generally called "Methods of nodal points" are used. Not all known methods of nodal points are limited to this simplification: each of the nodal elements a, x, y is adjusted separately. This manner of dealing with them must necessarily lead to such an observation deformation as will prove excessive when a higher precision net is being adjusted. The paper discusses two methods of simultaneous adjusting of the nodal elements a, x, y. The observation functions adjusted by the first method are angles and lengths determined by the nodal element; and in the second — sums of angles and sums of co-ordinate increments (departure and latitude) calculated for individual polygons. Both these methods enable the adjustment of the net with the so called side connections (with additionally observed directions toward fixed points, from certain polygon points). The numerical examples given show results very close to those obtained by means of the least squares method.

GADZICKI, J.

A few remarks concerning the article "Anniversay of Paralactic Traversing."

P. 127 (PRZEGLAD GEODEZYJNY) Poland, Vol. 13, No. 3, Mar. 1957

SO: Monthly Index of European Accessions (AEMI) Vol. 6, No. 11, November 1957

GAZDZICKI, J.
JANUSZ, W.

A comparison of approximate methods of adjusting polygon nets; based on a few numerical examples. p. 87.

Warsaw. Instytut Geodezji i Kartografii. (PRACE. PROCEEDINGS. Warszawa, Poland Vol. 6, no. 1, 1958.

Monthly List of East European Accessions Index (EEAI), LC, Vol. 8, No. 6, June 1959 Uncl.

GAZICKI, J.

An analogue computer for solving systems of linear equations. p. 373.

PRZEGLAD GEOFIZYCZNY. (Stowarzyszenie Naukowo-Techniczne Geofizyków Polskich) Warszawa. Vol. 15, no. 8/9, Aug/Sept. 1959.

Monthly List of East European Accession (EEAI) LC, Vol. 9, no. 2, Feb. 1960

Uncl.

GAZDZICKI, Jerzy

Application of the UMC 1 machine for geodetical computations. Przegl geod 33 no.12:456-458 '61.

GAZDZICKI, Jerzy

Solution programs of geodetic problems by means of the Polish universal digital computer UMC 1. Warsaw Inst geod i kartograf Prace 9 no.1:3-32 '62.

GAZDZICKI, Jerzy

Solving normal equations by electronic computers. Prace Inst geod 9 no.2:3-16 '62.

44259

S/035/62/000/012/061/064
A001/A101

9.7100

AUTHOR: Gazdzicki, Jerzy

TITLE: Solving the system of 739 normal equations on an UMC-1 computer

PERIODICAL: Referativnyy zhurnal, Astronomiya i Geodeziya, no. 12, 1962, 40, abstract 12G250 ("Przegl. geod.", 1962, v. 34, no. 7, 323 - 324, Polish)

TEXT: In adjustment of the Silesian triangulation network, the system of 739 normal equations was solved. The network was divided into 4 groups and was adjusted by the Pranis-Pranevich method. The method of cracowian root was selected for direct solution of normal equations. Advantages of this method include: simplicity of solution algorithm, small number of entries in the calculation process, i.e., cells in the computer memory, and a higher precision of calculational results. About 3,000 cells remained in the computer memory for the solution of the equation system properly. At the same time, in each group of equations the number of non-zero coefficients of normal equations above the main diagonal was 6,000 - 7,000. Therefore, normal equations of each group were di-

Card 1/2

Solving the system of... S/035/62/000/012/061/064
A001/A101

vided into 3 parts. Hundred hours were spent for solving the system (25 hours for insertion and extraction of data and 75 hours for calculations proper). Economic efficiency attains 70% in comparison with calculations on an adding machine. Individual stages of solution are described. There are 5 references.

B. Serapinas

[Abstracter's note: Complete translation]

Card 2/2

ACCESSION NR: AT4040345 P/2505/63/010/002/0003/0035

AUTHOR: Gazdzicki, Jerzy (Gaz'dzitski, Yezhi)

TITLE: Adjustment of triangulation nets on electronic computers

SOURCE: Warsaw. Instytut Geodezji i Kartografii. Prace, v. 10, no. 2(22), 1963, 3-35

TOPIC TAGS: triangulation net, computer, digital computer, UMC 1 digital computer, Pranis Praniewicz multigroup adjustment

ABSTRACT: The paper is divided in 3 parts: 1) Adjustment of single groups; 2) Multigroup and multistep adjustment; and 3) Description of a multistep adjustment of a large triangulation net. The first part describes programs for the complex adjustment of the triangulation nets. These programs were prepared for the medium size digital computer UMC 1, installed in the Institute of Geodesy and Cartography. The main feature of these programs is the maximal elimination of needless operations on the zero-elements during the whole procedure of adjustment, which permits shortening the time of computation and adjusting larger blocks with the same memory capacity. With regard to use the programs are

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ACCESSION NR: AT4040345

divided in the following parts: a) determination of the form of the table of normal equations; b) setting-up and perforation of the correction equations; c) setting-up of the normal equations; d) solution of the system of normal equations with the computation of standard errors, and e) computation of the adjusted coordinates and the final control. The initial data are the measured angles, the number of points, which defines the position of angles in the net, the definite and approximate coordinates. The second part gives the formulas of the multigroup adjustment of Pranis Praniewicz and of its generalization -- the method of multistep adjustment. These formulas are deduced on the basis of algorithms of the root of the block Cracovian, in which the calculus on the elements (simple numbers) is replaced by the calculus on the blocks (ensembles of numbers), which is more convenient in automatic computations. The method of multistep adjustment permits the adjustment of large geodetic nets even in these cases where the electronic computers to be used have a small memory. The third part contains a description of the four-step adjustment of the triangulation net performed on the UMC 1 computer, fitted with a drum memory with 4096-word capacity. This net consisted of 566 points: 24 given and 542 to be determined.

Card 2/3

ACCESSION NR: AT4040345

The observations included in the adjustment consisted of 3328 angles, 7 bases and 1 astronomic azimuth. The author concludes that the results of adjustment confirmed completely the usefulness of multistep adjustment in automatic computation. Orig. art. has: 11 graphics and 44 formulas.

ASSOCIATION: none

SUBMITTED: 00Feb63 DATE ACQ: 25Jun64 ENCL: 00

SUB CODE: DP, ES NO REF SOV: 006 OTHER: 017

Card 3/3

SULC, Stefan, inz.; GAZDIK, Jan, dr.

The tenth anniversary of the Freezing Technology Research Institute in Bratislava. Prum potravin 13 no.6:316-318 Je '62.

1. Vyskumny ustav mraziarensky, Bratislava.

L 39931-66 JXT(CZ)/GD

ACC NR: AT6017137 SOURCE CODE: UR/0000/65/000/000/0181/0183

AUTHOR: Gazditski, I.

ORG: Department of Leveling and Geodetic Calculations, Geodetic-Cartographic Institute, Warsaw, Poland (Otdel uravnitel'nykh i geodezicheskikh vychisleniy Geodezicheskko-kartograficheskogo instituta)

TITLE: Use of UMC type digital computers for geodetic computations

SOURCE: Sovet ekonomicheskoy vzaimopomoshchi. Postoyannaya komissiya po koordinatsii nauchnykh i tekhnicheskikh issledovaniy. Sredstva i metody mekhanizatsii podgotovki i poiska nauchno-tekhnicheskoy informatsii, inzhenernogo i upravlencheskogo trude (Means and methods for mechanizing the preparation and research of scientific and technical information and of engineering and control work); lektsii, prochitannyye na vystavke "Inforga-65" v maye-iyune 1965 g. Moscow, 1965, 181-183

TOPIC TAGS: computer, digital computer, electronic data processing / UMC-1 digital computer, UMC-10 digital computer

ABSTRACT: The article discusses the compatibility and effectiveness of two types of computers used by the Polish Geodetic Service. The UMC-1 is a small, electron tube, fixed point computer with an access time of the order of 100 operations a second and a magnetic drum memory of 4096 34-bit words; input and output are from punched tape

Card 1/2

L 39931-66
ACC NR: AT6017137

and teletype. The UMC-10 is a transistorized, fixed point computer with speeds of 2000 operations per second, internal ferrite memory of 4096 34-bit words, supplementary external magnetic drum memory, punched-tape readers (500 characters per second), punched tape and teletype input and output (150 characters per second). Both types of computers possess identical logical structure and use the same system of coding. The chief disadvantage of the UMC series is the lack of a floating point.

