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# Space INTELLIGENCE NOTES

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



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*FEATURED ARTICLES*

KELDYSH NEW CHIEF OF SOVIET SCIENCE ACADEMY Replacing Aleksandr N. Nesmeyanov as President of the USSR Academy of Sciences is Professor Matislav V. Keldysh. Described as a leading expert in space mathemati and aerodynamics, he was formerly Vice-President of the Academy and holds Stalin science prizes and Order of Lenin medals.

The change came shortly after the establishment of the new State Committee of Scientific Research Work (see May issue of SIN), so there may be a connection between the two events. Nesmeyanov had been President of the Academy since 1951 and, according to Tass, resigned of his own will in anticipation of the expiration of his term of offic The facts that Keldysh is a relatively young man (50) and that greater Academy emphasis is now being placed on the practical applications of science together indicate that Nesmeyanov's resignation may forecast a organizational shakeup. This view is strengthened by the support Keldysch has given to Khruschev's desires to revamp many of the Academy's activities. (New York Times, May 20, 1961)

SOVIET METEOROLOGICAL SATELLITES IN OFFING? In a Tass interview Professor Georgi I. Pokrovskii stated that it would be "expedient to create....a system of man-made satellites...." around the Earth at differing altitudes to undertake weather studies.

VOSTOK The following details on the Vostok manned satellite have been adapted from a translation of articles in Izvestiya and Sovetskaya Rossiya of 25 April and 30 April 1961, respectively: Components and systems were checked out and perfected on the first five spaceship-satellites (Kosmicheskij Korabl-Sputniks) which contributed greatly to the establishment of Vostok in orbit and the solution of flight control problems required for manned travel and recovery. The fourth and fifth spaceship-satellites each carried a dummy in the pilot's seat and were considered control launchings for the Vostok. In addition, the experimental dogs Chernushka and Zvezdochka were in the cabin during the flight, and were recovered. See flight firing summary.

Two Methods Tested Two possible methods of recovering an astronaut from space were investigated. The first method involved landing in the cabin and was tested in the fourth and fifth spaceship-satellite experiments. The pilot's seat was catapulted from the cabin at an altitude of about seven kilometers and landing by parachute was also tested in previous landings. (For example, the container with the dogs Belka and Strelka aboard was recovered by this method.)

## KOSMICHESKIJ KORABL-SPUTNIK FLIGHTS

| Name | Launch Date | Weight, lb* | Initial Perigee Miles | Initial Apogee Miles | Comments |
|---|---|---|---|---|---|
| Kosmicheskij Korabl-Sputnik 1 | 15 May 60 | 10,008 | 188 | 228** | No recovery due to breakdown in satellite's orientation system (retro-rockets fired 180° out of phase). |
| Kosmicheskij Korabl-Sputnik 2 | 19 Aug 60 | 10,120 | 190 | 210 | Reentry capsule recovered with animals, including two dogs, Strelka and Belka. |
| Kosmicheskij Korabl-Sputnik 3 | 1 Dec 60 | 10,060 | 116 | 164 | No recovery (two dogs, Pcholka and Mushka, and other animals aboard). |
| Kosmicheskij Korabl-Sputnik 4 | 9 Mar 61 | 10,363.5 | 105 | 155.5 | Payload contained a dog (Chernushka) and other biological specimens that were recovered successfully from the reentry capsule. |
| Kosmicheskij Korabl-Sputnik 5 | 25 Mar 61 | 10,352 | 111 | 154 | Payload, with dog (Zvezdochka) and other biological subjects, recovered. |
| | | --- | --- | | |
| Vostok 1 | 12 Apr 61 | 10,418 | 108.76 | 203 | Pilot recovered in capsule after 1 hr 48 min flight. |

*Not including last stage of carrier vehicle.

**Increased to 430 after retrorockets fired.

Note: This summary supersedes that given in the April SIN; later information indicates that the Korabl-Sputnik designations are only used for animal-carrying satellites. The 4 Feb 1961 firing becomes Sputnik 4 and the 12 Feb 61 firing, from which the Venus probe was launched, Sputnik 5.

Orientation in Space The problem of orienting Vostok in space could be accomplished either by an automatic sun-seeking system or by the pilot. The former means insures the appropriate turning of the vehicle to accurately maintain the required position. The sensing units of the system consist of a number of optical and gyro devices. In the alternate case of manual control, the astronaut uses an optical orientor for determining the position of the ship with respect to the Earth.

Cabin Equipment The housing of the Vostok's cabin has three portholes and two fast-opening hatches. Made of heat-resistant glass, the portholes are designed for visual observation during the entire flight. An optical orientor mounted on one of the portholes consists of two ring-shaped mirror reflectors, a light filter, and glass with a grid. The rays coming from the line of the horizon strike the first reflector, then pass through the porthole glass to the second reflector, which directs them through the glass with the grid to the astronaut's eye.

When the ship is correctly oriented vertically, the astronaut sees an image of the horizon in the form of a ring and observes the section of the Earth's surface below through the center part of the porthole. The position of the long axis of the spaceship-satellite relative to the flight direction is determined by observation of the movement of the Earth's surface in the visual field as seen from the porthole.

Manual Control Using the manual control devices, the astronaut may turn the vehicle so that the line of the horizon is visible in the orientor in the form of a concentric ring and the direction of movement of the Earth's surface coincides with the course line of the grid. This indicates the correct vehicle orientation. If necessary, the visual field of the orientor can be covered with a light filter or a blind. A globe located on the instrument panel makes it possible to determine, along with the current location of the ship, its landing place when the deceleration engine is started at the appropriate time.

Backup Deceleration System The structure of the Vostok makes recovery possible by using the natural resistance of the atmosphere should the decelerating system fail. The supplies of food, water, and regeneration material and the capacity of the power sources are calculated for up to 10 days of flight. Precautionary measures are provided in the structure of the ship to prevent a cabin temperature increase beyond the rated limit during the prolonged surface heating caused by the gradual deceleration in the atmosphere.

ROCKET PLANES AND COSMOPLANES Requirements which may be considered important for manned flight are outlined. Piloted spacecraft are divided into two categories: "rocket planes" (for near-Earth missions) and "cosmoplanes" (for interplanetary missions). Gagarin's Vostok vehicle is described as the "prototype of the rocket plane of the future".

Rocket planes can be put into satellite orbit or near-satellite orbit; they can change their orbits, maneuver, glide, and land in a predetermined area. Interplanetary cosmoplanes, requiring a maximum speed exceeding 11.2 km/sec, are a further development of rocket planes.

Pilots Considered Important The presence of a pilot in a rocket plane is considered important since manual correction of possible flight deviations simplifies the guidance system. A spherical "antioverload capsule" mounted transversely on two semiaxles could protect the astronaut against acceleration forces. The capsule could rotate 360° with a displaced center of gravity to insure constant orientation for the chest-to-back action of the accelerating force.

Reentry Problem The reentry problem may be approached in several ways For instance, an attitude control system is actuated first. Deceleration engines operate briefly only in the initial stage of descent; further deceleration is achieved by utilizing the resistance of the atmosphere. Overheating of the vehicle is prevented by the use of high melting materials or by forced cooling of the shell. In the lower layers of the atmosphere, speed is reduced by special parachute systems An alternate method of descent would be by gliding, diving in and out of the denser atmosphere for cooling, and then landing at a specific airfield.

Navigational Equipment With regard to navigational equipment for a spaceship, a dual control system is recommended where aerodynamic sensors of the flight parameters would be used only at altitudes ranging up to 40-60 kilometers. In the upper layers of the atmosphere, independent inertial guidance would take over. The astronaut would be able to control the vehicle's position through a display system of horizontal and converging lines, changes in the configuration of which would indicate any changes in the ship's position and speed. Vehicle orientation in relation to the Earth would be shown by a map projected on a screen. An analog computer would operate a system so that the map would constantly move in accordance with the actual flight route. Thus, the exact position of the rocket plane would be seen at all time: The same principle may be used for a display of stellar configurations.

Space Cabin Illumination Other aspects of space flight discussed are infrared guidance, time measurements, and auxiliary equipment. For illumination of the space cabin and the instrument panel a fluctuating light with definite and specific relationships between on and off periods is recommended. (Adapted from Ekonomicheskaya Gazeta, April 16, 1961.)

The accompanying table provides a list of the firings of the five spaceship-satellites launched prior to the orbiting of Vostok, followed by Vostok 1 data.

NO CAMERAS ABOARD VOSTOK Gagarin reported that no cameras were aboard the Vostok and consequently "no pictures were taken".

AND NO PRIOR FLIGHT TRAINING IN MISSILES In answering questions about his training for the Vostok flight, Gagarin said that he had never been aboard ballistic missiles. He stated that after he was selected to make the flight he was given "plenty of time for preparation and training". As for eating in orbit, the cosmonaut stated he was provided with a "special food developed by the Academy of Medical Sciences". He lost no weight during the flight, stepping out at 69.5 kilograms.

GAGARIN'S PULSE RATE In mid-April A. N. Nesmeyanov reported that the night before the Vostok flight "Youri Gagarin took a sedative and slept well until he was awakened several hours before take-off time. His pulse was 70 to 75 (beats) per minute during the entire period of preparation for the flight and after the launching of the rocket". This contrasts with a later report arising from a general meeting of the Soviet Academy of Sciences which revealed that Gagarin's pulse rose to 158 beats a minute during the period of maximum acceleration after take-off. Moreover, a pulse of 109 was recorded three minutes before take-off due to "slight emotional tension".

COMMUNICATIONS FROM VOSTOK Like Shepard in the Mercury capsule, Gagarin was able to maintain voice communications during his flight into space, even during the period of high 'g' forces, vibration and noise. He was able to broadcast information about his own state of being and about "the operation of the systems inside the cabin of the spaceship". He had the same sort of impressions as Shepard on leaving the atmosphere: "It is indescribably beautiful".

YOURI GAGARIN ON SPACE FLIGHT The following words were given in a speech by Gagarin and translated by J. L. Zygielbaum in JPL Document No. 22:

"Many people are interested in my biography. I have read in the newspapers that some irresponsible persons in the United States of America, who are distant relatives of the Gagarin nobility, consider that I am one of their offsprings. I will have to disillusion them. They have acted very stupidly. I am a simple Soviet man. I was born March 9, 1934 to the family of a peasant. The place of my birth was in the Smolensk region. There were no princes or nobility in my family tree. Before the revolution my parents were poor peasants. The older generation of my family, my grandfather and grandmother, were also poor peasants, and there were no princes or counts in our family. Therefore, I will be forced to disillusion my self-appointed relatives in America.

