Science and Man's Progress

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A press conference held by Mikhail Millionshchikov, Vice-President of the USSR Academy of Sciences, and Dzhermen Gvishiani, Vice-Chairman of the State Committee of the USSR Council of Ministers for Science and Technology

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A press conference for correspondents who covered the official visit of the US President to the USSR was held in the International Press Centre set up for the occasion, on May 26, 1972. Mikhail Millionshchikov, Vice-President of the USSR Academy of Sciences, told the newsmen about the significance of science in the solution of major socio-economic tasks facing Soviet society. Dzhermen Gvishiani, Vice-Chairman of the State Committee of the USSR Council of Ministers for Science and Technology, spoke about the role of technological and scientific progress in the country's economic development. The present booklet contains the materials of the press conference.

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Opening Statement by Mikhail Millionshchikov

Solution of major contemporary social and economic problems is unthinkable without the application of science-based methods and techniques.

Lenin, the founder of our state, made a tremendous contribution to the elaboration and introduction of a scientific approach to matters connected with socio-economic transformations.

Lenin was the first to point to the nation-wide importance of science and the necessity of its development in the socialist state. To duly appraise the boldness of Lenin's ideas, it should be recalled how much he did to promote the progress of Soviet science at a time when Soviet Russia, suffering economic chaos, hunger and cold, was much more in need of basic means of subsistence than the achievements of science of that period.

The initial Soviet years saw the establishment of a number of institutions to deal with major departments of science. These institutes played the decisive part in the development of Soviet science.

Today, on the eve of the 50th anniversary of the formation of the Soviet state, we can say with pride that the subsequent course of events has fully confirmed the correctness of our Party's farsighted policy in respect to science.

In a historically short period, 15-20 years, Soviet science reached the world level even in those departments which had not existed in pre-revolutionary Russia.

Thus, in physics, Soviet scientists discovered the effect now called the Cerenkov radiation and produced the theory of chemical chain reactions.

Shortly before the war, right after the discovery of uranium fission, Soviet physicists proved the possibility of the nuclear chain reaction and evolved the corresponding theory.

In 1937 Soviet scientists discovered the superfluid properties of helium and in 1941 they advanced the theory of superfluidity. In 1938 they formulated the theory of plasma processes.

Later, during the war, they worked out the phase stability method which lies at the basis of nearly all contemporary elementary particles accelerators.

The USSR also proposed the method of electronic paramagnetic resonance, this effective instrument of solid-state research.

Independently of their foreign colleagues, Soviet scientists advanced the idea of plasma magnetic thermal isolation which constitutes the foundation and, it might be even said, the hope of all projects concerned with controlled thermonuclear fusion.

Soviet physicists discovered, also independently of their American opposite numbers, the possibility to produce electromagnetic oscillations of ultrahigh frequencies, up to light frequencies, with the aid of the hardware now known as masers.

The institutional principles of science formulated in the initial years and decades of our state and the state's unflagging attention to, and support for, science, promoted national scientific pro-

gress, and explain the USSR's ability to cope with such major complex problems of modern science and technology as atomic energy harnessing, space flights, and the development of up-to-date aircraft, communication facilities and computing machinery.

Soviet science progresses both "vertically," i.e., towards raising the general standards of research and developing research facilities, as well as "horizontally," by spreading to vast, once technologically backward areas. Territorial de-concentration of science in this country is connected with the growth of economic areas, both traditional and new ones which develop at priority rates. Besides, the expansion of science's geography is explained by the democratic character of our multinational state which attaches much importance to the development of the productive forces of every republic, the study of its history, economy, language and literature, and the training of its own scientific manpower.

All constituent republics now have their national academies of sciences which investigate a wide range of problems covering everything from relativistic cosmology to plant growing and animal husbandry.

Today over 30 scientists from constituent republics are among the full and corresponding members of the USSR Academy of Sciences. This is indicative of the fast numerical and professional growth of scientific manpower in constituent republics.

The following large science centres were organised in the Russian Federation: the Siberian Department of the USSR Academy of Sciences, the Urals and Far Eastern Science Centres of the USSR Academy of Sciences, the North Caucasian

Higher School Centre and a number of branch offices of the USSR Academy of Sciences. Research carried out in these centres promotes the accelerated technical and economic growth of the Russian Federation's outlying areas.

The numerous fruitful results received by Soviet scientists in different sectors of science in recent years have been highly appraised by the world scientific community.

The last decade has witnessed the tempestuous growth of space research. Soviet science and technology have made a tremendous contribution to cosmonautics. Since the first Soviet Sputnik, the first manned space flights and the first space walk, important landmarks have been passed on the road towards the development of long-life manned orbital stations.

Automatic space probes have been used to advantage for the studies of the Moon since 1959. Following the first probe's soft landing on the Moon and the creation of artificial satellites of that planet, Soviet automatic stations brought samples of lunar rock to the Earth. Valuable scientific information was received with the aid of the self-propelled automatic laboratory *Lunokhod-1.*

Venusian and Martian investigations with the aid of automatic probes can be placed among the outstanding achievements of Soviet science. These investigations have yielded priceless information on the physical and chemical specifics of these planets' surface and atmosphere.