SUB CODE: 09,08/ SUBM DATE: none

Card 2/2 fl/ S

MYSONA, Mieczyslaw; NALEPA, Wieslaw; GAZDZINSKA, Jadwiga

Obtaining of enamels on aluminum sheets. Szklo 12 no.8:243-247 Ag '61.

1. Katedra Towaroznawstwa, Wyssza Szkola Ekonomiczna, Krakow.

GAZDZITSKIY, Yezhi [Gazdzicki, Yerzy] (Varshava)

Use of electronic computers in Poland for geodetic calculations.
Geod. i kart. no.7:41-49 Jl '63. (MIRA 16:8)
(Poland--Electronic computers)

GAZECKI, J. (Warsaw)

Sound energy equations for coupled halls. Proceed vibr probl 5 no.3:231-239 '64.

GAZEL, A.; STEPNIEWSKI, S.; URBANSKI, S.

Cleaning cotton fabrics. Biuletyn Wlok. p. 2.

PRZEGLAD WLOKIENNICZY. (Stowarzyszenie Inzynierow i Technikow Przemyslu Wlokienniczego) Lodz, Poland. Vol. 12, no. 1, Jan. 1958.

Monthly List of East European Accessions (EEAI) LC. Vol. 8, no. 7, July 1959.

Uncl.

L 5126-66 EWT(1)/EEC(k)-2/EWA(h)

ACCESSION NR: AP5023658 UR/0119/65/000/008/0025/0025
621.319.44

AUTHOR: Gazeleridi, V. I. (Engineer); Pedanov, V. V. (Engineer)

TITLE: Capacitance meter based on the charge-comparison principle

SOURCE: Priborostroyeniye, no. 8, 1965, 25

TOPIC TAGS: capacitance meter

ABSTRACT: The charges of a reference capacitor box and the capacitor being tested are compared by charging both to 150 v, connecting them in opposition, measuring their difference voltage, and minimizing it by adjusting the box. The latter can be adjusted stepwise from 1 to 182 μF. The capacitance meter is claimed to have a maximum error of about 0.85%. It is suitable for testing paper-insulation capacitors of 50 μF and higher. "T. I. Aksenova took part in this project." Orig. art. has: 2 figures and 2 formulas

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: EC

NO REF SOV: 000 OTHER: 000

Card 1/1

GAZENBUSH, N. K.

GAZENBUSH, N. K. "Problems of agricultural technique in the growing of cucumber seeds," Doklady (Mosk. s-kh. adad. im. Timiryazeva), Issue 9, 1949, p. 91-93

SO: U-5240, 17, Dec. 53, (Letopis 'Zhurnal 'nykh Statey, No. 25, 1949).

BREZHNEV, D.D., akademik, prof.; GAZENBUSH, V.L.; KAMERAZ, A.Ya.; MEDVEDEV, P.F.; MIZGIREVA, O.F.; FILOV, A.I.; ZHUKOVSKIY, P.M., akademik, prof., obshchiy red.; LEONT'YEV, V.M., red.; CHUNAYEVA, Z.V., tekhn.red.

[The flora of cultivated plants of the U.S.S.R.] Kul'turnaia flora SSSR. Moskva, Gos.izd-vo sel'khoz.lit-ry. Vol.20. [Vegetable plants of the nightshade family: tomato, eggplant, black nightshade, melon pear, pepper (Capsicum), ground cherry, mandragora] Ovoshchnye paslenovye; tomat, baklazhan, chernyi paslen, dynnaia grusha, perets, fizalis, mandragora. 1958. 531 p. (MIRA 13:3)

1. Vsesoyuznaya akademiya sel'skokhozyaystvennykh nauk imeni V.I. Lenina (for Brezhnev, Zhukovskiy).
(Nightshade) (Vegetables)

1. GAZENEGER, Ye.

2. USSR (600)

4. Dairy Bacteriology

7. Plant laboratory strives to improve the quality of the product, Mol. prom., 13, No. 10, 1952.

9. Monthly List of Russian Accessions, Library of Congress, February, 1953. Unclassified.

VOLODARSKIY, N.I., GAZENKO, A.I.

Phasic heterogeneity of tissues in the sunflower (Helianthus annuus L.). Bot. zhur. 45 no.5:742-745 My '60.
(MIRA 13:7)

1. Kubanskiy sel'skokhozyaystvennyy institut, g. Krasnodar.
(Sunflowers) (Plant cells and tissues) (Growth (Plants))

GAZENKO, G.G.

Review of G.G. Avtandilov's book "Brief scale of colors". Lab. delo no.1:64 '64. (MIRA 17:4)

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PETROV, V.I.; GAZENKO, G.G.; BOBOV, V.S.; MEN'SHIKOV, V.V.

Brief news. Lab. delo no. 11:699-703 '64. (MIRA 17:12)

1. Glavnyy vrach Upravleniya klinikami I Moskovskogo ordena Lenina meditsinskogo instituta im. I.M.Sechenova (for Bobov).

GAZENKO, O.

Efficient work of building crews. Stroitel' no.4:10 Ap '57.
(Building) (MLRA 10:6)

GAZENKO, O. G. (Lt. Col. Med. Service)

"A Few Data on Physiological Analysis of Flyers' Fatigue Sensation," Voyenno-meditsinskiy zhur., No.1, pp 36-40, 1955

The paper describes experiments that were carried out on 8 flyers going about their daily flying routine. Three tables with test data are included in the text.

D 312255, 22 Aug 55 - Translation

SOV/25-58-11-9/44

AUTHORS: Gazenko, O.G., Malkin, V.B., Candidates of Medical Sciences

TITLE: Biology of Cosmic Flights (Biologiya kosmicheskikh poletov)

PERIODICAL: Nauka i zhizn', 1958, Nr 11, pp 17-22 and p 2 of centerfolds (USSR)

ABSTRACT: The maintenance of normal living conditions for men during cosmic flights is the main task of cosmic biology. At the present time 2 groups of experiments are being conducted in the USSR: laboratory experiments and experiments in rockets with telemetric registration of biologic functions. Tests with animals carried in rockets up to 110 km showed normal reactions, insofar as they withstood acceleration and retardation satisfactorily, and blood pressure, pulse and breathing increased only slightly. At heights up to 212 km, especially unfavorable effects were noticed at re-entry of the rockets into the atmosphere. However, the problem of re-entry at 450 km has been solved. Soviet researchers are especially concerned with the problem of re-entry of passengers from space ships. Great difficulties have yet to be overcome in solving re-entry at supersonic velocities. When a space ship travels at a velocity exceeding sonic velocity

Card 1/2

Biology of Cosmic Flights

by 5 times, the nose section is heated to more than 1,000° C. Subsequently, temperatures in the airtight compartment may become unbearable for humans. It has been shown by special experiments, that at an humidity of 30 %, temperatures of 100° can be endured by men for 30 minutes, and temperatures of 200° only for 3 minutes. The effects of acceleration are being thoroughly studied, whereby it was found that acceleration of 10 G may be endured for several minutes. However, acceleration should be considerable lower than this to maintain operating ability. The authors describe the different operations of re-entry from a cosmic flight: catapulting of pressure cabin from the space ship, slowing down of descent by means of reactive drives and parachute, and finally landing of the cabin with a parachute.
There are 8 photos and 7 drawings.

