

Space

INTELLIGENCE NOTES

SPACE SYSTEMS INFORMATION BRANCH, GEORGE C. MARSHALL SPACE FLIGHT CENTER

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RISE OF THE SOVIET INTELLIGENTSIA. A major continuing contest for power is now being waged behind the scenes in the Soviet Union Professor Albert Parry of Colgate University said in the first of the Graduate Lecture Series at Case Institute of Technology's Strosacker Auditorium. The struggle is between "the middle leadership" or Russia's new technical intelligentsia---engineers, scientists, managers---on the one hand, and Khrushchev's "upper leadership" or professional Communist bureaucrats on the other.

Not a publicized struggle at all, the process according to Dr. Parry can be deduced from a constant and careful study of private reports being brought from Russia as well as from a thorough reading of the Soviet press. "I consider the new Soviet scientists, engineers, and technicians that country's political wave of the future," Dr. Parry stated.

He declared that these technical intelligentsia are fully conscious of their role in recent Russian successes in rockets, missiles, and other progress in science and technology. "They are resentful of the loud effort of the Communist bureaucrats to claim credit for these achievements, to ascribe these successes to the Party," Professor Parry continued.

In one way and another the technical intelligentsia show their resentment and restlessness. Some, while members of the Communist Party, use their membership to oppose the bureaucrats in the daily routine of their jobs. Others disdain to hold Communist Party membership cards, and go unpunished. The Party now needs them more than they need the Party.

Khrushchev in his well-known shrewdness is aware of the developing phenomenon. He takes measures. He tries to man the most crucial of Russia's laboratories and launching pads with young persons whom he feels he can trust more surely than others. "He has sent his own young son Sergei to work in the field of rockets and missiles," said Dr. Parry, who is the author of the book Russia's Rockets and

Missiles, published in November 1960 in New York. "He tries to safeguard his hold on the armed forces of Russia by not letting the country's younger military technicians assume high command posts."

As a case in point, Dr. Parry cited the personality of Russia's commander-in-chief of rocket forces. Until late October 1960 he was Marshal Mitrofan Nedelin, a man in his late fifties, an artillery soldier with hardly any special training in rocketry and missileery, but a staunch Communist Party member, with a seat on the Party's Central Committee.

On October 25 the Soviet government announced Nedelin's death in a plane accident, and the appointment of Marshal Kirill Moskalenko as his successor. The new marshal of rocketry has no special rocketry preparation for his new post. Now 60 years of age, Moskalenko is merely an oldtime infantry man. A Communist Party member since 1926, he was advanced in the Party's hierarchy simultaneously with his military promotions.

"A rocket expert who would be less of a Party man and more of a new-generation scientists-warrior could have been appointed by Khrushchev to this latest vacancy in Soviet rocketry, but was not," Professor Parry said. "The fact remains that Khrushchev and his Party oligarchs, while using such young military technicians intensively and skillfully, do not trust them for those top rocketry posts where they could make (or help make) policy. Hence the appointment of Moskalenko who, like Nedelin before him, is a zealous Party-line marshal, with even less of specific rocketry or other modern outer-space knowledge than the late Nedelin possessed."

Yet the tide of the new technical intelligentsia is strong and cannot be halted by Khrushchev completely. The young military rocket men, so destructed by Nikita Khrushchev, "did receive their rapid promotions recently in the Soviet armed forces," Professor Parry remarked, "despite the older generals' and marshals' displeasure and the big chief's distrust, even though these were promotions not to the top commands."

As examples of disdain shown by the technical or "middle leadership" for the bureaucrats or "upper leadership," Professor Parry cited various scornful epithets commonly used by Soviet engineers when, in their conversations, they refer to Communist functionaries.

