USSR

SCIENCE PAVES THE ROAD TO PROGRESS

No. 1 (16)—20 Cents

FIREWORKS ILLUMINATE THE MOSCOW RIVER EMBANKMENT ON A HOLIDAY EVENING.

USSR

ILLUSTRATED MONTHLY

1706 Eighteenth Street, N.W.
Washington 9, D. C.
ADams 2-3426

The magazine *U S S R* is published by reciprocal agreement between the governments of the United States and the Soviet Union. The agreement provides for the publication and circulation of the magazine *U S S R* in the United States and the magazine *Amerika* in the Soviet Union.

Subscription Rate:

6 Months	$1.00
1 Year	1.80
2 Years	3.00

Published by the Embassy of the Union of Soviet Socialist Republics in the USA.

Second Class mail privileges authorized at Washington, D.C., with additional entries at Milwaukee, Wis., and Chicago, Ill.

Printed by The Cuneo Press, Inc.

HAPPY NEW YEAR!

By Anatoli Sofronov

ONLY two years ago I visited the United States of America as a member of a delegation of seven Soviet journalists, and it is with pleasure that I recall the hospitality of the American people.

Our countries are divided by the Atlantic and Pacific oceans, and we have different social systems. In spite of this, we have a lot in common. Yes, our people are really very much alike.

I feel it at the moment these lines are being written the way I felt it at the time when we were crossing America by plane, when we met hundreds of people and learned something of the life of the country.

We heard the wish for peace and friendship between our peoples repeated time and again by Americans in all walks of life, from the Cleveland industrialist to the bricklayer from Salt Lake City.

I would like to meet again the farmer from Arizona who showed us his livestock farm and thoroughbred racing horses.

How good it would be to clasp the hand of the old ship's mechanic who more than once bathed in the icy waves of the North Sea during the war when he was convoying arms deliveries to the Soviet Union. He has retired on a pension, and we met him in San Francisco.

With the greatest pleasure would I talk to the San Francisco editor who received us in his home and proudly showed us his sleeping children.

Continued on next page

Anatoli Sofronov is a popular playwright and the chief editor of the magazine Ogonyok. *He has traveled through many countries and visited the United States in 1955 with a delegation of Soviet journalists. His articles on his trips abroad are read widely by the Soviet public.*

1958 MARKS THE FIRST YEAR OF THE SOVIET STATE'S FIFTH DECADE. ANNIVERSARY PARADES LIKE THIS, IN MOSCOW'S RED SQUARE, TOOK PLACE ALL OVER THE COUNTRY

People in America looked at us in wonder, their curious glances traveling over our suits, shoes, ties and watches. They found that many things were similar to those made in any other country. But most important, they found that Soviet people were made of pretty much the same stuff as themselves.

The year 1957 has departed, and the New Year has come. As the lights on the numerous fir trees are switched on and people gather around the holiday tables, they are in high spirits, looking forward to the new events the coming year is sure to bring, to new dreams and new plans taking shape in their minds.

We have good reason to feel happy and elated today. The year 1957 was a good year for us, and we gathered momentum for the future. I am not talking about the launching of the earth's first artificial satellites, a feat that crowned all of our scientific and technological achievements. The sputniks are the pinnacle, but the path leading to the top is paved with the remarkable achievements of Soviet scientists, engineers, workers and farmers.

The industrial enterprises of Moscow alone produced up to 190 completely new models of machines, apparatus and instruments in 1957. The country's farmers raised a good crop. And though the fields of the Urals, Kazakhstan and the regions along the Volga River suffered from drought, the nation was supplied with all the grain it needs.

Billions of rubles have been invested in housing construction and millions of families have moved into new apartments. Additional millions of acres of virgin land have been reclaimed for agriculture in Siberia and Kazakhstan, yielding their first crop of grain. Colossal hydroelectric stations have switched on myriads of new lights. Many new universities and institutes, thousands of schools and theaters have been opened. The movement for overtaking the USA in per capita production of meat, milk and butter has attained countrywide proportions. The world's most powerful synchrophasotron was set into action at the small town of Dubna, near Moscow. Shostakovich composed his Eleventh Symphony, which music lovers have called superb. Last summer Moscow threw open its doors to 34,000 young people from 130 countries who arrived at the World Youth Festival and experienced our hospitality firsthand.

New Year's Eve has always been a time for celebration the world over. But for the people of my country this year it was a double event—the beginning of 1958, of course, and the beginning of the fifth decade of the Soviet state.

I look back over these forty years with mixed emotions—pride in our achievements, satisfaction in the knowledge that what we have accomplished will be of help to all mankind, and a bit of sadness, too, in remembering the struggle of wars, the hardships and sacrifices of reconstruction. But everyone in my country knows that the spadework has been done now and that our past efforts will yield increasing rewards with each new year. That is why 1958 has special meaning for us.

A lot is expected of the coming years. It is hard to predict what new discoveries and inventions human genius will make possible. But of one thing I am sure—whatever good the years bring to my country will be of benefit to other countries as well. We don't view our accomplishments in terms of narrow personal advantage but rather those of general usefulness.

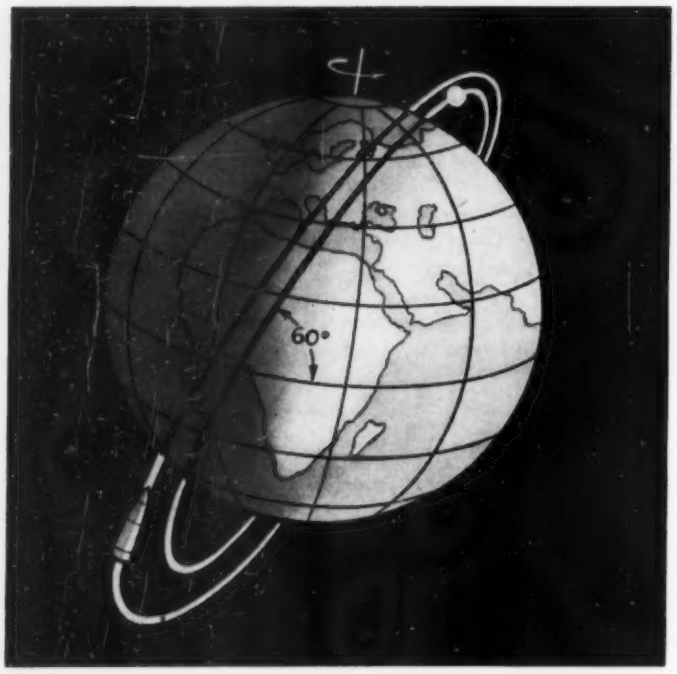
Now I don't mean to imply that the spirit of competition is not keen in my people. We do like to win and we get as much pleasure from being "first" as the next one, but never at the expense of good sportsmanship. Perhaps this example will give some insight into our character. Recently I made a trip to Krasnodar Territory, to the fertile Kuban. I heard the Kuban Cossacks say: "We'll surely get ahead of Iowa in the production of milk, butter and meat."

And I know that the people of the Kuban are true to their word. They have a high regard for the achievements of the Iowa farmers, and they want to bring their own farms up to these high standards. We have already made it known that we would welcome an exchange of visits between the farmers of Iowa and the collective farmers of the Kuban.

The fervent wish of the Soviet people is peace with all the nations of the world, mutual assistance and mutual cooperation. I am convinced that this coincides with the dreams and wishes of hundreds of millions of people throughout the world. And it is natural that this wish should be nearest our hearts at the start of 1958.

May this year become a landmark. May it become the happiest year for mankind, when economic and cultural relations among the nations of the world are strengthened and broadened in a spirit of international good will and confidence. ■

THE GAIETY OF THESE UKRAINIAN YOUTHS REFLECTS BOTH THE CONFIDENCE AND THE GREAT OPTIMISM OF THE COUNTRY AS IT PASSED ITS FORTY-YEAR MILESTONE



SPUTNIK II

Cosmic Fact-Finder

THE second man-made satellite was a larger, heavier and more complex version of Sputnik I. Its refinements were ordered by the fact that it was carrying a variety of complicated instruments and Laika, the first space traveler, whereas Sputnik I carried only relatively simple instruments.

The Instruments

Sputnik II was launched as a final unit of a multistage rocket. This simplified its visual observation. In tracking the first sputnik, observers found it easier to follow the course of the carrier rocket than the satellite itself because of its greater luminosity. The carrier rocket was brighter than the satellite by several stellar magnitudes.

In the forepart of Sputnik II a special frame enclosed the instrument to record short-wave radiation from the sun—the ultraviolet and X-rays. A spherical container resembling that of Sputnik I carried two radio transmitters and sources of their power supply, thermal controls and sensitive elements to register such effects as fluctuations of temperature. Also in the forepart of the rocket was the airtight cabin which housed the dog and the instruments to record its physiological reactions.

Mounted on the body of the rocket were instruments for the study of cosmic rays, radio-telemetering equipment to transmit all the data recorded on the satellite, equipment for measuring temperature on the satellite's outer surface and inside it, sources of power supply for the satellite's scientific and measuring instruments.

The total weight of all equipment, the dog and power sources was 1,120 pounds, six times as heavy as Sputnik I. The instruments and containers mounted on the rocket's frame were shielded from the aerodynamic and heat effects of the passage through the dense layers of the atmosphere by a special protective cone. After the satellite was thrust into its orbit the cone was jettisoned.

Satellites' Life

The speed imparted to Sputnik II by its rocket gave it an elliptical rather than a circular orbit. At its farthest distance from the earth it reached an altitude of better than a thousand miles, almost double that of the first sputnik.

The resistance of the earth's atmosphere tends to act as a brake on the movement of a satellite. This alters the size and shape of its orbit. It meets the greatest resistance at the point where it comes closest to the earth, what is called the perigee of the orbit. At the farthest point from the earth, the apogee, the satellite moves in cosmic space, outside the earth's atmosphere, which extends, theoretically, to an altitude of about 600 miles.

Because the satellite gradually slows down, its elliptical orbit becomes smaller and its path more and more circular. When the orbit shrinks to a height of about 60 miles, atmospheric resistance becomes so great that the heat generated burns the satellite up like a meteor.

Since the period of revolution of Sputnik II was greater than that of Sputnik I, it had less resistance to overcome. It could reasonably be assumed then that the second moon would traverse its orbit for an appreciably longer time than the first.

As a result of world-wide trackings of the two sputniks, science should be able to forecast with accuracy the length of life of future satellites. This is only one of the many invaluable findings which data from the sputniks will give us. *Continued on page 6*

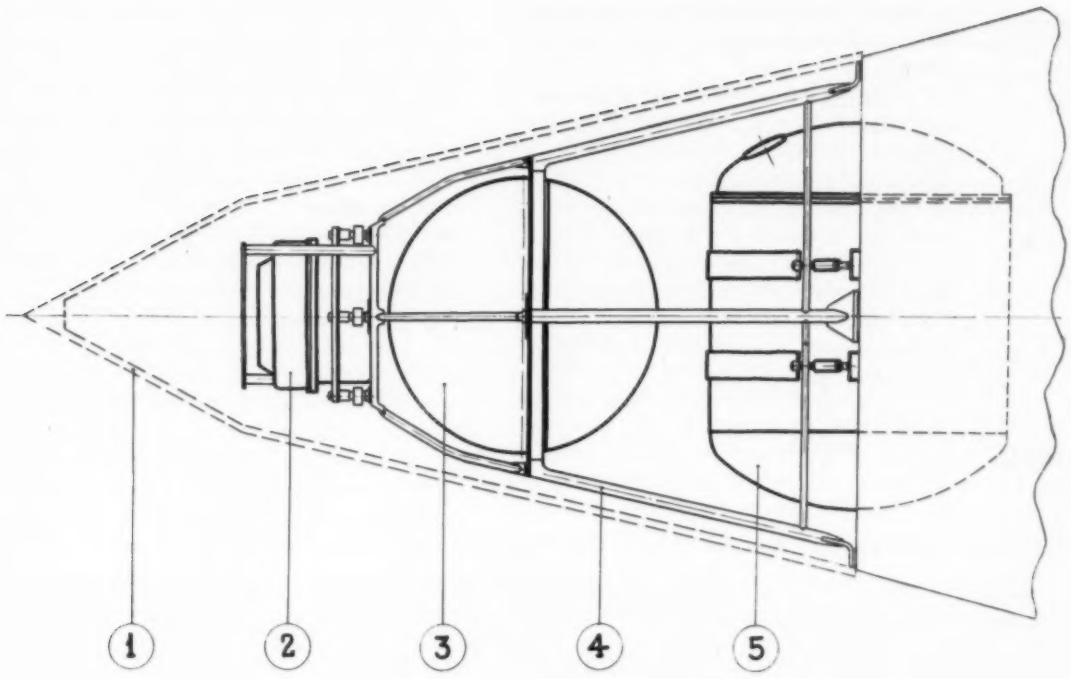


DIAGRAM
OF THE FORWARD SECTION OF SPUTNIK II

1—Protective nose cone jettisoned after the satellite reached its orbit.

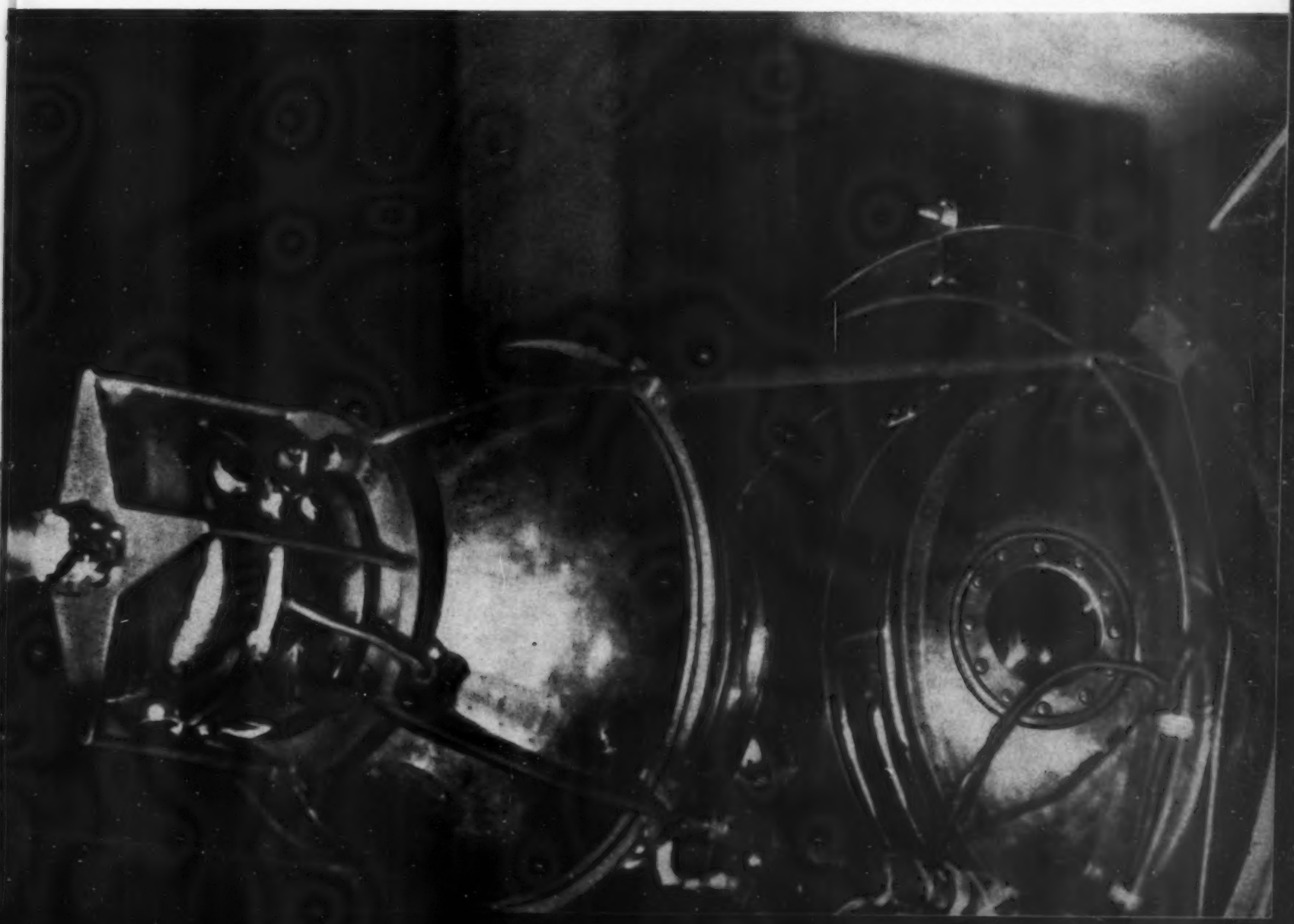
2—Instruments for studying the sun's radiation (ultra-violet and X-rays).

3—Sphere containing two radio transmitters and other instruments.

4—Frame enclosing the satellite's scientific equipment.

5—Airtight cabin for experimental dog.

PHOTOGRAPH OF THE FORWARD SECTION SHOWN IN DIAGRAM ABOVE. THE WEIGHT OF EQUIPMENT AND DOG WAS 1,120 POUNDS—SIX TIMES MORE THAN SPUTNIK I.



SPUTNIK II

Cosmic Fact-Finder *Continued*

Sun's Short-wave Radiation

The data on the sun's short-wave radiation provided by Sputnik II are most important for further study in physics, astrophysics and geophysics.

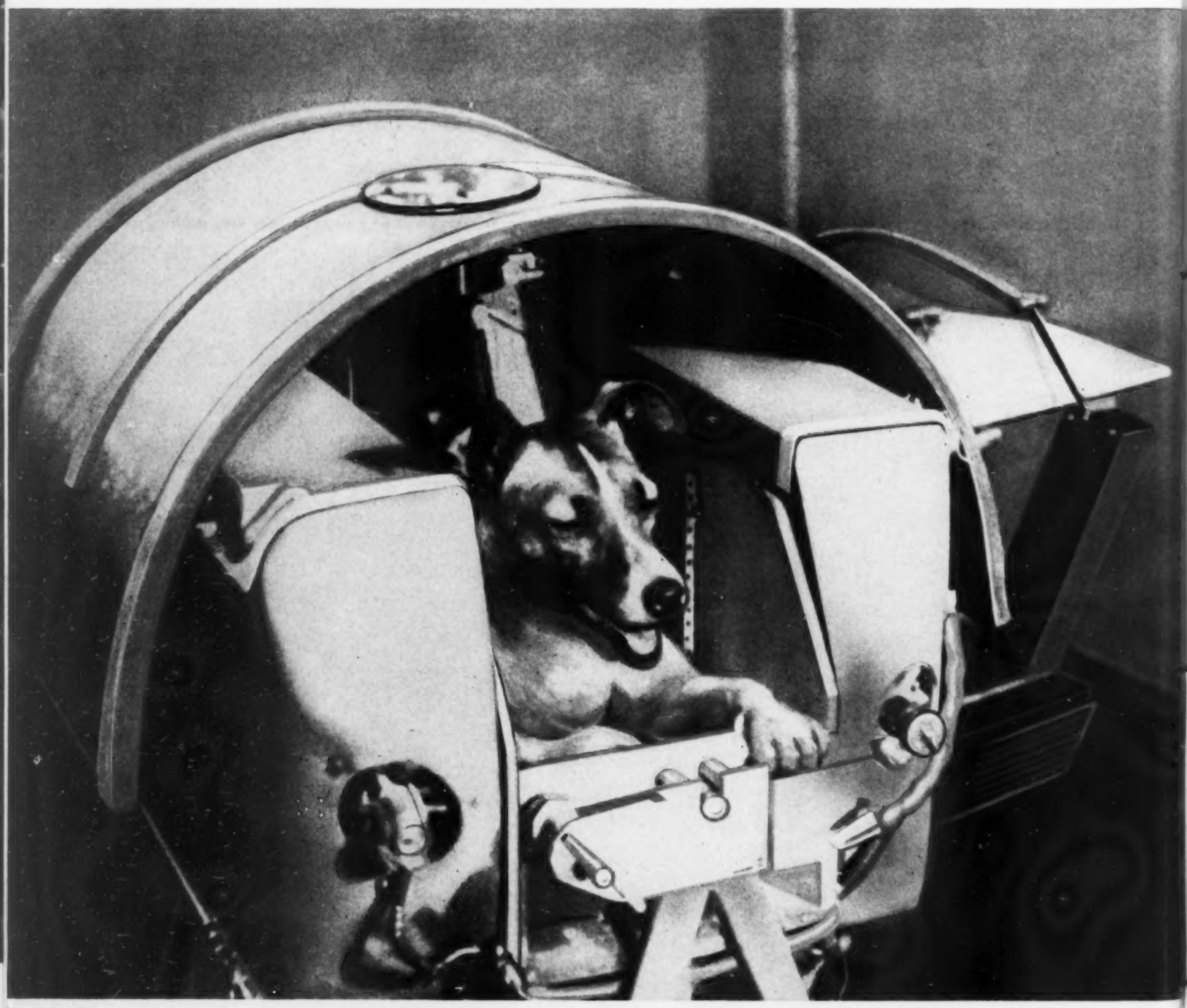
The amount of energy of the sun's short-wave radiation is comparatively small, tens of thousands of times less than the sun emits as visible light, but this radiation greatly affects the earth's atmosphere nevertheless. The reason for this is that short-wave radiation is extremely active. As the rays strike the air molecules, they break them down into atoms. These free atoms are known as ions and the strongly ionized upper layers of the atmosphere as the ionosphere.

The condition of the exterior layers of the sun—the chromosphere, the gaseous layer around the sun, and the corona, the luminous envelope which we see only during a total eclipse—is not constant. It changes continually. Scientists believe that there is a close link between solar activity, chromospheric eruptions, and the ionospheric absorption of radio waves which is responsible for interruptions in radio communication.

While the earth's atmosphere shields us from the deadly short-wave radiation of the sun, it has also made it impossible for us to study this vitally important phenomenon without getting outside the atmosphere. The instruments in Sputnik II measured the rays before they were absorbed by the atmosphere.

Three photoelectronic multipliers, placed at an angle of 120 degrees to each other, served

LAIKA IN HER CABIN PRIOR TO SPUTNIK II FINAL ASSEMBLY. DATA OBTAINED FROM HER FLIGHT WILL HELP ENSURE SAFETY OF FUTURE COSMIC TRAVELS BY HUMAN BEINGS.



as radiation receivers. The electric signals given off by the multipliers trained on the sun were amplified by radio circuits and transmitted to the earth through the telemetric system.

Along with data obtained by the sputnik instruments observations of solar radiation were made by the entire network of ground "sun-service" stations as part of the International Geophysical Year program. When all data are collected and organized, science will be able to draw its first significant conclusions as to the connection between solar short-wave radiation and the processes that take place in the outer layers of the sun and the state of the earth's ionosphere.

Cosmic Rays

The atomic nuclei of different elements are accelerated and acquire very great energies in the cosmos. The cosmic radiation that thus originates affords the opportunity of investigating outer space at great distances away from the earth and even the solar system.

As cosmic rays travel toward the earth from their birthplaces, they undergo the effects of the surroundings through which they pass. Due to various processes taking place in outer space, their composition and intensity change.

The number of cosmic-ray particles increases, for example, if there are intensive explosions on the sun and the conditions are created for accelerating atomic nuclei. There is reason to expect that in such cases only the number of particles with small energies increases, while the number of particles with high energies remains without change.

The sun is also the source of corpuscular radiation whose streams have intensive magnetic and electric fields. It is believed that the effects of this radiation on cosmic rays as well as fluctuations in the earth's magnetic field change the number of particles with both small and high energies.

In order to understand the nature of the transformations cosmic rays undergo in outer space, we must not only establish increases or decreases in the intensity of cosmic radiation, but also determine how the number of particles with different energies changes.