Soviet science has many interesting achievements in astronomy, radio astronomy and astrophysics. Important advances have been made in mathematics and mechanics.

Nuclear physics experimental facilities have been expanded thanks to the construction of

powerful particles accelerators in Serpukhov and Yerevan and colliding-beam accelerators in Novosibirsk. These accelerators have made it possible to collect new facts about elementary particles interrelationships at high energies.

Soviet scholars have made the decisive contribution towards the evolvement of high-temperature plasma heating and confinement methods and the solution of the controlled thermonuclear fusion problem.

Quantum electronics progresses confidently. New types of lasers have been developed and the range of problems tackled with their aid is growing.

Research into high-pressure solid-state physics has helped to formulate methods of synthesising new superhard materials. Methods of growing industrial crystals have been formulated.

Work is in full swing on methods of the direct conversion of thermal and nuclear energy into electricity. Nuclear electricity generation is growing.

In chemistry, along with the elaboration of theoretical problems, large-scale work is underway on the synthesis of more and more complex compounds, specifically hetero-organic compounds.

New Soviet welding methods and metallurgical processes have met with universal recognition.

Important results have been received in the past few years in molecular biology, biochemistry, genetics, microbiology and plant and animal selection.

Geological studies have made it possible to predict and discover a big number of mineral deposits, including gas, oil and diamonds.

Much importance is attached to the social

sciences. The 24th CPSU Congress advanced as a task for the current five-year period to carry out complex studies of the evolution of our society. These studies will constitute the foundation of the science-based direction of the socialist economy and communist construction. Using the latest mathematical methods and computer technology, the economic science promotes national economic progress and the rational utilisation of the economic laws of socialism. Studies in humanities facilitate the further development of the Soviet state, the solution of topical political, social and ideological questions, the ideological moulding and the ethical and aesthetical education of Soviet people, and the growth of culture.

Materials of the 24th CPSU Congress show that the further development of science and the acceleration of the scientific and technical revolution, represent, as before, one of the main directions of the activities of the Party and the Government. The programme for the development of science, elaborated with the direct participation of the USSR Academy of Sciences, emphasises basic studies of the main laws of nature.

International cooperation has always been an effective stimulus for scientific research. The role of international cooperation has been immeasurably enhanced by the current scientific and technical revolution. Scientific discoveries or technological innovations, originating in any area of the planet, soon become the property of the world scientific and technological community and find their way into the science and engineering of different countries.

That is why scientific contacts between all countries, big and small, developed and develop-

ing, are especially important today for the general progress of science and technology.

We now maintain different scientific contacts with nearly all the countries of the world. Every year the USSR Academy of Sciences plays host to 10,000 foreign scholars and sponsors up to 120 scientific gatherings with participation of our colleagues from other countries.

A member of 140 non-government international organisations, the USSR Academy of Sciences takes an active part in international programmes for the study of the world ocean and the environment, Antarctic research, the Hydrological Decade, the international biological programme, etc.

The USSR Academy of Sciences attaches utmost importance to scientific collaboration with academies of sciences in socialist countries. The aim of this collaboration is to promote the solution of major development problems of national science, the development of scientific and technical integration and the industrial growth of the countries concerned.

Our Academy has contacts and ties, in this or other form, nearly with all capitalist and developing countries. The long-term basis for these contacts is provided by agreements which the USSR Academy of Sciences concludes with scientific establishments of other countries, as well as by inter-government agreements.

Cooperative studies of major scientific problems hold an important place in this collaboration.

The USSR Academy of Sciences carries out an extensive programme of international collaboration in the exploration and use of space for peaceful purposes.

Under the Intercosmos Programme, in 1969-72 the Soviet Union launched six artificial satellites

of the Earth and a number of geophysical and meteorological rockets.

In November 1971 in Moscow nine socialist countries signed the agreement on the Intersputnik international organisation and space communications system.

Under the Soviet-French cooperation plan, in 1970 the Soviet Union delivered a French reflector to the Moon for its laser ranging. The interplanetary station *Mars-3* and the satellite *Oreol*, carrying French scientific instrumentation, as well as the French research and technological satellite *SRET* were orbited in 1971-72.

On the international rocket range TERLS (India) Soviet and Indian specialists systematically use rockets for sounding the upper atmosphere.

Cooperation between Soviet nuclear physicists and their foreign counterparts has traditions of long standing. Scientists from socialist countries have been jointly tackling problems of elementary particles and nuclear physics at the Joint Nuclear Research Institute in Dubna for almost 20 years now. Soviet-French scientific cooperation, involving the world's largest proton accelerator in Serpukhov, develops fruitfully.