"I attended grade school, then a manual school in Lyubertsy near Moscow. After that, I went to the Saratov Industrial Technicum to become a smelting designer.

"However, my oldest dream was to become a pilot. At the time of my graduation from that technicum in 1955, I simultaneously completed studies at the Saratov Aeroclub. I was next accepted to the Orenburg Aviation School, from which I graduated in 1957 and was granted the title of Air Force Fighter Pilot. I served with one of the branches of the Soviet Armed Forces.

"At my own request, I was accepted as a candidate to become a cosmonaut of the Soviet Union. As you can see, after the selection I became a cosmonaut.

"I passed through a proper preparation period which was designed by our scientists. This was described in detail by the president of our Academy of Sciences. I successfully passed all preparations, learned the necessary technique and was ready for a cosmic flight.

"I am very happy and immensely thankful to our party and our government, for entrusting me with this flight. I have completed this flight in the name of our Fatherland, in the name of the great Soviet people, and the communist party of the Soviet Union.

"Before the flight I was in good health and felt very well. I had complete assurance in the success of this flight. Our technique is very reliable and I, as well as all my comrades, scientists, engineers, and technicians did not doubt for a minute its successful completion.

"My state-of-being during the flight was superb. During the active portion, when the spaceship was injected into orbit, the effects of gravitation, vibration and noise, as well as other factors of the cosmic flight, did not have any bearing on my condition. I was able to work productively in accordance with the program which was assigned for this flight. After injection into orbit, when the carrier rocket was separated, a state of weightlessness began. In the beginning this feeling was somewhat unpleasant, in spite of the fact that, before the flight, I was subjected to short periods of weightlessness. However, it didn't take long at all, and as I became used to this condition, I continued to carry out the program.

"In my own opinion, the effect of weightlessness has no influence on the normal state of the organism and on the physiological functions of a human organism.

"During the flight, I ate and drank water, maintaining a continuous radio contact with the Earth over several channels, as well as over the telephone and telegraph. I observed the surrounding area, I followed the operation of the installations aboard the spaceship, I reported to Earth and recorded observations and other data in my log book as well as on a tape recorder. My state of being during the entire period of weightlessness was superb.

"Then, in accordance with the flight program the command was given for descent. The spaceship was automatically adjusted, the braking installation was activated and the speed of flight began to decrease. The ship landed safely, and it gave me great pleasure to meet immediately my own Soviet people. The landing took place at a preselected area in our country.

"I would like to tell you a little bit about what I observed.

"The view of the Earth from an altitude of 175 to 300 km is very sharp. The Earth's surface looks approximately the same as seen from a high-flying jet plane. Clearly distinctive are large mountain ranges, large rivers, large forest areas, shorelines, and islands.

"The clouds which cover the Earth's surface are very visible, and their shadow on the Earth can be seen distinctly. The color of the sky is completely black. The stars on this black background seem to be somewhat brighter and clearer. The Earth is surrounded by a characteristic blue halo. This halo is particularly visible at the horizon. From a light-blue coloring, the sky blends into a beautiful deep blue, then dark blue, violet, and finally complete black.

"When I left the Earth's shadow, the Sun's rays penetrated the Earth's atmosphere. At this point, the Earth's horizon was dark blue, violet, and finally black.

"The transition into the Earth's shadow took place very rapidly. Darkness comes instantly and nothing can be seen. Obviously, the spaceship passed over the ocean during this period of time. If the spaceship would have passed over large cities, then I would have probably been able to see the lights of those cities. The stars were well visible.

"The exit from the Earth's shadow is also rapid and sharp.

"Because I was prepared for it, the influence of the cosmic flight factors were endured very well. Now I feel excellent.

"I would like to praise here our Soviet designers, engineers and technicians, as well as the entire Soviet nation, for creating the remarkable spaceship "Vostok", its remarkable equipment and the powerful carrier rocket which has placed such a huge spaceship in orbit.

"I am immensely glad that my beloved fatherland was the first in histor to penetrate the cosmos. The first airplane, the first satellite, the firs cosmic spaceship, and the first manned flight into space, these are the stages on the great road of my fatherland toward the conquest of the mysteries of nature.

"We plan to fly some more and intend to conquer cosmic space as it should be done.

"Personally, I would like to fly some more into space. I like flying. My biggest wish is to fly toward Venus, toward Mars, which is really flying."

VOSTOK LAUNCHING AND LANDING SITES On 31 May 1961 Col. Lebedev, Assistant Air Attaché of the Soviet Embassy in Paris, announced that Vostok was launched from a "Cosmodrone" at Baikonus near the Aral Sea by a large six-engine space carrier vehicle developing 20,000,000 hp. After a 108 minute flight which brought the satellite to a 203 mile altitude, Vostok landed in a field near Smelouka, 400 miles southeast of Moscow. Note: a 187.6 mile altitude had been previously reported.

## SUN

Gammas from the Sun In an article from the USSR-Astronomical Journal (Sept-Oct 1960) by I. M. Gordon several arguments are given in favor of the assumption that $\gamma$-emission (which was observed in a flare during balloon observations over Cuba) is due to two-photon annihilation of positrons generated as a result of nuclear collisions of cosmic protons, generated during chromospheric flares. Another possible source of $\gamma$-emission is the reverse Compton effect. It is pointed out that if the annihilation supposition is correct, $\gamma$-emission should have a step at $E \sim 5 \cdot 10^5$ eV. Measurements made by means of balloons and artificial satellites should give a possibility of choosing between these two hypotheses. If the step in question is observed, the process of formation of neutrons and deuterons during flares will be detected, and a conclusion obtained that a synthesis of chemical elements is taking place there. The measurements of the intensity of $\gamma$-emission will permit a quantitative estimate of the efficiency of this mechanism.

Excitation of Hydrogen Also in this issue is an article by G. S. Ivanov-Kholodnyy, G. M. Nicolskiy and R. A. Gulayev of the Institue of Applied Geophysics, Academy of Sciences, and Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation, on the lowering of the ionization continuum in an ion electric field. Expressions for the number of events per second in a hydrogen plasma are obtained for: (1) charge exchange, (2) ionization by electron collision and by radiation, (3) total photorecombination on all levels, and (4) recombination by three body collisions. The relative role of these processes for ground and high levels is estimated.

## MERCURY

Hungarians Photograph Transit of Mercury Across Sun On 7 November 1960 the Urania Observatory in Budapest made four telephotographs of Mercury's transit across the disc of the Sun. The observatory also sent photographers aloft to record this phenomenon. The photographers used planes loaned by the Hungarian Home Defense Sport Federation and took 2,700 aerial photographs from an altitude of 4,400 meters. (Nepszabadsag, 9 November 1960)

VENUS

Hungarian Space Expert Gives Data on Venus Rocket In an address to industrial apprentices and young communists, given in Budapest on 15 February 1961, Jozsef Sinka, Secretary of the Space Travel Committee (Urhajozasi Bizottsag), said that the Venus rocket launched by the Soviet Union was originally a five-stage rocket, weighing about 800 tons, about 75 meters tall, 4.5 to 5 meters in diameter, and consisting of 180,000 to 200,000 component parts. The first three stages were used to place the assembly in orbit. ("Why Was the Soviet Union Able to Surpass the United States So Greatly in Space Research," by Jozsef Sinka, Secretary of the Space Travel Committee; Budapest, Ifju Kommunista, Vol. V, No. 3, March 1961, pp. 29-33)

Secretary of Astronautics Section in Hungary Discusses Soviet Venus Probe In an article on the Soviet Venus probe, Erno Nagy, Secretary of the Astronautics Section of the Federation of Technical and Scientific Associations, discusses the timing of the launching, rate of rocket acceleration, ultimate speed, course, shape of orbit, and probable fate of the probe. Then, speaking specifically of the carrier rocket of the probe he says:

"Now we would like to say a few things which have probably not been published so far about the carrier rocket of the Venus rocket: the launching of the Venus rocket made use of an entirely new procedure. The space rocket was first put into the orbit of an artificial satellite, and it continued on its way to Venus from this orbit. It is easy to calculate that if the intent had been to set the entire 642-kilogram cosmic laboratory on its course in one continuous launching, a four or five-stage rocket at the very least would have been required. The number of stages is no obstacle; both the Soviet Union and the US have launched rockets of such complexity.

"The two-phase launching was the result of an ingenious concept in guidance technology. If the five-stage carrier rocket had taken the space rocket directly to its ultimate course, then the deviations from the prescribed course of each stage would have been transmitted to the subsequent stage and compounded in such a way that the fifth stage would have had little chance of being on course. Putting the Venus rocket first into an artificial satellite orbit made it possible to measure the actual performance data of the first three stages with great accuracy and to compare them with the theoretical precalculated data. One can say that after the first three stages had been fired, the Soviet rocket engineers were able 'to balance their accounts' on the orbit of Sputnik 5 and on this basis determine to what extent the first three stages together had deviated from the prescribed course.

"These actual data were then fed into electronic computers, and on this basis, the future course of the rocket was calculated and the exact time when the space rocket could leave the orbit of the Sputnik was established. The time for resumption of flight had to be selected in such a manner that most of the velocity of the Sputnik would be transmitted to the space rocket. It was also necessary that said rocket, together with its booster rocket, should be in such a position that the end of the second period of acceleration would leave it on the precalculated course toward Venus." ("Towards the Mysterious Planet," by Erno Nagy; Budapest, Technika, Vol. V, No. 3, pp. 1-11)

Venus Probe Radio Contact Various explanations as to why radio contact was lost with the Venus probe in late February have been given in Soviet publications: (1) The vehicle suffered meteoritic damage, (2) radio signals were too weak to penetrate Earth's atmosphere, and (3) charged solar particles enroute may have screened off the signals. Not mentioned was the possibility that radio contact was deliberately cut off. On May 20th unidentified signals were received by the Jodrell Bank radio telescope on a frequency that was employed in the Venus probe. No immediate confirmation was forthcoming, but the Russians did say that the probe was fitted with a reserve communication system which was to begin transmission as Venus was approached. Tape recordings of the signals were sent to Moscow for analysis.

Rotation of Venus By carefully analyzing radar returns from Venus, Soviet scientists Vladimir Kotelnikov and Isoif Shklovskij of the Academy of Sciences have determined the planet's period of rotation to be either 9 or 11 days; the former would be the true period if Venus' axis is inclined as predicted by Kuiper, whereas the latter would occur if the axis is perpendicular to the Earth-Venus line. Heretofore no accurate information has been available on the rotation rate because of the inability of astronomers to see through to the solid surface with optical equipment. It is reported that different parts of Venus reflect radar waves differently, suggesting an uneven surface.