"The Soviet press, with much indignation at engineers, reveals that a favorite term of contempt applied by them at Communist bureaucrats is plebei, that is plebeians." Parry said as for the engineers' and scientists' attitude toward the Soviet dictator himself, "one recent private report is that at least some Soviet intellectuals know the truth about the crude behavior of Nikita Khrushchev last May in Paris and last September and October in New York. Their derogatory word about him, whispered among themselves, is svinopas, or 'swineherd.' In Russian this term has far more sneer and venom than the word 'swineherd' connotes in English.

Dr. Parry concludes: "In short, there is a new aristocratic, patrician feeling among such Russian intellectuals. They know that they are already above the country's lower middle classes, and above all the classes beneath the lower middle classes. But they want to be at least on a par with the bureaucratic upper classes, and if possible above the bureaucrats, too."

Dr. Parry is Professor of Russian Civilization and Language at Colgate University in Hamilton, New York, and Chairman of Colgate's Department of Russian Studies. A regular contributor to the Washington weekly journal Missiles and Rockets, on Soviet affairs, he is noted for predictions of Russian rocketry successes made by him in the American press and in his lectures in 1953-54. Since 1958 Dr. Parry also has been a visiting lecturer and consultant at the U. S. Army War College. (News Release, Case Institute of Technology)

SOVIET SCIENTISTS LOOK TO THE FUTURE. The Soviet publication Izabretai Ratsionalizator contained a number of articles in which Soviet Scientists expressed their views on future developments in astronautics.

Professor K. P. Stanyukovich, Doctor of Technical Sciences, discusses the program outlined at the 1955 congress. He states that the original date estimated for manned exploration of Mars (1978-1985) may be considerably shortened due to the rapid progress of science.

In regard to interstellar flight, Professor Stanyukovich points out that our nearest neighbor in the heavens -- Proxima Centaura -- is 40 trillion kilometers distant, and a rocket travelling ten times the speed of an earth satellite would require ten thousand years to make the flight. The fuel demands of such a flight cannot be met even by controlled thermonuclear reaction; therefore, it will be necessary to derive the propulsive energy from external sources. He then goes on to discuss the possible application of the "anti-matter" or photon rocket in which the combination of matter with anti-matter particles results in a photon stream which is accompanied by the release of tremendous amounts of energy of a magnitude equal to 100 times that which is released in a nuclear reaction. He sites the enormous problems associated with building such a rocket due to the intense radiation involved and discusses the possibility of the discovery of a calmer but equally powerful source of radiation of electromagnetic energy.

Academician L. D. Landau and Professor Yu B. Rumer discuss the relativistic aspects of space travel such as the slowing down of time for a traveler who moves at velocities near the speed of light. They point out that the energy requirements for attaining such speeds are prohibitive as well as the time required to accelerate to such velocities. (Department of Commerce)

SOVIETS & NEW YORK PUBLISHER SIGN CONTRACT. A new contract establishing terms for exclusive English language rights to Soviet scientific books for the next six years was signed by Consultants Bureau Enterprises, Inc. and Mezhdunarodnaya Kniga, the official Soviet book export agency, in Moscow last October.

Consultants Bureau, the New York publishing house which pioneered cover-to-cover translation of Soviet scientific journals, and is today the largest publisher of English translations of Soviet scientific books and journals, has always worked closely with Soviet scientists, editors, and publishers, and particularly with Mezhdunarodnaya Kniga. Consultants Bureau will be granted the exclusive world rights in the English language to important Soviet monographs, symposia, conference proceedings, and collections, all on highly specialized scientific and technical subjects.

The new six year agreement contains automatic renewal provisions at two year intervals. Earl Coleman, publisher of Consultants Bureau, noted that not only would this contract result in much-improved communications between Soviet and American scientists, but that it is also an indication that the official Soviet book agency anticipates a prolonged period of free trade between the USSR and the United States.

This contract covering scientific books follows closely on the heels of a similar contract signed earlier last year with Mezhdunarodnaya Kniga which granted Consultants Bureau the exclusive rights to translate 23 major Soviet journals in the fields of chemistry, physics, biology, and medicine.