Card 2/2

GAZENKO, O.G. (Doctor) and KUZNETZOV, A.G. (Prof.)

"Further Biological Investigations on Rockets."

report presented at the 4th European Congress of Aviation and Space Medicine, Rome, Italy, 22 October - 5 November, 1959.

17-2000

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R/002/60/000/009/001/003
A125/A026

AUTHORS: Gazenco, O.G. and Malkin, V.B., Candidates of Medical Sciences

TITLE: Can Man Live Without Weight

PERIODICAL: Ştiinţă şi Tehnică, 1960, No. 9, pp. 14-15

TEXT: Subject article presents some problems regarding the life in space, i.e., in a state of weightlessness? Since no man yet was in space, Scientists were restricted to study these problems on the basis of simulated conditions. The German cardiologist Langer believed that an absolute loss of weight would have fatal consequences. But, the results obtained during the flight of the Soviet satellite having the dog Laika on board, and especially after the recovery of the second Soviet space ship having various animals on board, proved him wrong. The electrocardiogram and the recordings of the respiratory tract revealed a normal functioning of these organs. Although there are no data on the influence of the weightlessness on the digestion, it is supposed that this function will not be considerably impaired. Weightlessness will almost not disturb at all the activity of plants. The behavior of man in weightless state was studied during parabolic flight trajectories of aircraft. Many experiments were conducted to

Card 1/2

Can Man Live Without Weight

establish the feelings of pilots in weightless state. Based on the data obtained, scientists believe that disturbances of the physiological functions due to a state of weightlessness will not be too great. Another important problem is the return of the man from space, i.e., a passing from the state of weightlessness to normal weight. The unfavorable influences of the weightlessness can be eliminated by producing an artificial gravity based on the centrifugal force. The results of all these examinations show that life is possible also under the conditions of weightlessness. There are 2 figures and 1 photograph.

Card 2/2

GAZENKO, O.G., kand.med.nauk; MALKIN, V.G., kand.med.nauk

Problems in space flight. Zdorov'e 6 no.9:4-5 S '60. (MIRA 13:8)
(SPACE FLIGHT)

GAZENKO, D.G.

"Some Results of Medical and Biological Investigations on Spaceships-Satellites (1960-61)" by D.G. Gazenko (USSR)
Report to be submitted for 4th Meeting of the committee on space research, Florence, Italy 7-18 April 1961

GAZENKO, O. G.

a. Radar Contact with Venus - V. A. Kotelnikov

b. Some Results of the Constant Geomagnetic Field Measurements Carried Out from Sputnik III over the Territory of the USSR - S. Ch. Dolginov, L. N. Zhuzgov, N. V. Pushkov, Tyurulina, L. O., I. V. Tyurmenev

c. Some Results of Physiological Reactions to Space Flight Conditions - O. G. Gazenko, V. I. Yazdovsky

d. On the Motion of the Body of the Variable Mass With the Constant Power Consumption in the Gravitational Field - G. L. GROZDOVSKIY, Y. N. Ivanov, V. V. Sokolov

e. On the Rocket Solar Corpuscles - V. I. Krassovsky

f. Optimum Contour Heat Rejection Fins Cooled by Radiation - G. L. Grodzovsky

g. Investigation of Interplanetary Plasma and Planetary Ionospheres by Means of Charged Particle Traps on Space Rockets - K. I. Gringauz

h. Rocket and Satellite Meteoric Dust Investigations - T. N. Nazarova

i. On Investigation of Cosmic Radiation on Spaceships-Satellites. - S. N. Vernov, Y. E. Nesterov, N. P. Pinsenko, I. A. Savenko, P. I. Shavrin.- UNCLASSIFIED

reports to be presented at the XIIth International Astronautical Congress, Washington D. C. 1-7 October 1961

(19)

BLOKHIN, Nikolay Nikolayevich; PARIN, Vasiliy Vasil'yevich; GAZENKO, Oleg Georgiyevich, kand.med.nauk; VERNOV, Sergey Nikolayevich; STAROSTENKOVA, M.M., otv.red.; SHISHINA, Yu.G., red.; NAZAROVA, A.S., tekhn.red.

[Medicine and cosmic flight] Meditsina i kosmicheskie polety; sbornik. Moskva, Izd-vo "Znanie," 1961. 30 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.8, Biologiia i meditsina, no.9)

(MIRA 14:6)

1. Prezident Akademii meditsinskikh nauk SSSR (for Blokhin). 2. Deystvitel'nyy chlen Akademii meditsinskikh nauk SSSR (for Parin). 3. Chlen-korrespondent AN SSSR (for Vernov).

(SPACE MEDICINE)

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S/560/61/000/011/008/012
E027/E635

AUTHORS: Gazenko, O.G., Bayevskiy, R.M.

TITLE: Physiological methods in space medicine

SOURCE: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli. no. 11. Moscow 1961. Rezul'taty nauchnykh issledovaniy, provedennykh vo vremya poletov vtorogo i tret'yego kosmicheskikh korabley-sputinikov, 68 - 77

TEXT: The authors discuss the problems involved in carrying out physiological investigations on men and animals during space flights. The necessity of recording observations and transmitting them to earth has led to the development of the new science of biotelemetry. In this field transducers are of prime importance in converting physiological information into electric currents, and due consideration must be paid to their reliability and to the avoidance of unnecessary discomfort when they are attached to the experimental subject for prolonged periods. The amount of information which can be carried by the communications channels must also be considered. Thus, to

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Physiological methods in ---

transmit an electrocardiogram with an amplitude of five volts with an accuracy of 0.25 volt twenty different signals can enter the channel, which should be able to transmit not less than 100 signals per second. The electrocardiogram thus contains around 400 items of information per second, and the capacity of the channel should be 500 items per second. Similarly, the electroencephalogram requires a transmission frequency of 200 signals per second and a channel capacity of 800 items per second; for the electromyogram the respective figures are 1000 and 4000, for the pneumogram 10 and 20, and for the thermogram 0.05 and 0.25. The capacity of the channel required can be reduced by coding the information to be transmitted. In space flight physiological methods are applied for three purposes; (1) to exert continuous medical control over the experimental subject; (2) to obtain information on the effect of space conditions on the subject, and (3) to detect conditions dangerous to life and health. Some

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Physiological methods in ---

measurements, such as of respiration and cardiovascular activity fall into all three categories. The main methods used in space physiology, such as electrocardiography, seismocardiography (a variant of ballistocardiography used in the third Soviet satellite, which can only be used during free flight), phonocardiography, arterial oscillography, recording of the pulse and respiratory movements, electromyography, recording of body movements, thermometry and investigation of the higher nervous activity are briefly reviewed. There are 6 figures and 1 table.