Soviet-American scientific contacts are growing actively. In 1959 the USSR Academy of Sciences and the US National Academy of Sciences signed the scientific cooperation agreement which provides for the exchange of scientists to become acquainted with research in the host country, the organisation of collaborative research projects, the training of scientists in research establishments of both countries as well as for lecturing. Both countries consented to increase the volume of these activities by 20 per cent in 1972.

In 1961 the USSR Academy of Sciences concluded the agreement with the American Council of Learned Societies on the exchange of specialists in the social sciences and humanities.

The agreement, signed by the USSR Academy of Sciences and the US National Aeronautics and Space Administration, provides the basis for the development of Soviet-American scientific contacts in the study of the near-Earth space, the Moon and other planets, the environment, space meteorology, biology and medicine.

Soviet and American experts discuss technical matters connected with the development of common rendezvous and docking facilities for manned spaceships and stations.

Unquestionably, we have to pay for the impressive achievements of technological progress. Most of the negative spin-off of this progress which, it must be admitted, is frequently due to abuses, cannot but worry people throughout the world. In this respect, the environment causes the greatest concern because the equilibrium of natural processes can be disturbed and natural resources can become depleted as a result.

Does our present-day knowledge permit us to evaluate chances of success for man-nature relationships and establish the main conditions for forestalling the dangers connected with the intensive utilisation of natural wealth?

The answer is clear enough and, in principle, the possibility of a happy civilization-nature coexistence is beyond doubt. Despite the complexity of processes in nature, a sufficiently high level of knowledge and technology can help to make up for the damage caused by man to his environment. A prerequisite of success is the detailed study of the entire complex of interdependent natural pro-

cesses and the main laws governing that equilibrium of animate and inanimate nature which has arisen as a result of tens and hundreds of millions of years of its evolution.

In this connection, basic researchers are confronted with a number of important problems, including:

to quantify biospheric processes;

to study the mechanisms of individual biocenoses, ecosystems and the biosphere in general;

to forecast the renewal of natural resources;

to establish a limit to man's interference with the biosphere, the excession of which would upturn its equilibrium;

to work out recycling technologies which produce no waste and effective waste purification methods.

As the development of natural resources, in particular, to produce energy to rid mankind of arduous physical jobs, cannot but grow, of special importance for the future is not only environmental pollution control, but also the evolvement of integrated production processes making the fullest possible use of raw materials and industrial waste.

Of course, we'll have to reconsider radically production effectiveness criteria. These criteria must take an account of the public spending to repair the damage caused by environmental pollution as well as the harm it does to the physical and mental health of the human race.

For all the importance of the scientifico-technical aspect of the environmental problem, we are firmly convinced that the main condition for a happy man-nature coexistence is the solution of major socio-economic problems and the establishment of a social system under which economic development proceeds in the interests of society as

a whole rather than the egoistic interests of individuals.

Socialism offers every opportunity for a rational and careful attitude to nature.

Important relevant measures, envisaged in our country, such as the government's decisions on pollution control for Lake Baikal and the Ural and Volga basins, exemplify convincingly a plan-based, concrete approach of the socialist state to this problem important for mankind as a whole.

Opening Statement by Dzhermen Gvishiani

The Communist Party and the Soviet Government have invariably paid great attention to the promotion of scientific and technical progress, regarding it as part of a long-term economic strategy. This strategy found expression in highly important policy documents of the CPSU and in practical work undertaken by Party and state organs already in the first years of Soviet power.

Tremendous importance was attached to the development of science by Vladimir Lenin. Analysis of the scientific conception of technology, of its peculiarities, laws of development, motive forces, criteria and social functions occupies a central place in the vast activity of the founder of the Soviet state. Lenin's work in guiding economic development was permeated with orientation on the highest level of science and technology. This produced its beneficial results for the Soviet people and our socialist state. In the first years after the revolution, years of great trials for our country, a number of institutes were set up on Lenin's initiative. Among them were the Leningrad Physico-Technical Institute, the Moscow Institute of Electrical Engineering, the All-Union Heat Engineering Institute, the Central Aero-Hydrodynamic Institute, to mention but a few.

Today the Soviet Union possesses an extensive

network of research establishments staffed with highly competent personnel. The staffs of the research and higher educational institutions include about one million scientific workers and lecturers, among them about 270,000 doctors and masters of sciences.

It should be specially noted that in the Soviet times great headway has been made by science in all the national Union republics. All of them now have their own academies of sciences, universities and research institutes many of which play a vanguard role in a number of scientific and technical fields. In keeping with the Leninist national policy, national cadres of scientists, engineers and technicians have been trained in the Union republics.

As is known, this year our people will celebrate the 50th anniversary of the founding of the Union of Soviet Socialist Republics. The development of science in the Union republics is one of the vivid examples characterizing the colossal importance of the creation of the multinational Soviet state, an embodiment of heretofore unknown relations of unity and friendship of free nations and peoples without distinction of colour of skin or nationality.