Cosmic-ray particles are strongly deflected in their passage through the earth's magnetic field. Only particles with very great energies will reach unhampered any spot on our planet. Thus the earth is surrounded in its way by an energy barrier which decreases in height from an equatorial peak as geomagnetic latitudes increase.

The number of particles in cosmic radiation and their energies can be established by measurements made at different latitudes. The dependence of the number of cosmic-ray particles on the latitude, the so-called latitude effect, determines the distribution of the particles according to their energies, or the energy spectrum of cosmic radiation.

The satellite, moving at a speed of five miles per second, crosses from one latitude to another in a very short time. Thus by satellite measurements of cosmic radiation we can determine the effect of the latitude and with this the distribution of the cosmic-ray particles according to their energies. The fact that a great number of these measurements have been made is of inestimable help. Therefore, the satellite data will help us trace the changes both in the composition of comic radiation and its intensity.

Sputnik II supplied data on cosmic radiation with two counters. After a signal was broadcast that a definite number of cosmic-ray particles had been counted, the particles were again recorded, with a new signal broadcast as soon as the same number was reached. Dividing the number of recorded particles by the time taken to count them, we obtain the number of particles the counter traps each second. In other words, we find the intensity of radiation.

Preliminary organization of the sputnik data on cosmic radiation shows that the counters functioned properly. The dependence of the number of cosmic-ray particles on geomagnetic latitude is clearly evident. Complete systematization of the measurements of the energy spectrum of primary cosmic particles will make it possible to investigate the changes that come with time in this spectrum and compare them with the processes which took place at that time in outer space.

First Space Traveler

Laika, the first living organism to travel for several days through cosmic space, gave science vital data on reactions under gravity-free. weightless conditions. Pulse-beat, respiration, arterial blood pressure and cardial biopotentials, temperature and pressure in the animal's cabin were recorded and radio-telemetered.

To regenerate the air in the cabin and maintain the proper air composition, highly active chemical compounds were used which provided the required amounts of oxygen and absorbed carbon dioxide and surplus vapor. The amount of compounds in chemical reactions was controlled automatically. The cabin was equipped with apparatus to feed the dog and eliminate wastes.

Laika went through a course of training. The animal was gradually accustomed to protracted stays in small hermetically sealed chambers, to the space suit, and to the attached impulse converters that recorded physiological functions. She was also trained to bear up under overstrain, and her resistance to vibration effects and other pertinent factors were tested under laboratory conditions.

The actual satellite flight was the culmination of experiments that had been carried on over a number of years by Soviet scientists with animals sent up in rockets to altitudes of 60 to 120 miles.

The physiological data received from Sputnik II are being carefully studied. But even now we can say that the dog behaved normally when the satellite was thrust into orbit and bore up well under the subsequent state of weightlessness. The data recorded indicate that the condition of the animal was satisfactory throughout the experiment.

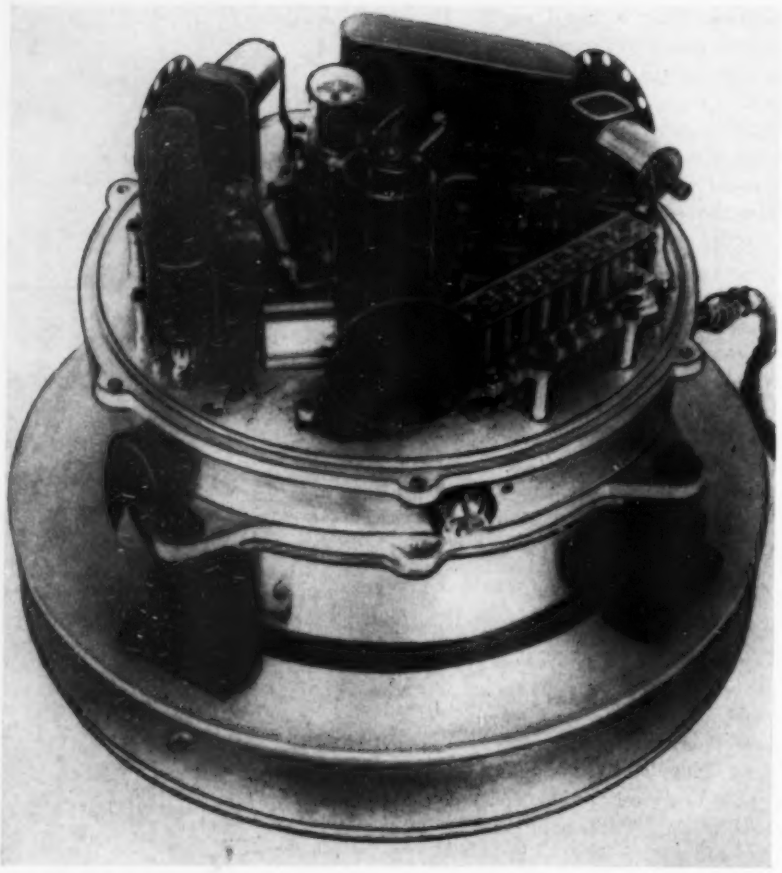
It is apparent that the observations are of momentous importance for the future interplanetary flights and provide the basis for inventions and techniques that will make for safe cosmic travel by human beings.

Continued on next page

MEDICAL AND BIOLOGICAL DATA SENT BY SPUTNIK II

Key to Symbols:

CR—Cosmic rays.
SR—Solar radiation (ultra-violet and X-rays).
GO—Gravity zero (weightlessness).
R—Respiration.
C—Cardiac activity.
B—Blood pressure.



THESE INSTRUMENTS SENT DATA ON THE SUN'S SHORT-WAVE RADIATION FROM SPUTNIK II.

SPUTNIK II

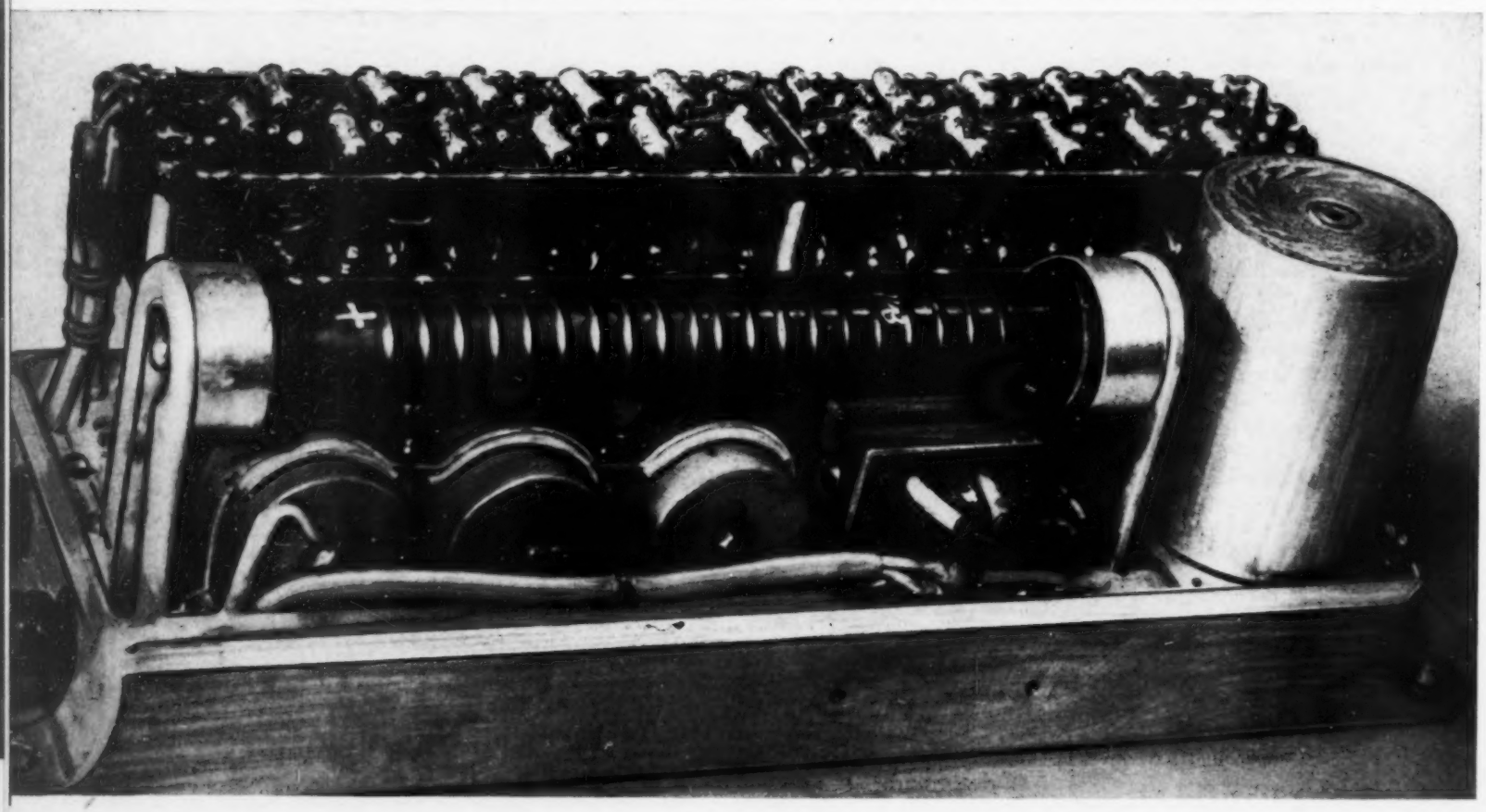
Cosmic Fact-Finder *Continued*

Tracking the Satellite

Sixty-six special optical observation stations and all the astronomical observatories in the Soviet Union, and scores of foreign scientific centers made systematic observations of the two satellites and the carrier rocket of the first sputnik. The brightness of the carrier rocket and the second sputnik also made it possible to use the visual observations obtained by meteorological stations with balloon theodolites.

Together with visual observation, the satellites were photographed. This helped define their orbits. Radio tracking also furnished important information. The broadest community of radio amateurs throughout the world tracked the sputniks along the stations specially assigned to this task. Complete analysis of radio observation will yield valuable data on the peculiarities in the ionization of the upper

INFORMATION FROM THESE INSTRUMENTS IN SPUTNIK II WILL FACILITATE TRACING THE ORIGIN OF COSMIC RAYS AND CHANGES IN THEIR COMPOSITION AND INTENSITY.



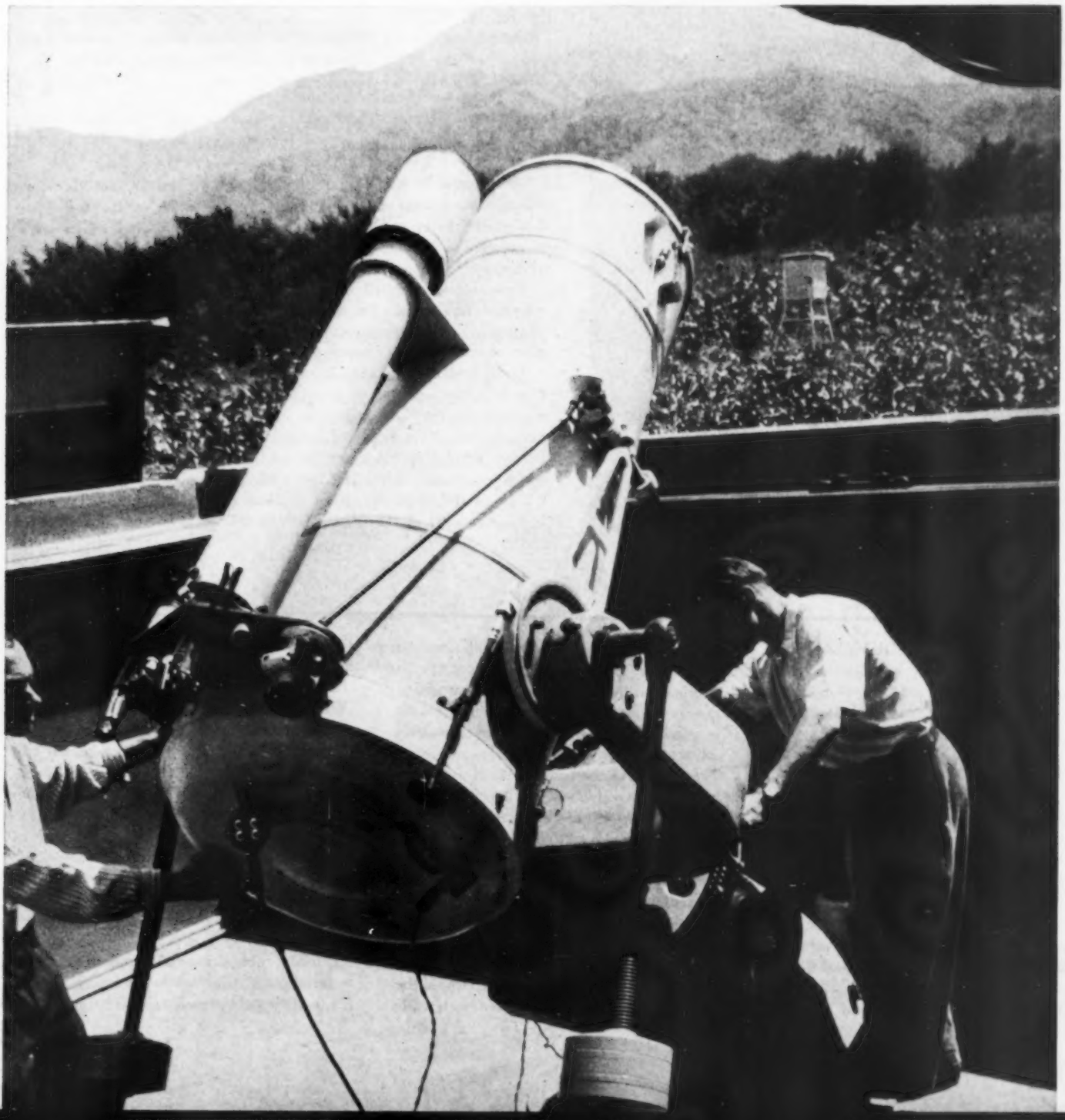
layers of the ionosphere and also of the absorption and propagation of radio waves.

An interesting phenomenon occurred in the passage of Sputnik II near the area of maximum ionization of the atmosphere, where conditions were particularly favorable for the propagation of radio waves through ionospheric channels. In several cases the radio waves reached the receiving stations not via the shortest distance, but after traveling around the longer side of the globe. There were a number of individual reports of world-round radio echo.

The duration of the research measurements by the second satellite's instruments had been set for a seven-day period. At the end of the scheduled period the radio transmitters and the telemetering equipment ceased to function. Further tracking of Sputnik II to forecast its flight and to study the upper atmospheric layers was continued by optical observation and through radar. ■

A METEOR TRACKER USED TO PHOTOGRAPH THE SPUTNIKS. PHOTOS HELPED DEFINE THEIR ORBITS.

KAZAKHSTAN OBSERVATORY IS ONE OF MANY SPUTNIK TRACKING CENTERS. OPTICAL OBSERVATIONS ARE IMPORTANT FOR FURTHER SCIENTIFIC RESEARCH.



FULL-SIZED MODEL OF SPUTNIK I DRAWS CROWDS AT MOSCOW EXHIBITION HALL.

EARTH SATELLITE: Link in Over-all Scientific and Technological Development

By Alexander Topchiev
Secretary, USSR Academy of Sciences

THE FIRST SATELLITE to be orbited around the earth was no accidental feat of Soviet science and engineering. Nor was it the product of any single branch of learning. Sputnik reflected the inevitable result of the development of the country's science and technology as a whole.

Theoretical and Experimental Physics

The greatest headway has been made in the physical sciences. Soviet scientists have done much in developing the theory of relativity, particularly in the aspects of non-stationary solution of Einstein's equation of gravitation and the problem of the law of movement of the system of bodies.

A considerable contribution was made to the development of modern quantum mechanics. An important landmark in this direction was Vladimir Fok's approximate method of resolving the problems of quantum mechanics of many particles.

Soviet scientists propounded the theory of the inception of nuclear forces as the outcome of the exchange of light particles which was essential for the development of our ideas about atomic nuclei. The development of the theory of nuclear forces was also greatly influenced by the liquid-drop model of the nucleus suggested by Yakov Frenkel which was further developed in the theory of fission.

One of the most significant achievements of the physical sciences is the discovery of the so-called Vavilov-Cherenkov effect that laid the

LEARNING MORE ABOUT OUR PLANET

By Mikhail Molodensky

Corresponding Member,
USSR Academy of Sciences

OBSERVATIONS of the man-made satellites will lead to important conclusions as to the precise shape of our planet. Even the moon's movement allows us to determine one of the basic features of the earth's structure, namely, the fact that it is compressed at the poles.

As Sputnik moves in its orbit, it reacts to every change in the earth's gravitational field, with the line of its flight indicating the irregularities. With this new data and the use of modern astronomical and radiolocation methods, the dimensions of our planet can be determined with infinitely greater precision than was previously possible because Sputnik is approximately 50 times closer to the earth's center than the moon.

The plotting of the trajectories of a number of artificial satellites will finally enable us to determine the exact configuration of the earth, an extremely important element in the study of the origin, history and structure of our planet. By knowing the satellites' speed we shall be able to calculate precise measurements of the distances between various points on the globe, thus making the present data more accurate.

Geochemists have found out much about the earth's chemical composition. But man-made satellites provide the means for many new findings. New data will be available on the chemical composition of the earth and the changes in this composition that are produced as a result of various cosmic radiations.

Sputniks open new avenues for research in all the earth sciences—gravimetry and geochemistry, geodesy and geophysics, seismography and hydrology. They will give us important information on the composition of the cosmic dust that floats through interstellar space. Science has thus far merely guessed at its nature and properties, but the satellite laboratory will afford the possibility of undertaking a study of this problem from stage to stage. The supposition that cosmic dust is the material out of which planets are formed testifies to the importance of such a laboratory. ■

foundation for the optics of greater-than-light velocities. The theory of this effect was worked out by Igor Tamm and Ilya Frank. They have solved the problem of the radiation emitted by the electron when moving with a velocity greater than that of light.

Signal advances were made in experimental physics, especially nuclear physics. Cosmic ray research by means of the Wilson chamber, started as early as 1924, developed later into a series of experiments to investigate the properties of elementary particles, split the atomic nucleus artificially, study artificial radioactivity and the machinery and laws of the formation of positrons.

In 1940 the spontaneous fission of uranium nuclei was discovered in the Soviet Union. Shortly thereafter it was established that by a small enrichment of a natural mixture of uranium isotopes with uranium-235 a chain process of fission was possible with ordinary water employed as a retarding agent.

Soviet physicists have solved a number of major technical problems involved in the peaceful use of atomic energy which helped to give our science one of the leading places in the world.

Vladimir Veksler's method of "auto-phasing" charged particles, discovered in 1944, made possible the construction of powerful accelerators. The world's biggest 10-billion electron volt proton accelerator, started in the Soviet Union in 1957, is based on this method which is now being adopted in other countries. In the making of accelerators, the basic instrument for investigating the properties of elementary particles, our scientists and engineers have attained the highest energies ever recorded anywhere in research laboratories.

Designing work is currently under way for the construction of a still more powerful 50-billion electron volt accelerator. When completed, it will give another great impetus to the advancement of nuclear physics.

Soviet scientists have carried out important investigations in the physics of reactors and other aspects of building reactors. This work was essential for the construction of a number of nuclear reactors for scientific experiments and power generation. One of them is our atomic power plant started in 1954, the first in the world.

The successful operation of this plant served as the basis for programming the construction within the next few years of several larger power stations run by atomic energy. At present work is being done to design atomic engines for transport, and the first atomic icebreaker will soon be on the way.

The construction of nuclear reactors has made it possible to begin production of radioactive isotopes, which are widely employed in research laboratories, industry and agriculture as radiation sources and "tracer" atoms. Radioactive isotopes helped disclose the essence of many complex processes occurring in nature and technology.

Among the investigations of fundamental importance for the peaceful use of atomic energy is the work done to attain a controlled thermonuclear reaction by means of high energy impulse discharges. This permitted us to obtain temperatures of over a million degrees centigrade, higher than any ever before reached under laboratory conditions. The investigation of high-energy gas discharges moves us nearer to the solution of the major task of present-day science, the elaboration

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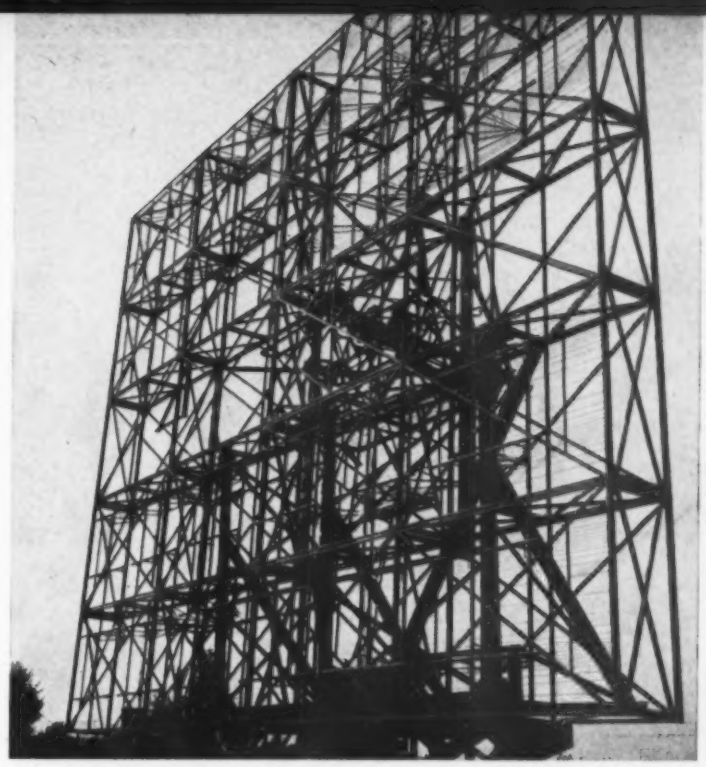
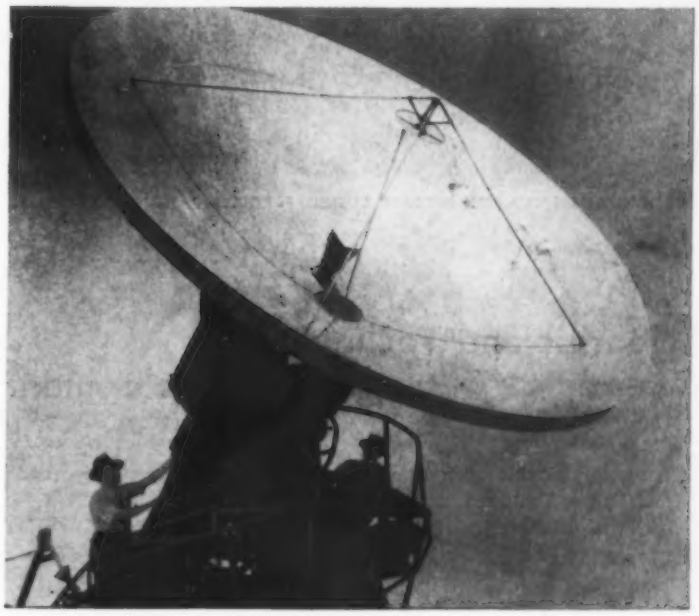


THIS STEEL LATTICE WORK IS THE ANTENNA OF A POWERFUL RADIO TELESCOPE.

ONE OF THE RADIO-ASTRONOMICAL CENTERS MAKING CELESTIAL OBSERVATIONS.