SUBMITTED: May 3, 1961

Card 3/3

28589
S/565/61/000/009/003/004
B144/B101

17.2000
27.2000

AUTHOR: Gazenko, O. G., Candidate of Medical Sciences

TITLE: Fundamental medicobiological problems of space flight

PERIODICAL: Meditsina i kosmicheskiye polety; sbornik, no. 9, 1961, 13-27

TEXT: A short historical synopsis of rocket technology mentions K. E. Tsiolkovskiy, F. A. Tsander, G. Oberth, and R. Goddard. Of late manned space flight has made enormous progress, last not least owing to the great achievements made in space biology and space medicine. The principal problems included: 1) possible noxious effects of cosmic factors on organisms and their prevention; 2) life preservation during space flight, e.g., air regeneration; 3) selection and training of astronauts. The cosmic factors can be subdivided into three groups: a) factors characteristic of space itself: extreme low barometric pressure, almost complete absence of O_2, meteorites, ionizing radiation, etc.; b) dynamic factors involved in rocket flight: acceleration, noise, vibration, weightlessness; c) factors influencing living conditions in the artificial medium of the hermetically sealed cabin, e. g., pressure reduction,

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partial replacement of N_2 by He, absence of day and night rhythm, etc. Some results achieved in Soviet experimental flights are described. At first, respiratory conditions in the cabin were maintained by air/O_2-containers and chemical absorption of CO_2 and moisture; later, chemical regeneration was realized. Protection against temperature variations was obtained by lining the cabins. The crew is rescued either in separable cabins with stabilizing, braking, and parachute devices, or by catapulting and protection against air rarefaction by space suits. Animal tests with rockets reaching altitudes of up to 450 km showed that the increase in the respiratory and pulse rates during acceleration subsided within 4 - 6 min after weightlessness had set in. Throughout the flight, physiological function were recorded and the behavior filmed. As a result, the stabilization and braking of the separated capsule had to be improved. The only drawback of rocket tests was their short duration. Subsequent biological experiments on artificial satellites and space-ships, beginning with the flight of the bitch Laika in November 1957, offered new prospects. Pulse and respiratory rates, electrocardiogram, and motility were radiotelemetrically recorded. The evaluation of relevant data showed that

Fundamental medicobiological...

weightlessness had no strong effect upon the basic physiological functions, measuring instruments, and life-preserving devices. A safe return to the earth was of great importance in order to study the effect of cosmic radiation after the landing. Such tests were started with two dogs on board of the second space-ship, followed by the launching of smaller laboratory animals, seeds, microorganisms, tissue cultures, ferments, etc. This test series proved that weightlessness, transition to overload, and ionizing radiation in the orbit below the radiation belts did not have any noxious effect upon organisms and that safe landing could be achieved. The idea that space is incompatible with life will have to be revised. The preparation of manned space flight included the selection of healthy and psychically stable individuals by tests on centrifuges and vibrostands, in space-flight simulating chambers, etc. Then, the men chosen underwent a special training to improve their physical strength, ability, and perseverance, and were instructed theoretically (rocket technology, astronomy) and in the operation of the space-ship. The flight of Yuriy Gagarin in April 1961 proved that manned space flight is possible and the way into the universe open to man.

Card 3/3

SISAKYAN, N.M. (Moskva); GAZENKO, O.G. (Moskva); GENIN, A.M. (Moskva)

Some problems of space biology. Zhur. ob. biol. 22 no.5:325-332 S-O '61. (MIRA 14:9)

(SPACE BIOLOGY)

Biblio

JPRS: 12971

CSO: 6503-N

CERTAIN PROBLEMS OF SPACE BIOLOGY

Following is a translation of an article by A.M. Siakhyan, O.G. Gazenko, and A.A. Genin in Zhurnal Obshchey Biologii, (Journal of General Biology), Vol XXV, No 5, 1964, pages 325-332.

Recent brilliant successes in science and technology permit us to proceed with the planned and systematic study and the mastery of cosmic space.

Opened to biological science are vast and extremely attractive prospects for fundamental investigations which in a most general way can be defined to have both scientific: The effect of extremal factors of cosmic space upon living earth organisms.

The biological bases for safeguarding space flights and life on the planets.

The forms and conditions of extra-terrestrial life.

Bearing in mind the fruitfulness of the comparative method in investigations, the authors hope that even a brief summary of the above problem will attract the attention and interest of representatives of various biological sciences, whose creative participation is indispensable for the successful development of space biology and for the solution of the problems confronting it.

External Factors of Cosmic Space

Biological investigations in space have several particularly important methodological and general-biological aspects. The contemporary terrestrial organisms in the process of evolution adapted themselves to certain conditions of existance (the influence of the gravitational field, barometric pressure, the background of ionizing radiation, etc.). Cosmic space represents a medium with characteristics sharply different from those which living organisms encounter within the limits of the earth's biosphere.

1

A negligible density of matter, the absence of molecular oxygen, the presence of intensive and biologically active radiation, and a unique temperature condition -- all these exclude the possibility of the vital activity of adequately organized representatives of the earth's organic world in outer space.

The protection of man and his possible companions -- terrestrial animals and plants -- during space flights from the unfavorable, damaging effect of external factors presents a very complicated and important biotechnological problem.

There are two circumstances requiring particular attention: the biological effect of cosmic ionizing radiation and the state of weightlessness.

The danger of the afflicting biological effect of cosmic radiation is probably one of the main obstacles in the road to mastering cosmic space.

It should be pointed out that in radiological behavior cosmic space is not uniform.

The presence of belts of heightened radiation, the intensity of which may reach magnitudes dangerous to living organisms, have been discovered around the earth. It is quite possible that radiation belts of similar or even higher intensity exist around other planets which possess a magnetic field. Moreover, it is necessary to keep in mind that in space, the intensity of radiation and its qualitative composition undergo constant fluctuations in time, depending upon many causes. Deserving special attention in this respect are the solar flares, during the course of which, the intensity of radiation may increase several times and may present a threatening danger to living organisms. At present, unfortunately, any long-range prognosis of such occurrences is difficult.

In the study of the biological effect of cosmic radiation only the first steps have been taken, and this problem requires careful study in the future. It is necessary to clarify the relative biological effectiveness and peculiarity of the action of heavy nuclei capable of causing a very high density of ionization. The subject of the combined effect of flight, as, for example, overloads and vibrations is of extreme importance. Here, can be expected variations in radiosensitivity of biological objects (in genetic functioning, for example), as well as variations in the resistance of organisms to the effect of other factors.

The discovery of areas of high-intensity radiation zones in cosmic space put before biology a number of important practical problems connected with the protection of members of the crew.

Unquestionable, the difficult problem is the protection against fluxes from the inner terrestrial radiation belt, the lower border of which lies approximately 600 km from the surface of the earth in the region of the equator.

It is possible that the correct plotting of flight trajectories, with the avoidance of the zones of high-intensity radiation will be of chief importance. However, studies concerning the devising of physical and biological means of protection are also very promising.

The state of dynamic weightlessness is justly considered one of the characteristic but little studied factors of space flight. It might be eliminated by creating an artificial gravity force on the ship. However, to what extent this is necessary, and what intensity of artificial gravity should be advised still require experimental solution.

The data obtained in the course of conducting biological experiments on the ship-satellites permit the assumption that, in itself, the state of weightlessness will not adversely affect the vital activity of organisms in the course of a twenty-four hour or even longer period of time. Furthermore, it may be hoped that at the zero time, the coordination of movements and man's orientation in space will not be impaired. But the question of whether a prolonged stay in the weightless state can change the functional condition of organism so much that the return to their normal gravitational field would prove an excessive load remains entirely open.

Furthermore, it is necessary to take into consideration the fact that the earth's gravitational field apparently exerts a definite influence upon the physiology, cellular and subcellular structures, the development of forms, and morphogenesis. It is presumed that in the primary stages of the splitting of the fertilized egg the axes of the body must be orientated in a certain manner in the gravitation field. How those processes take place under the absence of gravity, constituted [illegible] extremely interesting problem, which has important significance for the protection of future space flights.