Of great importance for our country with its vast territory was the establishment of large scientific centres in its eastern part and in the first place of the Siberian Branch of the USSR Academy of Sciences. The decision to organise this centre was taken in 1957. Since then the Siberian Branch has unfolded its activities on a large scale, advancing to leading positions in a number of branches of mathematics, mechanics, hydrodynamics, nuclear physics and chemistry, in the application of computer technology in economics.

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The Soviet Union's achievements in outer space exploration are convincing evidence of the high level of development of its science.

Outer space research is already beginning to produce practical results. The *Molniya-1* communications satellites and the *Orbita* ground stations ensure radio-telephone communication over very large distances and the reception of telecasts in the remotest parts of the Soviet Union. The weather satellites of the *Meteor* series make it possible to conduct observations of the Earth's cloud cover and to measure a considerable range of atmospheric parameters, helping to improve weather forecasting for the national economy.

World recognition has been won by the work of Soviet mathematicians in the spheres of theory of numbers, functional analysis, mathematical statistics, probability theory, mathematical logic, and a number of other fields.

Great importance is attached to research in the physics of elementary particles and specifically to the extension of the experimental base of this research. The Soviet Union has one of the world's largest circular proton accelerators for energies of 76,000 million electron-volts.

Our country was the first in the world to build an atomic power station and a nuclear-powered ship, the icebreaker *Lenin.* Soviet scientists carry on successful research in the field of controlled thermonuclear fusion.

One of the outstanding achievements of Soviet scientists is the creation of a new branch of science, quantum electronics, where the most important result of their work is the creation of fundamentally new generators of radiation combining high

power with an exceptional coherence of light beams. Quantum generators have found application in physical and astronomical research, in geodesy, medicine and some other fields.

Extensive research is conducted in solid-state physics, the basis for the production of a wide range of synthetic crystals.

Special mention should be made of the manufacture of artificial diamonds and borazon, which is as hard as diamond but can operate at higher temperatures. Artificial crystals are already widely used in mechanical engineering.

Among the most impressive successes of our chemists is the elaboration of scientific foundations and technologies for the large-scale utilisation, in the chemical industry, of oil and natural gas, colossal stocks of which are to be found in the Soviet Union. As we know, chemistry today stands for new high-quality synthetic materials, greater agricultural production, intensification of production processes in many branches of the economy, and an abundance of high-quality consumer goods. Great attention is paid to research and development in the fields of mineral fertilizers, synthetic rubber, plastics, chemical fibre, film, varnishes and paints.

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Under conditions of the socialist system of economy questions of scientific and technical progress in our country are a concern of state policy, and guided development of science and technology is an organic part of the socialist system of directing socio-economic development.

The system of planned development of the national economy presupposes elaboration of long-

term scientific and technical forecasts both for most important fields and for the national economy as a whole. Proceeding from this, our Party and Government adopted a decision on the elaboration of forecasts for a period ending in 1990.

Pursuant to this decision, the State Committee of the USSR Council of Ministers for Science and Technology intends to work out about fifty long-term scientific and technical forecasts as a basis for the choice of the most promising trends of technical progress determining the effectiveness of development of the national economy as a whole.

The main demand made on planning for the country's scientific and technical development is that questions of scientific and technical progress should be coordinated with the social and economic development of socialist society in such a way as to ensure their intrinsic unity.

The economic development of our country, the achievements of science and technology necessitate a search for new ways to the solution of the problems of organisation and management of the economy and hence a modification of the technical basis of management, above all through the application of electronic computers.

The scale on which electronic computers are used in many branches of our economy is growing rapidly.

The main trend in the introduction of computing techniques in the 9th five-year-plan period is continuation of work on the development of automated control systems for enterprises and economic sectors, the automation of production processes, and the creation of an extensive network of computing centres.

The most important part of this work will be

the realisation of measures to set up a state automated system of collection and processing of information for national economic planning and management, to be closely coordinated with development of automated control systems at all levels and with the nation-wide automated system of communications which is now being created. Towards the end of the current five-year period the number of control systems of all types is to be increased approximately sixfold compared to the preceding five-year period. An economy of about 1,900 million roubles is to be obtained from the introduction of computing techniques in 1971-75.

The power industry is one of the most important branches of the national economy. Research and development work in this sphere is conducted on an exceptionally large scale in our country, which by rights occupies the leading position in world technology as regards the development and production of power equipment and the construction of hydraulic power stations. The path travelled by the Soviet hydropower industry is from the Volkhov station, its firstling, with a capacity of 80,000 kilowatts, to the 6,000,000-kw Krasnoyarsk giant, whose 500,000 kw-generators are the most powerful in the world.

The Soviet Union holds a leading place in the comprehensive utilisation of electric and thermal energy. At present about one-third of all our steam turbines are used for the generation of not only electricity but also heat for industry and public utilities. Soviet scientists and designers have proved that combined production of electric and thermal energy in a single process is very profitable economically. The efficiency of the best thermal power stations is known to equal about

40 per cent, whereas the efficiency of the utilisation of fuel at heat and power plants reaches 75-80 per cent.