All books published by Consultants Bureau will in future be made available to English-speaking scientists within six months of their publication in the USSR. This rapidity of dissemination of significant Soviet research reports will be a direct result of the increased cooperation guaranteed by the new contract.

Where the importance of Soviet conferences warrants even speedier dissemination of their proceedings to the Western scientific community, Consultants Bureau will publish the English translations of these proceedings at the same time as the Russian originals appear in the USSR. The first instance of such simultaneous publication in Russian and in English occurred on October 20, 1960 with the appearance of THE STRUCTURE OF GLASS in Leningrad and in New York. (News Release, Consultants Bureau)

SOVIET NUCLEAR ENGINE. The following report on a nuclear rocket engine currently under development by Russia appeared in Space Daily: The rocket has a sea level thrust of 550,000 lb, will be able to lift off 400,000 lb and orbit 43½ tons in a 300-mile-high orbit. Liquid hydrogen will be the propellant. (Space Business Daily, February 9, 1961)

DEVELOPMENT OF COSMIC MICROBIOLOGY. The following is an abstract of the article, "Routes of Development of Cosmic Microbiology," by Prof. N. Zhukov-Verezhnikov, member of the Academy of Medical Science USSR, V. Yakovlev, and Prof. Mayskiy; Moscow, Meditinskiy Rabotnir, No. 90 (1838), 10 November 1959, pp 2-3.

The authors of this article state that the Soviet launching of three artificial earth satellites and three cosmic rockets has created a background for continued progress in all branches of scientific knowledge. New problems have arisen for biology and medicine which have brought about the emergence of new specialties.

Cosmic microbiology, one of the new specialties, consists of a study of microscopic forms of life found on planets and heavenly bodies and the utilization of microorganisms to ascertain the conditions existing in cosmic space. Information about the effect of cosmic space on physiological functions can be obtained by sending highly developed animals into outer space; the time-range limitations of cellular vitality and genetic changes can be ascertained by sending microorganisms into the celestial cosmos and keeping them there for a long time before returning them to earth. The rapid replacement of one generation of microorganisms by another makes it possible to determine the genetic effect of various factors present in outer space.

Friedrich I. Engels discussed cosmic space and the propagation of life in the cosmos in his book, The Dialectics of Nature. The panspermian theory developed by S. Arrhenius was widely discussed at that time. According to this theory, spores of microorganisms may be transferred from one planet to another. This, it was claimed, provides unity of the origin and structure of a living organism in the entire cosmos. Discussions of whether cosmic space presents a favorable climate for the propagation of life did not lead to anything definite at that time. It was theorized that the presence of ultraviolet rays beyond the limits of the earth's atmosphere and radiation in outer space do not present favorable conditions for spores of microorganisms to remain alive for a long time. The majority of scientists thought that outer space was sterile. This concept should be reconsidered in the light of new information obtained as a result of planned research.

Recent preliminary data confirm the hypothesis that it is impossible for spores of microorganisms to exist in cosmic space for a long period. Without experimental verification it is premature to accept that data as conclusive. It is known that the short-wave portion of ultraviolet radiation of the sun can destroy vegetative forms of bacteria and spores very quickly if they are not protected. The thin membrane surrounding the spores possibly protects them properly from ultraviolet rays. Spores were obtained from samples gathered at high altitudes with the aid of probing balloons; however, the data are not sufficient to justify conjecture that spores of microorganisms could escape the effects of ultraviolet and cosmic rays.

Data obtained with the aid of artificial earth satellites show that in the area beyond the limits of the earth's atmosphere, one or two cosmic particles fall per second per square centimeter. These cosmic particles have energy between 10^9 and 10^{18} ev. There are two zones of rising radiation above the earth. One zone contains 10,000 particles per second per square centimeter with energy of 10^6 ev (due mainly to protons); the other zone contains from 10,000 to 100,000 particles per second per square centimeter with energy between 10 Kev and 100 Kev (due mainly to protons [sic.])*. Above these two zones, within the area of cosmic space surveyed, the level of radiation is generally not very great.