Out of the multitude of factors, the effects of which encountered by human organisms might be during flight into space, we have dwelt only upon space radiation and weightlessness. The total list of external factors is quite broad and, furthermore, there is no assurance that it is complete. Quite possibly, further investigations of the physics of outer space and biological experiments will discover some additional, as yet unknown conditions, of space to whose biological effects we had not, until now, attributed any significance.

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R000514530006-7"

Biological Bases for Safeguarding Space Flights

In order to form a definite point of view concerning the evaluation of various means for safeguarding prolonged space flights, it is necessary to formulate the basic requirements and the initial data to which these means should correspond.

The formulation of such a point of view is rather complicated and controversial. There is no doubt that space flight will in one way or another cause some discomfort in the life of the crew, since technical facilities inevitably conflict with the very extensive and varied needs of man.

A complete solution to this problem is hardly possible. In general, however, it is now necessary to formulate a definite point of view regarding some principal problems, with the awareness that subsequent studies and the experience of actual space flights may bring essential corrections to present conceptions.

The central question determining the entire complex of life-safeguarding systems is the formation of nutritional requirement for astronauts.

We possess rather extensive data determining the optimum ratio between food substances contained in human ration. The necessary mineral composition of food has been studied in detail and the quantitative requirements of the majority of vitamins have been determined. These requirements have been established for various conditions of human occupational activity. However, not until now has it been possible to conduct studies on the basis of which the nutritional requirements suitable to the occupational activity of cosmonauts could be formulated.

The formulation of these requirements can only be tentative, and substantiated only by the consideration that we possess no direct reasons for assuming any essential peculiarities in the metabolic processes of a man who is undertaking a prolonged space journey.

Assuming that a man on a space ship performs work of low or medium intensity, one can tentatively accept as a basis the norm of nutrition developed for similar conditions and determine a tentative twenty-four hour ration for a cosmonaut in a following manner:

1. Caloricity of ration -- 3000 Kcal.
2. Food composition: a) proteins -- 110 gm, of which 63 gm are of animal derivation, b) fats -- 90 gm, c) carbohydrates -- 418 gm, d) mineral substances and vitamins -- 22 gm.
3. Water -- 2200 gm.

The nutritive composition of the daily ration may undergo some changes, particularly in regard to the ratio of fats to carbohydrates (total calority remains intact). However, until careful and thorough studies have been conducted, it is hardly possible to hope for the possibility of a substantial change in the ratio of the nutritive substances. Thus, the total weight of the daily ration should consist of 640 gm of dry weight of assimilable food substances and approximately 2200 gm of water.

Also of considerable importance to a human's well-rounded diet, are the quality of food products, their taste, features, consistency, manner of culinary preparation, etc.

A human's individual peculiarities, his habits and inclinations should not be ignored in the composition of the food ration designed for the diet of cosmonauts for many years. Under the monotonous conditions of flight with limited information and a sharp reduction of stimuli and impressions, varied and tasty food may have substantial significance in stimulating the psychic and physiological functions of the organism.

Therefore, in developing rations for safeguarding life during prolonged space flights, it is advisable to start from the necessity of making the food ration as close as possible to the optimum. Assuming that the suggested ration fully satisfies the energy losses of the cosmonaut and that during flight no continuous accumulation of body weight or substantial reorganization in the biological structure of organs and tissues take place, it is possible to calculate a human gas exchange with sufficient accuracy.

For example, for oxidation of the food substances in the ration 632.8 liters (892.25 gm) of oxygen will be required, while 566.5 liters (1121.67 gm) of carbon dioxide (respiratory coefficient 0.8951), and approximately 340 gm of water will be given off.

The above figures may undergo substantial fluctuations periodically. However, in the overall balance, arrival at after a considerable period of time, these fluctuations should level out.

For example, in order to maintain human life and work fitness during space flight, 640 gm of fully assimilable food (dry weight), 2200 gm of water, and 862 gm of oxygen will be required daily.

Consequently, in order to sustain a crew of five during a three-year cosmic journey, the weight of the supply of oxygen, water, and food should be at least 19 tons. Actually, this amount will be considerably larger on account of the weight of packing, special storage facilities, control devices, etc.

The creation of a partial or complete regenerative cycle of substances in the cabins of spaceships can substantially reduce this weight and, something very important, decrease its dependency upon the duration of the space flight. The realization of such a cycle is completely possible through the utilization of the radiant energy of the sun.

The realization of a complete regenerative cycle of water can have the greatest effect. At the same time the solution of this problem encounters a minimum of difficulty and does not require any complicated or cumbersome equipment. Fully appropriate here are various physical and physico-chemical methods (distillation under normal or reduced pressure, electrodialysis, purification by ion-exchange resins, etc.). Since the weight of a daily drinking water supply is 2200 gm per person, the advantages are obvious.

The realization of an oxygen cycle presents considerably greater difficulties. However, this problem can also be solved by applying a number of physical and biological methods.

The photolytic decomposition of carbon dioxide by hard ultraviolet on copper and other catalyzers is of unquestionable interest.

Very promising are studies in the field of electrolysis (or pyrolysis) of water, with subsequent interaction between hydrogen and carbon dioxide. Under certain conditions, as a result of this reaction, oxygen may form. The initial products of the above reaction -- carbon dioxide and water -- are the end products of metabolism, and the amount of oxygen which can be derived from them exceeds human needs. Therefore, oxygen regeneration via physical and chemical methods can take place in a closed cycle.

Unquestionably promising in this connection are studies of biochemical conversions, which take place in a large number of anaerobic bacteria, as a result of which hydrogen and carbon dioxide are absorbed and oxygen is given off.

By effecting the regeneration of oxygen in the chemically sealed cabins of spaceships, it is possible to facilitate substantially the solving of the problem of prolonged space flights, including flights to the most adjacent planets of the solar system.

This, however, is not yet the complete solution to the problem of man's autonomous existence in cosmic space, since the possible duration of space flight is limited by the supply of food aboard the spaceship.

A more complete solution of this problem lies in the realization of Tsiolkovskiy's idea concerning the creation of a closed ecological environment in the cabins of space-

ships, on interplanetary stations, and on specially erected structures on planets. The decisive link in the realization of this idea is a complete regeneration of food with fullest utilization of human vital activity products.

It is theoretically possible to imagine the possibility of solving the problem of its feeding of cosmonauts by means of the artificial synthesis of carbohydrates, fats, and aminoacids from carbon dioxide, water, ammonia, urea, and other end products of metabolism. Formaldehyde, methanol, and other substances formed upon the extraction of oxygen from water and carbon dioxide can serve as intermediate elements of the reactions.

More attractive in this respect is the method of chemical synthesis of the necessary predecessors of the basic nutritive substances and their subsequent assimilation by microorganisms or by means of other types of biosynthesis. The products of biosynthesis thus developed can easily be extracted and utilized for a balanced diet for cosmonauts.

The scientific research in this field is extraordinarily interesting and promising. It goes beyond the bounds of space biology problems and, has unquestionably broader significance.

However, the difficulties standing in the way of accomplishing this task cannot be ignored. It can hardly be presumed that the synthesis of food products from non-organic substances can be achieved in the very near future. Apparently, the most realistic way of establishing a closed cycle of substances is the method of reproduction on a small scale of the basic principles on which rests the interrelation between man and his natural environment on Earth.