The Soviet Union's scientific and technical progress has enabled it to advance to a leading place in the world in the transmission of electric energy over large distances. It operates many alternating-current transmission lines for 500,000 volts and a unique 750,000-volt A.C. line between Konakovo and Moscow.

The Soviet Union has no equals in the technology of direct current transmission. In 1963 it commissioned the 800,000-volt direct current Volgograd-Donbas line. We plan to build a 1,500,000-volt line for alternating current and a 1,500,000-volt line for direct current. Such lines will be used to link up the power systems of the central regions, the Urals, Siberia and Kazakhstan.

Considerable headway is slated for atomic power production. It is gratifying to note that the development of Soviet atomic power engineering has reached the level where atomic power stations have become economically profitable for regions remote from mineral fuel resources. This is the result of intensive scientific research and technical improvement of equipment, specifically of the development of reactors with capacities of one million kilowatts and more.

In the period 1971-75 the Soviet atomic power industry will develop at a much faster rate than before. Due to be built in the five years are atomic power stations with an aggregate capacity of 6,000,000 to 8,000,000 kilowatts.

In addition to improving the existing methods of production and transmission of electricity the search will be continued for new methods of directly converting thermal and chemical energy

into electric energy and new methods of transmitting electricity with minimum losses.

Important successes have been achieved in metallurgy. In 1971 the Soviet Union produced 120.5 million tons of steel, advancing to a leading place in the world in this respect. At present our country turns out more steel than Britain, Italy, the FRG and France taken together.

The latest production methods and the most up-to-date home-made equipment will be used in the new metallurgical enterprises that are being built. For instance, construction of a blast-furnace with a volume of 5,000 cubic metres has been started; it will have very high technical and economic characteristics. Labour productivity per worker servicing this blast-furnace will be 22,000 tons of pig iron per year, compared with 15,800 tons now.

The scientific foundations of the electrification of railways, laid on Lenin's initiative in the GOELRO plan for the electrification of Russia, played the decisive part in the technical modernisation of railway transport. Thanks to electric traction organically combined with diesel traction the world's highest indicators of utilisation of railway lines have been achieved. The Soviet Union operates the world's longest electrified railway lines: those between Moscow and Baikal, 5,500 km long, and between Leningrad and Leninakan, which is 3,400 km long. The introduction of electric traction makes it possible not only to raise the fuel utilisation factor but also sharply to reduce the ejection of noxious products of combustion into the atmosphere.

The chemical industry remains a priority branch in the 9th five-year plan period. Allocations for it exceed 17,000 million roubles. Several new large capacities will be put into operation. Capacities

in the production of mineral fertilizers will increase by 34.6 million tons a year, chemical fibre, approximately by 450,000 tons and synthetic resins and plastics, by approximately 1.7 million tons.

Ever wide use is being made of programme-controlled metal-cutting machine tools. In the five years the manufacture of such machine-tools will grow by at least 250 per cent.

Our agriculture will receive new types of machines and implements, efficient earth-movers and land-improving facilities necessary for raising the productive capacity of farmland and ensuring comprehensive mechanisation and automation, especially in animal husbandry and fodder production. Thanks to this labour productivity at collective and state farms will go up by 37-40 per cent and costs will be considerably reduced. More than half of the 455 types of new machines developed for the mechanisation of livestock breeding farms are already manufactured by industry.

One of the central targets of technical progress in the 9th five-year plan period is comprehensive utilisation of raw and other materials and fuel, to be achieved through fuller processing of raw materials and extraction of all useful components from them, effective combustion of fuel and utilisation of its products, and reduction of materials consumption by means of improving designs and manufacturing techniques.

The 24th Congress of the CPSU outlined a colossal programme of further development of economy, science and technology as the basis for raising the material and cultural standards of the people.

With a view to carrying out the main task of the new five-year plan, that of considerably im-

proving the material and cultural standards of the people, provisions have been made for raising the national income by 37-40 per cent, industrial output by 42-46 per cent and average annual agricultural output by 20-22 per cent. Real incomes per head of the population are to go up by almost one-third. The slated increases in production and in the national income are to be achieved primarily through raising labour productivity in all economic spheres. Higher labour productivity is to account for 80-85 per cent of the increment in the national income, for 87 to 90 per cent of that in industrial production, and all the increase in agricultural production. The planned growth of labour productivity will bring about a real economy of the living labour of more than 32 million people.

It should be specially stressed that all the work of carrying out the tasks set by the 24th CPSU Congress is pivoted on scientific and technical progress, on the application of the latest achievements of science and technology in production.

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An important part in accelerating scientific and technical progress in our country, in promoting successful development of industry and agriculture and solving pressing scientific problems on the basis of effective application of the latest achievements of world science and technology is played by scientific and technical contacts and cooperation with foreign countries.

This cooperation is conducted on a particularly large scale with the socialist countries. The principles of fraternal mutual assistance, equality and mutual benefit by which the socialist states

are quided have made possible extensive development of many forms of this cooperation, which has a history of more than two decades.