THE WORLD'S WEATHER

By Alexander Obukhov

Corresponding Member,
USSR Academy of Sciences

AIR MASSES that form above ocean areas often determine the weather of land areas. Unfortunately we know so little about these great wastes of water which cover two-thirds of the globe that we have no way to forecast devastating typhoons and tornadoes.

Because of the lack of meteorological data, the Pacific Ocean and parts of the Atlantic and Indian Oceans are not charted at all on synoptic maps which summarize observations taken over a wide region at about the same time. This is also true of the polar regions and of some mountain areas.

All in all, from the greater part of the earth's surface we obtain no weather data, and this cannot but help affect the accuracy of our forecasts. Little is known today about even so comparatively simple a question as the distribution of clouds over the globe and the distribution of air currents connected with them because of the difficulty of solving this question by "terrestrial" means only.

Meteorological rockets which are shot to altitudes of 50 to 55 miles above the earth provide valuable information but cannot answer all the questions. Immeasurably broader possibilities for study of the upper reaches of the atmosphere and of its lower regions where weather is made are opened by the creation of the man-made satellite. In its course around the globe it describes a very complex path which covers almost all the territory of the earth with the exception of the polar regions.

It will thus be possible to obtain detailed information about the movement and distribution of clouds throughout the globe and, consequently, of the air currents over most of its surface. That is of great value in advancing studies of the general circulation of the terrestrial atmosphere and creating physically substantiated methods for long-range weather forecasts.

To investigate the complex movements and changes in the atmosphere we must know the

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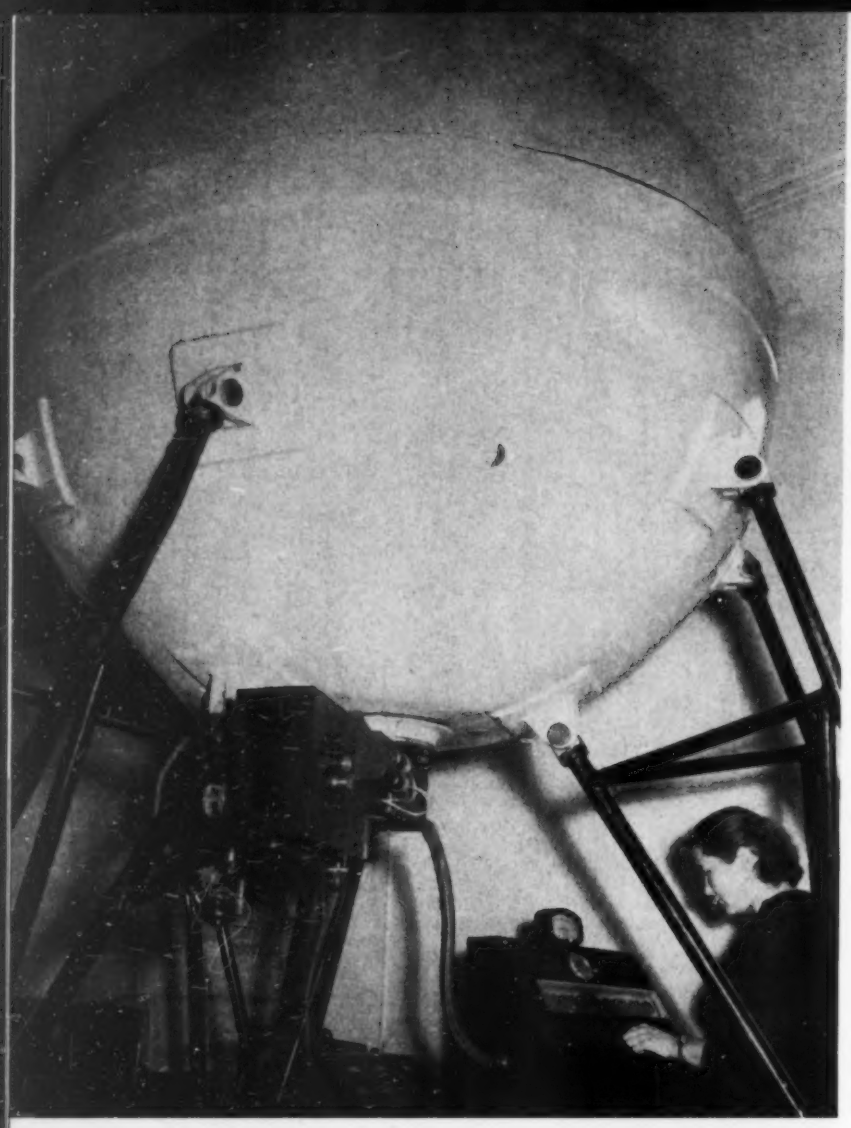

THIS IONIZATION CHAMBER RECORDS COSMIC PARTICLES PASSING THROUGH IT.

Scientific and Technological Development

Continued

of a reactor capable of working on heavy and super-heavy hydrogen (deuterium and tritium), and not on uranium fuel.

The work of Igor Kurchatov, Mikhail Leontovich, Lev Artsimovich and other Soviet scientists is tremendously important in the attainment of these objectives.

SOUND PROPAGATION THROUGH ATMOSPHERE IS STUDIED WITH THIS GENERATOR.

Mathematics and Mechanics

The vigorous development of modern physics and engineering has confronted mathematics with new tasks, since there is no sphere of theory or practice today that can progress without complex mathematical apparatus. Soviet scientists have introduced many original elements in the development of both theoretical and applied mathematics.

The combination of the classical theories with the new methods have completely changed the appearance of the theory of probabilities, algebra, topology and other branches of mathematics. There has been considerable development of new and highly important branches of mathematics, such as the theory of operators and mathematical logic. Along with the theory of differential equations and the theory of probabilities, the theory of operators has become a principal mathematical instrument in physics.

Peaceful uses of atomic energy, automatic regulation of production processes and jet and rocket techniques have set mathematics fundamentally new tasks. Soviet mathematicians are successfully working out new directions, such as the theory of information and the theory of programmation of electronic computing machines. The designing and construction of high-speed calculating machines has ushered in a new epoch in science and engineering.

Bordering directly on mathematics and making wide use of its methods is mechanics. Theoretical mechanics, based in its development on the accomplishments of mathematics, nurtures a number of subsidiary branches of mechanics, which in turn are directly connected with technology and make for its rapid progress. Technology itself, however, has set science many new problems, compelling it to solve a good many questions in a new way. An especially graphic illustration is furnished by aircraft rocket engineering, the development of which is closely connected with research in aero, hydro, and gas dynamics.

WEATHER *Continued*

earth's albedo, the quantity of energy the earth reflects into space. Satellite observations will supply us with this vitally necessary information. They will also fill in the very scanty data we now have on the density of air at high altitudes, the interaction of the atmospheric layers, and supply other such information with which we can accurately determine the laws of weather formation.

In addition to having satellites circle the earth at altitudes of several hundred miles, it is desirable to set them spinning at lower altitudes. While these laboratories probably will not function long, they nevertheless can furnish data on the atmosphere around the earth that cannot be obtained from any other source. ■

THE EARTH'S MAGNETIC FIELD

By S. Dolginov and N. Pushkov

Masters of Physico-Mathematical Sciences

MEASUREMENTS of the terrestrial magnetic field were made until recently either on the ground or with the help of aircraft and rockets. A mathematical analysis of the measurements led to the conclusion that the field should be considered as consisting of two parts: one due to sources within the earth, and the other to extra-terrestrial sources whose share is from one to three per cent.

The existence of the external sources is confirmed by the swift changes in the terrestrial magnetic field, known as diurnal variations of the earth's magnetism, magnetic disturbances and magnetic storms. These changes are closely interconnected with such extra-terrestrial phenomena as solar activity, the state of the ionosphere, the aurora borealis and cosmic rays. But the analysis of terrestrial observations can neither indicate the exact location of the external sources of the field, nor determine their nature.

Investigation of diurnal variations, magnetic storms and the phenomena connected with them led scientists to assume that the external magnetic field may be due to systems of electric currents existing beyond the earth.

The most likely place where such currents can originate is the ionosphere—those layers of atmosphere which contain a large number

RADIO OPERATORS TRACKED SPUTNIKS AND RECORDED ALL THEIR MESSAGES.

Radio Engineering

There would have been no satellite without present-day accomplishments in radio engineering. Communication with the sputniks would have been impossible without the long period of research in the propagation of radio waves, specifically in the ionosphere.

For a quarter of a century now work has been done in the Soviet Union to "sound" the ionosphere continually by means of special ionosphere stations. This made it possible to correctly pick the radio frequency for communication with the sputniks.

As far back as 1930 our scientists theoretically substantiated and practically accomplished the phasal methods of distance measurement by radio waves. The stations that tracked the sputniks are patterned on these methods.

Radar made it possible for man to peek into outer space long before the first earth satellite was launched. The measurement of distance to the moon by means of radar was one of the first accomplishments.

Radio astronomy, a relatively new branch of science, developed as a consequence of the success gained in advancing aerial engineering and in increasing the sensitivity of radio receiving equipment. Radio telescopes are now used to study the sun and investigate the so-called radio stars.

An important achievement was scored in the investigation of thermoelectric phenomena. This work, done under Abram Ioffe, resulted in the designing of thermoelectric generators transforming heat energy directly into electric power. A great future lies ahead of semi-conductor photo-elements which transform the energy of different radiations, as for example the energy of sunlight, into electricity.

Our scientists have elaborated the theory and investigated the electrical properties of semi-conductors. On this basis they have evolved samples of semi-conductor radio instruments, diodes and triodes.

ASTRONOMICAL STUDENTS ASSISTED SCIENTISTS IN PHOTOGRAPHING THE SKIES.

Chemistry

An eminent place in the general achievements of Soviet science which has made it possible to solve important problems of technical progress belongs to chemistry. Nikolai Semenov and his school, for instance, evolved the theory of chain reactions that is of great significance for world science. A study of a large number of model reactions has made it possible to bring out the basic laws of chain processes, to outline ways of investigating various elementary stages

Continued on next page

of electrically charged particles. The existence of sources of a magnetic field in the ionosphere has been confirmed by direct magnetic measurements made with rockets.

It is also assumed that currents may exist beyond the ionosphere. The source of extra-ionospheric currents may be the charged particles, corpuscles, emitted by the sun, captured by the earth's magnetic field and revolving around the earth in the plane of its magnetic equator.

During the International Geophysical Year the variations of the external magnetic field will be recorded uninterruptedly by a large number of ground stations. It is also planned to measure it from rockets and satellites.

Measurements made on satellites will help to verify whether the streams of solar particles are neutral or consist of electrically-charged particles of any given sign. Satellites will also help to verify the existence of extra-ionospheric currents, to obtain data on the ionospheric system of currents, and extend our knowledge of the main part of the magnetic field created by the sources within the earth. ■

OBSERVATORIES IN SPACE

By Victor Ambartsumyan

President, Armenian Academy of Sciences

IN STUDYING celestial bodies, we astronomers have always been enormously handicapped because our observatories and scientific stations are at the bottom of the air ocean which envelops the earth, an ocean hundreds of miles deep. We have dreamed of observatories outside the atmosphere and the sputniks have brought our dreams closer to reality.

Now we can confidently predict the construction of satellite observatories within a few years which will circle the earth at an altitude of several thousands of miles and transmit scientific data from interplanetary space.

One of the next steps is a rocket capable of penetrating beyond the sphere of terrestrial gravitation, of reaching the vicinity of the moon and of circumnavigating it. Such a rocket would give us a wealth of information on the nature of lunar terrain and the structure of the dark side of the moon that is not visible from the earth.

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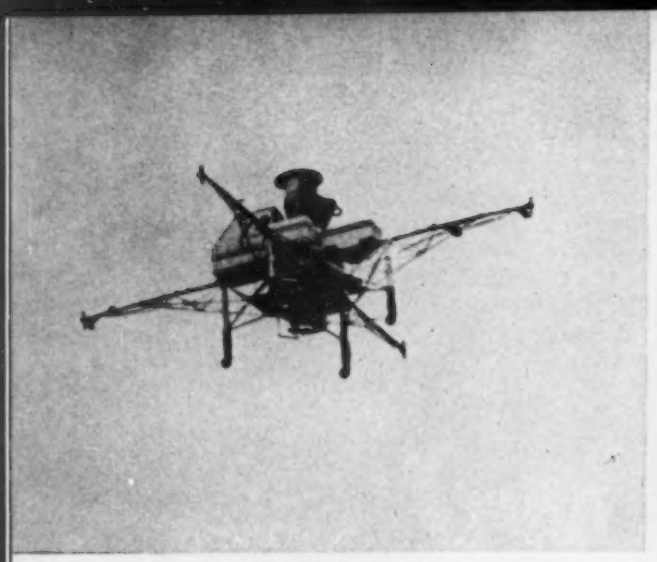
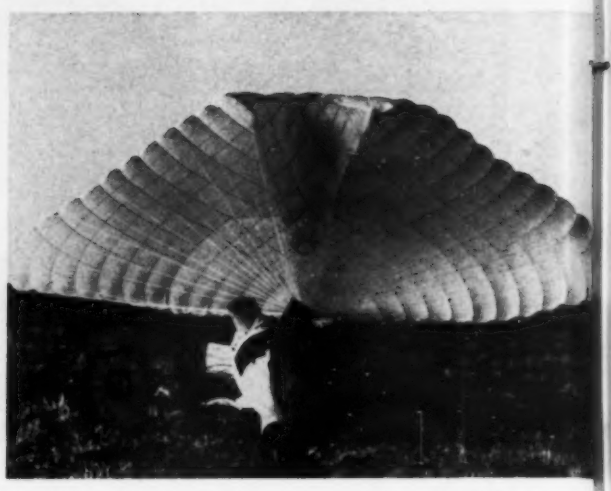


A JET CARRIER USED FOR STUDIES IN UPPER ATMOSPHERE.

AN INSTRUMENT CHAMBER FOR ROCKETS.



PARACHUTE RETURNS A ROCKET'S INSTRUMENT SECTION.

Scientific and Technological Development

Continued

of the process and, what is more important, the method of controlling a developing chain reaction.

An outstanding part in producing industrial radium and natural radioactive elements as well as artificial radioactive elements belongs to the research of Vitali Khlopin and his followers. It was under his direction that the first Soviet radium was obtained. Vitali Khlopin discovered the law of quantitative co-precipitation which makes possible the theoretical calculation of new methods for the isolation of radioactive substances.

Of great importance are the achievements in such comparatively new fields of chemistry as biochemistry, biophysics and organic chemistry of elements. The theoretical and experimental research of Alexander Nesmeyanov and his school, for example, have led to the use of new methods in the organic synthesis of metals and elements and the production of a number of valuable new types of substances.

In A United Front

Solution of one of the greatest tasks ever undertaken by man—overcoming the power of gravity and entering cosmic space—would not have been possible without the creation of high-speed aircraft. In this field, too, our scientists and designers have made outstanding contributions.

More than a half century ago, before the birth of the airplane, Konstantin Tsiolkovsky laid the foundation for the theory of jet propulsion and worked out the design for a rocket to travel in outer space. In the late twenties our engineers began research in the actual problems of the physics and technology of jet propulsion. In the early thirties stationary tests of jet engines were conducted. In 1933 our scientists launched the first rocket designed for meteorological observation.

During the postwar years we began to construct ballistic and guided long-range missiles. Since 1947 instruments sent aloft by rockets have been in regular use for the study of the upper layers of the atmosphere and the processes that take place beyond its limits.

Radiation of X-rays by the sun was discovered, and information was obtained on the chemical composition of the atmosphere at an altitude of more than 60 miles. Our scientists explored the concentration of free charges in the ionosphere, which plays a key role in long-range communication by short-wave radio. Observations were made of living organisms under conditions of weightlessness.

Every step in the construction of the earth satellites and in the broad program of scientific observation and research after their launching was the product of an infinite number of hands and brains, the result of a united effort of a science that is highly developed in various fields and a technology that commands the most complex modern skills.

The progressive development of industry in the Soviet Union gives new food to science, setting forth new tasks. At the same time science influences technology and production. The strength of Soviet science lies in its bonds with practical work and life. Its main features are collective effort, research on a broad scale, connection with practice and selfless service to man. ■

OBSERVATORIES *Continued*

Development in electronic computers has reached a stage where we can design instruments for rockets or satellites which will not only make measurements, but will decide, without human guidance, what measurements need to be taken in relation to earlier ones made.

Development in radio equipment, moreover, makes it possible to relay earthward vast numbers of observations and measurements automatically, and with further research, to telecast what the satellite sees.

Every possibility exists for a relatively early launching of these observatories in space and, in a future not too distant, for the launching of manned space ships into the great reaches of the cosmos. ■

TRAILING COSMIC RAYS

By Sergei Vernov

Corresponding Member,
USSR Academy of Sciences

COSMIC RAYS travel for countless light years to reach the earth. The energy of particles of cosmic radiation can be expressed only in billions and tens of billions of electron volts. The energy of some particles is even millions of times greater.

It is believed that the primary cosmic particles gradually gain in velocity in some kind of electro-magnetic field near stars or in cosmic space.

Due to processes taking place in space, the composition and intensity of cosmic rays change. In particular, the number of cosmic-ray particles will increase if there are intensive explosions on the sun and the conditions are created for accelerating atomic nuclei to great energies. Thus, there arises an additional stream of cosmic rays.

Research on the how and the where of the original processes which result in creating cosmic rays should be conducted beyond the earth's atmosphere. Otherwise secondary cosmic radiation produced in the atmosphere can be mistaken for primary radiation.

Rockets help answer some of the questions, but they are ineffective because their flight is too short. By launching a satellite laboratory, continuous observations of cosmic

World's Hams Tracked Sputniks

By Andrei Ivanov

EXCEPT for the scientists in laboratories and observatories, the world's radio amateurs comprised the busiest group tracing the orbits of the sputniks around the globe.

One of them in Moscow was especially active. He is Valentin Vasilishchenko, but hams across the world know him best by his call letters: UA-3-EG. He is shown in the picture at the right with his son Sasha.

Valentin was kept on his toes when the first sputnik was launched. "UA-3-EG! Come in UA-3-EG!" came from amateurs in England, Germany, Yugoslavia, France and Spain. All wanted data.

Douglas Clock, a Britisher, called: "Much excitement about the moon. It's wonderful." But Clock couldn't bring in the signals and asked for help. Valentin obliged by relaying the "beep" by radio phone.

Thousands of hams in the Soviet Union had to supply their colleagues in other parts of the world with all kinds of information—the signals for identifying the sputniks, the schedule for their passage over various areas, data concerning their launching and equipment.

Three students in Tashkent, the capital of Uzbekistan, established contact with California, Japan and South America. Tokyo said, "Thanks, Tashkent, we hear it clearly."

An American operator pleased the Tashkent students by messaging: "Reception clearer since satellite launched. Hope world weather clears as quickly."

Every ham in the world seemed to be tracking the sputniks. An endless flow of reports streamed to Moscow's Sputnik Center to be compared, correlated and studied by scientists. ■

rays can be made over long periods of time.

The satellite laboratory will open new opportunities for study by eliminating the distortions produced by the earth's atmosphere. It will be possible to classify the cosmic rays in greater detail according to their mass and energy. This in turn will enable us to find out the mechanism of their origin in the far depths of the cosmos and in our solar system as well.

It is not unlikely that experiments conducted with the satellite as a vehicle for our instruments will lead to the discovery of new, unknown types of cosmic rays.

Various data received from the cosmic ray laboratory above the atmosphere can provide us with an incomparably greater knowledge of the universe than we now have. ■

AT SUCH A TENDER AGE, THIS NECESSARY HYGIENIC EVENT REALLY SEEMS TO BE ONE OF LIFE'S DARKER MOMENTS IN AN OTHERWISE PLEASANT KINDERGARTEN ROUTINE.

Loving Care for Children

By Olga Sokolova-Ponomareva

Director, Pediatric Institute of the Academy of Medical Sciences

Care of the child in our country begins long before birth. As part of our regular medical procedure, every expectant mother is under the care of the maternity center in her home district.

Every district in the Soviet Union, and this includes rural areas, has its maternity center staffed by obstetricians and pediatricians. There are about 13.500 such centers. Each region and city has a staff of specialists in children's diseases. All consultation and treatment for both mother and child is free, entirely at state expense.

At her district maternity center, the expectant mother is examined at regular intervals. There, too, she is taught how to bathe, feed and diaper the coming child, and how to furnish its room. Nurses demonstrate proper methods of massage and exercise for the infant and proper feeding procedures.

Our pediatricians do not subscribe to the practice, so common abroad, of substituting bottle feeding for breast feeding, either partly or completely, soon after birth. Our investigation and experience has shown that there is no adequate substitute for breast feeding. Mortality among breast-fed children is decidedly lower than for bottle-

BREAKFAST IS AN IMPORTANT PART OF HER DAY. IT SEEMS VERY PERPLEXING AND DIFFICULT HERE, BUT THIS LITTLE GIRL IS ON TARGET AFTER SEVERAL NEAR MISSES.

fed children. For those infants who, for special reasons, cannot be fed mother's milk, we have available a wide assortment of high quality baby foods.

The mother's health will determine the child's. To care for the child you must care for the mother, too. All expectant working mothers and mothers of unweaned infants receive special privileges.

Maternity leave of 112 days with full pay—56 days before delivery and 56 days after delivery—is established by law. If she wishes, the mother of the newborn child may add her annual vacation to her maternity leave to make a total of some five months, all at full pay. If necessary, she may take additional leave up to twelve months; this without pay. This gives the mother time to recuperate and rest after childbirth and to take care of her child during the early days of its life.

The day after the mother returns from the maternity hospital, she is visited by the district pediatrician and nurse. The center is notified by the maternity hospitals of the birth of children in their district.

Preventing Disease

The major emphasis in Soviet medical practice is prophylaxis—to keep people from falling ill. The best way of preventing disease is to strengthen the infant's resistance, to fortify his body. We consider physical culture the most important way of reinforcing the health of our children. Every nursery, kindergarten and school has a program of physical exercise, games and gymnastics planned and graded by physicians and educators.

We find that the children in our nurseries today are a half inch to an inch taller, weigh more by two or two and a half pounds, and have almost an inch greater chest expansion than comparable children before the war. We attribute this in part to our physical education program, although improved living standards of Soviet families and the greater number of children's summer camps available are also significant factors.

Continued on next page

JUST BURSTING WITH HEALTH, GENYA POLYAKOV ENJOYS SUNLAMP TREATMENTS.

Loving Care for Children *Continued*

EACH PHYSICIAN AT THE MEDICAL CENTER EXAMINES ABOUT 20 CHILDREN DAILY.

Some six million of our school children spend their summers at camps. Younger children, of nursery and kindergarten age, are sent to country playschools. Our summer camps help build strong healthy bodies to withstand disease.

Another contributing factor in building resistance is vaccination against diphtheria, measles and other infectious diseases. We use the vaccine against poliomyelitis prepared by the method of the American scientist Salk. Although its use is relatively new in the Soviet Union, it has already become widespread. All newborn infants, as of the beginning of last year, are vaccinated against tuberculosis. Rickets is another disease which is being successfully attacked by Soviet pediatricians.

All these factors—the physical education program, the summer camps, the general use of prophylactic vaccination and the rising living standards—have had a beneficial effect on children's health. The incidence of tuberculosis as well as stomach, skin and other ailments has been sharply reduced.

Child mortality is definitely on the decline. In the Russian Federation, for example, which takes in better than 113 million of the Soviet Union's 200-million population, child mortality has been decreased by four times as compared with the pre-war period.

Hospital Environment

It is obvious that no amount of prophylaxis can completely safeguard a child against illness. Our children's medical centers and hospitals are constantly expanding, in number, in staff, and in equipment.