The task consists chiefly of selecting from the intricate system of these naturally complex interrelations those which can be most efficiently utilized within the limited space of a spaceship cabin and those which would least reflect shortcomings and would receive the maximum effect of the advantages of space flight.

Of greatest interest in this respect is the photosynthesis of green plants, which brings about the formation of organic matter from the end products of human and animal metabolism.

At present, the attention of biologists is being drawn most of all to the utilization of the photosynthesis of unicellular algae for the regeneration of air and food. The advantages of the use of unicellular algae arise from the high coefficient of their utilization of solar energy and the possibility of achieving a relatively constant rate of accumulation of organic matter within a small volume of suspension.

providing a short vegetation period and a multiplicity of specimens which are in various stages of development.

It is also necessary to keep in mind the circumstance that practically the entire biomass of unicellular algae can be utilized for human nutrition. The technical advantages of utilizing the algae are obvious (the possibility of maximum efficient utilization of cabin space, even distribution of light, etc.).

In order to establish a nutritional system satisfying to the maximum degree the physiological needs of a human organism, it is necessary to conduct studies directed at ascertaining the possibility of including higher plants and animals in the closed regenerative cycle of substances in the cabin of a spaceship. This would make it possible to approximate, to a substantial degree, the communal ration to the natural one on earth. The solution to this problem will unquestionably require the efforts of a large number of scientific research groups, but the necessity of these studies is totally obvious.

While examining the prospects of future flights, it is impossible to avoid thinking about the problem of the possibilities of the occurrence of extreme conditions during flight and the ship's crew being subjected to some life-endangering external influence or experiencing a catastrophic insufficiency of oxygen, water, or food.

One solution to the problem might be a substantial reduction in metabolic processes, putting a man into a state close to anabiosis. The search for, and the development of, a method for a controllable state close to anabiosis or lethargy and artificially producible at any needed moment, presents a complex, interesting, and, moreover, exceptionally important practical problem.

The tasks confronting space biology cannot be solved without developing means for securing accurate information concerning indicators of the vital activity of organisms. Rapid progress in the disciplines related to space biology, such as automation, radioelectronics, cybernetics, and other branches of knowledge, creates conditions favorable for this purpose.

In contrast to studies being conducted by biologists on earth, any measurements taken during flight are linked with the necessity of transmitting the information along radiotelemetric lines. Thus, biological telemetry is the chief method of investigation and the means of controlling and receiving scientific information during space flight.

The use of radioelectronic affixes a specific stamp upon the methods and technics of biological experiments. The

principal tasks of the biologists and the engineers working in this field are the development of new pickups -- converters of physiological and biological indicators into electric ones, the development of automatically functioning systems for the operative control of any biological objects or cosmonauts during flight, and the further introduction of computer engineering for the processing of scientific data.

With an increase in the duration and range of cosmic flights in connection with the expected decrease in the capacity of radio channels, there arises the problem of the automatic processing of biological information aboard the spaceship leading the generalized results not only in the radio line, but also in the ship's control system. In connection with this, there arises the necessity of devising methods of information-coding, setting up rational algorithms for its analysis, and developing small-sized, economical, and reliable electronic digital computers which will permit the solution of radio-biological problems connected with the safeguarding of cosmic flights.

Recent brilliant successes in science and technology permit us to proceed with the planned, systematic study and mastery of cosmic space.

Forms and Conditions of Extraterrestrial Life

(Exobiology)

The study of the presence and the peculiarities of living matter and organic substances in space is included in the task of space biology.

Various hypotheses concerning the existence of living matter on celestial bodies of the solar system and the universe as a whole have received rather broad renown. Unfortunately, exact data in this respect are very limited.

The idea of a life-zone within the limits of the solar system -- the ecosphere of the sun -- appeared as a subsequent development of V.I. Vernadskiy's conception of the earth's biosphere.

From the assumption that organic life based upon carbon compounds is possible at temperatures of +800 to -70°, it is possible to single out an area of space located at a distance of 92 million to 275 million kilometers from the sun. Within this zone there are three planets: Venus, Earth, and Mars, the earth being located almost in the thermal center of the ecosphere. Its average annual temperature is approximately +14°, while that of Venus is approximately +50°, and that of Mars approximately -50°.

All attempts to solve the problem of the existence of life on Mars by means of observations from earth have encountered great difficulties. Only recently, owing to the use of infrared spectroscopy has it been possible to discover on the dark regions of the planet (the so-called "seas"), absorption spectra, considered characteristic for organic compounds of biological origin. Naturally, the direct proof of existence of life on this planet and, still more, the investigation of its properties, would become possible upon direct contact with the object of study.

Recently, fixed attention has been attracted by a study of the composition of carbonic meteorites. It has been demonstrated, that most of these meteorites are soluble in organic solvents, and that they contain a high percentage of carbon substance of the Orgeille meteorite permitted the detection of hydrocarbon, which are closely related to animal products, and the assumption of the existence of extra-terrestrial biogenic processes.

There are indications pointing to the detection of organic compounds and microscopic organisms of extra-terrestrial origin in the mass of the so-called Murry meteorite.

In evaluating such findings, reserve and caution should be exercised. At the same time, these findings deserve the closest attention and, what is most important, they point out one of the many fruitful methods of exobiologic investigations.

New possibilities in this direction are being opened by the achievements of cosmonautics and the establishment of cosmic scientific stations is in prospect. First in prospect, evidently, is an explanation of the presence in cosmic space of the simplest forms of life, the elementary biochemical processes and the substrate, those similar to what we encounter on earth as well as those different from them.

Until recently, there had been only hypotheses in this score, among which Svante Arrenius's theory of transsperry, enjoyed the greatest popularity.

Among a number of objections, two are the most serious: the damaging effect of radiation and the absence of a visible natural mechanism which could help the spores to overcome the forces of gravity.

Nevertheless, the results of laboratory experiments permit us to assume that some very resistant spore forms of microorganisms may exist in cosmic space and maintain vital activity by migrating from one celestial body to another, for example, in the composition of meteoric particles.

Extra-terrestrial microorganisms could adapt themselves to unusual conditions of free space by developing defensive

devices and a sharp reduction in or variation of forms of interaction with the environment. In connection with this, it is interesting to study the possibility of the existence of terrestrial forms of life and their ways of adaptation to the conditions on other planets. There is experimental evidence that certain anaerobic and conditionally anaerobic microorganisms are able to adapt themselves to the conditions which are presumed to exist on Mars.

An investigation of the problem concerning the extent to which these conditions are bearable for certain plants, in particular lichen and moss, would be very interesting.

It is becoming more and more evident that the conditions of cosmic space do not necessarily have to lead to the destruction of the simplest representatives of the organic world of the earth and, even less so, to the destruction of organic matter. In this connection there arises a problem of extreme theoretical and practical importance: the prevention of uncontrolled drifting of terrestrial forms of life and organic matter to other celestial bodies, as well as the drifting of unusual forms of life to the earth.

Extremely attractive to biologists will be the prospects for comparing the forms of life or biogenic products, detectable in space with those on earth. This comparison will make it possible to ascertain the nature of creation and the development of life in the universe and to confirm the unity of the laws of the development of living.

It is easy to see that the development of space biology will not only serve the aims of interplanetary travel and man's mastery of the cosmos. In the future space biology will contribute to the formation of the most general concepts of biology relating to the problems of life in general.

When we turn to cosmic space and to celestial bodies, we are offered the inexhaustible and incomparable possibility for the future utilization of the energy resources of the universe. To what degree it will prove possible and desirable to utilize the mineral resources of celestial bodies or organic forms of matter for the needs of earth and its future colonies on planets, it is needless to say, difficult to state at present.