The Radius of Venus The analysis of observations of the occultation of Regulus by Venus on 7 July 1959 confirms the value of the radius of Venus 8".41 ($\Delta$ = 1 A.U.), derived from the transit of Venus across the solar disk. Thereby, the ambiguity of data on the dimensions of Venus given in scientific literature is eliminated. The linear radius of the planet is 6,100 $\pm$ 34 km. Besides, the corrections to the ephemeris position of Venus at the epoch of occultation are determined with great precision: $\Delta\alpha = +0^s.044$; $\Delta\delta = -0".60$. (From a report by D. YaMartynov, State Astronomical Institute Imeni Shternberg, Moscow, Astronomicheskiy Zhurnal, Vol. 37 No. 5, Sept-Oct 1960.)

On the Distant Planet Venus Professor I. Shklovskiy, in an article entitled "On the Distant Planet Venus," (Izvestiya on 14 February 1961), concentrates on the point that we are about to get our closest look at another planet, and one of the least known. He reviews the little we know about Venus and describes how difficult it has been and how long it has taken to assemble these few facts. He discusses the planet's atmosphere and mentions the recent detection of nightglow, molecular nitrogen, and traces of water vapor. He mentions the recent contributions made by radioastronomy, especially the observations made by A. D. Kuz'min and A. Ye. Salomonovich with the 22-meter radiotelescope of the Physical Institute of the Academy of Sciences of the USSR. He explains the importance of the ability of radiowaves to pass through the dense clouds that shroud Venus. This method has made it possible to estimate surface temperatures as being as high as 300° Celsius. It has been assumed that the greater part of the atmosphere below the cloud layers consists of carbon dioxide. Atmospheric pressures at the surface on Venus are approximately five times greater than on Earth. With a pressure of about five atmospheres and a temperature of 300° or more, the author feels there is no possibility of there being a sea on the surface of that planet. (Compare this with article below.) Venus, he concludes, is a gloomy world -- red hot rocks, a complete absence of water bodies, an atmosphere of carbon dioxide, and a continuous cover of clouds blocking off light from the Sun and stars.

Davydov On Venus V. Davydov, Scientific Secretary of the State Astronomical Institute im. P. K. Shternberg, writing in Ekonomicheskaya Gazeta, covers much of the same material presented by Shklovskiy. However, he quotes the well known Soviet astronomer N. P. Barabashov, Academician of the Academy of Sciences of the Ukrainian SSR, as believing that the entire surface of Venus is covered by a thick layer of water. His theory is that the great content of carbon dioxide in the atmosphere of Venus can only be explained by the fact that the atmosphere is insulated from the solid surface; if it were not, the carbon dioxide would be used up in the process of converting silicates to carbonates. The ocean on Venus does not boil because of the high pressures prevailing on that planet. He quotes Professor V. V. Sharonov as believing that the cloud cover on Venus is many tens of kilometers above the surface.

Venus Studies

In earlier spectral studies, Professor N. A. Kozyrev noted the existence of ashen light from Venus and attributed the phenomenon to the destructive effect of strong solar radiation on the gas molecules in the rarefied atmospheric layers during the day followed by the rebuilding of molecules at night, resulting in the emission of light energy. Spectral confirmation of the presence of hydrogen, oxygen, and water vapor has led Kozyrev to postulate the existence of life on Venus.

Recent radiotelescope recordings of temperatures up to 250°C do not invalidate this assumption, according to Kozyrev, who believes that the bulk of this solar energy is dispersed into outer space by the planet's dense atmosphere and that the temperatures at the surface remain at about 30-50°C. (Krasnaya zvezda, 26 Mar 1961)

Astronomers of the Crimean Observatory under the direction of A. B. Severnyy and V. K. Prokof'yev have been able to obtain a luminosity spectrum of the Venus crescent 4 m in length. The spectrum will increase knowledge of the composition of the Venusian atmosphere since it will aid in detecting even slight absorptions of sunlight by the gases in the upper layers of the planet's atmosphere. (Komsomol'skaya pravda, 2 April 1961)

MARS

Astronomical Coincidence Sheds New Light on Mars A recent Soviet report by S. N. Sredinsk indicates that a coincidence of solar altitude was discovered on Mars and Earth in 1954; this coincidence was fully exploited for scientific purposes. It was apparent that identical seasonal phenomena were occurring almost simultaneously on both planets. The observations described in this article tend to confirm the existence of a vegetative cover on Mars. This was done by correlating the altitude of the Sun and changes in the coloring of the surface for both planets. The "ice caps" of Mars are subjected to a similar analysis. The study suggests a similarity of physical conditions on Mars and on Earth. (Minsk Division of the All-Union Astrogeodetic Society, Priroda No. 12, 1960)

Addition to Soviet Literature on Mars A book on Mars was published in 1959 by the Astronomical Council of the Academy of Sciences, Commission on Physics of the Planets, Moscow. Entitled "Results of Observations of Mars During the Time of the Great Opposition of 1956 in the USSR," it has 196 pages and is illustrated.

JUPITER

Theory on the Existence of a Cometary-Meteoric Ring Around Jupiter The possibility of the existence of a ring of comets and meteorites around the planet of Jupiter has been examined by S. K. Vsekhsvyatskiy. The arguments for the eruption theory, on whose basis the existence of a cometary-meteoritic mass moving around the planet is claimed, are reviewed. Peculiarities in Saturn's rings are cited which indicate a more rapid evolution of the rings' matter than that proposed by various observers. A hypothesis for the existence of a cometary-meteoritic ring around Jupiter is verified by means of examining the times of greatest visibility of Jupiter's equatorial belt and the changes in its position

on the disk. It is shown that the best visibility of the belt coincides with the periods of the Earth's and Sun's maximum selenographic latitude and that the change of position is a positive indication that the equatorial belt is the shadow of the ring. Peculiarities of Jupiter's hypothetical ring, whose optical thickness is several tenths less than that of Saturn's ring, and the possibility of observing the eye of the ring are discussed. (Izvestiya Akademii Nauk Armyanskoy SSR, Seriya Fiziko-Matematicheskikh Nauk, Vol XIII No. 5, 1960)

## TELESCOPES AND INSTRUMENTS

Installation of Largest Soviet Telescope Completed Pravda reports that the installation of the new reflector telescope at the Crimean Astrophysical Observatory, Academy of Sciences USSR, has been completed. The instrument, claimed to be the largest in Europe and the USSR, has a reflector 2.6 meters in diameter. The telescope is housed in a specially designed tower equal in height to a 10-story building.

Two Large Radio Telescopes During 1959-60 a giant movable radio telescope has been operated on an experimental basis at the Physical Institute imeni P. N. Lebedev. The diameter of its metal parabolic mirror is 22 m and the focal length is 9.5 m. The mirror weighs 65 tons, and the entire telescope weighs 380 tons. It exceeds 26 m in height.

The new radio telescope is described as an extremely complex and precise instrument, and according to the report, its assembly and adjustment continued for about two years. The radio telescope operates on centimeter and decimeter frequency ranges and is reported to possess the greatest resolving capacity of any movable radio telescope in the world. It can be aimed at any point in the sky and is thereby able to investigate the radio radiation of the Sun, Moon, planets and discrete sources in the indicated wave frequencies. In particular, it is possible to study the subsurface strata of the Moon. It may also be assumed that scientists will soon be able to get data on the period of rotation of Venus, something which has been impossible to determine with ordinary optical telescopes. The period of rotation could not be determined because Venus is always covered by a cloud deck which is impenetrable for visible light. But radio waves can pass through these clouds. (Note: See page 13 concerning work already carried out.)

An even more powerful radio telescope is under construction at the Institute's radioastronomical station. It is designed to make observations on meter waves. Each of its two "shoulders" is 40 m high and 1 km long. By using this telescope scientists will be able to investigate sources of radio radiation situated far beyond the limits of the Galaxy.

This will make it possible to get valuable information on the nature of the universe and refine and supplement optical observations. This will be of great interest in revealing the laws governing the structure and development of the cosmos. (Vestnik Akademii Nauk SSSR No. 3, 1960)

Recording Microphotometer A registering microphotometer is described by L. M. Kotlyar, which automatically transforms the negative density to corresponding intensities or logarithms of intensities, according to the characteristic curve of the negative.

The characteristic curve is represented by a broken line consisting of a number (sufficiently large) of linear segments. This broken line is introduced into the microphotometer by means of a special device and the negative density, measured by means of the usual microphotometer (the photocurrent from the photoelement of the microphotometer), is automatically transformed to corresponding intensities or logarithms of intensity.

Results of tests of the microphotometer, designed by the author at the Pulkovo Observatory, are given. (Astronomicheskiy Zhurnal Vol. 37 No. 5, Sept-Oct 1960)

Special Problems in Photographing Cosmic Rockets Discussed A recent two-page article in the Sept-Oct 1960 issue of the Soviet Astronomical Journal describes a device which allows the Abele plateholder to be used for photographing cosmic rockets. A photograph is included of this adaptation which was devised at the Zvenigorod Station of the Astronomical Council after it was discovered that the telescope could not be moved at a velocity adequate to follow lunar rockets and that it was easier to provide a smooth movement of the plateholder.

Design and First Test Results of a Camera with a Moving Film for Photographing Faint Artificial Satellites A description of a camera with a moving film used for photographing faint satellites and the first results obtained in tests are given by L. A. Panaiotov. The camera has a 100 millimeter objective and a focal length of f:3.5. With it, it is possible to obtain pictures of satellites to $6^m.0$. Precision of obtained positions was $0.01^o$ and for the time moment, $0.01^s$. The method of observations and the processing of photographs are described. The effect of various systematic errors is studied. (Astronomicheskiy Zhurnal, Vol. 38, No. 1, January-February 1961)

GDR Agrees to Join in Soviet Satellite Tracking Program A statement on scientific cooperation between the academies of science of the USSR and the German Democratic Republic (East Germany) during 1961 was signed recently in Berlin, reports Ekonomicheskaya Gazeta from Moscow. Included in the program of scientific cooperation is the optical tracking of artificial earth satellites.