SOME HEALTHFUL BASKING ON THE BEACH, AT THE CHALPON-ATA, A LAKESIDE SANATORIUM FOR CHILDREN LOCATED ON LAKE ISSYK-KUL IN THE KIRGHIZ REPUBLIC.

We pay considerable attention to creating the proper kind of hospital environment for children. Children's medical centers are furnished to dispel, at least insofar as we are able, the average child's fear of doctor's offices and hospital wards.

In the Krasnogvardeisky District Medical Center of Moscow, the walls are decorated with lovely Russian fairy-tale frescoes. The waiting room of the Omsk Medical Institute's Children's Clinic in Siberia is full of pictures and flowers. One of the most important, and by far the most popular, piece of equipment in the dental division of Children's Medical Center No. 2 in Moscow is a bright, yellow canary.

Sanatoria and special rest homes for children in resort areas are most important elements in fighting disease. Our children's sanatoria now have room for 106,000 patients. Treatment is either entirely free or given at very low cost, depending upon family income. Youngsters convalescing from infectious diseases or suffering from tuberculosis, rheumatism, or the after-effects of poliomyelitis, spend from six weeks to six months in these country or seaside sanatoria, where they are given medical treatment and physiotherapy.

Some children's diseases, we are happy to note, have been practically eradicated in the Soviet Union. These days our pediatricians rarely get cases of extreme rickets, typhoid or blennorrhea of the eyes.

On a recent visit to the Soviet Union, Morris Pate, Acting Director of the United Nations Children's Emergency Fund, talking of world health problems, told us that "the most taxing and immediate problem is to conquer malaria, which kills half a million of the world's children every year."

Malaria no longer presents a problem to our physicians. Thanks to the nation-wide program of land reclamation, the draining of swamplands and to improved living conditions, malaria has disappeared as a mass disease.

Soviet public health efforts are now concentrated on eliminating tuberculosis. Since every child is under medical observation from the day of birth, and given a complete check-up periodically, we are able to catch the disease in its very earliest stages, or to diagnose tendencies long before the disease manifests itself. In either case, treatment is immediately instituted at home, in a sanatorium, or at a children's hospital.

A great deal of work is also being done to combat rheumatic ailments. Here, too, our children's sanatoria are most helpful aids. The hampering problem in rheumatism is the fact that science has not yet found the cause or agent for this incapacitating disease.

With regard to other common children's ailments, a great deal of research has been done on ways of reducing infant mortality from inflammation of the lungs. We use oxygen, antibiotics and physiotherapy, together with climatic cures in chronic cases. Our techniques for the prevention and treatment of acute stomach and intestinal diseases have had most encouraging results.

The Pediatric Institute of the Academy of Medical Sciences, which I direct, is only one of the very many agencies in our country which are working to keep our children strong and healthy. Every agency, in one way or another, is devoted to one phase or another of this vital job. We have no underprivileged children in the Soviet Union. Medical care, education and opportunity for mental and physical growth are available to all. ■

THIS GIRL IS GIVEN SPEECH CORRECTION AT A CHILDREN'S MEDICAL CENTER.

DENTAL CARE IS INCLUDED ALONG WITH COMPLETE AND FREE MEDICAL SERVICES.

TRAINING STARTS IN KINDERGARTEN WHERE SKILLFUL CHILD HANDLING PREPARES THE YOUNGSTERS FOR THE REGIMEN OF CLASSROOM DUTIES.

PEOPLE ARE WONDERFUL

By Ilya Kotenko

Photos by Sergei Kosyrev

THIS IS THE BOY'S MOTHER TATYANA FOKIN, SO HAPPY AFTER THE OPERATION.

THIS is a tale of a flagged express train, of a cross-country plane flight, of automobiles breaking speed limits—all because of a small boy who swallowed a large nut.

The story in capsule was told in a letter that Yevgeni Fokin wrote to *Pravda*, the Moscow newspaper, in which he thanked the brakeman, the locomotive engineer, the pilot, the doctors and all the other various and unidentified people who combined to save his child's life.

Tatyana and Yevgeni Fokin are a young couple, and Sasha is their first child. They live in the small town of Ludinovo. Yevgeni is a trade school teacher.

One afternoon last June, on the way home, Yevgeni bought a bag of nuts. It is the last bag of nuts, he underlines in his letter, that he intends ever to buy. After dinner the family sat around talking, mostly about Sasha and his new tooth—he had six then, and he was managing the shelled nuts very well with them. But Sasha prefers to feed himself. He kept reaching for the dish, and the parents kept pushing it out of arm's length.

Sasha has a mind of his own, however. With one twist he wriggled across the table, grabbed a handful of nuts and stuffed them into his mouth. He spit them out, a little tearfully, when he was scolded, but then he began to cough and choke. Yevgeni thumped his back, turned him upside down, but that didn't help. The child was choking, and the parents got panicky. Yevgeni grabbed the child and rushed to the hospital.

The young interne examined Sasha, who by this time had stopped choking although he kept coughing—and said the boy would be all right. Yevgeni took him home, thanking his lucky stars.

Sasha passed a quiet night. The choking had not recurred, although there was a wheeze when he breathed that worried the Fokins. Later in the day the wheezing got worse, and Tatyana brought the child in to see Dr. Nina Kuralova at the Medical Center.

Dr. Kuralova examined Sasha. "The child has to be operated on at once," she told Tatyana. "You must get him to Bryansk, and the sooner the better. The fastest way is by train."

But there was no train to Bryansk for hours, the Fokins found when they got to the railroad station. They explained the situation to the ticket agent, who explained it to the stationmaster, who called the dispatcher, who flagged the non-stop fast express.

The Fokins clambered aboard the train, with stationmaster and ticket agent waving them good luck. They got to Bryansk, dashed across town in a wild taxi ride, and got to the hospital.

The doctor on emergency duty was Grigori Petukhov. He looked at the child and shook his head. Sasha had to have immediate surgery. The child would have to be gotten to Moscow—and fast, because the operation was complicated.

Much hurried telephoning up and back to the city authorities, another dash across town by car to the airport, this time with Dr. Petukhov, and they all boarded the plane waiting for them. The pilot, Victor Morozov, got off the ground immediately.

Dr. Petukhov asked how long it would take to get to Moscow. Moro-

SASHA, THE BOY WHO MADE NEWS HEADLINES WHEN HE CHOKED ON A LARGE NUT.

zov answered, "It's poor flying weather, overcast and with a side wind that will slow us down. I would estimate that it will probably take us three hours."

"You'll have to make it faster," the doctor told him. "The boy is in bad shape."

Morozov did. He said later that it was a flight he never wanted to take again, what with bad weather, racing against time, and trying to avoid air pockets. The doctor had told him that the ride had to be smooth. "If the boy is jarred, and the nut is dislodged and gets down here"—tapping his chest significantly—"I'll have to operate right in the plane." To give point to his warning, the doctor had his instrument case open on his lap, with scalpel and gauze napkin ready for emergency operation.

To the parents all this part of the trip must have been mercifully hazed. Tatyana says all she remembers of it is the jolt when the plane landed. An ambulance was waiting for them at the Moscow airport. In the ambulance, Dr. Petukhov asked the interne whether preparations for operating had been made.

"Don't worry," the interne told him, "everything is taken care of. Professor Shcherbatov has been asked to do it."

Dr. Petukhov turned to the parents. "Don't worry," he said, with his first smile in three hours, "the boy will be fine."

And he is, of course. One glance at Sasha dressed up to have his picture taken is evidence enough. As for Yevgeni and Tatyana, they end their letter of thanks with the phrase, "People are wonderful." ■

SASHA'S FATHER, YEVGENI FOKIN, IS A TRADE SCHOOL TEACHER.

STATIONMASTER PELAGEYA TRUTNEVA FLAGGED NON-STOP TRAIN.

DR. PETUKHOV WAS READY FOR EMERGENCY PLANE OPERATION.

PILOT VICTOR MOROZOV SAID THE FLIGHT WAS NERVE-RACKING.

The School

TEACHERS OF THE FUTURE. SOME MEMBERS OF FRESHMAN CLASS AT LENIN PEDAGOGICAL INSTITUTE IN MOSCOW.

Teacher

By Lydia Cherpakova, *Vice-Chairman, Teachers' Union*

TEACHING as a profession is regarded highly in the Soviet Union. In every part of the country trained teachers are much in demand. Compared with the 280,000 teachers of pre-revolutionary Russia, the Soviet educational system now has 1,811,000 teachers for its 213,000 schools.

The national budget for education keeps increasing year by year as school facilities are expanded, curriculum is enlarged, and new schools are built. The seven-year free school, long universal throughout the country, has been recently replaced by ten-year schooling in cities and towns. In rural areas the shift to ten-year schooling is well under way.

Teacher-Training

To keep pace with expanded schooling, the number of teacher-training schools has grown. There are now 905 pedagogical schools for various teaching levels. They require seven or ten years of general education for admission.

Graduates of teacher-training schools with the course of study of either three or five years are certified to teach the first four elementary grades.

Continued on next page

Vyacheslav Nedzelsky, young coal miner who has now become a teacher, is greeted by Dean Nadezhda Timofeyeva of the Moscow Pedagogical Institute.

A VERY WIDE CHOICE OF CAREERS IN TEACHING IS OFFERED BY PEDAGOGICAL INSTITUTES. THESE STUDENTS HAVE DECIDED TO BECOME HIGH SCHOOL HISTORY TEACHERS.

IMPORTANT MOMENT FOR THE NEW TEACHER. VALENTINA VANIFATOVA, GRADUATE OF THE LENIN INSTITUTE, CONDUCTS HER FIRST CLASS. SHE IS AIDED BY OLDER TEACHERS.

The School Teacher *Continued*

Senior grade teachers must be university graduates or graduates of pedagogical institutes.

The teacher-training curriculum, besides the required pedagogy and science courses, includes observation and practice teaching. Students lead extracurricular activities and assist the classroom teacher. In his second year the student will be assigned to a particular school class for his supervised practice teaching. He will usually stay with that assigned class until he graduates.

Tuition for future teachers, as for all students in the Soviet Union from elementary school through college and postgraduate work, is free. Those who make satisfactory grades, and that includes the great majority of students, receive monthly state stipends paid while at school and during the summer vacation period.

There are 800,000 students in attendance at the pedagogical institutes and the pedagogical divisions of universities. For those who have full-time jobs in other areas and wish to qualify as teachers, each institute has a system of correspondence courses. Correspondence students are given an annual month's leave from their jobs at full pay to appear for consultations and to take term examinations.

Wide Choice of Jobs

Upon completing his studies, the new teacher has a wide choice of job possibilities. The graduate teacher does not have to look for a job; the job seeks him out. Every pedagogical institute receives requests for trained teachers from all districts of the country. If the graduate should elect to take a teaching post a distance from his home, the department of education will pay his traveling expenses and will grant him a month's salary for necessary expenses.

Teachers are encouraged to continue their professional education after graduation. There are special summer institutes and forums, as well as many other methods to provide this training in most parts of the country. Those attending summer institutes receive full salaries and are provided with free transportation and living allowances.

All teachers in the Soviet Union, and especially the young teachers, are given every opportunity to widen their pedagogical knowledge and increase their qualifications. The new teacher just starting in a school always receives the friendly help of older colleagues and draws freely upon their experience.

There are many organizations that are designed to assist the young teacher. One such body is the Pedagogical Council in every school that is established to discuss educational problems, to exchange experiences and generally help those just starting in the field.

These councils consist of the school principal, his assistant and the teaching staff along with the librarian, school physician and the chairman of the parents' committee. The councils discuss plans for the school's work, the records of the various teachers, forms and methods of work with the parents and after-school activities of the children. They have been found most useful to the young teacher in addition to their over-all service to each school community.

Pedagogical rooms have been set up in towns, in school districts and in some schools. These are staffed to provide continuous assistance for teachers in their daily classroom work.

Another most important instrument in the raising of teachers' qualifications is the teachers' conference. These conferences are convened twice each year during the summer and winter vacation periods and

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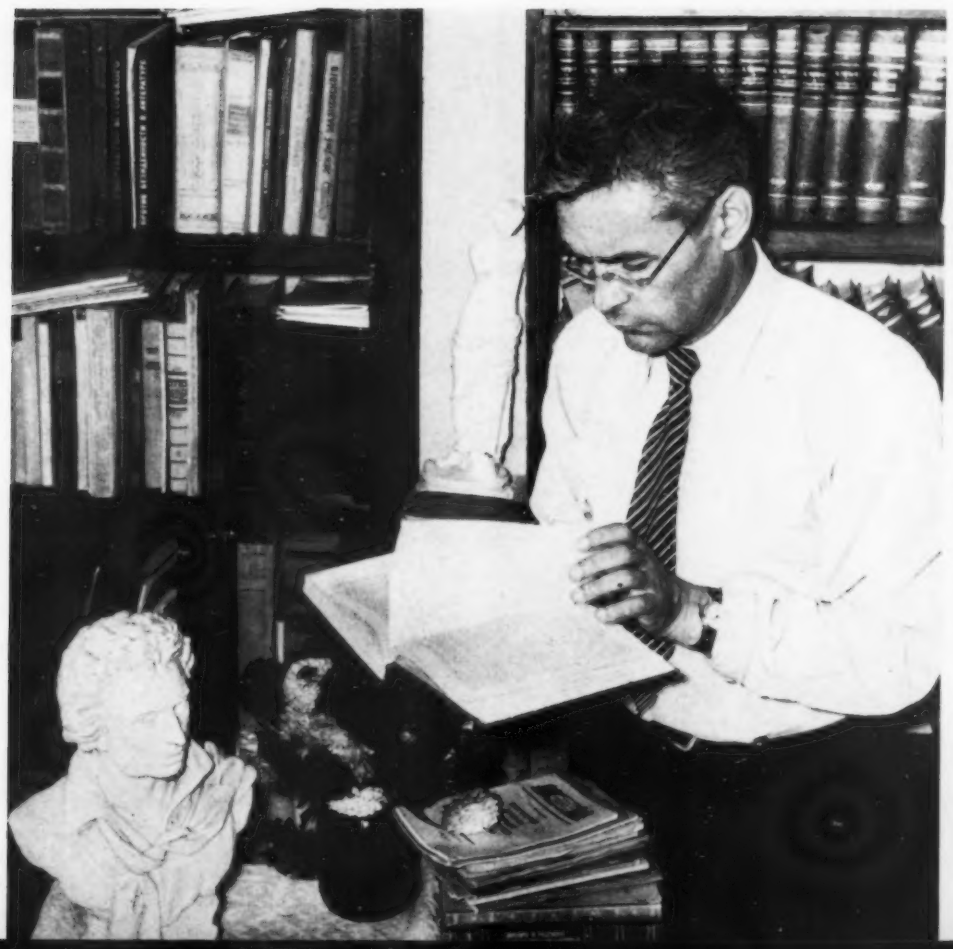
ALEXEI MASITIN HAS BEEN TEACHING FOR FIFTEEN YEARS. HE WILL BE ELIGIBLE FOR A RETIREMENT PENSION IN TEN MORE YEARS.



Alexei Masitin at home. Teaching these days requires keeping abreast of the latest literature on pedagogy and cultural developments generally.

WITH THE SCHOOL POPULATION INCREASING YEARLY, MANY NEW SCHOOLS ARE ADDED, LIKE THIS ONE IN THE TOWN OF PERVOURALSK, IN THE SVERDLOVSK REGION.

The School Teacher

Continued

An individual approach to each pupil is the backbone of Soviet teaching methods. It helps to bring out the children's aptitudes and abilities.

their program of professional training and interchange of experience is found of real value. Participants discuss mutual problems of education and their work. Reports are made on how various educational techniques are reflected in the grades of a class. The teachers' conferences are very helpful in the gathering and distribution of special pedagogical experiences.

The teacher-training organizations and conferences, continuing from year to year, keep classroom leaders in complete touch with the latest and best methods throughout their careers.

A considerable number of books and magazines devoted to education are published to help teachers keep abreast of current trends and methods. There are special newspapers for teachers in every Union Republic of the USSR, and many special pedagogical magazines are published to further broaden their professional understanding and contacts. The magazines include *The Elementary School, Soviet Pedagogy. Public Education, The Family and the School.* The Textbook and Pedagogy Publishing Division of the Ministry of Education of the Russian Federation, one of the fifteen Union Republics, alone issued 258 titles in 1956, in editions of from 10,000 to a million.

There are, besides, the publications of numerous educational research institutes which deal with educational psychology, methodology, curriculum evaluation and the like.

Schedules and Salaries

Teachers in the elementary grades teach on a twenty-four-hour-a-week schedule—four hours a day, six days a week. Upper grade teachers work an eighteen-hour-a-week schedule. Each senior class has several teachers for different subjects.

The salary schedule begins at 710 rubles a month as the basic pay. It is increased by 10 per cent after five years of teaching, and by another 10 per cent after ten years. The basic salary is purely for time spent in classroom teaching. For checking pupils' homework and compositions, the teacher gets an additional 60 rubles a month. For leading extracurricular activity on school grounds he gets another 150 rubles a month.

If the teacher works more than the regular hours—he may if he wishes—his salary is increased proportionately. Teachers who work in remote parts of the country—the Far North or the Far East—receive larger salaries: from 20 to 100 per cent more, depending upon the region and its distance from large centers of population. Every teacher is entitled to at least one month's annual vacation with full pay.

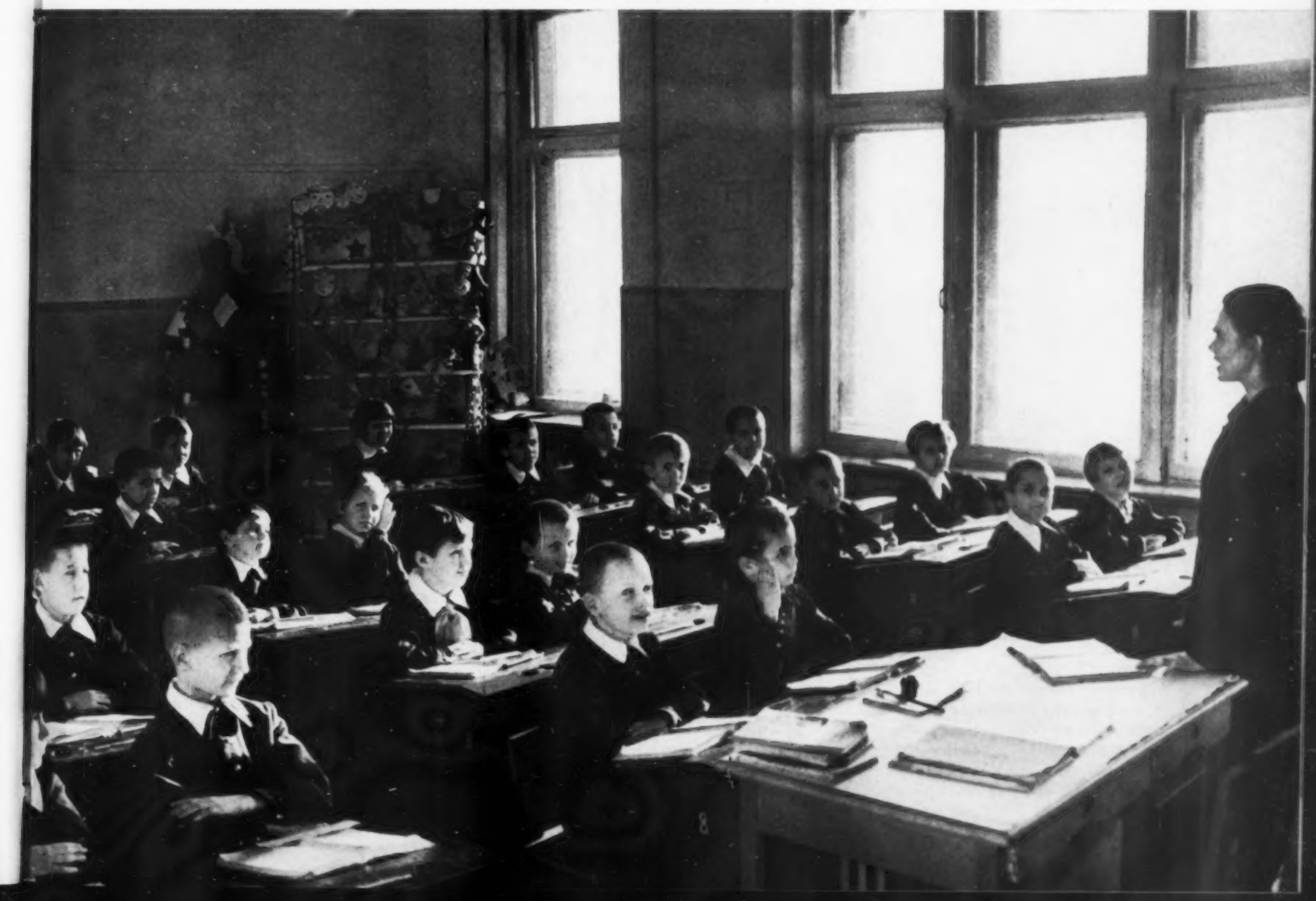
The law provides a pension of 40 per cent of salary for those who have taught for 25 years, irrespective of age at the time of retirement. However, many teachers continue to work and receive their usual salary plus a proportionate part of the retirement pension.

Actually, the income of the Soviet teacher is materially larger than his salary. His social insurance is financed out of the state fund. Like all citizens, he gets medical and dental care without cost, also at state expense. Teachers who work in rural areas and in industrial housing developments live in rent-free apartments or single family houses, with no charge for utilities. The village teacher receives his own kitchen garden without charge.

Teachers' organizations include the trade union, various learned societies and clubhouses. The Burevestnik Sports Society with a teacher membership of 340,000 has its own stadiums, swimming pools and gymnasiums.

Soviet teachers have a long tradition of services in a profession which is perhaps the most demanding of all for patience, understanding, skill and responsibility. A measure of the esteem and public confidence they hold may be gauged by the fact that 122,000 teachers were elected as representatives to the local, regional and national legislatures. ■

THIS YOUNG TEACHER'S FIRST CLASS IS THE BEGINNING OF A LONG PROCESS OF LEARNING, WITH CONFERENCES, PEDAGOGICAL COUNCILS AND REFRESHER COURSES TO HELP.



PROFESSOR ALEXANDER BAKULEV (CENTER) HAS BEEN ABLE TO EFFECT COMPLETE CURES OF VALVULAR AND OTHER CARDIAC DISORDERS REGARDLESS OF THE AGE OF THE PATIENT.

The Next Fifty Years of Medicine

By Professor Alexander Bakulev

President, USSR Academy of Medical Sciences

IN the second half of our century some of the most familar and most dreaded diseases will virtually disappear in the Soviet Union. Tuberculosis, for example, will be eradicated as a mass disease within the next ten to fifteen years. This is not idle speculation, but hard-headed planning based on actual scientific progress in combating mankind's "white plague" that once decimated whole regions.

The answer for tuberculosis, as well as for most diseases affecting mankind, lies in the living environment of contemporary and past generations—housing and working conditions, hygiene, diet and the general well-being of the population. Cholera, which killed hundreds of thousands as it swept Europe during six great epidemics between 1817 and 1926, has been eliminated as a major disease by improved sanitation. Malaria is no longer a mass hazard in most countries due largely to swamp drainage and mosquito control measures.

In the Soviet Union the improvement in working conditions and the rise in the standard of living over the past forty years have contributed largely to reduce the incidence of the many diseases which develop from poverty, malnutrition and exhausting labor. Old natural breeding grounds for disease have been eradicated in the process of constructing new cities and reclaiming land.

As Soviet medicine sees it, the next half-century should see the elimination of both man-made and natural breeding grounds of disease. It envisages in the not too distant period the control of such killers as cancer, sclerosis, diseases of the heart and such incapacitating and widespread ailments as rheumatism.