It is evident that we shall obtain a definite answer in the course of future study and mastery of space.

Article received by editors
20 June 1961

2471 ZnD 11

GAZENKO, O. G., PARIN, V. V.

"Soviet Experiments Aimed at Investigating the Influence of the Space Night Bacteria on the Organism of Animals and Man"

Soviet Papers Presented at Plenary Meetings of Committee on Space Research (COSPAR) and Third International Space Symposium, Washington, D. C., 23 Apr - 9 May 1962

VASIL'YEV, P. V., VOSKRESENSKIY, A. D. and GAZENKO, O. G.

"Some Problems of Experimental Space Physiology"

report presented at the 13th Intl. Astronautical Federation Congress (IAF)
Varna, Bulgaria, 23-29 Sep 1962

SISAKYAN, N.M., akademik, glav. red.; CHERNIGOVSKIY, V.N., akademik, red.; PARIN, V.V., red.; LEBEDINSKIY, A.V., red.; YAZDOVSKIY, V.I., doktor med. nauk, prof., red.; GAZENKO, O.G., doktor biol. nauk, red.; GONCHAROVA, L.S., red. izd-va; POLYAKOVA, T.P., tekhn. red.

[Problems of space biology]Problemy kosmicheskoi biologii. Pod red. N.M.Sisakiana. Moskva, Izd-vo Akad. nauk SSSR. Vol.1. 1962. 461 p. (MIRA 15:10)

1. Akademiya nauk SSSR. Otdeleniye biologicheskikh nauk.
2. Deystvitel'nyy chlen Akademii meditsinskikh nauk SSSR (for Parin, Lebedinskiy).

(SPACE BIOLOGY)

SISAKYAN, N.M.; GAZENKO, O.G.; GENIN, A.M.

Problems of space biology. Probl.kosm.biol. 1:17-26 '62.
(MIRA 15:12)
(SPACE BIOLOGY)

S/030/62/000/001/003/011
B105/B101

AUTHOR: Gazenko, O. G., Doctor of Biological Sciences

TITLE: Some problems of space biology

PERIODICAL: Akademiya nauk SSSR. Vestnik, no. 1, 1962, 30-34

TEXT: The General Assembly of the Otdeleniye biologicheskikh nauk Akademii nauk SSSR (Department of Biological Sciences of the Academy of Sciences USSR) met in Moscow from 3 to 5, 1961 to discuss problems of space biology. Over 30 reports were made and three films shown. N. M. Sisakyan, V. V. Parin, V. N. Chernigovskiy, and V. I. Yazdovskiy reported on "Problems of space biology and physiology". In the report "Some general results of medical and biological experiments on cosmic earth satellites", O. G. Gazenko, A. M. Genin, and V. I. Yazdovskiy discussed the main results of the biological experiments. The following three main problems exist at present in space biology: (1) clarification of effect of extremum factors of space on living terrestrial organisms; (2) elaboration of the biological fundamentals of safeguarding space flight and life on other planets; (3) investigation of the conditions and forms of life beyond the earth.

Card 1/2

Some problems of space biology

S/030/62/000/001/003/011
B105/B101

The factors of spaceflight affecting living organism may be divided into three groups: (1) overstrain, vibrations, engine noise, weightlessness; (2) ultraviolet, infrared, and visible ranges of radiation, ionizing radiation, concentration of gas and solid matter, temperature conditions, etc.; (3) insulation, restricted space, peculiarities of the microclimate, rhythm of life, nutrition, etc. The cosmonauts Yu. A. Gagarin and G. S. Titov are mentioned. Under the effect of weightlessness, the two Soviet cosmonauts felt a change of heart beat, dizziness, and sickness. The effect of overstrain and protective measures are serious problems. Perfection of biotelemetry is of great importance for the development of space biology. Lately, methods have been elaborated, permitting to study the coordination of arbitrary movements of man and the blood supply to the brain.

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PARIN, V.V.; BAYEVSKIY, R.M.; GAZENKO, O.G.

Problems of biological telemetry. Probl.kosm.biol. 1:104-117 '62.
(MIRA 15:12)

(AEROSPACE TELEMETRY) (TELEMETER(PHYSIOLOGICAL APPARATUS))

GAZENKO, O.G.; YAZDOVSKIY, V.I.; CHERNIGOVSKIY, V.N.

Medicobiological investigations in artificial earth satellites.
Probl.kosm.biol. 1:285-289 '62. (MIRA 15:12)
(ARTIFICIAL SATELLITES) (SPACE BIOLOGY--RESEARCH)

S/865/62/001/000/015/033
E028/E185

AUTHORS: Antipov, V.V., Bayevskiy, R.M., Gazenko, O.G., Genin, A.M., Gyurdzhian, A.A., Zhukov-Verezhnikov, N.N., Zhuravlev, B.A., Karpova, L.I., Parfenov, G.P., Seryapin, A.D., Shepelev, Ye.Ya., Yazdovskiy, V.I.

TITLE: Some results of medical and biological investigations in the second and third satellites

SOURCE: Problemy kosmicheskiy biologii. v.1. Ed. by N.M.Sisakyan. Moscow, Izd-vo AN SSSR, 1962. 267-284

TEXT: The maintenance of life conditions is discussed with special reference to the second Soviet satellite. During the flight the proportion of oxygen in the air of the cabin could be maintained at 21 to 24%, whereas the relative humidity rose from 37 to 47%. The temperature ranged from 16 to 19°C. Water and food were provided together in a mixture solidified with agar, in order to facilitate automatic dispensing in conditions of weightlessness. This was carried out twice daily by command signals from Earth. Telemetric recording of the physiological parameters of the dogs Belka and Strelka during space flight showed the

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Some results of medical ...

occurrence of tachycardia as a result of acceleration, noise and vibration; there was also a rise in the respiration rate: a return to normal pre-flight values occurred during the condition of weightlessness. Movements of the animals were observed by television cameras and also by potentiometric sensors mounted in the harness. No abnormalities were observed in the behavior of the animals after return to earth or during the following 3 months. It was concluded from the experiments carried out in the second satellite that dogs could readily be accustomed to space flight conditions. Genetic changes were noted in the progeny of actinomycetes, plant seeds and fruit flies after return from space flight. The third space satellite contained two dogs (Pchelka and Mushka), two guineapigs, two rats, twenty six mice, fruit flies, seeds and other biological materials which were included in order to study the effects of cosmic radiation. The results are not described.

S/865/62/001/000/019/033
E028/E185

AUTHORS: Gazenko, O.G., and Georgiyevskiy, V.S.

TITLE: Preparation of the animal for the experiment

SOURCE: Problemy kosmicheskoy biologii. v.1. Ed. by N.M. Sisakyan. Moscow, Izd-vo AN SSSR, 1962. 321-327

TEXT: Dogs are considered to be the most suitable animals for space flight experiments; they should be cross-bred males, not more than 6 kg in weight and aged 1.5 - 6 years. The animals are first accustomed to confinement for 20 days in cages of gradually decreasing size, the final one being 54 x 41 x 20 cm. They are then adapted to existence in a hermetically sealed container 64 cm in diameter and 80 cm long containing all the equipment necessary during space flight. The procedure was used in selecting the dog Layka, which subsequently underwent a successful space flight. There are 2 figures.

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S/865/62/001/000/020/033
E028/E185

AUTHORS: Gazenko O.G., Gyurdzhian A.A., and Zakhar'yev, G.A.