ASTRONOMICAL UNIT On 11 May 1961 the Soviet Academy of Sciences reported that the astronomical unit has been established at 149,457,000 kilometers or 92,870,000 miles, plus or minus 5,000 kilometers (about 3,000 miles). This information was gained as a result of radar distance determinations of the planet Venus (see Venus rotation report). The Soviet figure is 90,000 miles less than a recently obtained US radar result which shows the astronomical unit to be 149,599,000 kilometers (92,960,000 miles). US experiments conducted by the Jet Propulsion Laboratory of the California Institute of Technology and the Massachusetts Institute of Technology did not agree completely: MIT's astronomical unit is 1,240 miles shorter than JPL's. (New York Times May 14, 1961; Missiles and Rockets May 29, 1961)

BOOK PUBLISHED ON ORIGIN OF EARTH AND PLANETS The third edition of a book entitled Proiskhozhdeniye Zemli I Planet has been published in Moscow. Only 82 pages long, it is by Boris Yul'yevich Levin and is available in either microfilm or photocopy from the SLA Translations Center, 56 East Randolph Street, Chicago 1, Illinois, for $1.80.

LUNAR CATALOG Also available from SLA are a Catalog and Schematic Map of Selected Lunar Objects for a Full Moon (Katalog I Skhematicheskaya Karta Izbrannykh OB" Yektov DLYA Polnoluniya) by S. M. Kozik, and a 73 page Academy of Sciences report entitled Iskusstvennyye Sputniki Zemli, vyp. 5 (Artificial Earth Satellites, No. 5).

HUMAN COLONIZATION OF PLANETS In an article in the Polish magazine Nowe Drogi, Professor Leopold Infeld writes that "in the next 50 years our planetary system will probably become to us as commonplace as air travel is now. In the next 50 years we shall probably know its secrets as well as the secrets of the Moon, Mars, or Venus. We shall know whether life is possible there. We may even organize migrations of the people specially adapted to the conditions of Mars or Venus. If there is no life there, we shall be able to start."

SPACE PHYSICS AND GEOPHYSICS

Earth Satellites and Geodesy A systematic review of the possible methods of determining the geocentric coordinates of points on the Earth's surface from lunar and artificial Earth satellite observations is given by I. D. Zhongolovich, Institute of Theoretical Astronomy, Academy of Sciences USSR. The connected problem (the determination of the difference between ephemeris and universal time) is examined. (Astronomicheskiy Zhurnal, Vol. 38, No. 1, January-February 1961)

The Soviet Program for the International Year of the Quiet Sun The author of the following article is N. V. Pushkov, a member of the directorate of the Soviet Geophysical Committee, and a recipient of the Lenin Prize.

"The International Geophysical Committee has adopted a resolution concerning the conduct of a new program of geophysical research at the time of the approaching period of minimum solar activity. It has received the name 'International Year of the Quiet Sun' (Mezhdunarodnyy god spokoynogo Solntsa -- MGSS). It will be observed from 1 April 1964 to 31 December 1965. It is expected that during this time the Sun will attain its maximum activity and that there will accordingly be relatively few disturbances in the atmosphere.

"It is proposed that research will be conducted in the fields of terrestrial magnetism, auroras, ionosphere, cosmic rays, aeronomy, and solar activity. Study will be concentrated on those geophysical phenomena which are obviously associated with solar activity.

"There have also been confirmed the principal bases which should guide the various countries in working out their national programs of research during the International Year of the Quiet Sun.

"In particular, full use should be made during this period of new data on solar-terrestrial communications which has been obtained during the IGY, as well as new experimental apparatus.

"During this time special attention will be devoted to continuing research on the Earth's radiation belts, especially the outer belt, because the intensity of radiation in the latter depends strongly on solar activity.

"A whole series of extremely important scientific problems remained unsolved after completion of the IGY. For example, too little study has been devoted to the lower layer of the ionosphere, there is inadequate data on phenomena transpiring at the upper surface of the ionosphere, and many important problems associated with cosmic rays have remained unsolved.

"In the field of terrestrial magnetism a great deal of interest centers on the study of very rapid pulsations (with periods equal to fractions of a second) which are found in the magnetic field and Earth currents. Among the most interesting problems is the study of the ultraviolet and Roentgen radiation of the Sun.

"A significant place in the program of the Year of the Quiet Sun should be devoted to a study of phenomena in polar latitudes -- in the Arctic and Antarctic.

"The International Year of the Quiet Sun will include a major undertaking in the form of a world magnetic survey using aircraft, nonmagnetic ships, and surface expeditions." ("International Year of the Quiet Sun," by N. V. Pushkov, Pravda, 14 March 1961, p. 3)

Geophysical Rockets Launched at Time of Solar Eclipse The following is taken from a Pravda article of 16 February 1961: At about midday on 15 February 1961 a series of geophysical rockets were simultaneously launched in the zone of total solar eclipse; they were equipped with apparatus for special research.

The rockets carried high-level automatic geophysical stations aloft. After the separation of the high-level automatic station from the rocket the electromechanical system was switched on. This system controls the automatic orientation of the station in space. The stations remained in a stabilized position during the entire time of their flight in the cone of the Moon's shadow.

Investigations of the Sun's corona and phenomena taking place in the upper atmosphere during a solar eclipse were made for the first time from a stabilized station.

The following experiments were made:

1. investigation of the short-wave region of the spectrum of the Sun's corona with a spectrograph,

2. investigation of the spectrum of the Sun's corona and solar radiation reflected and scattered in the atmosphere in different regions of the spectrum using telespectrometers and telephotometers,

3. photometry of the field of the Sun's corona in the roentgen, ultraviolet and visible regions of the spectrum with photon counters, roentgen quantum counters, and other radiation measuring devices,

4. photographing the Sun's corona with cameras with various kinds of light filters and polaroids.

The results of measurements made by each instrument were transmitted by radiotelemetry to the Earth; the photographs of the Sun's corona and the spectrograms were brought to Earth by parachutes.

In addition, meteorological rockets were launched before the eclipse, during the total eclipse, and after the eclipse, for the purpose of investigating the parameters of the state of the stratosphere and determination of the influence of solar radiation on change in air temperature in the atmosphere. Valuable data were collected which are being processed and studied.

Subsequent Report on the Geophysical Rockets On 19 February Pravda carried the following: The weather on the day of the eclipse was poor; the entire sky was covered by low-hanging clouds. The first launching began about noonday; many rockets were launched in quick succession. Helicopters soon discovered and retrieved rocket apparatus which had landed by parachute a few kilometers away.

Academician A. A. Blagonravov and G. I. Golyshev, Deputy Chairman of the Interdepartmental Geophysical Committee, report that the launchings were scheduled very precisely so that each rocket would reach its greatest altitude at a time not deviating by more than a second from that prescribed. The optical instruments, telephotometers, and telespectrometers made it possible to study the faint radiations of the Sun's outer corona and the interplanetary medium in undistorted form. Measured data were transmitted to Earth by radio. These automatic geophysical stations also carried instruments which were not pointed directly at the Sun. They measured reflected and scattered atmospheric radiation. Cameras on the rockets took many photos of the Sun's corona. Various light filters were used which were changed during flight by special mechanisms. Measurements were made to determine the precise daytime temperature of the atmosphere. These measurements are only possible during a total eclipse because measuring instruments ordinarily are affected by heating from the Sun's rays. These new measurements will make it possible to judge how correct the latter measurements are, and make appropriate corrections in them.

Properties of the Upper Atmosphere and Artificial Earth Satellites Some of the available experimental and theoretical information on the very highest layers of the atmosphere -- those above 100 kilometers is reviewed. The article is said to be the first summary of work published in the Russian language on the problem of the upper atmosphere in relation to artificial Earth satellites.

Part one of the article deals with the upper atmosphere, its temperature, molecular composition, pressure and density; the Earth's magnetic field; winds and the general circulation of the upper atmosphere; turbulence; diffusion; the energy received by the Earth from space; photochemical reactions in the upper atmosphere; ionization and the exosphere.

Part two, on the scientific use of artificial Earth satellites, contains the following headings: the Soviet artificial Earth satellites (Sputniks 1, 2, and 3); the theory of placing a satellite into orbit; the determination of a satellite's position; the scientific use of artificial Earth satellites (advantages and possible experiments); determination of the pressure and density of the atmosphere; meteors and interplanetary matter; measurements of Lyman Alpha intensity; ionosphere research; investigations of the Earth's magnetic field and the electrostatic field in the upper atmosphere; the study of cosmic rays; the study of the auroras; artificial

Earth satellites and the general theory of relativity; certain other experiments (the diffusion of sodium and certain gases from a satellite for upper atmosphere studies); satellite temperatures; induction braking of satellites; and the problem of recovering experimental data from satellites.

A bibliography of 137 titles is given. Of these 84 are of other than Soviet sources. (Trudy Tsentralnoy Aerologicheskoy Observatorii, No. 25, 1959)

New Interpretation Placed on Certain Data Recorded by Mechta Investigation of the geomagnetic field by means of Mechta (first Soviet cosmic rocket) showed that the measured intensity of the field decreased with altitude more rapidly than the computed intensity, attaining a minimum of 400 $\gamma$ at a distance of 20,800 km from the center of the Earth. It then increased to 800 $\gamma$ at a distance of 22,000 km, and then slowly decreased. It was noted that on the date of the launching of the rocket there was a small geomagnetic disturbance with a sudden onset. This was associated with a weak current of corpuscles which created a small equatorial ring current. Mechta intersected this current and this must be taken into consideration in the analysis of the recorded data. (Doklady Akademii Nauk SSSR, Vol. 135, No. 2, 1960)

Soviet-US Rocket and Satellite Measurements in Outer Belt Compared An article by K. I. Gringaus and S. M. Rytov compares the results of various measurements made by Soviet cosmic rockets and by the US satellite Explorer 6 and the Pioneer 5 deep space probe. On the basis of a thorough discussion of the data comparison, the authors feel that the results of measurements with the three-electrode traps on the Soviet cosmic rockets and with magnetometers on the US satellite and probe are in agreement. These independent investigations, using different research methods, apparently confirm and supplement one another. (Doklady Akademii Nauk SSSR, Vol. 135, No. 1, 1960)

A Listing of IGY Rocket Launchings in the USSR, the Arctic and Antarctic A full listing of rocket launchings in the middle latitudes of the European part of the USSR, the Arctic and Antarctic, and from shipboard is given, in connection with the main period of IGY research (1957-1958). Well over 125 such rockets are listed, together with the hour, day and month launched, the purpose of the launching, a list of the instruments carried, and in certain cases, the point of launching. (Mezhdunarodnyy Geofizicheskiy God, Informatsionnyy Byulleten No. 8, 1960)

A Third Terrestrial Radiation Belt A third, most distant radiation belt of the Earth, composed mainly of electrons with E > 200 ev, has been detected on the basis of results of measurements of currents by means of ion detectors, according to I. S. Shkovskiy, V. I. Moroz, and V. G. Kurt. At R = 50,000 km the electron flux is $N < 2 \times 10^7 cm^{-2} sec^{-1}$, in the zone 55,000 < R < 75,000, $N \approx 2 \times 10^6 cm^{-2} sec^{-1}$. This radiation belt is formed as a result of interaction of the permanent weak corpuscular stream "solar wind" and the Earth's magnetic field, which leads to a redistribution of energy from the protons to the electrons. The energy density of the Earth's magnetic field is in accordance with the value of the flux of charged particles. The third belt is characteristic of magnetically quiet days. Considerations are given in favor of the premise that the concentration of interplanetary plasma does not exceed the concentration of corpuscles in the solar wind, i.e., ~1 $cm^{-3}$.