At the beginning of this year 788 Soviet research institutes, designing offices and industrial enterprises cooperated in the elaboration of nearly 2,000 problems and themes with 852 organisations in Bulgaria, Hungary, the German Democratic Republic, Mongolia, Poland, Romania, Czechoslovakia, Yugoslavia and Cuba.

We are now introducing into production the results of successfully completed work on a number of important problems, such as improvement of the continuous steel pouring method jointly with the GDR, development of navigation stations for river- and sea-going vessels jointly with Poland, improvement of spinning spindles jointly with Hungary, and elaboration of a new method of heat treatment of steel pipes jointly with Czechoslovakia.

Many of the joint projects are basic to the development of interstate cooperation and specialisation in production among socialist countries. For instance, two joint research teams of the GDR and the USSR work on the problem "Development of the Process and Equipment for the Production of Polyester Fibre from Terephthalic Acid". An integrated technical project for the production of pure terephthalic acid and polyester fibre in a continuous process, which reduces the cost of fibre by 10-12 per cent and raises productivity by 25 per cent compared with the currently used method has been worked out.

Working together, Soviet and Czechoslovak organisations have designed a fundamentally new type of spinning frame. Called BD-200, these pneumomechanic spindleless machines double

labour productivity. Their serial production has been started in Czechoslovakia, and several hundred of them have already been delivered, in accordance with an agreement, to the Soviet Union. Under the 9th five-year plan more than 7,000 such machines are to be installed in the Soviet textile industry.

In 1964-70 organisations of the USSR Ministry of Communications and of the Ministry of Metallurgy and Machine-Building of the Hungarian People's Republic jointly designed and organised in Hungary commercial production of equipment for the radio-relay trunk line *Druzhba*, to operate over distances of up to 12,500 kilometres. Each of the six channels of this line can carry simultaneously 1,920 telephone conversations or one programme of black-and-white or colour TV. In 1970-71 Hungary delivered to the USSR, under a contract, 46 stations having *Druzhba* equipment, all of which are already functioning. Joint work is now under way to improve this equipment on the basis of experience in operating it.

An important stage in the development of scientific and technical cooperation was marked by consultations among scientists and specialists of socialist countries on the main trends of scientific and technical research in 1971-75.

Elaboration of about of 2,400 problems and themes was agreed upon in the course of bilateral consultations; 261 problems and themes were included in the plans of scientific and technical research conducted in the current five-year period by member countries of the Council for Mutual Economic Assistance on a multilateral basis.

The Comprehensive Programme for the Further Intensification and Improvement of Collaboration and the Development of Socialist Economic In-

tegration, which was unanimously approved by the 25th session of the CMEA in July 1971, contains a large number of concrete tasks and general problems pertaining to the joint development of a number of economic sectors and lines of production in CMEA countries, which are to be elaborated through cooperation and coordination of research and the establishment of international research teams, laboratories and designing organisations. Among the most important projects are those connected with the protection of the environment, industrial use of atomic energy, and development of computers and their application in the national economy. Agreements determining the order of work have already been signed and joint research work started.

One of the sections of the Comprehensive Programme provides for further development of cooperation in the field of scientific and technical information. This will take the form of cooperation between national information systems and will be conducted with the help of the International Scientific and Technical Information Centre which has functioned in Moscow since 1969.

The CMEA countries have made provisions for extending cooperation in supplying research establishments with apparatus, materials, instruments, etc. An agreement has been signed on the establishment of an international scientific, production and trading association, called *Interatominstrument*, for the joint development and exchange of scientific equipment.

In the course of socialist economic integration, called to life by the objective tasks of economic, scientific and technical progress, ever new possibilities are presenting themselves for utilising

the advantages of the international socialist division of labour, for pooling the efforts of socialist countries.

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The Soviet Union's scientific and technical contacts with capitalist countries are growing from year to year.

In its Directives for the new five-year plan the 24th Congress of the CPSU set this task: "Economically justified commercial, scientific and technical contacts with industrially developed capitalist countries which show willingness to develop cooperation with the Soviet Union in these spheres, shall be extended."

The rapid economic development of our country, its tremendous natural wealth, generally recognised high level of science and education and great scientific and technical potential make the Soviet Union an interesting and promising partner of capitalist countries.

The Soviet Union has maintained active scientific and technical contacts with developed capitalist countries for the past 10-15 years. Initially, these contacts were limited, for the most part, to exchange of information and visits of delegations of scientists and specialists to familiarize themselves with achievements in science and production, the past few years have seen a qualitative change in the character of these contacts: the transition to systematic long-term cooperation on a contractual basis.

As experience shows, scientific and technical contacts with capitalist countries develop more successfully when the economic interests of the countries concerned are taken into consideration.