The cause for rheumatism will probably be discovered in the next few years. Scientists are already agreed that the best way of preventing the disease is by hardening the organism, increasing its resistance. Medicaments will unquestionably be found for curing acute rheumatism and for preventing such serious complications as cardiac insufficiency which incapacitates so many of its victims.

Sclerosis of the blood vessels has been established as a metabolic disorder. No complete

cure has yet been found for this disease which most usually attacks the vessels of the heart and the cerebrum. The answer lies in rational nutrition. There is reason to believe that effective means will be found to prevent deposits of cholesterol on the walls of the blood vessels and to restore their elasticity and permeability.

There can obviously be no timetable for a cure for cancer and other malignant tumors but scientists are convinced that the second half of our century will rid mankind of these scourges. Indefatigable research in a number of directions has provided the beginning of a clue as to the origin of tumorous tissue. It is thought that the disease may be caused by chemical agents as well as viruses.

Scientists are studying the chemical transformations which tumor cells undergo and have found that the metabolic processes differ from those in healthy cells. When it is found exactly what chemical substances assist in bringing about these transformations, it may be possible to discover means of reversing the process in the desired direction. There are already available preparations which are fatal to some types of tumors.

The prospects of combating heart ailments are also promising. Although surgery on the heart and large blood vessels is relatively new in medical practice, no more than ten years old, thoracic surgery has made considerable progress in our country. Soviet surgeons, for example, have successfully operated on the heart in cases of congenital insufficiencies. Experimental work in this field has been going on abroad since 1954, but no operation has yet been attempted.

The principles underlying this type of surgery were developed on the basis of animal experiments conducted by Nikolai Galankin and Tigran Darbinyan at the Vishnevsky Institute of Surgery. Professor Yevgeni Meshalkin of the Institute of Thoracic Surgery was the first surgeon in any country to perform the operation.

The experience of Professor Pyotr Kuprianov with heart surgery in cases of unabated rheumatic processes is particularly noteworthy. Contrary to the opinions of some foreign medical men, Professor Kuprianov's experience and that of other Soviet surgeons leads to the conclusion that these operations induce speedier recovery.

Soviet science has done much to make surgery as painless as possible. Soviet designed instruments used for suturing blood vessels, the base of the lungs, the bronchial tubes, heart and nerves, insure a faster operation, a more reliable suture and permit the wide use of substitute blood vessels made of various materials.

The time is not too distant when surgeons will be performing operations on a bloodless heart, one temporarily shut off from the circulatory system. The heart surgeon will then be able to mend a heart completely, to stretch together all the unnecessary apertures in a case of congenital deficiency, to shift blood vessels to their proper places, to widen contracted passages, put in new valves, remove an injured vessel in the heart and replace it.

There are various instruments now available for sustaining blood circulation, some large and bulky, others no bigger than a water glass. Modern medicine has already tackled the problem of grafting tissues and replacing diseased organs with healthy ones—kidneys, spleen, gullet, heart, lungs, limbs. It may not be long before the surgeon will be able to transplant not only the heart grafted from a cadaver, but the lungs as well, in case of need.

Then there are the problems involved in longevity. Steps to prolong a man's life need to be taken at birth rather than at the onset of old age. Many childhood diseases leave lifetime traces.

We need not wait for the future to increase longevity. In our own time, a sharp decline in the incidence of scarlet fever, whooping cough, measles, diptheria, poliomyelitis and other childhood diseases will provide the basis for raising a healthier generation. An effective treatment for sclerosis will add ten to twenty years to the lives of sufferers.

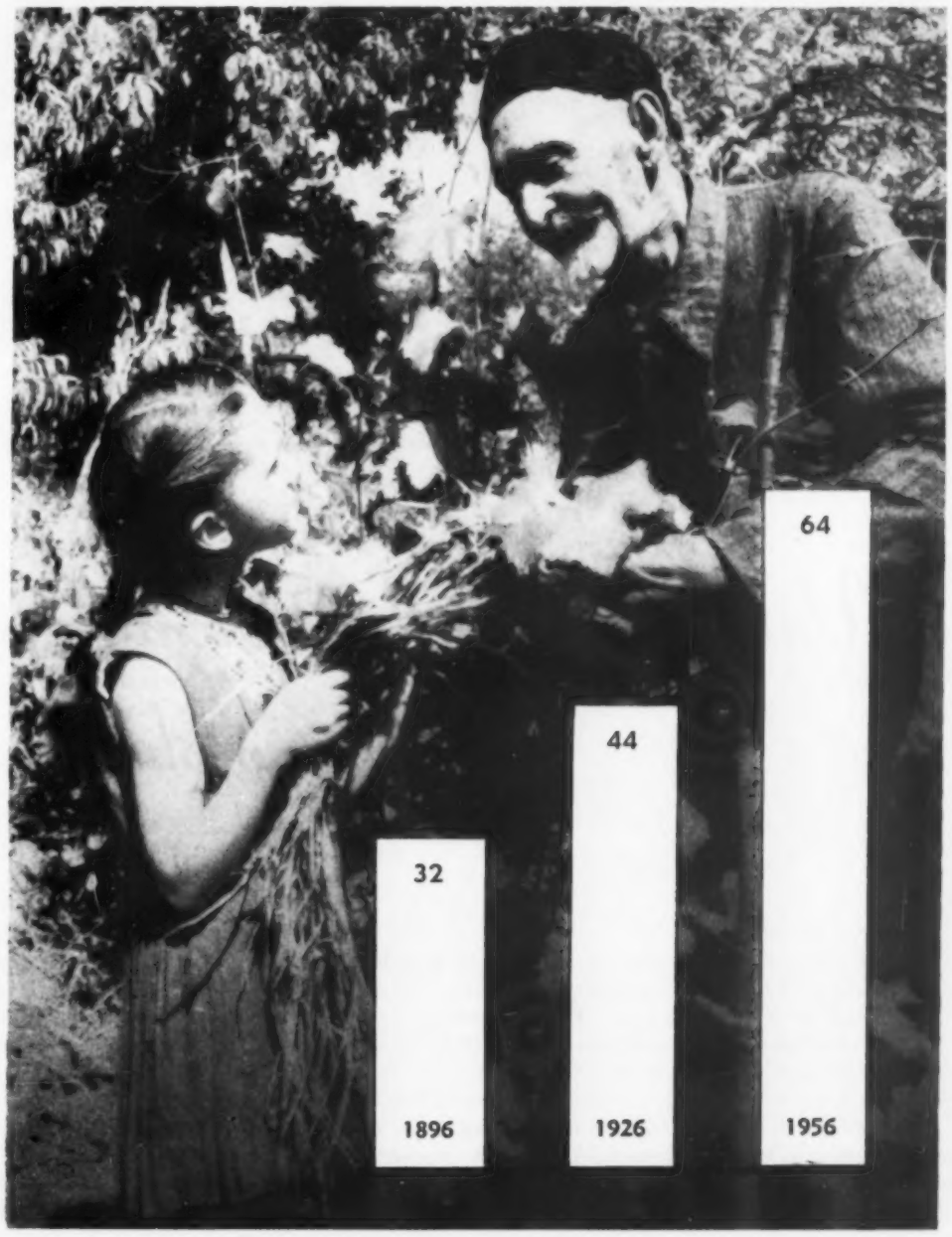
Physicians have already learned to control the functions of some of the internal secretion glands. There are synthetic hormones which compensate for the lost or failing function of natural glands. This whole field of knowledge is being constantly augmented by new findings, additional weapons for the fight against senility.

Medicine since its earliest beginnings has been dependent for its progress upon the natural sciences; today it also makes use of the remarkable achievements of the technical sciences. It is likely that directed streams of ultrasound will assist the physician of the near future in diagnosing defects in the heart partition and in other organs. By use of ultrasound it will be possible to dissect living tissues bloodlessly.

Supersensitive instruments will detect and trace the electric impulses of an organ or a group of cells to determine how they function. It will be possible to examine a patient by remote control, to hear his heart beat and to see it functioning on an X-ray television screen.

These are not fantasies; they will be future certainties in a world that those of us who are twenty or thirty years old today will be alive to witness. ■

CHART SHOWS HOW THE AVERAGE SPAN OF MAN'S LIFE IN THE COUNTRY HAS DOUBLED FROM 1896 TO 1956.



By Nikolai Abramov
Script Writer

Values of Truth, Friendship and Courage Are Emphasized

MY WORK gives me the chance to see a considerable number of new Soviet and foreign animated cartoon films every year, and to visit studios both at home and abroad. The production techniques used at the Soyuzmultfilm Studios, where Soviet animated cartoons are made, do not differ in essentials from those used in foreign studios.

The scene in all studios is the same—cartoonists drawing thousands of pictures of animals and funny little men, each frame varying by an imperceptible detail of movement. The pictures are shot, edited, the sound track is mounted, and the film is ready to show. Production is a taxing process that demands imagination, skill and endless patience.

Many of the stories for our animated cartoon films are based on whimsical and amusing folk tales and legends of Russia and other lands. The cartoon technique lends itself very naturally to popular science and to science fiction plots like the one used in *Flight to the Moon*.

Our cartoonists—there are 325 of them working in the Soyuzmultfilm Studios—turn to folk art represented in old Russian prints, national handicrafts and ornaments for their styles and ideas for cartoon representation. Many of our films use the graphic forms worked out by the best of the American cartoonists, Walt Disney in particular, whose

technique influenced the early development of Soviet animation. The rhythm of Soviet cartooning is just as energetic, the outline as vivid, the movement as smooth and the comic effect just as neat and convincing.

The special character of the Soviet animated film, however, does not lie in production techniques. It lies in the total background approach to a script—a philosophic approach, we might call it—that is social and life-asserting; that looks at nature and at people with warmth and optimism; that concerns itself with loyalty, courage, friendship, justice. A major function of a film, as we see it, is to instill in the viewer, children in particular, qualities that are socially desirable.

Take the film *Fedya Zaitsev*. A schoolboy draws a funny man on the classroom wall. When the teacher asks who marked the wall, he keeps silent and another boy is punished in his stead. The chalked funny man climbs down from the wall. Follows a series of adventures in which the boy and his chalk man are involved. Result: the boy confesses.

The moral here at first glance might seem too explicit. But the film has been running for years and is a prime favorite with children. In actuality, the moral is developed with a great deal more subtlety and finesse than this brief synopsis would indicate. We are quite aware, of course, that children do not like obvious moralizing.

In *The Little Girl and the Tiger*, the plot is simple. A little Indian girl takes pity on a trapped tiger and sets it free. Instead of being grateful, the tiger wants to eat the girl. "You bad tiger," she exclaims, "after I saved you. You're not fair." But justice triumphs and through a series of sequences the tiger is trapped again. The girl pities the tiger. Can she trust him a second time? Should she let him out again?

The alternative ending for this film was the subject for much heated discussion at one of the production conferences of the Art Council of the Soyuzmultfilm Studio that I attended. Everyone was aware that children are acutely sensitive to injustice, but the group of sophisticated film directors, artists and script writers gathered around the table were quite split as to the choice a child might make in this situation.

Finally, after much argument back and forth, the consensus was that a child would not free an unfair tiger a second time. The children's comments when the film was released testified that the Art Council had made their choice.

The Art Council is a characteristic feature of Soviet film studios. It is made up of film directors, writers, artists, critics, composers—some of whom do not work at the studio. Sergei Obraztsov, the famous puppeteer; Boris Yefimov, the cartoonist; and Boris Barnet, who directs feature films, are members of the Soyuzmultfilm Art Council, although they work elsewhere.

The Art Council is an independent group under the direction of the Studio. Although it is an advisory group—the director has the final say—its authority is considerable. Each script is discussed by the Council; sketches, music score, production plans, direction are all carefully scrutinized.

Soyuzmultfilm has recently made several full-length films—the Russian fairytale *Hunchback Horse*; Hans Christian Andersen's *The Snow Queen*; *The Bewitched Boy*, after Selma Lagerlof's story; *Twelve Months*, after a Slovak fairy story, among others. Many of them are being shown on foreign screens.

Now the studio is making serial films. Some have already reached the movie houses. The comic, *The Unusual Soccer Game*, and its sequel, *Old Acquaintance*, poke fun at the conceit of some champion athletes.

The first part of a serial, *The Adventures of Murzilka*, has also been released. The hero is a photo-reporter for a children's magazine. In the first installment he is shown searching high and low for a boy of exemplary behavior whose picture is to grace the magazine cover.

Some years ago the studio began producing puppet films. The most popular was Sergei Obraztsov's full-length *Heavenly Creature*.

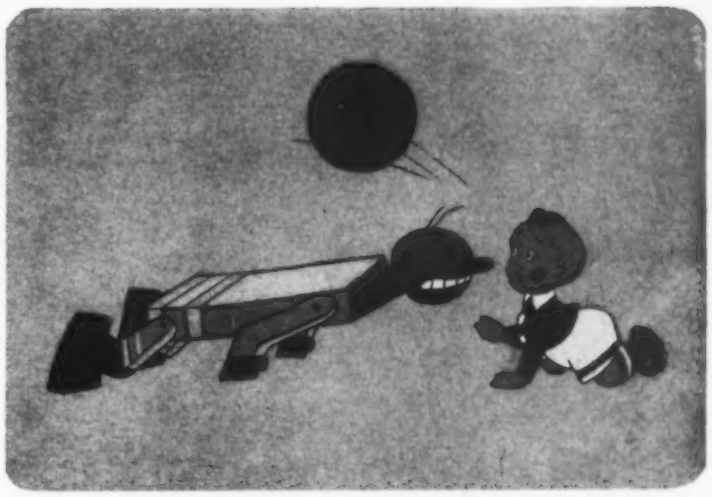
In the past twelve years Soyuzmultfilm has made about 180 color films. Twenty-one of these were awarded prizes and diplomas at international film festivals. Films like *The Unusual Soccer Game*, *The Golden Antelope*, *A Fire Burns in the Igloo*, and the full length *The Snow Queen* stand up to the best of animated films produced anywhere.

Many of the successes the studio has had are a result, at least in part, of the close contact it maintains with its young audiences. Each film is previewed by children in schools and clubs and the discussion which follows is very carefully listened to by the film people.

Animated films are exceedingly popular with Soviet audiences, young and old. Festivals of animated cartoon and puppet films were given in many Soviet cities last year. In response to public demand they will be given yearly.

More pictures on following pages.

The story of a schoolboy who lied to his teacher is the plot in *Fedya Zaitsev*. As might be expected, some amazing things happen to the lad that prove an exciting way to make a point.



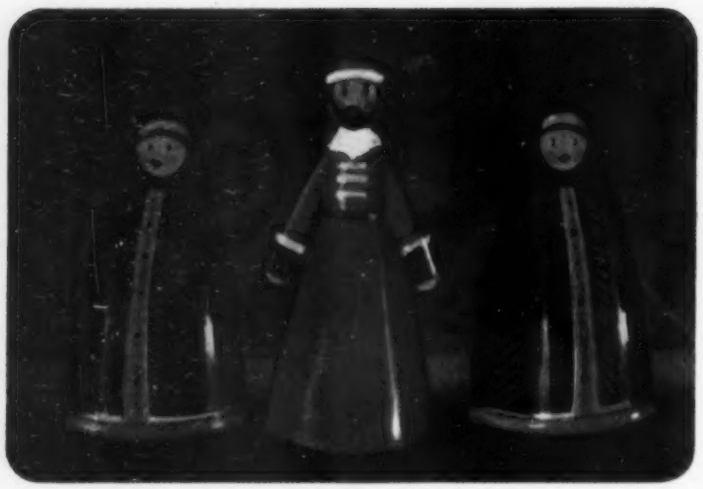
There is real fun in *The Unusual Soccer Game*. It pits the champion wooden players against the title-hungry stuffed toys in a contest replete with thrills, spills and good, clean fun.

When *The Snow Mailman* undertakes to deliver a letter to Grandfather Frost, the Russian Santa Claus, he meets perils and overcomes them in a handy fashion so the mails go through.

Heavenly Creature, **a full-length puppet film, deals with a tenor whose fame is dimmed by unusual occurrences at a variety theater concert. Even those who dislike tenors enjoy this one.**

A full-length film entitled *Twelve Months* concerns a girl sent into the wintry forest by her cruel grandmother to hunt for Snow Flowers. The Months help her through many perils.

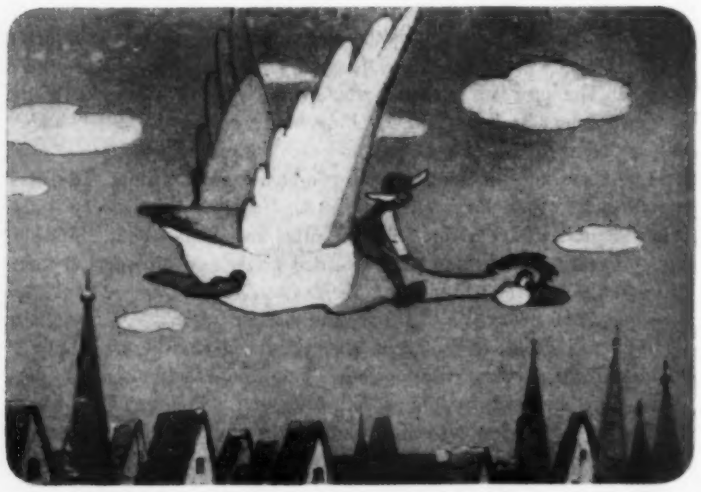
Animated Films Continued



The Marvelous Well **is an exciting story about two sisters, one industrious and the other lazy, who came to the magic kingdom of Grandfather Frost and received gifts from him.**

The Golden Antelope **deals with an Indian folk tale. It involves a peasant boy, an evil Rajah and a magic antelope in a series of adventures. The Rajah finds himself badly outmatched here.**

Prepared especially for the Moscow Youth Festival last summer, *Greeting Friends* offers an animated film concert by figures from many countries, and the film reflects the festival gaiety.



A Swedish tale is the basis of *The Bewitched Boy.* The original story by Selma Lagerlof is entitled *Nils' Journey on the Backs of Wild Geese.* Scandinavian children have long loved this.

The six panels on this page have been taken from the full-length cartoon film based on *The Snow Queen*, one of Hans Christian Andersen's beloved and most charming fairy tales.

The film delightfully tells the old story and the adventures of its principal characters, Kai and Gerda, who are shown together in this panel. Children everywhere quickly love them.

Kai is about to tie his little sled to the Snow Queen's sleigh to "hitch" a ride. The Snow Queen speeds her chargers and carries the lad off to her kingdom where he is held captive.

Left behind by this unfortunate tragedy, brokenhearted Gerda sets out on the long and difficult journey to find Kai in the strange Ice Kingdom, depending on her intuition to locate it.

The good black crows lead Gerda to a huge castle in their belief that the boy she is seeking is the prince who resides there in regal splendor. The prince is not Kai but proves gracious.

Gerda continues her search and is waylaid by a bandit gang. A friendly girl in the gang gives Gerda a deer. She then continues northward into more adventures and finds her Kai.

YOUNG PEOPLE ENJOY CELEBRATING THE NEW YEAR HOLIDAYS BY ATTENDING ANNUAL BALLS. HERE ARE STUDENTS OF THE MOSCOW CONSTRUCTION ENGINEERING INSTITUTE.

WINTER HOLIDAY

JANUARY marks the beginning of another year with all its challenges and hopes. And it is highly significant, too, for the month-long series of parties and celebrations.

New Year's Eve launches this season. Watch parties are the rule everywhere. Starting about 11 P.M. on December 31, the crowds begin gathering not only at individual homes, but also at factory clubs, trade union recreation centers and rural community halls. Many people have reservations at restaurants. But wherever the celebration may be, the stroke of midnight is tolled to the popping of corks amid repeated toasts of the merrymakers. Dancing and games follow until the crack of dawn.

As big and splendid as they are, these parties simply start the gay January festivities.

Elementary and high school students begin their winter vacations the end of December. The children come out in great throngs to the public squares and parks where decorated fir trees stand. The theaters provide special attractions for them, as do the concert halls

Continued on next page

One of the highlights of Moscow's New Year celebration is held in the Grand Kremlin Palace. Young workers and college students dance until dawn.

One-man band. Performing during intermissions, this musician dressed in an old Russian costume gets lots of laughs with his clowning for the crowds.

New Year parties for children are held in the best halls. This is a concert in the Kremlin.

This graceful and beautiful Dance of the Snow Flakes is being performed on the ice of Moscow's Sports Palace. With three daily performances during the holidays, it is seen by 15,000 children.

WINTER HOLIDAY *Continued*

everywhere. The circus also arranges performances in line with the spirit of the holiday. Trade unions open up their recreation centers for children's parties and their programs include theatrical and musical performances by artists from many fields of the entertainment world.

At each of these many parties there is always the fir tree and presiding over all is Grandfather Frost. This jolly old gentleman, who could easily double as Santa Claus in both costume and purpose, is generally aided by a beautiful Snow Maiden. There are games and songs by the youngsters—and of course the distribution of gifts. There are toys or books, cookies and candies to delight their eyes and satisfy their appetities.

Outdoors the parks have been transformed into a veritable fairyland of ice and snow. There are the artistically made figures from well-known characters of folk lore and fairy tales. The old Russian troika—a comfortable sleigh drawn by three horses—is a favorite with the children. Nearby they find many ski slides and ample provision for sledding. The park lanes, playgrounds and stadiums are flooded and turned into skating rinks.

The holiday activities for school children continue for about a fortnight. Meanwhile college and university students are taking their mid-term examinations. But despite the demands of their studies, most of them generally manage to get in the early parties or dances. By the end of the fourth week, however, examinations have been concluded and the students begin their two-week vacation.

Coinciding with the student balls are the New Year affairs of the young people from plants and offices. After working hours and on the week-ends there are innumerable concerts and dances, special theater parties and

GRANDFATHER FROST PLAYS THE LEADING ROLE AT THE FIR TREE PARTIES. HE IS SHOWN HERE WITH THE SNOW MAIDEN AND SOME OF THE GUESTS THEY ENTERTAIN.

a host of outdoor activities for everybody.

Ice-skating carnivals under multi-colored lights are enjoyable and sometimes even romantic. There are cross-country ski hikes, sleigh rides, ice-hockey games and other sports events to keep the young people on the move in a continuing round of good times.

Another holiday observance of this period should not be overlooked. Members of the Russian Orthodox Church, still following the old Julian calendar, celebrate Christmas on January 7. Believers of the Protestant and Roman Catholic faiths observe their Yuletide on December 25.

The new vacation period starts in January and almost as many workers from shop, factory and office take their annual leaves during the winter as in summer. The network of winter resorts have long since been booked to capacity. There are hunting lodges, ski stations with well-laid out trails, and the ever popular ice-skating rinks. For hardy souls there is even fishing—through the ice.