Relationship Between Solar Activity and Atmospheric Circulation A. A. Girs suggests that in studying the relationship between solar activity and atmospheric processes it is not only feasible to take into consideration the long-range (11-year and 80-90-year) changes in solar activity, but changes which occur within the period of a single year. He feels that the development of this theme will make it possible to improve the method of seasonal weather forecasts. (Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, No. 6, 1960)

Investigation of the Neutral Composition of the Upper Atmosphere at Heights Above 100 Km Mass-spectrometer measurements of the neutral composition of the atmosphere were made from rockets at heights greater than 100 km above the Earth's surface. A Bennett-type, 5-cascade, radio-frequency mass-spectrometer was used; its structure and operation are described in part by the author, A. A. Fokhunhov. The bulk of the article is a report on research findings, with the text being supplemented by ten graphs. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya No. 11, 1960)

On One Possibility of Leakage of Charged Particles from the Outer Geomagnetic Field V. D. Pletnev analyzes the structure of the Earth's magnetic field and points out that under certain conditions (which he specifies) a leakage of charged particles occurs of a given energy along the entire line of force. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya No. 11, 1960)

Study of the Upper Layers of the Atmosphere by Meteoric Methods An All-Union Seminar on the Study of the Earth's Atmosphere by Meteoric Methods was held in Ashkhabad from the 11th through the 14th of December 1959. It was sponsored by the Commission on Comets and Meteors of the Astronomical Council of the Academy of Sciences of the USSR.

The work of the seminar was under the direction of B. Yu. Levin. His report was devoted to the processes of disintegration of meteor bodies in the course of their travel through the Earth's atmosphere. In his opinion, these processes can substantially distort the parameters of the atmosphere determined by meteor photographs.

Other reports dealt with the structural parameters of the upper atmosphere as determined from data provided by rockets and satellites and the structure of the atmosphere by meteoric methods, the results of determinations of the density and temperature of the atmosphere from photographic observations of meteors, photometric research conducted at Stalinabad by using an "artificial meteor apparatus," the study of winds in the stratosphere on the basis of observations of the drift of meteor trails, and the results of work in the study of faint telescopic meteors.

The seminar participants became familiar with the operation of the Astrophysical Laboratory and the Physical-Technical Institute of the Academy of Sciences of the Turkmen SSR and inspected the new observatory at Vannovskaya near Ashkhabad. (Vestnik Akademii Nauk SSSR No. 3, 1960).

MORE ON THE "TUNGUS MYSTERY" In the December 1960 issue of Space Intelligence Notes, pages 12-16, a résumé was given of the so-called "Tungus Mystery" explosion of Siberia in 1908. While most scientists believe it was caused by a huge meteorite striking the Earth, we recall that no meteoritic matter could be found in the vicinity.* Two interesting reviews are available in the Astronomical Journal of the Academy of Sciences of the USSR (Vol. 36, No. 2) of books dealing with the fascinating subject, the first reviewed by K. P. Stanyakovich and V. V. Fedynskii and the second by Yu G. Perel. Because of the interest exhibited in the Tungus Mystery, these reviews are reproduced below.

1. In the Wake of the Fiery Stone, by I. Evgen'ev and L. Kuznetsova. The year 1958 marked the completion of 50 years since the occurrence of a remarkable phenomenon of nature--the fall of a huge meteorite in the basin of the river Podkamennaya Tunguska on June 30, 1908. The circumstances of the fall and the scientific studies of this phenomenon were such that, up to the present time, very little is known about the meteorite. However, the scale of the event was so great that the taiga has retained its scars for more than half a century, and the epic of its study still cannot be considered complete.

The Tungus meteorite has been described in scientific monographs, in verse, and in interesting but wholly implausible tales of fantasy that could only bewilder the reader. Yet Geografgiz in 1958, in an enormous edition of 165,000 copies, as part of the series "Travels, Adventures, Fantasy," published almost simultaneously with the book by I. Evgen'ev and

*Yet reviewers, on page 26, mention "recent discoveries of particles."

L. Kuznetsova the work "Visitor from the Cosmos" by A. Kazantsev, in which the author not only unqualifiedly represents the Tungus meteorite as a Martian interplanetary spaceship, but even claims that this fabrication is "a popular scientific (?!!) account of the problem."

Then appeared In the Wake of the Fiery Stone, a book by the two writers, I. Evgen'ev and L. Kuznetsova. This book is distinguished, to its advantage, by the conscientious attitude of its authors toward all the scientific data known about the "Tungus marvel," by the fascinating account of the history of its study, and, principally, by the fact that it portrays the modest hero of the Tungus meteorite, a noted scientist, a charming man with a pure soul, Leonid Alekseevich Kulik.

The image of this man, whom we knew in life, is captured faithfully in the pages of the narrative. Kulik the revolutionary and scholar, Kulik the communist and poet, Kulik the enthusiast and humanist, sometimes a bit childishly naive and zealous, but stern and exacting when it comes to the fulfillment of duty and the search for truth -- that is the basic leitmotiv of the book.

The account, in popular form, of the scientific data concerning the Tungus meteorite, and the literary portrait of L. A. Kulik, are enough to guarantee the book a place of honor among the works of popular scientific literature.

But there is still another remarkable feature of the book by Evgen'ev and Kuznetsova. It is the truthful account of scientific quests as feats of labor requiring many years of selfless hard work beset with difficulties and disappointments. In return, what joy and satisfaction the investigator experiences when he succeeds in obtaining new data, in unraveling one more secret of nature, in making the truth of human knowledge still more complete. The youth, who are faced with the task of seizing the heights of modern science, must know that scientific work demands both flights of thought and hard, tedious work. The book reviewed here describes this very well.

Leonid Alekseevich Kulik was a scientist of the old school. A student who participated in the revolutionary movement in 1905, a favorite pupil of the world-famous Russian scientist V. I. Vernadskii, he was one of the founders of Soviet meteoritics. But he worked in the period of the formation of science in the young Soviet Union. Kulik was one of those scholars who did a large part of their work in solitude, outside the large scientific collectives which are now so abundant in our country, without enough of the modern scientific equipment that is available in our time thanks to the remarkable industrial achievements of the Soviet Union.

Only this, coupled with the fact that Kulik was hindered by the outbreak of the war, in which he eventually was killed while fulfilling his patriotic duty at the front, can explain the incompleteness of his outstanding scientific research. In spite of recent discoveries of particle of the meteorite discussed in the books reviewed here, the problem of the "Tungus marvel" still faces science in all its magnitude. After the Soviet Union opened the era of the conquest of cosmic space on October 4, 1957, by launching the first artificial satellite of the Earth, the study of giant meteorites which plow through this space, and the investigation phenomena that take place in the collision of solid bodies, are becoming still more important and are of more than heuristic value.

To that generation which is destined to carry on the work begun by the outstanding Soviet citizen and scientists Leonid Alekseevich Kulik, we strongly urge the reading of the book, In the Wake of the Fiery Stone and the recognition of the threads that lead from the remarkable past of our native science to its still more remarkable achievements in the present and in the future.

2. Visitor from the Cosmos, by A. Kazantsev. The story-essay "Visitor from the Cosmos" by A. Kazantsev, published in a book issued by Geografgiz, is only a link (more exactly, one of the recent links) in a chain of creations by the author which have been printed in various editions, starting in 1946 (with the story-essay "Explosion," in the journal Round the World). "Visitor from the Cosmos" is not being published for the first time -- it has already been printed in the journal The Young Technician for 1951 (No. 3) and now appears with insignificant changes. A. Kazantsev has popularized this same theme throughout the last decade and in several editions. Therefore the story from the anthology Visitor from the Cosmos should be considered an alternative rendition by the author of a problem in which he has been interested and which he has studied for many years.

The crux of the problem is the following: the great catastrophe which took place June 30, 1908 in the Tungus taiga and which is recorded in history as the fall of a giant meteorite, the subject in our time of very careful study, was not, in the opinion of Kazantsev, the fall of a meteorite at all. "On the threshold of the Earth" an interplanetary atomic spaceship carrying inhabitants of Mars exploded. This atomic explosion was the cause of all the atmospheric phenomena, the destruction on the ground, and similar consequences which were observed following the catastrophe in the taiga on June 30, 1908.

Thus, once again, the theme of the population of Mars by intelligent beings appears in science-fiction literature. This theme achieved great popularity at the close of the 19th and the beginning of the 20th century, when it found its realization in the well-known novels of Wells, K. Lasswitz, and several other authors. At that time very little was known about the physical nature of Mars, but the existence of an atmosphere on that planet and certain other signs of similarity between Mars and the Earth opened a broad field for speculation concerning the possible habitation of Mars. At that time science had already recognized the cosmogonical hypothesis of Laplace, according to which Mars was older than the Earth and therefore it was possible to believe that intelligent inhabitants of Mars might have attained a higher level of development than terrestrial mankind. They might have built a gigantic system of irrigation canals, and they might even have undertaken interplanetary flights.

In the light of modern knowledge concerning the nature of Mars, the hypothesis of the existence of complex forms of life on that planet, not to mention intelligent inhabitants, lacks any serious foundation. Only the question of the presence of certain forms of plant life on Mars is discussed, although even here the problem has not been finally solved.