The primary task is to obtain material from cosmic space, beyond the limits of the earth's atmosphere, to subject it to chemical and biological analysis.

It is generally recognized that conditions present on Mars and Venus justify the assumption that microorganisms exist there. The situation on the moon is different. A. I. Oparin and V. G. Fesenkov state in their book, Zhizn' vo Vselennoy, (Life in the Universe), that no sufficient evidence has been found to indicate the possibility of the presence of some kind of life on the moon. The absence of an atmosphere and sharp fluctuations in temperature on the moon seem to exclude the possibility of life thereon. However, attempts should be made at some future time to investigate the moon's surface and the lunar strata. It is hypothesized that because of the absence of an atmosphere on the moon, particles from cosmic space are continually deposited on its surface. This lunar dust is of considerable interest to biologists inasmuch as its strata may characterize the proximate history of the chemical compounds in the solar system in the same way as geological formations characterize the history of the earth. Chemical examination of lunar dust for the purpose of isolating organic substances and direct attempts to find spores may contribute greatly to the study of life in cosmic space.

It is known that certain bacteria may exist in water at a temperature near the boiling point. In addition, many of them survive deep freezing as well as extensive changes in pressure. The protoplasm of some species of bacteria (anaerobes) is formed of the minimum amount of material; these do not need oxygen for respiration. Further study of the extreme conditions under which microorganisms live is very important. It should be noted that data about resistance of microorganisms to high and low temperatures, high pressure, etc. were obtained mainly by accident during searches for something else. No doubt, special experiments will result in the discovery of more resistant varieties of microorganisms.

*Pioneer III & IV data indicated that the inner belt is due mainly to protons (25-100 Mev) and the outer belt is due mainly to electrons (5-50 Kev).

The question of whether life evolved in conformity with an established rule or on the basis of chance phenomena has been widely discussed. Two clear lines of demarcation have been drawn. According to Michurin, organisms develop on the basis of definite laws, and chance plays the same part as in other forms of the development of matter. The other theory is that proposed by Weisman and Morgan, according to which modern species originated exclusively as a result of chance mutations with subsequent natural selection.

Experimental investigation of the question of the existence of life on other planets may produce new data to aid the solution of this old controversy. If the theory of Weisman and Morgan were followed, recognition of the fact that the chemical composition of microorganisms on other planets must be radiacally different from the chemical composition of the protein and nucleic acid of microorganisms on earth would be necessary because unity of structure could not have been achieved as a result of chance mutations. From the Michurin viewpoint, the chemical structure of the protein and nucleic acid of extraterrestrial and terrestrial microorganisms must be basically the same, because the laws of the development of living matter are the same on earth as on other planets.

D. Lederberg, a well-known American bacteriologist, stated that investigations of life on various planets will solve the question of whether evolution is divergent or convergent, i.e. whether or not unity in structure of organisms is secured by actual community of origin. The exploration of the cosmic space will provide new data to enrich our knowledge of the nature of the evolutionary process.

The reasons for sterilization of the second Soviet cosmic rocket were well publicized. The entry of terrestrial microorganisms would have caused doubt in later investigations about the origin of forms of life which may exist on the moon. It is doubtful that terrestrial microorganisms can displace the local forms, because local forms are better adapted to their environmental habitat than those brought from outside. A. A. Imshenetskiy pointed out that such a possibility should not be excluded.

Consideration must be given not only to avoiding the infliction of damage to probable inhabitants of other planets, but also to preventing alien microorganisms from invading the earth. Future experiments must consider the automatic disinfection of instruments and other equipment returning to earth from other planets.

To solve the problem of whether man's sojourn in outer space will cause organic changes which might reflect on his progeny, an index of genetic pathogenicity of secondary radiation present in various areas of cosmic space must be found. This cannot be accomplished by measuring radiation alone or by using physical devices and interpreting data recorded by them. Science does not have at its disposal devices which function continually and which accumulate information about all cosmic particles.