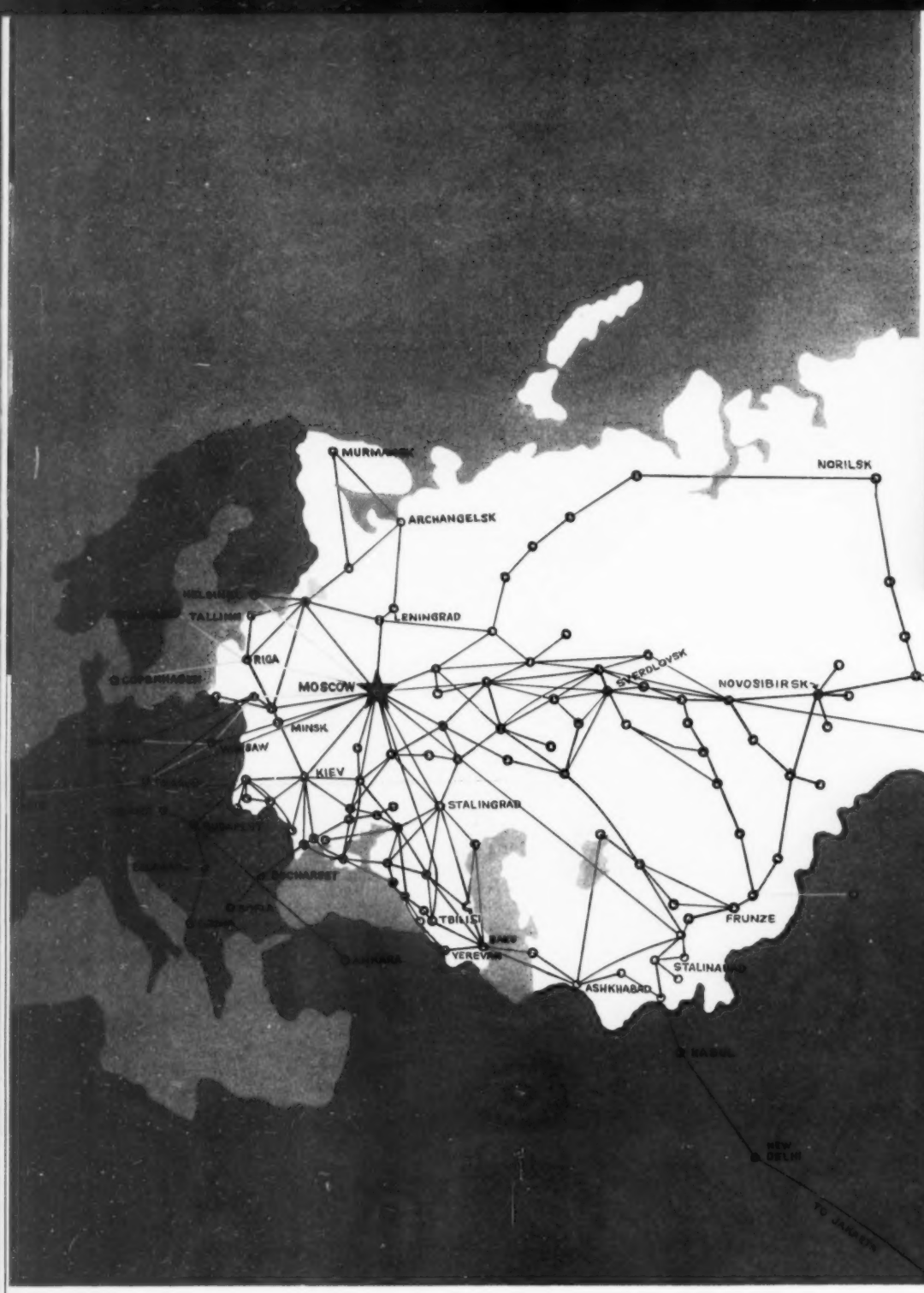
The snow by this time has completely blanketed most of the country, and no week-end would be complete without skiing excursions. Millions of ice skaters of every age fill the rinks every evening.

Regardless of one's particular interests and no matter where one may live in the Soviet Union, January is something extra special. Its events hold a real attraction for young and old. And they are universally agreed that they have started off the New Year in splendid fashion. ■

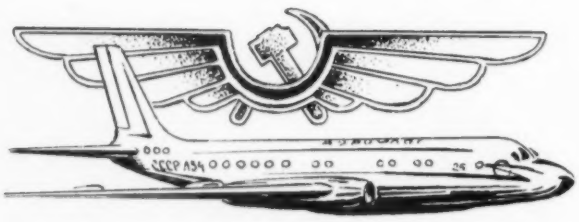
Playgrounds, parks and suburban areas offer slides, ice skating and ski trails for youngsters like these happy ones. This anticipated event occurs as January ushers in the carefree two-week school vacation.

Millions take to ice skating once winter sets in. They can find rinks on park lanes, stadium areas, and on apartment house and factory grounds.

College and university students find skiing a pleasant diversion between examinations held throughout January. They get their vacation later.



FLYING SOVIET AIR



аэрофлот

By Pavel Zhigarev

Director of the Central Administration, Soviet Civil Air Fleet

THE passenger and transport planes of Aeroflot, the Soviet Civil Air Fleet, wing their way north and south, east and west over tens of thousands of miles of our air lanes.

Each minute of the day and night finds passengers and rush freight en route to and from major cities, resort areas and construction jobs. We make regular flights to research stations adrift on the ice in the North Pole region and to scientific bases in the Antarctic. Aeroflot planes are on regularly scheduled runs to sixteen foreign countries.

The Soviet Union has surpassed all other countries in the length of its airlines. Aeroflot is constantly expanding its network and within the next three years we plan to almost quadruple our passenger traffic.

The rapidly growing popularity of air travel derives from Aeroflot's reputation for high speed, safety and comfort. The servicing of our skyliners is thorough and complete. The pilots, navigators and me-

Continued on page 40

VNUKOVO AIRPORT IS 17 MILES FROM MOSCOW. A NEW BUILDING WILL SOON BE BUILT FOR INCREASED TRAFFIC.

LANES

INSIDE CONTROL TOWER OF VNUKOVO AIRPORT.

THE TWO-ENGINE TU-104, SEATING 50 PASSENGERS, WAS THE FIRST JET-POWERED AIRLINER TO BE USED FOR COMMERCIAL SERVICE. ITS DESIGNER IS ANDREI TUPOLEV.

ANDREI TUPOLEV, DESIGNER OF MANY NEW TYPES OF PLANES.

PILOT GEORGI IVANOV IS CONGRATULATED ON HIS TWO MILLION MILES OF FLYING.

FLYING SOVIET AIR LANES *Continued from page 38*

chanics are the most competent in their fields. Aeroflot planes and personnel are equipped and trained to fly safely under all types of weather conditions, day or night.

Our airliners travel at high altitudes, frequently at elevations of 25,000 to 30,000 feet, to ensure smooth riding. Speeds often touch 600 miles an hour or more.

Relatively low fares are another factor which accounts for increased traffic. Fares are only slightly more than first-class railroad accommodations. When the new, larger planes are placed in operation, air fares will be further reduced.

Aircraft Progress

To get a picture of civil aviation progress made by the Soviet Union, one must go back some 30 years. The first Soviet airlines in the twenties flew low-powered, slow and uncomfortable foreign planes, chiefly of German manufacture. The country had no aircraft industry at the time.

When the Soviet Union began to develop under the impetus of the five-year plans in the early thirties, many new industries were born. Aircraft was among them. First progress was uneven. There were failures studded by successes. But as early as 1937 Valeri Chkalov and Mikhail Gromov made their USSR—USA non-stop flights over the North Pole in single-engined Soviet planes. Those flights demonstrated that Soviet aircraft had arrived in the international arena.

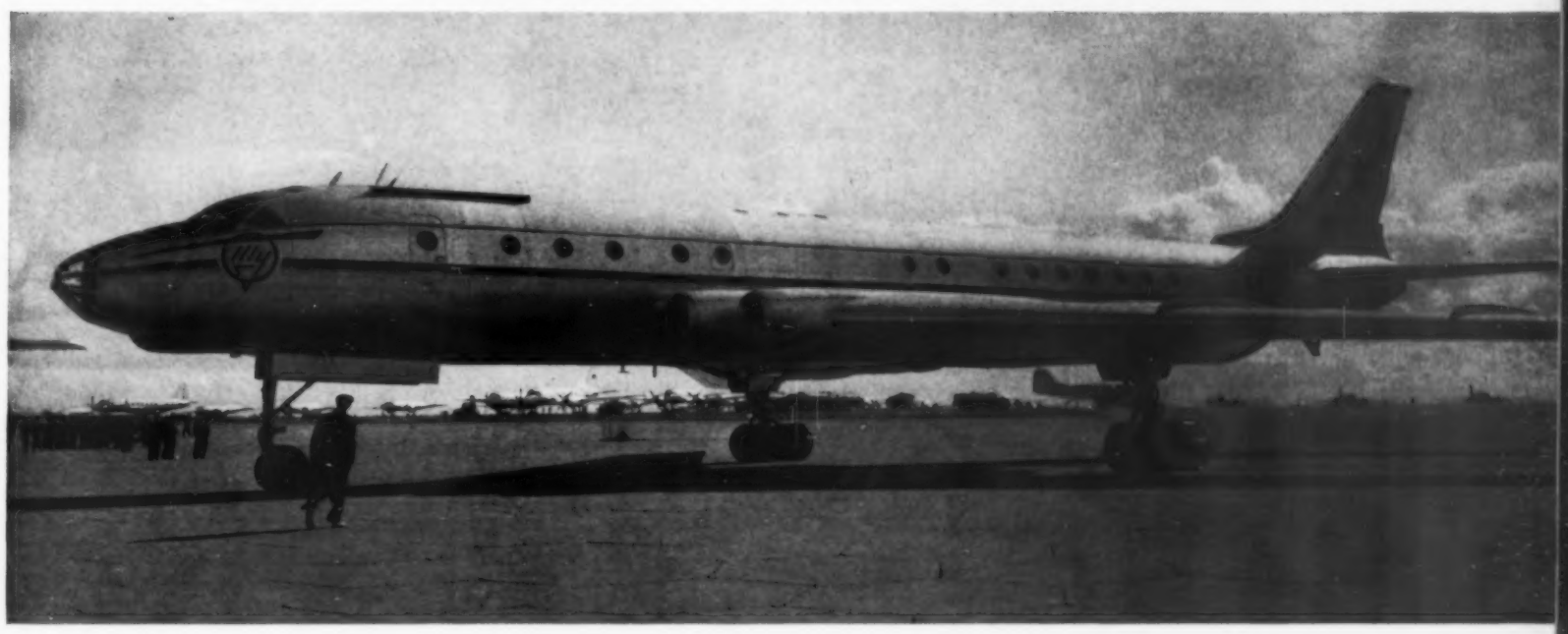
Since those epic flights, Soviet designers have produced dozens of models. Outstanding among those developed since the war are designer Sergei Ilyushin's twin-engined IL-12 and IL-14 passenger planes, which are still seeing service.

In September 1956, the 50-passenger jet airliner designed by Andrei Tupolev went into service on the Trans-Siberian run. This was the TU-104 that inaugurated regular passenger flights by jet-powered planes for the first time in the history of aviation. Powered by two turbojet engines, it has a cruising speed of 500 to 525 miles an hour, or about twice as fast as passenger planes equipped with regular piston engines.

Ever since that time the TU-104's have been in our regular service, at first on domestic and later on some international flights. Although the routes of these planes traverse widely different climatic conditions, their punctuality has become a by-word. Service personnel of the Prague

DEPENDABILITY, SAFETY AND COMFORT ARE SOME OF THE ATTRACTIONS OF THE TU-104. HERE IS SECTION OF THE PASSENGER COMPARTMENT.

ANOTHER TURBOJET AIRLINER DESIGNED BY TUPOLEV IS THE FOUR-ENGINE TU-110. IT SEATS ABOUT 100 PASSENGERS AND CRUISES AT SPEEDS IN EXCESS OF 620 M.P.H.



international airport insist that they set their watches by TU-104's arrivals and departures.

Bigger and Faster Planes

In 1957 a number of new types of airliners began coming off the assembly lines of their designers and builders. These were principally turbojet and turboprop planes.

The designing office headed by Andrei Tupolev completed the TU-104A. This is a modification of the TU-104 and is also powered by two turbojet engines. It carries 70 passengers and cruises at 590 to 620 miles an hour. Early last fall this plane flew from Moscow to New York. True, it had to stop for refueling, but the flying time was 11 hours as against the 63 it took Chkalov to fly from the Soviet Union to the United States in 1937.

Several types of new planes are even bigger. Tupolev's TU-110 is fitted with four powerful turbojet engines. It has room for about 100

Continued on next page

"YOUR ORDER, PLEASE," SAYS THE COOK ON A JET AIRLINER.

Oleg Antonov (at the left), the designer of the *Ukraina*, is shown here with Alexander Eskin, the test engineer of this four-engine turboprop airliner.

FLYING SOVIET AIR LANES *Continued*

passengers and has a cruising speed of better than 620 miles an hour.

Another plane designed by Tupolev is the four-engine turboprop TU-114 which can carry up to 220 passengers at a cruising speed of 600 miles an hour. The new airliner can make a non-stop flight from Moscow to New York in 10-12 hours.

The designing office headed by Sergei Ilyushin completed the IL-18 *Moskva* with four turboprop engines. This plane is built in three models: tourist, passenger and freight types. The tourist plane seats 100 passengers, the first-class passenger ship seats 75.

One of the objects of the designers was to produce a highly economical plane. And the *Moskva* really cuts the cost of passage to that of an ordinary railroad fare. With a cruising speed of above 400 miles an hour, it can cover more than 3,000 miles with a commercial load of 12 tons at an altitude of five or six miles, where atmospheric conditions have little effect on the smoothness of flight. The plane can take off and land at relatively low speeds, making it adaptable to almost any airport in the world.

Another new ship is the *Ukraina* produced by the designing office headed by Oleg Antonov. It has four turboprop engines and is built with three passenger compartments to accommodate 84 passengers. It has a specially equipped children's cabin. The tourist model of this airliner carries 126 passengers. The *Ukraina* performs nicely at an altitude of five miles and cruises smoothly at 370 miles an hour.

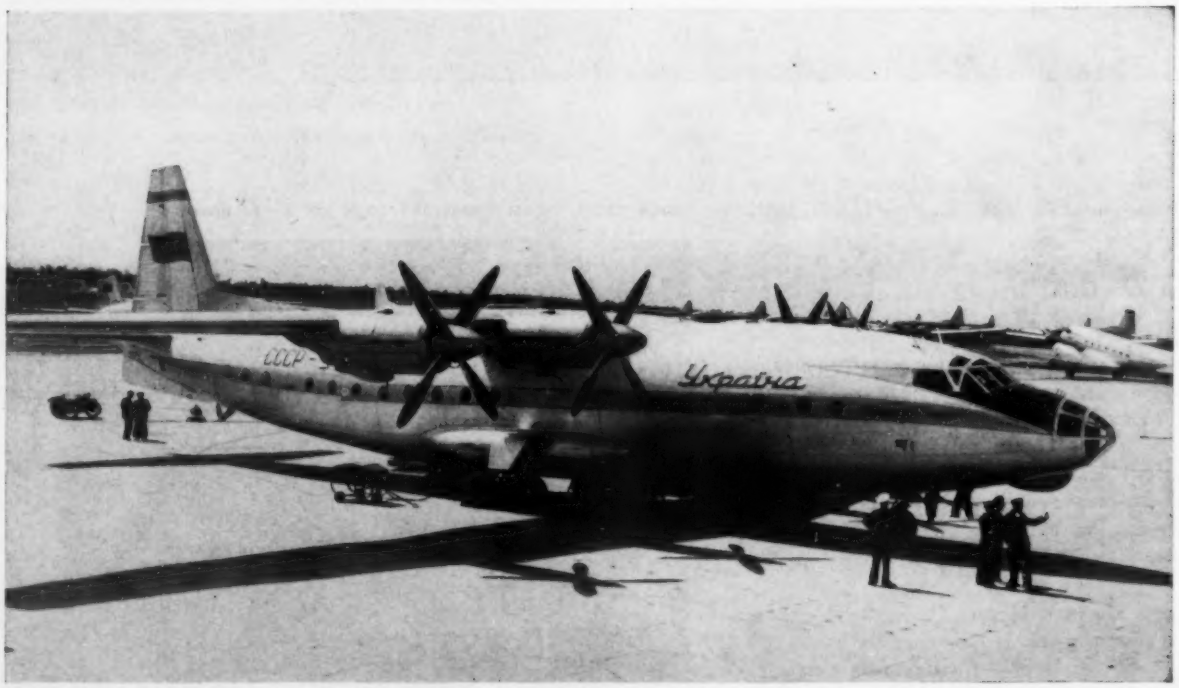
Antonov's engineers also designed the *Flying Whale*. This is a transport ship that can lift large machine tools and even small buildings or houses. Large enough to hold a regular city passenger bus, it is fast but can take off and land on very small fields. It is extremely economical to operate.

At the other extreme from these huge carriers of the sky is the *Little Bee*, also designed by Antonov. It carries seven passengers, and its speed can range from 25 to 125 miles an hour, which makes it similar to the helicopter in its take-off and landing qualities. Any small field, road or level spot 45 to 65 yards long suits it perfectly.

The *Little Bee* will be used to carry the mail and freight to remote areas and it can also be used for agricultural and medical services. The plane is simple to fly and can be piloted by any reasonably good automobile driver after a short flying course.

The civil aviation fleet will also soon be supplemented by turboprop helicopters for short flights. *Continued on page 44*

SEATING 84 TO 126 PASSENGERS ACCORDING TO INTERIOR DESIGN, THE *UKRAINA* CRUISES AT 370 M.P.H. AT 5-MILE ALTITUDES.



Flying Whale is a work horse in the Soviet Civil Air Fleet. This plane can hold a city passenger bus.

Sergei Ilyushin (center), who designed the *Moskva*, and two of his assistants—co-designer Vasili Bugaevsky and test pilot Vladimir Kokkinaki.

THE FOUR-ENGINE TURBOPROP AIRLINER *MOSKVA* CAN EASILY HANDLE 12-TON COMMERCIAL LOADS AT A CRUISING SPEED OF ABOVE 400 M.P.H. AT 6-MILE ALTITUDES.

STUDENTS OF AIRCRAFT ENGINEERING ARE TRAINED ON ALL TYPES OF MOTORS. THIS GROUP IS LISTENING TO AN ENGINEER'S LECTURE ON THE IL-12 PASSENGER PLANE.

FLYING SOVIET AIR LANES

Continued from page 42

A CIVIL AIR FLEET HELICOPTER FLIES A DOCTOR TO AN INJURED GEOLOGIST.

New Functions for New Needs

For Aeroflot's multiform services all types of planes are necessary and we do not junk our old model planes when newer ones are developed. The new jet planes, flying at supersonic speeds, as important as they are in cutting time and distance, obviously cannot replace the slower planes for such work as spraying crops or forest fire-fighting.

Many of the slower planes are equipped for special functions. One type, nicknamed the *Flying Prospector*, is an aero-geophysical laboratory used by geologists to prospect for mineral deposits with radioactive or magnetic properties.

Not long ago a Civil Air Fleet pilot, Mikhail Surgutanov, discovered one of the country's richest iron-ore deposits, the Sarbai fields in Kazakhstan. Other aerial prospectors participated in the long searches that helped locate the new industrial diamond deposit in Siberia ranking among the largest in the world.

Over our fields planes can be seen performing diverse agricultural tasks practically the year round. They serve to spread insecticides, give top dressing to crops, and destroy weeds. The most industrious farmer could never spray his vineyards as accurately, economically or as efficiently as the planes engaged in this work.

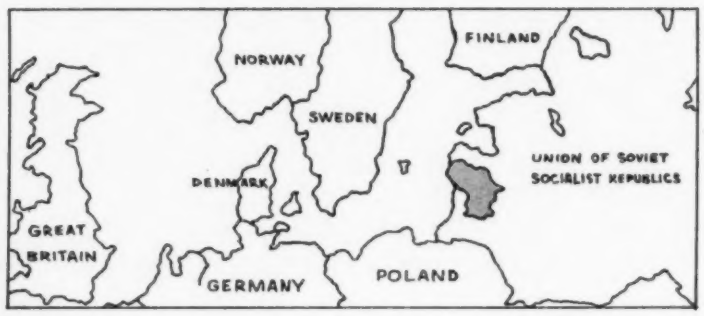
Another feature of the Civil Air Fleet's operation is the service it renders in bringing rapid medical attention to patients in remote areas, or picking up patients for transfer to medical centers. Pilots are trained to find a landing spot from the air and to fly doctors, patients and medical supplies in all kinds of weather. This function brings us no revenue, as medical service in the Soviet Union is free, but the work is given all the care and attention the other departments receive.

Aeroflot services are as varied as the needs of the country, and new services are provided as new needs arise. ■

OLD MODEL PLANES ARE NOT JUNKED. THEY WORK IN AGRICULTURE, FOREST FIRE-FIGHTING AND IN MANY OTHER SIMILAR SERVICES.

While drifting on Arctic ice, research station "North Pole 6" was serviced by Civil Air Fleet planes, which delivered mail and many supplies.

Helicopters assist fishing fleets in spotting schools of mackerel and other fish, and thus help the crews get large catches in less time.



FLOURISHING LITHUANIA

Justas Paleckis is President of the Presidium of the Supreme Soviet of the Lithuanian Soviet Socialist Republic—the republican legislature—and Vice-President of the Presidium of the USSR Supreme Soviet—the national legislature. He was born in 1899, son of a blacksmith, and was himself by turn student at the University of Kaunas, factory and office worker, schoolteacher and journalist. He was under attack much of his earlier life for his progressive views and political activity. In 1940, when Lithuania joined the Soviet Union, Paleckis headed the new republic.

By Justas Paleckis

ALTHOUGH we Lithuanians joined the family of Soviet nations eighteen years ago, in 1940, nine years were consumed with war and with repairing the damage of war. So that we have had only nine years of normal constructive life as a Soviet Republic.

It would be no exaggeration, however, to say that these few years have been more productive than as many preceding decades. The proof lies in the accomplishments, and these are plain to see.

Consider the last half-century of Lithuanian history in terms of its national and territorial integrity. Between the two world wars, the country was torn apart by its aggressive western neighbors. In 1920, Pilsudski, then virtual dictator of Poland, seized Vilnius, the ancient Lithuanian capital and its major industrial city. Later Hitler seized the Baltic seaport of Klaipeda, our only port city.

The ruling government of the country was quite willing to resign itself to the seizure of the capital city and the port, but the country's people were not. When the people declared Lithuania a Soviet Republic in 1940, both Vilnius and Klaipeda were returned as integral parts of the country. Today Lithuania, with its national boundaries intact, is a sovereign socialist state.

Lithuania Industrialized

It was not too long ago that Lithuania was one of the most economically depressed of Europe's many depressed countries. Factories were primitive. For the most part they were domestic craft enterprises employing from five to ten workers. The standard of living was miserably low, with school and health facilities correspondingly inadequate. Lithuania stood next to last among European countries in electric power

Continued on page 48

A residential street in Vilnius, capital of the Lithuanian Soviet Socialist Republic.

In the background are the lowlands to be flooded by Kaunas Hydroelectric Station.

MODERN TECHNIQUES OF MANUFACTURING ARE VERY MUCH IN EVIDENCE ON THE PRODUCTION LINES OF THIS SHOE FACTORY IN SIAULIAI.

CRANES MANUFACTURED IN VILNIUS ARE ONLY ONE OF MANY NEW PRODUCTS.

FLOURISHING LITHUANIA *Continued*

production. There were many towns, not to mention villages, which had no electricity.

The economic progress that Lithuania has made during the years of Soviet government is clearly visible to anyone who can make the simplest comparisons. Three hundred factories and mills have been built, many of them manufacturing products new to Lithuania—ships, turbines, instruments, and electrical equipment.

The largest factory in Kaunas, the Metalas, belonged to the Schmidt Brothers, a German firm, before 1940. It made locks and chains; most of its labor was manual. Today the factory, rebuilt and re-equipped with automatic machine tools since the end of the war, manufactures tractor cultivators, boilers for central heating systems, and flax-processing machinery, on a scale of production some thirty times greater than in 1938.

A large turbine plant, a factory producing reinforced concrete, and a silk plush mill, are some of the newer Kaunas enterprises. Altogether, the city's factories now manufacture four times as much goods as all of Lithuania did in the pre-Soviet period. And Kaunas is only one of several industrial cities in today's Lithuania.