This does not mean that a modern writer, choosing for himself a science-fiction genre, may not create a fanciful picture of interplanetary ships from Mars or from other planets, if these pictures are an organic part of an interesting and heuristically valuable narrative. On the contrary, since in our epoch, when cosmic voyages are on the threshold of real achievement, it is especially necessary to compose such works, in which fantasy might be the "background" or "canvas" for the development of a popular story that introduces, in lively, captivating form, the achievements and the short- and long-term perspectives of science, its "today," "tomorrow" and "hereafter." Who can deny the heuristic value of the science-fiction stories of Jules Verne and other writers of the past? Who would deny the heuristic value of Plutonium and Sannikov Land, by V. A. Obruchev, and similar works by other modern authors?

But in a different position is the writer who, making a fantastic hypothesis the "plot" of his story, converts this supposition into a scientific hypothesis or even a theory, comparing it with the conclusions of science, rejecting these conclusions, and maintaining his fantasy as scientific fact, disproving as it were the conclusions of "official" science and the opinions of the specialists.

Unfortunately, A. Kazantsev has gone along just such a path. It was not a meteorite, but a Martian spaceship, which exploded above the Tungus taiga on June 30, 1908 -- this, for A. Kazantsev, is not the "plot" of the science-fiction story, Visitor from the Cosmos (and of other literary creations by the author, published at various times), but a hypothesis advanced and supported by the author as a demonstrated fact. But since

this "scientific fact" contradicts the facts established by science, the author draws from this the "winged" conclusion: science is bogged down in the morass of routine, the scientists are obdurate conservatives, all their conclusions are built on blind faith in obsolete propositions and on traditions of caste reticence and narrow-mindedness. In a word, true science is not the science of the scientist, but the bold fantasy of the writer, which knows no bounds and is not subject to any controls.

Before us is the unusual structure of the tale, Visitor from the Cosmos. From page to page run two texts. Above is one set in large type. This is the story in the straightforward sense. The other, set in smaller type, is the "scientific commentary" by Kazantsev, which forms the basis of his hypothesis. If only the first text had been published, who would have objected to it? It would have been possible only to make some critical remarks regarding characteristics of the heroes of the tale. For example, the image of Natasha, the young astrobotanist, inclined to fanaticism and lacking in self-control, can hardly be regarded as a typical image of the young Soviet scientist. The image of the main hero, Krymov, is questionable -- he is too providential, too perfect. Actually, in science everything is very much more complicated. More complex too are the individual creative personalities of the great men of science.

But it is really the second text that is the object of our attention. It consists of a series of sections with headings in the form of questions. In the first section, titled "Is life possible on other planets?" it is explained in florid style that life on other worlds is possible, that the materialistic understanding of the Universe confirms this (in actuality, confirmation of the possibility of life outside of the Earth is simply a truism nowadays). The author selects Mars as a concrete example of a planet where the existence of life is beyond doubt. The subsequent sections ("What is Mars like?", "What is astrobotany?", "Are there canals on Mars?") are devoted to a proof that Mars is inhabited. Here one must note the basic contradiction in the author's views, a contradiction carefully concealed by him, but nonetheless clearly evident. The author popularizes the ideas of G. A. Tikhov and his school and quite obviously shares these views (the main hero of the tale is himself an astrobotanist, pupil and follower of G. A. Tikhov). At the same time, in describing the history of the study of the Martian canals, which has led, as is well known, to the conclusion that they are not artificial structures, the author declares that some astronomers even today consider the canals "marks of the vital activity of living beings who have reached a high level of intellectual development, not inferior to that of the people of Earth." No definite names of astronomers who accept this point of view are given by the author, of course (we know that such astronomers no longer exist). But thereby the author deliberately misleads the reader into believing that the hypothesis that Mars is inhabited has firm ground under it even today and is shared, if not by all, at least by some, scientists.

The subsequent sections of the "second" text form the direct "foundation" for the hypothesis of the Martian spaceship and, moreover, in a historical profile. A. Kazantsev here gives an extensive interpretation of his hypothesis.

In its general outlines this interpretation runs as follows:

Many phenomena which were supposedly observed at the moment the meteorite fell and thereafter cannot be explained within the confines of a meteoritic catastrophe. Among such phenomena the author places: the absence of any fragments of the meteorite, the absence of craters and holes, the existence of a standing forest at the center of the region of the catastrophe, the appearance of a ball as blinding as the sun at the very moment of the catastrophe, the unfortunate accidents with the Evenks, who visited the place of the catastrophe during the first days following it.

The author proclaims all of these circumstances to be entirely in agreement with, and directly the result of, his conception of the explosion of an interplanetary spaceship: the temperature of an atomic explosion (20 million degrees) caused the exploding spaceship to be vaporized, hence no remains of it can be found; the unfortunate accidents with the Evenks resulted from the effect of radioactive particles which fell to the ground; the shining cloud which was observed after the catastrophe was an effect of the remnants of radioactive substance in the atmosphere, and so on.

The author further discusses the question of whence the interplanetary atomic spaceship might have come. The arguments are not complicated: the planets of the nearest stars are too far away from us. The spaceship could only have come from Mars. But in June, 1908, Mars was far from the Earth, and in 1909 its great opposition was to take place. Why did intelligent inhabitants of Mars choose to fly to the Earth under such unfavorable conditions? It turns out that the Martian spaceship at first visited Venus and then flew to the Earth from Venus in order that, making use thereafter of the great opposition, it could return to Mars under the most favorable conditions. The author discusses in addition the light signals, which were supposedly noticed on Mars in 1909 -- an explosion of tremendous force, which supposedly was fixed on this planet by astronomers at Pulkovo in 1956. The author continues his double game with astrobotany. Nowhere mentioning that G. A. Tikhov and his successors, in their conclusions, do not go farther than the assumption that certain forms of plant life are present on Mars, the author leads the reader to believe that the achievements of astrobotany, unreservedly taken for the truth, are in complete agreement with the conclusion that Mars is peopled with intelligent beings, possessing an advanced technology.

And, finally, the author devotes the remaining part of the "second" text to the history of his "hypothesis." This is no longer a double game with the facts, nor simply a free treatment of them. Here is a consistent and conscious deception of the reader, in the pursuit of one definite goal: to show that he alone, Kazantsev, has discovered the true nature of the complex phenomena, contrary to all the "conjectures" of the representatives of official science.

As is well known, many years of investigation by Soviet scientists have made it possible to clarify the basic problems connected with the Tungus meteorite. They are set forth accurately and thoroughly enough in a series of published works. It is impossible to say -- and it is not maintained by anyone -- that all the questions relating to the fall of the meteorite have been comprehensively answered. However, investigations in this direction have not been discontinued by any means, but are continuing But the investigations which have been conducted refute completely both the conjectures and the direct fabrications adduced by A. Kazantsev in defense of his "hypothesis."

Thus, it has been established, that after the fall of the Tungus meteorite a typical, though exceptionally pronounced dust trail was observed for the bolide, and no one saw those phenomena ("a fiery pillar with black smoke," "a spreading black mushroom" and so on), to which Kazantsev refers. No such unfortunate accidents with the Évenks who visited the scene of the catastrophe have been established. The reference to the testimony of A. A. Polkanov, who allegedly observed "strange rays," as cited by A. Kazantsev, is based on inadmissibly free quotation from the diary of A. A. Polkanov (Meteoritics, No. 3). No one saw the "strange rays," but the phenomenon of the scattering of the Sun's light by pulverized meteoritic material in the upper layers of the atmosphere presents no mystery. Similarly, the other "arguments" of A. Kazantsev represent either a juggling of the facts or simple fiction.

The height of Kazantsev's shamelessness is reached with his statements (pp. 122-124 and others, of "the second text") concerning the activities of Soviet scientists, whom he ironically calls "the meteorite men." Without going into the details of these statements of opinion, one may say only that here is a conscious attempt to present a number of prominent Soviet investigators (some of them Kazantsev calls by name, others he does not dare to name openly) as hardened conservatives of science, to depict them as scholastics who do not have their feet on the ground and are alienated from life. In essence, this is a slander against Soviet science in the persons of these men, many of whom have rendered great service in the cause of the real conquest of cosmic space.

Kazantsev comes forward with this slander not only in the commentaries to Visitor from the Cosmos. We cannot touch here upon statements made by him more or less long ago, but it is impossible to pass over his paper, "The Planet of Peace," published in The Literary Gazette of January 6, 1959, in connection with the successful launching in the USSR of the first cosmic rocket in the world. In this paper Kazantsev, ignoring the role of Soviet scientists in making the artificial planet, again allows himself thrusts in the direction of the "meteorite men." Without any relation to the triumph of Soviet science and technology, to which, presumably, the paper is devoted, the "hypothesis" of the Martian spaceship is again brought in and it is maintained that the expedition of the Committee on Meteorites, working in 1958 in the Tungus taiga under the direction of K. P. Florenskii, came to the conclusion that the catastrophe of 1908 was an atomic explosion. This is simply untrue -- neither the expedition nor its director came to any such conclusion.

Still another statement by Kazantsev must be noted -- this is his paper in the journal The Young Technician (No. 9, 1958). In this paper, the young readers are presented from start to finish with a distorted history of the investigation of the Tungus meteorite. One can only wonder that the editors of The Young Technician not only published this paper, but in their remarks ask the scientists to submit their views regarding Kazantsev's hypothesis. The editors apparently rank Kazantsev with the most authoritative workers in Soviet astronomy and meteoritics. We can be no less surprised at Geografgiz, which considered it possible to issue "Visitor from the Cosmos" and thereby effectively assisted in the injurious dissemination of antiscientific fabrications under the combined cover of "scientific fantasy" and "scientific hypothesis."

In 1836 in St. Petersburg, an anonymous man of letters, if one may call him that, brought out in Russian translation a book which had already caused a sensation in the USA and in Western Europe. In translation, the book was titled "On the Inhabitants of the Moon and Other Remarkable Discoveries Made by the Astronomer Sir John Herschel During His Stay at the Cape of Good Hope."

J. Herschel in 1833-1838 carried out in South Africa his famous investigations of stars and nebulae of the Southern sky. He discovered no inhabitants on the Moon. His name was used for the express purpose described by the translator himself:

"It has been said that the description of all the discoveries contained in this book is nothing but a hoax, masterfully compiled by one of the foremost German story-writers, or, as others suggest, by one of the French astronomers. We do not undertake to resolve this doubt, for we recall that 'Gulliver's Travels,' on its appearance was accepted as true and that the accounts of the first experiments with steamships were thought to be fables. Until further news arrives from the Cape of Good Hope, our

readers (perhaps) will thank us for acquainting them with a book which has caused a greater sensation in Europe than all the other remarkable works ever published, and whoever remains deceived afterwards may console himself with the fact that he was deceived along with half of Europe."