TITLE: A sanitary appliance in a space capsule

SOURCE: Problemy kosmicheskoy biologii. v.1. Ed. by N.M. Sisakyan. Moscow, Izd-vo AN SSSR, 1962. 328-335

TEXT: The authors have developed a sanitary appliance to be worn by dogs during space flights. It consists of a one-piece garment of rubberized fabric adjustable by straps, with appropriate holes for the head, limbs and tail. The rear end is provided with an obturating ring which fits closely around the pelvis. A tube-like extension leads from this to a fixed tank in which the urine and faeces are collected separately. The appliance functioned satisfactorily and was well tolerated in 20-day laboratory experiments; it was subsequently used on the dog Layka during an actual space flight.
There are 6 figures.

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S/865/62/001/000/021/033
E028/E185

AUTHORS: Gazenko, O.G., and Gyurdzhian, A.A.

TITLE: Fixation of an animal in a space capsule, a fabric harness, and the arrangement of sensors for the recording of physiological functions

SOURCE: Problemy kosmicheskoy biologii. v.1. Ed. by N.M. Sisakyan. Moscow, Izd-vo AN SSSR, 1962. 336-344

TEXT: A fabric harness for affixing sensors to the body of a dog during space flight has been developed. It consists of two pieces which fit over the head and forelimbs and hindquarters respectively, and are joined by straps. A pocket in the neck piece accommodates the sensor for recording pulse rate and arterial pressure. The harness is fixed to the surroundings with chains which permit free movement of the animal while at the same time preventing traction on the sensor leads. It was well tolerated for periods of up to 20 days, and was used on the dog Layka during the second space flight.
There are 8 figures.

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BALAKHOVSKIY, I.S.; GAZENKO, O.G.; GYURDZHIAN, A.A.; GENIN, A.M.; KOTOVSKAYA, A.R.; SERYAPIN, A.D.; YAZDOVSKIY, V.I.

Results of investigations in an artificial satellite. Probl. kosm.biol. 1:359-370 '62. (MIRA 15:12)
(SPACE FLIGHT--PHYSIOLOGICAL EFFECT)

MOSKALENKO, Yu.Ye.; BAYEVSKIY, R.M.; GAZENKO, O.G.

Methods of studying blood circulation in the brain under the conditions of a changed gravitational field. Probl.kosm.biol. 1:400-404 '62. (MIRA 15:12)
, (GRAVITY--PHYSIOLOGICAL EFFECT)(BRAIN--BLOOD SUPPLY)

43808

S/216/62/000/006/002/002
A004/A127

AUTHORS: Gazenko, O.G., Limanskiy, Yu.P., Razumeyev, A.N., Izosimov, G.V., Baranov, V.I., Chichkin, V.A., Gaydamakin, N.A.

TITLE: Method of registering the action potentials of neurons of vestibular nuclei upon adequate stimulation of vestibular receptors in the cat

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya biologicheskaya, no. 6, 1962, 925 - 928

TEXT: The studies carried out were aimed at registering the action potentials of individual neurons of vestibular nuclei, particularly of the Deuters nucleus, during a motionless position of the animal and the reaction of these neurons on a stimulation of the vestibular apparatus during a vertical passive displacement of the animal. The tests were conducted on 17 cats on which action potentials of more than 500 neurons in the area of vestibular nuclei were registered. The authors describe the test conditions and the special test stand on which the animals were placed. The data obtained are being analyzed at present. Of the action potentials of 500 neurons registered, 6 groups of nerve cells were

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Method of registering the action potentials of ....

separated, which were grouped according to the following symptoms: 1) Increase in the background rhythm in stimulating the receptors - 439 cells; 2) slowing down of the background rhythm - 20; 3) increase in the background rhythm when moving the platform downwards - 14; 4) increase in the background rhythm when moving the platform upwards - 7; 5) neurons detecting the restoration of the background rhythm after motion sickness - 70; 6) neurons not detecting the restoration of the background rhythm in the period after motion sickness - 397. 51 neurons did not show any response to the stimulation of receptors. There are 2 figures.

Card 2/2

GAZENKO, O.G., doktor biologicheskikh nauk

Biologists enter space. Ilin. nat. no.11:26-28 O '62.
(MIRA 15:5)

(Space [illegible])

SISAKEAN, N.M. [Sisakyan, N.M.]; GAZENKO, O.G.; GHENIN, A.M. [Genin, A.M.]

Some problems of cosmic biology. Analele biol 16 no.2:3-11 Mr-Ap '62.

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PARIN, V.V.; GAZENKO, O.G.; YAZDOVSKIY, V.I.

Possibilities of protective adaptation of the body and the limits of adaptation in conditions of maximal overstrain and the state of weightlessness. Vest.AMN SSSR 17 no.4:76-81 '62. (MIRA 15:8)
(ADAPTATION (PHYSIOLOGY) (SPACE MEDICINE) (WEIGHTLESSNESS)

GAZENKO, O. G., doktor biologicheskikh nauk

Five days that shook the world. Nauka i zhizn' 29 no.9:2-11 S '62. (MIRA 15:10)

1. Chlen redaktsionnoy kollegii zhurnala "Nauka i zhizn'".

(Space medicine)

GAZENKO, O., doktor biologicheskikh nauk; GENIN, A., doktor biologicheskikh nauk; YAZDOVSKIY, V., doktor med.nauk

Physiological studies on "Vostok-2." Av.i kosm. 45 no.7:29-34 '62. (MIRA 15:8)

(Space perception)

GAZENKO, O. G.; RAZUMEYEV, A. N. ; PARIN, V. V.;

" Responses of the Central Nervous System on the Action of Some Factors of the Space Flight."

Report submitted for the 12th European Congress of Aviation and Space Medicine, 1-5 Oct 1963, Rome, Italy.

GAZENKO, O.G.

Soviet progress in bioastronautics.

Report to be submitted for the fourteenth International Astronautical Federation, Paris, France, 25 Sept-1 Oct 63

GAZENKO, O., doktor biolog. nauk

Space reveals its secrets. IUn. nat. no.4:18-21 Ap '63.
(MIRA 16:7)

(Astronautics) (Space biology)

GAZENKO, O.G.

AMD Nr. 972-36 21 May

EFFECTS OF AN ALTERED GRAVITATIONAL FIELD ON THE VESTIBULAR APPARATUS (USSR)

Vinnikov, Ya. A., O. G. Gazenko, L. K. Titova, and A. A. Bronshteyn. IN: Akademiya nauk SSSR. Izvestiya. Seriya biologicheskaya, no. 2, Mar-Apr 1963, 222-231.

S/216/63/000/002/003/004

Morphological and histochemical studies of the receptor cells of the utricle and the neurons of the vestibular ganglia of guinea pigs and cats were made while the animals were in a state of relative rest and after exposure to transverse radial accelerations of 1.5 G for 30 min, 3 G for 10 min, and 10 G for 3 min. Accelerations of 1.5 to 3 G caused an increase in acetylcholine esterase activity in the synapse regions and a slight decrease in the cytoplasmic RNA content of the receptor cells of the utricle. Accelerations of 10 G brought about a sharp drop in the cytoplasmic RNA content of the receptor cells of the

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AID Nr. 972-36 21 May

EFFECTS OF AN ALTERED GRAVITATIONAL FIELD [Cont'd] S/216/63/000/002/003/004

utricle and of some neurons of the vestibular ganglia, decreased the total protein and protein functional groups, and lowered the activity of oxidative enzymes in the mitochondria and the activity of acetylcholine esterase in the synapse regions. Acceleration-induced changes in RNA distribution were generally more pronounced in guinea pigs than in cats. Restoration of the amount and activity of these biochemical substances began several hours after exposure to 10 G and was complete 12 to 14 days later. [AB]

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