Hence the tendency towards coordination of cooperation in the scientific, technical and economic fields envisaging, along with exchange of information, joint elaboration of scientific problems and new production processes, joint production and marketing of certain articles, delivery of machines and plant, and exchange, sale and purchase of licences and knowhow.

Intergovernment agreements constitute the basis of the Soviet Union's long-term economic, scientific and technical cooperation with a number of capitalist countries. Such agreements have been concluded with France, Italy, Finland, Austria, Britain, Sweden, Belgium, Denmark and Canada and Norway.

Intergovernment agreements are supplemented and concretised in numerous agreements covering separate branches of science and technology, concluded both between governments and directly between the ministries, departments, organisations and firms concerned. Mention can be made of the agreements on cooperation in the field of colour TV with France, in peaceful utilisation of atomic energy with France, Britain, the United States, Italy, Canada, Denmark, Sweden and Finland, in the field of public health and medicine with France, and in power engineering with Canada.

Ever wider development is to be observed of profound long-term scientific and technical contacts between Soviet industrial ministries and scientific establishments and leading industrial companies and research institutions in capitalist countries.

The extension and development of forms of long-term cooperation is accompanied by the improvement and concretisation of the content of

treaties and agreements with capitalist countries on scientific and technical cooperation. Ever greater attention is paid in them to cooperation in production. Many examples can be cited of different forms of production cooperation with France, Italy, Austria and Finland, which include joint designing and construction of large industrial complexes and separate enterprises as well as modernisation of existing enterprises and shops with the use of foreign credits and equipment.

A good example of fruitful, mutually beneficial cooperation is furnished by the development of scientific, technical and economic contacts between the USSR and France. This cooperation grows from year to year, extending to ever new branches of science and technology important for accelerating scientific and technical progress in both countries. Cases in point are the successful introduction in the USSR and France of colour TV based on the jointly developed SECAM system; cooperation in outer space research, one of the results of which is stable radio and telephone communication between Moscow and Paris via the Soviet *Molniya-1* satellite; the installation of a French laser beam reflector on the moon rover *Lunokhod-1*; joint fundamental research in the field of high-energy physics conducted with the Serpukhov accelerator using the French bubble chamber *Mirabelle*; the joint elaboration of a continuous metallurgical process; the mastering of the production of a number of new chemical substances, and so on.

An important step in the development of mutually beneficial Soviet-French cooperation was made with the conclusion of a number of agreements on the joint establishment of large industrial complexes, specifically the agreement with

the French companies JEXA and ENSA (December 1969) on the delivery of gas scrubbing and drying installations for the Orenburg gas complex, the contract with Cocei (April 1972) on the delivery of three installations for gas scrubbing and the production of elementary sulphur, each with an annual capacity of 5,000 million cu. m, and the General Agreement on the Construction of a USSR-France Gas Pipeline and the delivery by French companies of pipes and other equipment for it.

Talks are now being completed with a number of French firms on their participation in the construction of the Ust-Ilim timber and wood-working complex now being erected in the USSR and specifically of a plant to turn out annually 500,000 tons of bleached sulfate pulp.

During the stay in the Soviet Union of President Pompidou in October 1970 agreement was reached on such important projects of industrial cooperation as the participation of Soviet organisations in the construction of an iron and steel combine in Fos-sur-Mer (France) and of French firms, among them Renault, in the construction of Kama lorry-building plant. In pursuance of this agreement contracts have been concluded on the delivery by the Soviet Union of a blast-furnace evaporative cooling system for the first stage of the Fos-sur-Mer combine and on the elaboration, by Renault, of the project and the delivery of equipment for the assembly and welding of cabins and cargo bodies for the Kama plant.

The extension of scientific, technical and economic contacts provides a powerful impetus to the development of Soviet-French trade. It was laid down, among other things, in the long-term agreement on commercial and economic cooperation for

1970-74 that the sides would strive to double Soviet-French trade in this period.

A milestone in the development of many-sided Soviet-French cooperation was the visit paid to France from October 25 to 30, 1971, on the invitation of President Pompidou, by the General Secretary of the CPSU Central Committee, L. I. Brezhnev.

The Soviet-French Declaration adopted as a result of that visit, and the agreement on the development of economic, technical and production cooperation between the USSR and France, signed in Paris on October 27, 1971, open up new wide prospects for the further deepening of Soviet-French long-term scientific, technical and economic contacts.

The recent years have seen a considerable enlivening of scientific and technical contacts with Italy, Finland, Austria, Japan and other countries.

Many Italian industrial companies with which we maintain mutually beneficial long-term contacts in scientific and technical fields willingly agree to the establishment of production-technical cooperation with the Soviet Union. Of considerable interest for our national economy are the proposals of Italian firms regarding cooperation in the construction in the Soviet Union of plants with annual capacities of 250,000 tons of low-pressure polyethylene and 150,000-200,000 tons of polyacrylonitrile fibre; the equipment will be repaid with the produce of these plants; also considered is the reconstruction of the Moscow and Leningrad synthetic detergents plants with a view to extending the production of washing powder by 100 to 150 per cent without enlarging the production floor space and so on.