On the appearance of this book in the Russian translation, V. G. Belinskii responded with a brief review. Belinskii did not analyze in essence the problem of the biological pecularities of the inhabitants of the Moon -- there was not need for that. For him, the trend of the book was important. Belinskii wrote this about it in his review:

"The translator of this book must be a very elderly person; he still recalls how 'Gulliver's Travels' was accepted as true; therefore he decided to translate this little book. He still is not sure that it is nonsense. However, if it is nonsense, it will not trouble him greatly. Half of Europe was deceived by this nonsense; and it is not surprising: after all, there are kind people everywhere, even in enlightened Europe.

"It is possible not to know this or that science, possible not to know any at all -- and still be a person; but one must not curse at science, one must not blaspheme over it..."

These words of Belinskii should be recalled in our time, in giving an objective appraisal of the statements by A. Kazantsev regarding his "hypothesis."

It is well known that in scientific institutions and in the editorial offices of scientific journals, letters and manuscripts are continually being received, the authors of which (representatives of the most varied professions, with the most diverse educational backgrounds) propose general theories of the development of matter, cosmogonic theories, theories of the structure of the stars and the planets, etc. Not knowing the fundamentals of science, these authors usually set themselves up as discoverers of new pathways in science, in opposition to the official scientists, who have been bogged down in routine and are incompetent to reveal the deep mysteries of nature. Often they level strange charges and outright threats against scientific workers who do not acknowledge the "discoveries" communicated by them.

Of course, patient and persistent explanatory work is being done with the authors of such "theories." But it is impossible not to recognize that their sentiments (and in particular, the relationship displayed by them toward science and scientists) find a source of nourishment in the stories and papers of A. Kazantsev and some other writers who confine themselves to the same style. This is the primary bad influence of "Visitor from the Cosmos" and other writings by A. Kazantsev.

KORABL-SPUTNIK 2 BIOLOGICAL REPORT Discussing the results of Soviet space experiments, Academician N. M. Sisakyan asserts that a "tremendous amount of experimental data" have been obtained which testify to the possiblity of manned space flight "right now." Technologically, such flight was already possible by August 1960, when Korabl-Sputnik 2 was launched. However, complex biological problems had to be solved. With regard to these, Sisakyan sees "basic value and significance" in the fact that life is not appreciably affected by space flight in a circular orbit beneath the lower radiation belts. One of the Korabl-Sputnik 2 dogs produced a normal litter the following November. Mushroom and other seeds carried by the satellite, however, grew much faster than control seeds. Preliminary data indicate changes in the immunological activity of the dogs' blood, in particular an increase in phagocytes. Sisakyan also refers to the importance of later firings with which biological data were obtained under the effect of primary cosmic radiation. Future interplanetary flights, he points out, must provide a closed biological system in which all the necessities for human life are obtained by green plants through utilization of solar energy. (Pravda, 26 Mar 1961)

EXPERIMENTS WITH ANIMALS DURING VERTICAL AND ORBITAL FLIGHTS N. M. Sisakyan elsewhere discussed vertical and orbital flight tests. He showed that, in vertical flights of animals up to 450 km, conditions necessary for animal life can be created for 3-5 hrs in space by the use of regeneration-type cabins. Catapulting is a safe method of leaving the cabin at altitudes of 78-85 km for a flight speed of 2,000 km/hr and at altitudes of 39-40 km for a speed of 4,100 km/hr. One-piece space suits are the most effective means of protecting animal life in the event of leaks in the cabin; according to Sisakyan they assure safe flight from altitudes of 78-85 km with total time of 50-65 min in the upper atmosphere.

The most substantial changes in the functioning of the cardiovascular and respiratory systems occur during launching and recovery of the rocket. These functions return to their initial values 5-6 min after the acceleration or at the end of the weightlessness period.

Sisakyan stated that the USSR would not launch a man into space by vertical rocket for a short-term flight, adding that many spaceships with animals would be launched before a man is put into orbit. It has been determined that overloads should act on the human body in a transverse direction: chest-back, back-chest, or from left to right. It is assumed that man will withstand the transition from acceleration to weightlessness much more easily than from weightlessness to acceleration. The ability to withstand overloads after weightlessness will decrease by about 2 G's. In view of possible serious mental and physiological disorders caused by the special conditions in the space

cabin, "volitional" and manual training of the future astronaut is of great significance. He should be active, not in a passive "contemplative condition, and he should be able to withstand different atmospheric pressures which may range from 760 mm Hg to 405 mm Hg with partial oxygen pressure of about 160 mm Hg (about 20-40% oxygen).

The dog carried on board the second spaceship satellite satisfactorily withstood the accelerations during the launching, but the time required for respiration and pulse to approach normal was three times longer than during laboratory experiments. The dogs carried on the second spaceship-satellite registered physiological changes no greater than those found during special tests on the ground. During the transition to weightlessness, pulse and respiration rates began to decrease rapidly and in half an hour were comparable to data obtained before the flight. (Priroda, No. 1, 1961)

SPACE STATIONS Stantsii v Kosmose is a 446 page book issued in 1960 by the Publishing House of the Academy of Sciences USSR (Moscow). It contains a collection of articles, papers and reports by Soviet scientists which were published in Soviet newspapers and periodicals from 1957 to 1960. The articles are compiled in such a way as to acquaint the reader with the procedures for launching artificial Earth satellites and space rockets by descriptions of the instruments and the scientific apparatus and also with experimental material. The book is divided into five sections: (1) Artificial Earth Satellites -- a Triumph of Soviet Science and Engineering; (2) Preliminary Results of the Investigation of Cosmic Space; (3) The Artificial Planet: The First Rocket to the Moon; (4) The Unprecedented Feat of Science; and (5) Spaceships.

The work contains articles by such outstanding Soviet scientists as Academician L. I. Sedov, V. V. Dobronravov, B. V. Kukarkin, Ye. K. Fedorov, N. N. Barabashov, I. S. Shklovskiy, A. G. Masevich, Ye. L. Krinov, V. I. Krasovskiy, and V. L. Ginsburg.

The book is intended, according to the foreword, for specialists dealing with problems on the study of cosmic space as well as for a wide circle of other readers. It is felt it would be found useful, it says, to propagandists, agitators and for teachers in their work (Sic!).

The book was compiled by V. V. Federov and edited by A. A. Mikhaylov, Corresponding Member of the Academy of Sciences USSR.

THE MOTION OF ARTIFICIAL SATELLITES OF THE MOON Four orbits for artificial satellites of the Moon (polar with low eccentricity, equatorial with low eccentricity, polar with high eccentricity and equatorial with high eccentricity) are considered by V. A. Brumberg, S. N. Kirpichinikov, and G. A. Chebotarev of the Institute of Theoretical Astronomy, Academy of Sciences, USSR. The aim is to study the motion of lunar satellites in a series of particular examples by numerical integration. This method permits a precise calculation of the ephemeris of a satellite and a good idea of the evolution of the orbit under study for a sufficiently large number of revolutions. Mathematically, the problem is reduced to the integration of equations of motion of a point with infinitely small mass which is in the Moon's field of gravity and which experiences perturbations caused by the non-spherical shape of the Moon and the attraction of the Earth and the Sun. (Astronomicheskiy Zhurnal, Vol. 38, No. 1, January-February 1961)

THE ORBIT OF THE THIRD SOVIET COSMIC ROCKET V. T. Gontkovskaya and G. A. Chebotarev, Institute of Theoretical Astronomy, Academy of Sciences, USSR, examine the motion of the third Soviet cosmic rocket during the period from 15 October 1959 to 30 March 1960. The basic orbital characteristics of the rocket are presented in tabular form and in four figures. (Astronomicheskiy Zhurnal, Vol. 38, No. 1, January-February 1961)

SOVIET SPACE CARRIER VEHICLE LAUNCHING TECHNIQUE The following information comes from a translation of the 9 May 1961 edition of Die Presse (Austria), which discusses a possible ramp launching technique the Soviets may have developed. The translation supplied reads as follows:

"The French publication Auto-Journal presents a sensation in its latest issue, believing it is able to reveal the secret of the Soviet successes in space traveling. The issue is whether or not the Soviet rocket propellants are in fact so much better than those used by the Americans, and whether this was the reason for the successful launching of heavy Soviet flying objects. Auto-Journal refers to information received from an informant who had himself cooperated in construction activities for Soviet launching bases. This information was checked by western experts and the specialists called the Soviet "trick" possible and probable.

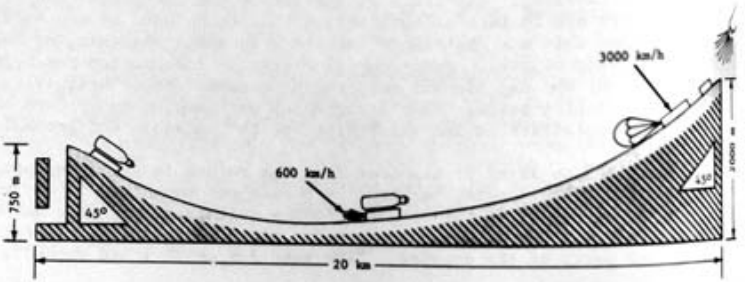
"The "trick" consists in the fact that the rocket is given an initial speed of 3,000 kilometer per hour by powers not contained in the rocket on a ramp of 20 kilometer length. Such a huge launching base has been constructed in the Altai Mountains; two additional bases are located in other parts of the country. "The ramp for which I had worked",

declares the informant of the Auto-Journal, "joins closely the shape of a valley. The ten meter wide rail installation descends first along a 2 kilometer long track and then ascends on the opposite slope in a 45 degree angle."

"The rocket is hoisted by an elevator to the 60 meter long truck that runs on the rails of the ramp. The truck has 24 bogie wheels on each side. Truck and rocket have a weight of 350 metric tons. When the signal for the launching is given, this mass begins to roll down the slope. When it has reached a 20 kilometer per hour speed, electric motors of the truck are switched on by sliding contacts. When the speed reaches 600 kilometers per hour, several rocket sets on the truck are ignited. Thus the rocket and the truck shoot up the steep track. At its end the speed is 3,000 kilometer per hour and here the truck is separated from the flying body by braking rockets and parachute. In this way, the Soviets save one rocket stage, the weight going to the benefit of the payload.

"The French journal points out also that the Americans drew the worse card in choosing Werhner von Braun, the father of the V 2 and supporter for the vertical launching method. The Soviets on the other hand made sure they got the German engineer Schultz, who had a decisive role in the development of the V 1, and who also perfected the ramp launching method."