In 1940, with a population of three milion, Lithuania had 115,000 unemployed. In a search for a livelihood, hundreds of thousands of our people had migrated to Western Europe, America and Australia before the First World War and after it.

There is no unemployment in Lithuania today. There is a great need for both skilled and unskilled labor and the tide of migration has reversed, with many Lithuanians returning to their native land from foreign countries.

Strazdas Fabionas is a lathe operator at the Zalgiris machine-tool plant in Vilnius.

Vladas Bucius is employed in the shoe department of a large factory producing leather goods of various kinds.

These sausages are being prepared for shipment in a Kaunas meat packing plant.

Making amber necklaces is a traditional skill among Lithuanian handicraftsmen.

The semi-conductor laboratory at Vilnius State University. Professor Povilas Brazdzunas is conferring with students.

Pronuskus Savickas, scientist, one of the most eminent biologists of Lithuania.

The Lithuanian Farmer

For the farmer in pre-Soviet Lithuania, making ends meet was a never-ending problem. Most farms were heavily mortgaged. The total of farm debts owed to the Agricultural Bank of Lithuania in 1936 was over 150 million lits. Between 1933 and 1937, 140,000 acres were sold for debt.

It was no simple nor easy matter to break with age-old traditions and ways of life. But collective farming has justified itself even to the most timid and fearful of farmers in the course of these last few years in very concrete terms of a better standard of living.

Small marginal homesteads have merged into big collective farms with resources for mechanized labor and large acreage scientific methods. By the end of 1956 about 20,000 tractors and 1,500 harvester combines were in use on the collective and state farms.

Large tracts of land have been reclaimed. More land was drained last year alone than in the twenty years before the war. Many thousands of experts in soil cultivation, fertilizing, livestock breeding and other phases of intensive farming have been trained.

The Lithuanian farmer today can see the difference in the daily facts of his life. His clothes are as good as those of people in the cities. His home is lighted by electricity and is comfortably furnished. He has no doctor, dentist or hospital bills—all medical services are free. His children are educated at free schools and colleges.

Free Education for Everyone

"If everyone gets an education, who will tend the pigs?"—that was the answer the Lithuanian people used to get in old times in response to petitions for extending public education, improving schools, bettering conditions for schoolteachers. The majority of Lithuania's population, both urban and rural, could not afford education and was illiterate.

Soviet Lithuania has universal compulsory seven-year schooling; in the larger cities 11-year schooling is the rule. Compared with 1940, there are now six times as many high schools and seven times as many children in attendance.

Before the war Siauliai, one of Lithuania's biggest towns, had only eight elementary schools and four high schools, and these were intended for the entire school population of northern Lithuania. With so few schools and with high tuition fees, it is evident that only the wealthy could afford an education.

Today Siauliai has 19 high schools, three seven-year schools, four primary schools, a teacher-training school, an institute for advanced pedagogy, a ten-year music school, an agricultural school and a school for nursing and obstetrics. About 9,000 Siauliai children attend school, four times as many as before the war.

In 1938 there were about 4,000 college students in the whole of Lithuania, with the number steadily declining. Today the eleven schools of higher education have a student body of more than 23,000. In numbers of college students per 1,000 of the population, Soviet Lithuania leads France, Italy, Denmark, Sweden and Norway, with all of the country's graduates assured of jobs in their chosen fields upon graduation.

Books and Readers

Another index of Lithuania's cultural growth is book publishing. Book editions, particularly in fiction and poetry, are now significantly larger to meet the reading needs of a literate citizenry. *Seasons of the Year*, a long poem by Donelaitis, a Protestant pastor and poet who lived in East Prussia in the middle eighteenth century, will serve as an example. Between 1919 and 1939, the poem was published in two editions

Continued on page 51

Harvester combines and other machines used in large-acreage farming have greatly replaced former dawn-to-dusk laboring.

FLOURISHING LITHUANIA

Continued

COLLECTIVE FARM PASTURE WITH A LOCAL BREED OF SHEEP. SCIENTIFIC FARMING METHODS ARE NOW USED THROUGHOUT THE COUNTRY.

The fishing industry is a major source of income. These cooperative fishing boats are at Klaipeda on the Baltic Sea.

LITHUANIAN FARM WOMEN PERFORM THE UKRAINIAN FOLK DANCE "SPRING" AS A PART OF ONE OF THE MANY DANCE FESTIVALS THAT ARE SO POPULAR WITH THE PEOPLE.

of some 8,000 copies. In Soviet Lithuania the poem has been published in eight editions in a total of 75,000 copies.

The work of Zemaite, a Lithuanian classic, was put out in a solitary edition of 30,000 copies before 1940. Since 1945, twenty-six books by Zemaite have been published with a combined total of 571,200 copies. Within the recent period, books by the distinguished Lithuanian writer Petras Cvirka have been published in a combined edition of 1.5 million copies. Shakespeare, Byron, Scott, Longfellow and Mark Twain have been published in translation, and among contemporary American writers, Theodore Dreiser, Upton Sinclair and John Steinbeck are widely read.

Theater and Music

Another way of measuring the temper and well-being of Lithuanian life is in terms of the growth of our national arts.

Lithuania now has ten theaters, as compared with the three before 1940—theaters which play to capacity houses. In pre-Soviet Lithuania concerts were the rare thing, even in the capital, but today the State Philharmonic Orchestra schedules regular concerts, not only in Vilnius and others of the larger cities, but in small, out-of-the-way towns which had never before heard a symphony orchestra or a chamber-music group.

The Lithuanian Chorus and the Song and Dance Ensemble perform at home and for audiences in other of the Soviet Republics. Operas ballets, symphonies and concertos written by contemporary Lithuanian composers are performed regularly to large and interested audiences. The works of Lithuanian composers like Dvarionas, Juzeliunas, Vainiunas and Korosas are played not only in Lithuania but everywhere in the Soviet Union.

Lithuanian folk music and folk singing has experienced a renaissance during the Soviet period. No less than 180,000 Lithuanians sing in amateur choruses, dance in folk dance groups and perform with theater groups. At the yearly song, music and dance festival held in the republic's capital, contenders from every city and district vie for prizes. In the last festival, 32,000 singers, dancers and musicians from every city and village participated.

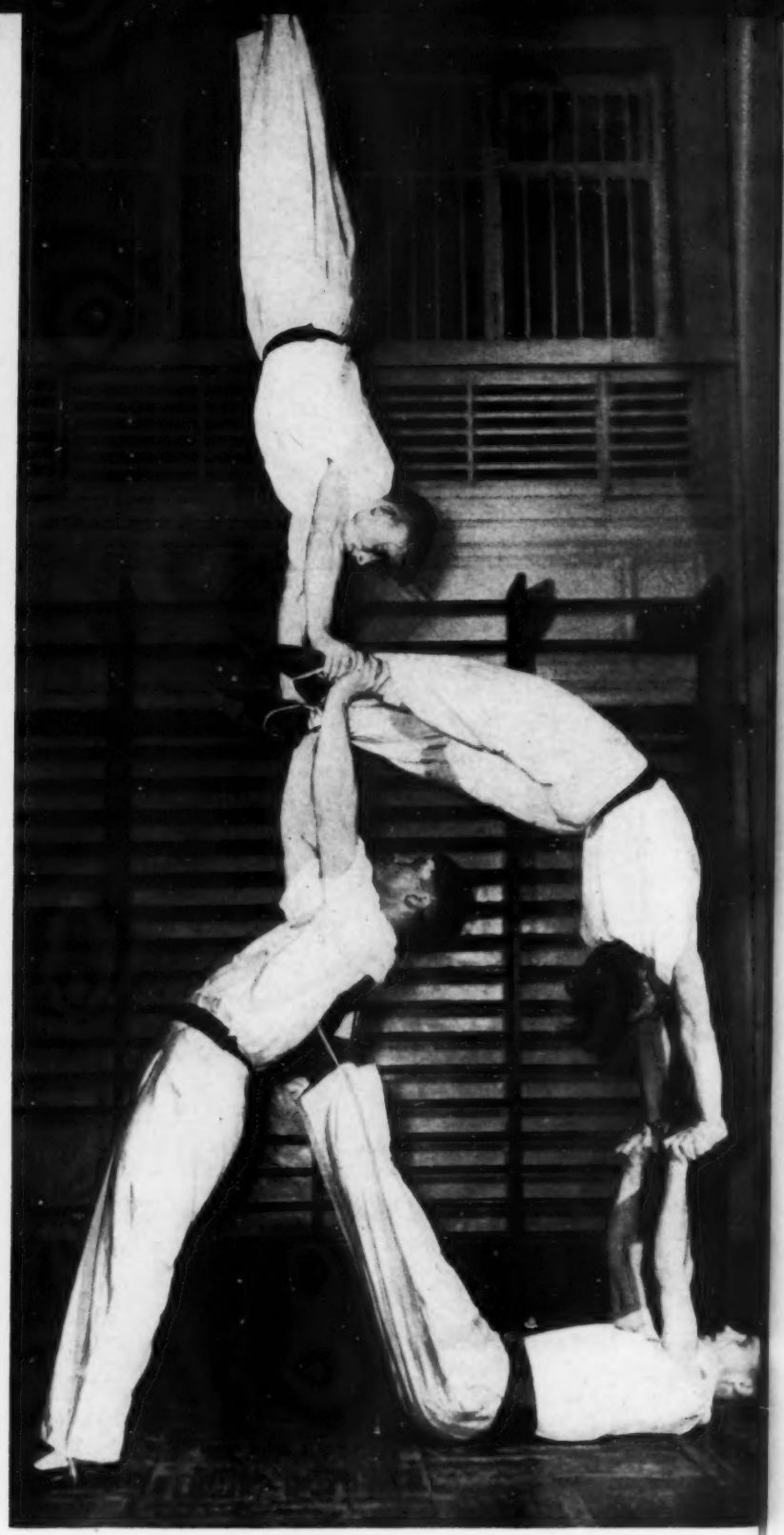
The People's Government

In Soviet Lithuania the governmental structure is based upon the people's ownership of the republic's wealth and resources, operated for the general welfare. The character of the republic's legislators reflects this principle of a socialist country.

Of the 26,383 deputies elected to local government bodies—village, town and city councils—almost 16,000 are workers and farmers, the remainder are intellectuals.

Sixty-two of the 209 members of the highest legislative body in our republic—the Lithuanian Supreme Soviet—are women. Among the deputies are 47 workers, 35 collective farmers and 127 schoolteachers, doctors, engineers, agronomists and other people in the professions. In the old Lithuanian Diet there was not a single worker.

In the Supreme Soviet of the USSR there are 35 Lithuanian deputies. Together with representatives from other of the Soviet Republics, they take their equal part in legislating and in assuring steady and confident progress toward a fuller and richer life for the whole nation. ■



EVERYBODY IN THE KUZNETSK METAL PLANT CAN FIND SOMETHING TO INTEREST HIM AT THE CLUB, WHOSE ACTIVITIES RANGE FROM STRING ORCHESTRAS TO ACROBATICS.

SOCIAL CENTER IN A

By Yuri Grafsky

Photos by Dmitri Chernov

HUMOROUS FOLK SONGS, VERY OFTEN ABOUT LOCAL PEOPLE AND EVENTS, ARE ALWAYS A WELCOME ADDITION TO ANY PROGRAM GIVEN AT THE CLUB.

SIBERIAN STEEL CITY

THE handsome, marble-fronted building of the metalworker's club in Siberia's steel city, Stalinsk, fairly hums with activity after working hours and on week-ends.

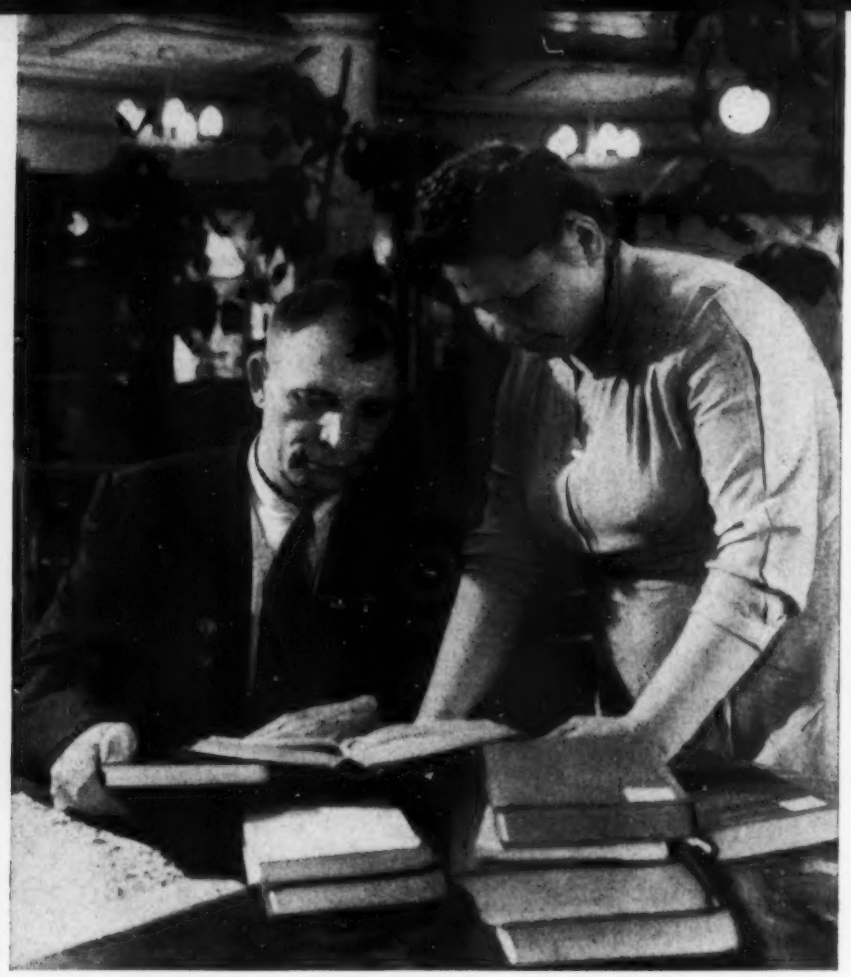
Two thousand metalworkers and members of their families are spare-time actors, musicians, artists, singers, dancers, acrobats, and whatever else you can think of in the way of avocations and interests.

The requirements to join any of the forty-odd amateur circles and twenty sport groups? Interest, nothing more. Facilities, equipment, musical instruments, theatrical costumes and teachers are all provided by the management of the Kuznetsk metal plant and the union. The outlay in funds for these purposes came to 900,000 rubles last year.

The theater studio has a membership of 40 hard-working amateurs who have six plays to their credit, among them *Marriage* by Gogol

Continued on page 55

The club's industrial museum has exhibits tracing the plant's history. Visitors are often college students.

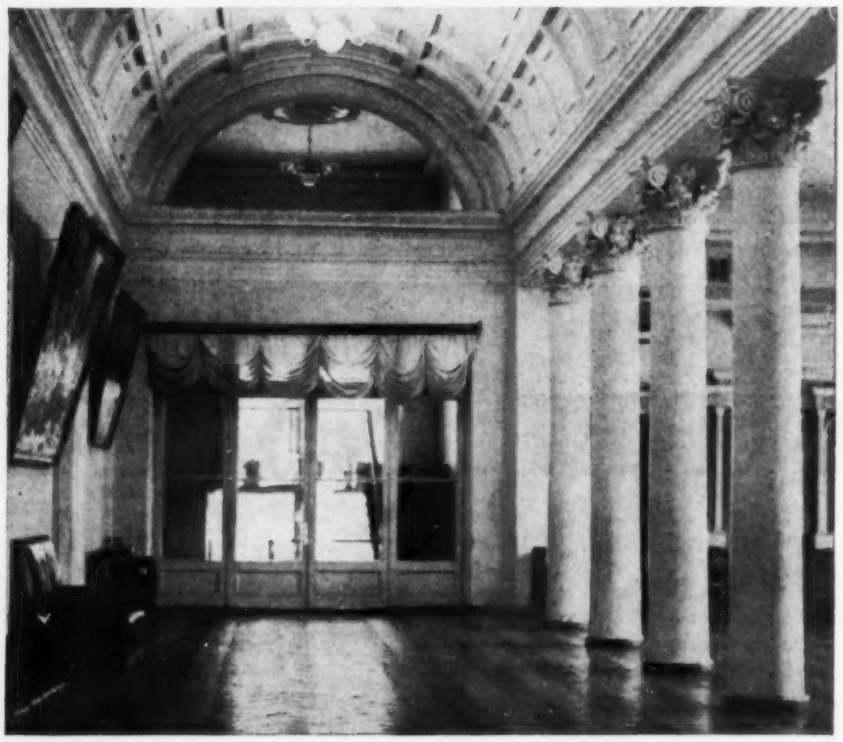


Mikhail Burkatsky is one of the regular users of the club's 163,000-volume library. A foundryman with years of experience behind him, he is now writing a book about his trade.

Open-air dances, concerts and carnivals are held in the beautiful park surrounding the club building.

SOCIAL CENTER IN A SIBERIAN STEEL CITY

Continued



In the evenings this hall is always the center of merry-making. Dances, parties and a host of other activities are arranged here for the young people of the plant.

More than anything, this six-year-old wants to be a soccer player when he grows up. A frequent visitor to the club's locker rooms, he listens eagerly to tips from his grandfather, who takes care of the sport gear.

and *The Zykovs* by Maxim Gorky. Under the tutelage of professional actor Alexei Konchevsky they are now rehearsing Chekhov's comedy *The Proposal*, with leading roles to be played by Mikhail Gubarkov of the blast furnace division, Victor Tanchayev of the transport division and Galina Melikh, head librarian of the plant's technical school.

For a two-day carnival held last fall in the park that surrounds the club building the literary circle wrote an original comedy for performance by the theater studio, the art circle designed masks, costumes and sets, and the club's band supplied the music for the pageant and for the big open-air dance which was the climax of the carnival. Between those who acted, danced, played or just looked on, there were 4,000 guests at the club when the festivities closed.

From time to time, workers in one shop will take over the club for some special occasion of their own—a big ball at which the young people who work in the rolling mill are host, or a literary evening put on by workers in the open-hearth shop.

Activity number one at the club is arguing life, love and literature. Listening to others argue runs it a close second. There is a regular schedule of debates with topics posted well enough ahead so that the large and usually vociferous audience can arm itself with background information.

The club has a reading room and a large library of general reading material beside literature on metallurgy. Some 600 readers a day use the library collection of 163,000 books. The range of interests of the library's 6,500 members is exceedingly wide.

Weigher Mikhail Kidyayev, for example, in the past few months has borrowed Russian classics—the works of Ivan Goncharov and Gleb Uspensky—and books on atomic power stations and the origin of the earth.

Metalworker Sergei Yudin has been reading Leo Tolstoy, Dostoyevsky, Galsworthy and Stendhal and the contemporary Soviet novels by Vyacheslav Shishkov, Vasili Grosman and Leonid Leonov.

Electrician Georgi Tolstikov has been concentrating on Theodore Dreiser. He has read in succession *Sister Carrie, The Titan* and *The American Tragedy*.

Foundryman Mikhail Burkatsky is one of the most regular of library readers. He is the three-time winner of the Order of Lenin, the highest of national awards, for his suggestions for improving production of steel. Now he is writing a book from the background of his many years of work.

Very frequently the library will arrange author-meets-reader meetings. The last such meeting was a talk with Vladimir Popov, author of novels about the steel industry *Steel and Slag* and *Smelting of Steel*.

During this past year the library arranged 26 readers' conferences at which the latest books of Soviet writers were discussed. There was a particularly heated exchange of opinions on the novels *Youth Is with Us* by Vsevolod

Continued on next page

A theater for the children offers them a chance to make puppets, build sets and act in plays.

PERFORMANCES GIVEN BY THE CLUB'S SONG AND DANCE ENSEMBLE ARE ALWAYS A POPULAR FEATURE.

SOCIAL CENTER IN A SIBERIAN STEEL CITY

Continued

Kochetov and *Not by Bread Alone* by Vladimir Dudintsev.

The musical life of the club is quite full too. Artists from the Novosibirsk and the Kemerovo regional philharmonic orchestras are frequent guest performers at the club. Ensembles and individual artists from Moscow and Leningrad also perform periodically. The famous pianist Emil Gilels played at the club shortly after he came back from his 1955 American tour.

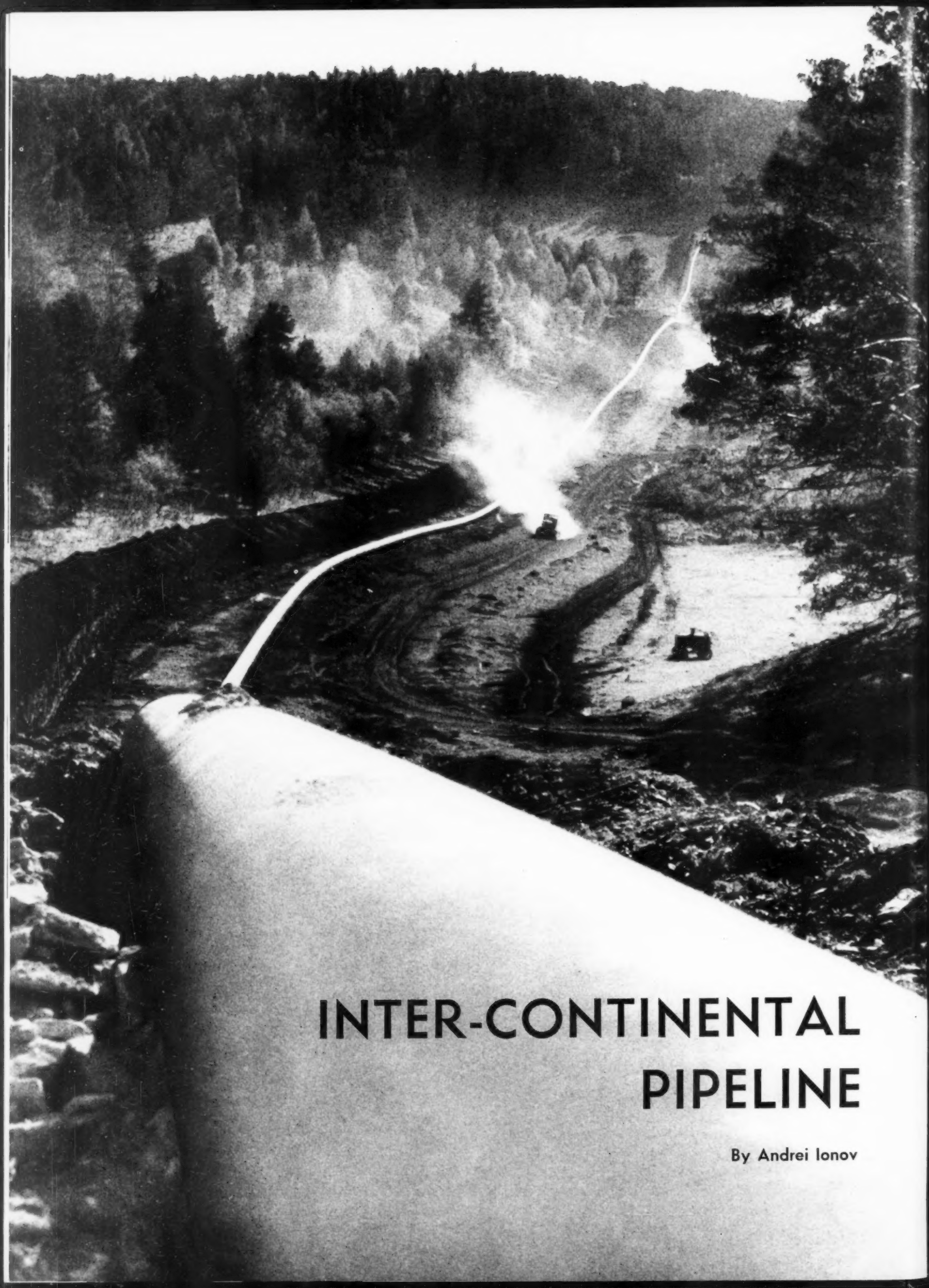
Both the Kuznetsk plant and Stalinsk where the plant is located have been growing together. Stalinsk has new broad tree-lined avenues, a new theater, museum, motion-picture theaters and community centers. The new housing developments have spread so far beyond the old city limits that the club at the center of town, not too long ago within easy reach of plant workers, is now an hour's travel away for a good many of them.