It is possible that living cells will be able to play the unique role of a "counter of particles." Information about the origin of particles will accumulate within this "counter" and may consequently be detected by computation of the number of cells changed through inheritance in comparison with those cells which have not been exposed to radiation. This peculiarity of living cells and the capacity of microbial cells to replace one generation with another within a comparatively short time make microorganisms irreplaceable in the effort to clarify the genetic hazards of cosmic rays.

It is entirely feasible to have microorganisms sent up in an artificial earth satellite. Species of microorganisms which can be used most conveniently as "bioelements" must be selected, special instruments must be devised, etc. Scientists of various specialties must take part in this work.

The problem of cosmic rays that reach the earth remains unsolved. The question of fluctuations in the level of radiation on the surface of the earth is significant in the study of the origin of hereditary diseases and other forms of genetic changes: microorganisms are also useful here as genetic indicators. (Central Intelligence Agency - Scientific Information Report; Distributed by U. S. Department of Commerce, Office of Technical Services.)

DANGER OF RADIATION SICKNESS REVIEWED, HOPES FOR CURE REVIVED. The following is an abstract of an unsigned article which appeared in Tekhnika Molodezhi No. 9, Moscow, September 1959, pp 32-34.

This article compares the effects of radiation to those of an "invisible flame" but states that they are much more horrible because of its prolonged course and because radiation sequelae appear even in the remote progeny of the irradiated victims.

The treatment of the six Yugoslav scientists who were the victims of a nuclear reactor accident is reviewed and certain passages from their diary are quoted. The seriousness of radiation sickness is explained as essentially due to the fact that radiation damages the bone marrow capacity for blood regeneration, and the body reserves of red blood corpuscles are depleted in 4 months, whereas the white corpuscles are depleted in about 9 days at which time death results.

Great significance is attributed to the experiments involving bone marrow transplanation from healthy rats into irradiated mice, and from healthy mice into irradiated rats, i.e., successful bone marrow transplantation not only between different individuals, but also between different species. This fact is significant in that although radiation exerts a lethal effect on an organism, it provides a miraculous method of treating its victims. Furthermore, the experiments conducted at the Scientific Research Laboratory of the Louvain Cancer Institute, Belgium,

indicate that rats irradiated during intrauterine life are less sensitive to radiation than normal, unirradiated rats of the same age. If this is confirmed, and there is much research on this subject, it seems that a possibility for obtaining "something like a preventive inoculation against radiation" has been discovered.

The article describes a case which occurred in April 1959 in Alma-Ata; a 10th grader, Valeriy Opalko, was afflicted suddenly by leukemia and received bone marrow transplantations from five volunteers of his class. V. M. Pilat performed the successful operations, and the life of the youth was saved.

Several photographs of people and tissues subjected to radiation effects and one photograph of remote control weighing of radioactive materials are included. (Central Intelligence Agency - Scientific Information Report; Distributed by U. S. Department of Commerce, Office of Technical Services.)

INTELLIGENCE BRIEFS:

Since the information blackout concerning the latest two Russian space shots, there has been speculation about them and some rebuttal from the Soviets.

Western scientists advanced the theory that the big Russian satellite sent up on February 4 was part of a Russian man-in-space program. But Soviet space scientist Leonid I. Sedov says the Russian satellite contained "no special equipment for scientific study of outer space, nor were there any experimental animals. It was the first time that such a ship was launched and the aim was purely experimental...the rumors which have been spread abroad to the effect that there is a human being in this satellite do not accord with reality."

After the Soviet Venus probe was launched on February 12, more theories were developed to connect the February 4 shot directly with the one made on February 12. One theory is that the latter launching was a backup shot for the one occurring eight days earlier. Here the assumption is made that the first attempt to fire a Venus probe from Earth orbit either failed because of mechanical or electronic malfunction or because characteristics of the orbit attained were not favorable.

Another theory suggests the possibility that the first satellite was placed in orbit for the purpose of serving as a communications relay for high-speed radio transmission of data from the Venus probe.