A cross section of the launching ramp is shown by the accompanying sketch.



BIBLIOGRAPHY OF LITERATURE ON OSCILLATORS AND RELATED DEVICES USED IN THE USSR EARTH SATELLITES An annotated bibliography has been compiled by the Air Information Division of the Library of Congress from USSR publications for the years of 1957 through 1960. There are 109 entries alphabetically arranged by author, corporate author, or title. Coverage of information extends only to the use of oscillators and related devices used in USSR satellites or in the tracking of the satellites. Emphasis was placed specifically on the uses of: (1) stability of oscillator frequency used in USSR satellites, (2) techniques on comparison of standard frequencies radiated by ground transmitters with those of the satellites, (3) use of the beat frequency and Doppler effect in satellite tracking, (4) application of Earth satellites for solving geodetic problems, and (5) satellite instrumentation pertaining to the above problems. Also noted are the most current references to instrumentation found in space probes. Library of Congress call numbers are included at the end of the entries in this bibliography when the source is available in the collection of the Library of Congress.

TRACKING OF MISSILES AND SPACE VEHICLES: REVIEW OF SOVIET LITERATURE The Air Information Division has also compiled abstract translations at AID during Dec 60 of Soviet development in tracking missiles and space vehicles. The materials in this report deals with the following topics: (1) electromagnetic problems, (2) ion clouds and ionosphere perturbations, (3) radio astronomy, and (4) propagation phenomena.

ON THE STABILITY OF REGULAR MOTIONS OF ARTIFICIAL CELESTIAL BODIES A study has been made of the disturbed rotational motion of a rod-shaped satellite about its center of inertia while in a circular orbit. Three primary cases, which correspond to three initial orientations of the major axis of the rod in inertial space, were considered. The cases are (1) the "arrow" orientation in which the major axis is tangential to the circular orbit, (2) the "floating-bar" in which the rod is perpendicular to the orbit plane, and (3) the "spoke" orientation in which the rod is initially aligned with the radius vector to the center of inertia. The last case is shown to be the only case where the attitude of the rod may be stable in the first variational sense. This case, the "spoke" initial orientation, should be of interest to designers of local vertical attitude control systems for Tiros, Midas, and Samos type vehicles. (Translation, in 1961, of 18 page report by G. N. Duboshin available from Library of Congress, Ref. 61-10637.)

**LABORATORIES IN SPACE** The book "Laboratorii v Kosmose" by Georgiy Borisovich Zhdanov and Igor Pavlovich Tindo was published in Moscow in 1959 by Izd-vo Tsk VLKSM "Molodaya gvardiya", 191 pages. It has both an editor and technical editor, and is intended for the informed general reader. Emphasis is on Soviet contributions to space science and technology. The table of contents is translated below:

Chapter 1. The first step towards reaching the stars.
Comforts to be sacrificed.
Dangers concealed in the emptiness.
A proven friend (the parachute).
In the region of automation and cybernetics.
Soviet rockets penetrate outer space.
Flying laboratories at work.

Chapter 2. In the depths of the air ocean.
Two windows to the universe.
On the border of space.
Mirages in the ionosphere and a radio-speedometer for the Sputnik.
Treasure-troves on the Sun and a chemical analysis by radio.

Chapter 3. A hot and a cold Sun.
How to measure the temperature of the Sun.
The riddle of the corona.
Rockets search the outbursts of the Sun.
Receivers of invisible rays.
Ultraviolet astronomy.
A dangerous competitor of the electronic computer.

Chapter 4. Three-dimensional geography.
Electromagnet 12,000 kilometers in length.
Surprising discoveries on a geographic map.
Satellites study the shadow of the Earth and the cosmic breathing of the Sun.
Discovery of Earth radiation and unexpected magnetic traps.

Chapter 5. Particles and fields around the Earth.
Geysers 150 million kilometers high.
Electrified and magnetized Earth.
Where geophysics and astrophysics meet.

Chapter 6. New tasks for the Sputniks.
Chemical composition of the universe and the age of comsic rays.
Some features of a clock in flight.
Fantasy or reality.

REVIEW OF SOVIET SPACE ACHIEVEMENTS A 2,000-word report dealing with Soviet successes in space technology and astronomy during the last three years was published in Vestnik Akademii Nauk SSSR No. 11, 1960 by L. I. Sedov. This is a chronology of the events which have taken place from 1957 to 1960.

WOMEN NEXT IN SPACE? Reports are circulating in Europe that a Soviet woman may soon be fired into orbit, either alone or with two men. Also predicted are animal shots around the Moon. Meanwhile, Robert C. Brown, chairman of the National Telemetering Conference in Chicago, said that the Soviets had launched a man in their August 1960 flight, but that "he either was killed when reentering the atmosphere or suffered such ill effects that the Russians could not make his feat public". He added that "we tracked the capsule reentering the atmosphere and the Russians later announced it had carried two dogs, rats and mice". He also feels there may have been a man aboard both the December 1st, 1960 (Kosmicheskij Korabl-Sputnik 3) and the February 4, 1961 (Sputnik 4) shots. (Sputnik 4 was not given the Korabl designation since it was reported not to have carried any life aboard)

MULTIMAN SPACE SATELLITE The Moscow correspondent of the Warsaw newspaper Trybuna Ludu, Arak Perlowski, does not mention a woman, but reports that Soviet scientists are considering sending a crew of two or three cosmonauts on the next flight, which "...would probably involve a number of orbits around the Earth".

ON THE USE OF AVAILABLE TECHNICIAN INFORMATION John C. Green, Director of the Office of Technical Services, U. S. Department of Commerce, has prepared an informative article on the use of technical information for the Datex Digest (No. 1 First Quarter 1961), extracts of which appear below. He discusses among other things, Russia's All-Union Institute of Scientific Information, pointing out that it abstracts all Soviet literature together with journals and reports in 65 foreign languages originating from more than 90 countries. His office provides a clearing-house service on Soviet science and technology, and is the source of much information that appears in Space Intelligence Notes.

"In the last few years, a unique industry has arisen in this country. It is one whose scope and magnitude rival the chemical, the electronic, or the automotive industries. This new giant is scientific research and its commercial product, loosely termed knowledge.

Since 1940, the performance of research has grown fifteen times until today as a 12.5 billion-dollar-a-year industry it has become a significant force in our economy and, in fact, in our society. It should be remembered that the product of every scientific study is new knowledge and this must be recorded for the benefit of the researcher, his sponsors, and the scientific fraternity at large. Our civilization is built on the written record and we must augment and preserve this record for ready access if we are to progress.

With the expansion in the number of scientists performing research, there has been a corresponding expansion in the record of their findings. Today there are roughly 55,000 scientific and engineering periodicals published each year and these contain over one million articles which are deemed significant to some branch of research and engineering.

The United States and England are the dominant producers, sharing the responsibility for nearly half the total output. However, the Russians, the Germans, the French, and the Japanese are not far behind. Even the Red Chinese are beginning to publish the results of their scientific work. If their "drive" in science should approach that of the Soviet -- a few years from now we'll face a problem paralleling our current one where it has been found necessary to take extraordinary measures to keep abreast of Russian developments. In the USSR, the Academy of Sciences has created an All-Union Institute of Scientific Information. I have been privileged to visit that organization as a member of a U.S. team of information specialists. We were informed that they maintained a full-time staff of nearly two thousand people, plus the aid of 25,000 part-time scientific and engineering specialists. Their Director, Dr. A. I. Mikhailov, advised us that they abstract all the Soviet literature plus reports, journals and papers received from 92 countries in 65 languages. (I can assure you that U.S. information receives special attention in Dr. Mikhailov's program.)

At present the Soviet take from four to six months from the time the source article appears until an abstract thereof in the Russian language is printed and distributed. However, they have a seven-year plan which calls for a maximum time limit of three months for such abstracts and one month for items which they consider to be of special importance to Soviet science and industry.

Others who have visited Russia say that the Soviet consider their information clearinghouse to be a most important innovation. For example, Mr. James Rand of Rand Development Corporation in Cleveland reports that Soviet scientists assured him that the creation of the institute was comparable in scientific significance to the production of the atomic bomb.

Now, putting all of a Nation's information under one roof produces some impressive statistics but we need not be ashamed of what we are doing in this country. A monolithic society dominated by government should be expected to create a central ministry of scientific information. Equally, a free society should be expected to produce a pattern of voluntary collaboration encompassing the technical press, the scientific societies, and the Federal Government, and this is precisely what we have done.

Having established the fact that an international resource of scientific information exists -- one of great magnitude and one which is being augmented at a startling rate -- why is it of any concern to you and your company? If you accept the thesis that our economy and our security are inextricably interlocked to scientific progress, it should not be necessary to belabor the point. However, there is a thought that I'd like to stress -- this is -- the research the other fellow has done can be as useful to you as the research you finance yourself. If a piece of information is new and significant, it doesn't matter whether a scientist in Moscow, Peiping, Tokyo, Bonn, or Chicago did it. The important thing is that it be located, that its importance be recognized, and that it reach the person who can put it to use at the right time.

This leads to the question -- what should a company do, in addition to or differently from what they are doing now? There is no single definitive answer -- since the requirements of each company are individual, the effort should be tailored to the need. We can say with reasonable authority that most companies are not set up to take maximum advantage of research performed elsewhere. Think of your own company. Your firm probably has a library submerged in the organizational structure with a few librarians valiantly striving to collect and catalog materials of possible interest to your technical staff. This is fine but it isn't enough. Many technical people are reluctant to enter the library. Further, they do not keep up with the literature. The company suffers. A few firms have recognized this situation and have set up internal organizations whose objectives are to communicate the right information to the right people at the right time.

These information researchers have the central responsibility for seeing that information from all sources promptly reaches the people who should know about it, that its significance is pointed out, and that its use is encouraged.

I would like to make special mention of two science information resources which are not being "mined" effectively by most firms.

The first is the research performed by large industry which can be purchased at reasonable costs through a license arrangement covering patents and related information. Application of such a technique permits a medium-sized or small company with meager technical facilities to acquire research information which may have demanded expenditures in terms of personnel, facilities, and funds far beyond its capabilities.

The other science information area to which I recommend increased attention is the Federal Government which has emerged relatively recently as the world's largest sponsor of research. The Government's diverse scientific agencies produce approximately one thousand new reports each month. My office undertakes to obtain, announce and supply them to U. S. industry. Currently, our sales of such materials are grossing nearly three-quarters of a million dollars a year with a continuing growth."