Out of discussion in shop and trade union meetings grew three new clubs in the past five years. They are now functioning in various parts of the city, with a fourth being built in a growing district.

Stalinsk is more than a steel town. It is a city of people learning, reading, debating, playing, singing in these busy centers of social and cultural life. ■

HERE ARE SOME SUNDAY PAINTERS PRACTICING THEIR SKILL. QUALIFIED INSTRUCTORS SUPERVISE REGULAR ART CLASSES FOR CLUB MEMBERS IN THE EVENING AS WELL.

WHEN SUB-ZERO COLD CLOSED SCHOOL FOR THE DAY, SASHA THOUGHT IT WOULD BE A GREAT CHANCE TO IMPROVE HIS HOCKEY, UNTIL A FORMIDABLE OBSTACLE AROSE.



INTER-CONTINENTAL PIPELINE

By Andrei Ionov

UNDER construction now is the world's longest oil pipeline. It will extend from the Volga River to Lake Baikal—2,315 miles of underground metal piping to carry oil between the European and Asian parts of the Soviet Union.

For the first 900 miles this new Tuimazy-Omsk-Novosibirsk-Irkutsk pipeline will parallel the present Tuimazy-Omsk line and then it will continue to run through the larger part of Siberia. On its way from the oil fields of Bashkiria it will cross the Ural Mountains and the marshes of the West Siberian plain and will be bedded under the Belaya, the Irtysh, the Ob, the Yenisei and other deep rivers. Through these thousands of miles of steel piping 28 inches in diameter, laid 6½ feet underground, oil will be driven from one powerful pumping station to the next—there will be 13 in all.

Men and machines are now chopping through dense forests, blasting mountain rock and digging river and lake shores. The sound and clatter of the big excavators and bulldozers ring through the great empty spaces of this primeval country.

To cut the path for this Eurasian pipeline, more than 25 million cubic yards of earth must be moved. Two hundred and fifty miles of the route must be cut through the steep slopes of the Ural Mountains, an undertaking of large dimensions by itself.

But the very difficulties of this gargantuan construction job seem to have developed the skill and ingenuity to meet them. Andrei Korobeinikov, an excavator operator, tackled the steep slopes of the Urals with his E-505 Soviet excavator and demonstrated that the machine could be used efficiently in mountain areas. Now the E-505's clamber up and down the slopes like flies on a wall.

Another excavator operator, Alexander Saprikov, fabricated a new type of bucket for rocky ground which cuts down sharply on wear and tear. Pyotr Bezrukov worked out a method of using his excavator to dig trenches in river beds without recourse to divers.

These and other ingenious techniques, devised not only by excavator and bulldozer men, but by insulation men, pipelayers, welders and assembly teams, have been widely publicized and have helped cut down time and labor. On all sections of the route, miles of pipe have already been put into place and covered over.

Network of Underground Carriers

Building oil and gas pipelines is new in Soviet construction, the youngest of its widely ramified engineering industries. It began to develop in earnest only as short a time ago as the end of the war. Lines were first built to pipe natural gas from deposits in the Ukraine and on the Volga to consumer areas, and to pipe oil to refineries from the fields in the Volga region.

Now many new underground pipelines supply cheap natural gas to towns and cities in various parts of the country. One of the longest gas pipelines in Europe stretches for 800 miles between Stavropol in the South and Moscow. The country's production of natural gas is expected to increase by 500 per cent between 1956 and 1960, to service 200 towns with a combined population of 40 million people.

Some 9,000 of the 15,000 miles of pipeline to be built during this five-year period will carry oil. The Eurasian pipeline from Tuimazy to Irkutsk is the longest, but only one of 30 being laid out. They vary in length depending upon function, from the 3-mile underwater pipeline recently built to bring oil from the Caspian Sea islands to the mainland, to the pipeline 65 times as long—195 miles—that runs through forest and plain and under rivers and canals from the Zhirnovsky oil field to the tanks of the newly-finished Stalingrad refinery. Stalingrad is now served by three gas pipelines. A new pipeline almost 500 miles long will soon supply Leningrad with natural gas from the South. The Jarkak-Bukhara-Samarkand-Tashkent 500-mile network of line will spread out from Uzbekistan.

New Oil Fields

The Eurasian line is being built to pipe oil from the new fields, discovered and tapped only in recent years, between the Volga River and the Ural Mountains. These rich fields have shifted the center of the Soviet oil industry from the long-famous Baku fields in Azerbaijan to Tataria and Bashkiria, which are autonomous republics within the Russian Federation, and to the Russian cities along the Volga banks.

In the prewar year 1940 the Russian Federation produced only 7 million tons of oil, while Azerbaijan produced 22 million. Today oil output of Azerbaijan remains at the same figure, while oil output in the Russian Federation has jumped to 61 million tons. Oil production has also been much increased in the Central Asian Republics—Turkmenia, Kazakhstan and Uzbekistan.

Rotary excavator cuts trench, partly through mountains, in which pipeline is to lay. The pipe sections are then welded by mobile automatic machines.

The fields between the Volga and the Urals and in other eastern regions now account for 65 per cent of all oil produced in the country.

The reserves of Devonian oil in Tataria, Bashkiria and the Volga region are unusually large. It is from these fields that oil is piped to Siberia for refining. An endless stream flows from Tuimazy to Omsk, transported via underground pipelines at one-seventh the cost of rail carriers.

Around Siberia's first refinery, at Omsk, an oil center of recent origin and considerable size has grown. From Omsk, diesel oil, gasoline, kerosene and lubricating oils are carried to all parts of Siberia. Southeast of Omsk, near the city of Pavlodar, another refinery is now being built.

There are no oil wells at Omsk or Pavlodar, or anywhere else in Siberia, as a matter of fact. Geologists are prospecting for Siberian oil deposits, and not without result. It may be that Siberia at some time in the future will not only pipe and refine oil, but will tap its own crude oil deposits. ■

Special machines like this one clear pipe sections of scale and rust and give them a protective coating before other machines put them underground.

RAMS OF ASKANIA-NOVA BREED YIELD ALMOST SEVENTY POUNDS OF WOOL EVERY YEAR. THE ANNUAL SHEAR FOR EWES OF THE SAME BREED COMES TO THIRTY POUNDS.

Askania-Nova Preserve

By Mikhail Alexandrov

Photos by Alexei Mokletsov

ASKANIA-NOVA is one of the great natural laboratories of the Soviet Union—100,000 acres of forest and wild grass plain set aside as an animal preserve in the Ukrainian Republic, north of the Crimean Peninsula. On its open pastures graze zebra, buffalo, eland, spotted deer. White swans glide majestically on its quiet ponds and pink flamingoes strut along its shores.

Here are birds and animals, plants and trees, many of them rare and exotic species collected from every climatic section of the globe. The European bison; the aurochs, now nearly extinct; the African gnu; the Australian emu. All are being carefully and scientifically acclimated. Many species like the saiga antelope and the steppe marmot that were fast disappearing are multiplying rapidly under these favorable conditions.

There are many such natural preserves in the varying geographical zones of the Soviet Union—in the Siberian taiga, on the Ukrainian steppes, in the Caucasus mountain country, and in the Central Asian deserts. As early as 1920, while the Civil War was still in progress and the country was far from stabilized, the Ilmen State Reservation was set up in the Southern Urals, the first of many large conservation areas. Under the old regime they were privately owned lands, usually stocked for hunting. Little attention was paid to conservation.

Before the Revolution Askania-Nova was the property of a large landowner. Some sporadic zoological research was undertaken there from time to time, but without adequate means or material. Large-scale and consistent research was begun in 1919, when the Ukrainian Soviet Republic declared it a national preserve. Since that time experimental stations and laboratories have been built for study of steppe flora and fauna.

But Askania-Nova is more than a zoological and botanical garden. The wild life conservation and study is correlated with the more im-

These South American ostriches feel quite at home at Askania-Nova. This natural preserve contains animals from every climatic belt in the world.

Zebra and Przhevalsky horse. Work is being done in Askania-Nova to domesticate wild animals. Antelope, deer and pheasants have been tamed here.

mediate function of Askania-Nova as a scientific laboratory for breeding domestic animals. The Mikhail Ivanov Institute for Animal Breeding at Askania-Nova, founded in 1932, has been doing original work in this most important and practical field of study.

The name of biologist Ivanov is intimately associated with the history and progress of scientific animal breeding in the Soviet Union. At Askania-Nova he developed a number of new breeds, notably the Ukrainian steppe hog and the Askania-Nova fine-fleeced sheep, which are now raised throughout the steppe regions of the country. This new breed of hog grows fast, reaches a weight as high as 704 pounds in sows and 990 pounds in boars, and is unusually fertile. The Askania-Nova breed of sheep yields large quantities of wool. The annual shear of ewes is 27.7 pounds, that of rams is 66 pounds and more.

Ivanov also founded an experimental zootechnical and pedigree breeding station at Askania-Nova. This was in 1925 when there were very few such Soviet stations. Now there are scores of them in every geographical region of the country. When he died in 1935 he left an important body of work behind him and incompleted research which is being followed through by such noted scientific workers in the field as Academicians Leonid Greben and Alexander Makeyev.

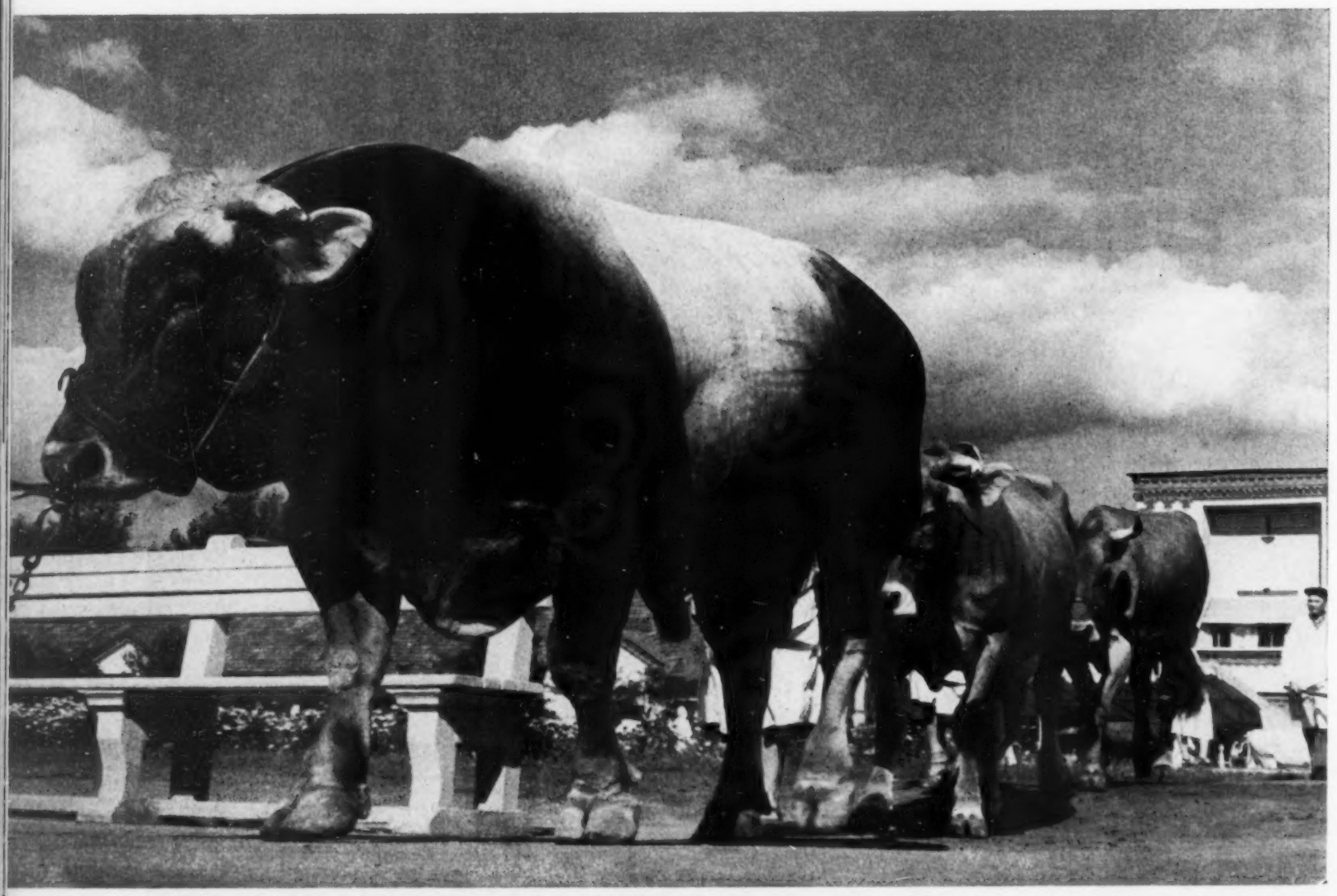
Work is being done to improve existing breeds and to develop new ones. Both the Ukrainian speckled hog and the fine-fleeced mountain merino sheep were developed at Askania-Nova. A particularly fertile breed of karakul sheep has been produced by cross-breeding with the Romanov coarse-wool breed. The ordinary variety of karakul sheep will give 110 to 120 lambs per 100 ewes, while those of the new bred variety give 165 to 170, and have given as many as 205. The new breed also yields karakul pelts of high quality.

Experimental work is under way to improve the Red-Steppe breed of milch cows, and a new type of milch and beef cattle is being produced. Through interspecies hybridization of the common cow with the

Continued on page 63

MANY NEW BREEDS HAVE BEEN DEVELOPED HERE. A COW CROSSED WITH A WILD ZEBU RESULTED IN THIS NEW BREED OF CATTLE WHOSE MILK HAS A HIGH FAT CONTENT.

THE VAST GRASSY PLAINS AT ASKANIA-NOVA SEEM TO STRETCH TO THE HORIZON, AND THEY PROVIDE A PASTURE FOR AFRICAN ZEBRAS AND OTHER GRAZING ANIMALS



RED STEPPE BULLS. WITH THESE PRIZE BEEF ANIMALS AS WELL AS WITH OTHER STOCK AT THE PRESERVE, SCIENTISTS ARE CONTINUALLY ENDEAVORING TO IMPROVE THE BREED.

Askania-Nova Preserve *Continued*

wild zebu, a new breed of zebu-like cattle which gives milk with a high fat content has been developed.

Askania-Nova also has a large, well equipped station for the artificial insemination of farm animals. It services the collective and state farms in the general vicinity and helps improve the quality of herds. Last year 44 of the station's pedigreed rams were used for the artificial insemination of 56,000 sheep.

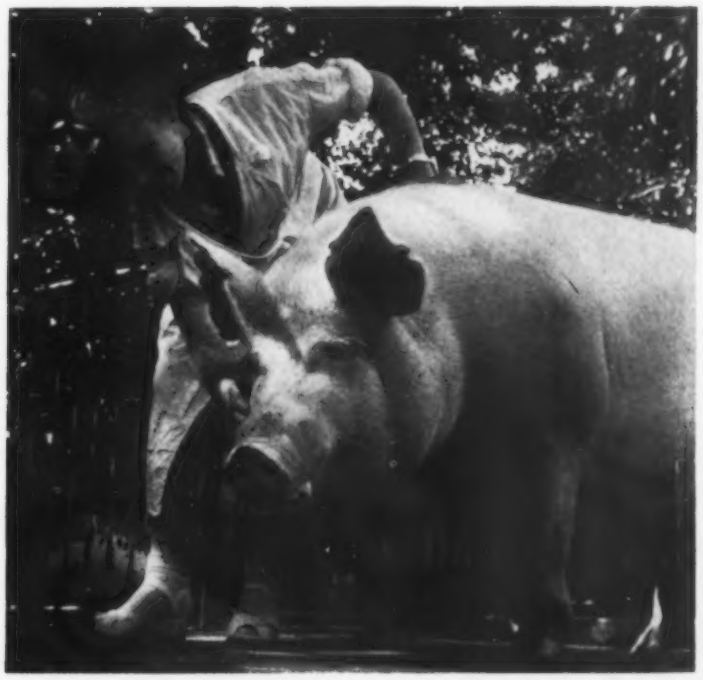
During the Nazi invasion the flocks of the famous Askania-Nova sheep breed were practically wiped out. After the war, sheep breeders at the "Krasny Chaban" state farm and the "Zavety Ilyicha" collective farm, not far from Askania-Nova, undertook to restore the breed. Using methods worked out by Askania-Nova's scientists, they not only restored the flocks, but improved the breed in the process.

The work done at Askania-Nova, both with wild and with domestic animals, is followed with close interest by animal breeders in the country, who frequently visit the preserve to watch progress or to seek advice on local breeding problems.

Many thousands of excursionists also visit Askania-Nova every year. They come to see how nature is being transformed, wisely and patiently, for man's benefit. ■

THESE SPOTTED DEER SEEM TO BE HEEDING THE PHOTOGRAPHER AT RIGHT MOMENT

IN FOREGROUND ARE BLACK DUCKS CONTRASTING WITH PRETTY PINK FLAMINGOES.



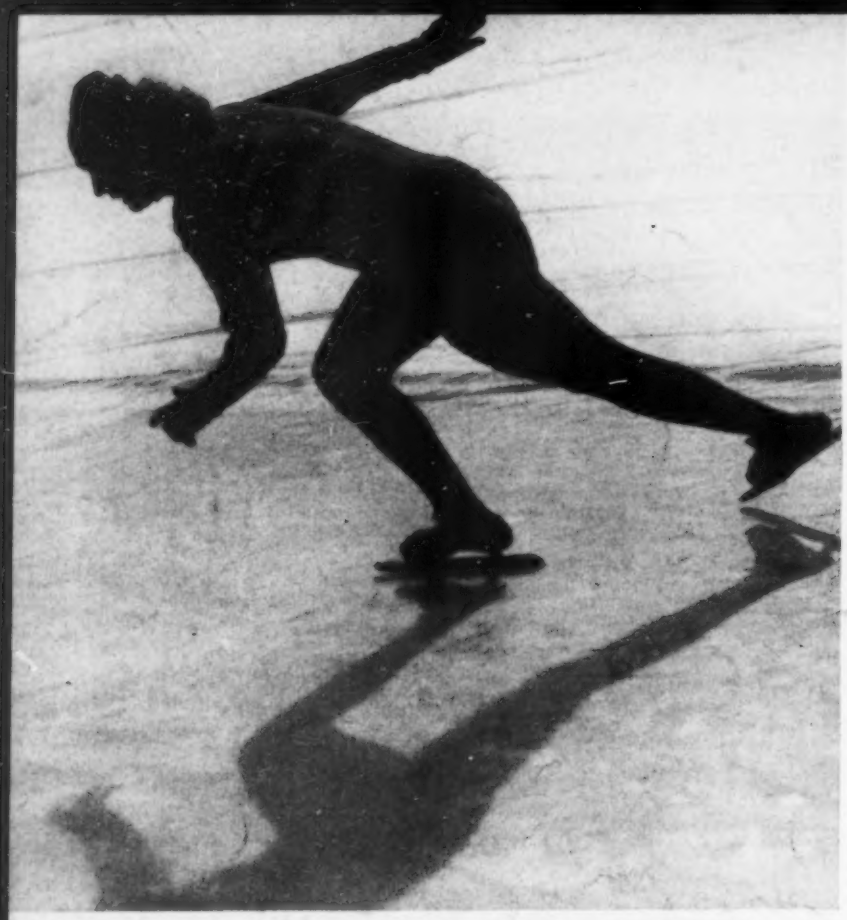
THIS IS A HEAVYWEIGHT UKRAINIAN STEPPE HOG PRODUCED AT ASKANIA-NOVA

IN ALL THE PRESERVE'S 100,000 ACRES, NO ANIMAL IS FASTER THAN THE ANTELOPE. ALTHOUGH THEY ARE FAR FROM THEIR NATIVE AFRICA, THEY HAVE BECOME ACCLIMATED.

The World's Fastest Woman Skater

Inga Artamonova of Moscow

By Victor Kuprianov



THE YOUNG SKATER'S STAMINA AND LONG STRIDE ARE HER GREATEST ASSETS.

MEET INGA ARTAMONOVA, the world's fastest woman skater. Springing from the ranks of the unknowns, she outsped contenders from eight countries to win her crown last winter.

Inga first broke into print when she captured the USSR title two years ago. The skeptics regarded the performance as sheer luck. They argued that the favored skaters were off form because of the strain of the world championship that preceded the national event. Be that as it may, the Soviet title-holder said at the time, "Next year I hope to become the world champion!"

And she meant it more than her critics believed. A very determined girl, she applied herself with a will and worked hard throughout the year. She roller skated, rowed, ran in cross-country events and played volleyball to build up wind, muscle and technique.

A DETERMINED GIRL OF 22, INGA IS DEVOTED TO HER FAMILY AND HER HOME.

Inga is one of the few speed skaters who can skate practically standing up on outstretched legs. What that means is a longer stride—microscopically longer, perhaps, but all those microscopic trifles taken together give the margin that makes all the difference between winning and just taking part. Why then don't the other skaters skate that way? Yes, why don't they? That requires years of training and muscle building.

Our new champion has a winning smile and tremendous will power. Once she sets her mind on something—Grr-rr-r! She was that way at high school before the thought of a world title had even entered her mind. This tall girl decided she'd learn to swim. So she joined the Dynamo Sport Club and began training in their pool.

But Inga's grandmother had other ideas. She said NO! Now most grandmothers know that merely saying "no" is not enough. Decisive action is needed. Grandma Artamonova had her own method. She flatly refused to give Inga money for carfare.

In most cases that would be a pretty fair deterrent—especially when the pool is situated four miles from home. But not so for Inga. She set her jaws and hiked the four miles and back. And, in passing, it might be said that these long walks helped build up her stamina to championship caliber. So at present Inga belongs to the select group that can say, "Everything that I am I owe to Grandma!"

The question fans asked is: Is this a star of the first magnitude or merely a meteor that flits once across the sky and is gone? There are many who predict a long string of victories. One of them who should know is Maria Isakova, the famous speed star who wore the world crown for three years. She thinks Inga will reign supreme for at least a decade. It is a thrilling prospect for Inga, but just imagine what it does to the other girl skaters.

The world championship for women last year not only showed that Inga Artamonova was best at all the four distances contested—it also showed that the class of women's speed skating has improved noticeably. In the past the titles and records seemed to be a Soviet monopoly. But now we are seeing new names on the roll of honor. Miss Hutunen of Finland actually outskated Inga by the slim margin of about two seconds in the 3,000-meter race—the longest distance which usually makes or breaks champions. And the 16-year-old Finnish champion, Miss Sinvonen, ran second to Inga in the 1,000-meter event.

All of that is a reminder to Inga that she can not rest on her laurels this winter if she wants to keep her championship title. ■

ACTION PORTRAIT SEEMS TO REFLECT HER WILL TO WIN THE CHAMPIONSHIP. ▶

AN EVENING AT THE RINK (See Picture Story on Page 34)