In the course of more than fifteen years fruitful

contacts have been maintained with Finland in such branches, already traditional for Soviet-Finnish scientific and technical cooperation, as the pulp-and-paper and wood-working industries, forestry, timber procurement, land improvement, and building. Of great importance for the national economies of both countries is joint research, organised in recent years, aimed at preventing the pollution of the waters of the Gulf of Finland and also in the sphere of processes and equipment for purifying drinking water and sewage.

One more example of fruitful cooperation is the elaboration, jointly with the Belgian company Union Chimique Belge, of highly effective processes for the production of acrylic acid nitrile from propylene and ammonia and of adiponitrile by means of electrolytic hydrodimerization of acrylic acid nitrile. These processes have already been patented in a number of countries, and negotiations are under way with companies in another eleven countries (the United States, Japan, France, Britain, Finland and others) on their purchase of licences for the catalyst for the synthesis of acrylic acid nitrile and for a method of production of adiponitrile.

The improvement that has become apparent in interstate relations with the FRG creates favourable conditions for the development of large-scale scientific, technical and economic contacts with that country. The Joint Commission for Scientific, Technical, Commercial and Economic Cooperation Between the USSR and the FRG is called upon to organise and coordinate scientific, technical and economic contacts in metallurgy, chemistry, mechanical engineering, electrical engineering, radio engineering, instrument building, light industry, and other branches.

The present level of scientific and technical cooperation between the USSR and the USA does not, regrettably, accord with the possibilities and objective interests of the two countries.

The development of scientific and technical contacts between the USSR and the USA is hampered by discriminatory restrictions, practised by the American side, in a number of branches of industry where there exist good prospects for mutually beneficial scientific, technical and economic cooperation.

The 24th CPSU Congress expressed in its documents the Soviet Union's readiness to promote scientific, technical and economic contacts with the USA on the principles of equality and mutual benefit, to an extent more consistent with the economic potentials of the two countries.

The Soviet-American agreements on cooperation in the protection of man's environment, the development of medical science and health services, and the exploration and utilisation of outer space for peaceful purposes, signed at the time of the meeting between the Soviet and US leaders, furnish a reliable legal basis for the development of comprehensive links and contacts between the two countries.

It is now necessary to carry into effect these agreements which will not only be of benefit to the USSR and the USA but will also make an important contribution to the cause of world peace. It is to be hoped that despite the ideological differences between the USSR and the USA and the divergent viewpoints concerning many political problems, these agreements will be successfully implemented on the basis of the principles of peaceful coexistence between states with different socio-economic systems.

The promotion of scientific and technical co-operation with the developing countries, the passing on to them of the rich scientific and technical experience of our country is a reflection of our Party's policy of internationalism, fraternal friendship and disinterested assistance to the peoples that have won political independence and are fighting to achieve independence in the economic, scientific and technical fields.

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Along with the steady development of bilateral scientific and technical contacts, the past few years have witnessed the growing importance of multilateral cooperation conducted within the framework of international organisations both on a governmental and non-governmental basis.

While carrying out their traditional tasks in providing a forum for systematic meetings of scientists and engineers from different countries to exchange experience and achievements, discuss new theories and hypotheses, etc., international organisations occupy themselves more and more with international cooperation in solving big interdisciplinary and global problems which entails the conduct of diverse observations and studies under a single programme, according to a single procedure within time-limits strictly agreed upon.

Taking an active part in 300 international organisations which work in practically all spheres of economics, science and technology, the Soviet Union acts on the principle that their universality and a possibility for all interested countries to participate in them are a necessary condition for the efficiency of these organisations.

The Soviet Union is contributing to the solution

of practically all problems on which the major international scientific and technical organisations are now working.

At present international organisations of the United Nations system are carrying out, jointly with international non-governmental organisations, such important programmes as the study of the global ocean, the International Hydrological Decade, Man and the Biosphere, and others. The Soviet Government allocates considerable material resources and brain power for the realisation of these programmes.

The Soviet Union intends in the future as well to take a most active part in multilateral scientific and technical cooperation within the framework of international organisations.

Questions and Answers

Question (Hungarian Telegraph Agency): Would you please give us some details about the plan for cooperation between the Serpukhov and Batavia research centres?

M. Millionshchikov: I'd sooner reply in essence than in form. The thing is that a high-energy accelerator has been built in Batavia near Chicago, USA. It has not yet been brought up to design parametres. This will make possible a number of exceptionally important experiments on the scattering of high-energy particles in the near future.

This experiment may be of fundamental significance as it may confirm or refute existing theories, in particular those evolved by Soviet scientists.

Soviet physicists have designed and made equipment with the help of which this experiment may be made on the accelerator in Batavia. The equipment has been shipped to Batavia and is being made ready for the joint Soviet-US experiment.

Simultaneously we are making similar opportunities available to American physicists at our functioning accelerator at Serpukhov. I believe this opens fine prospects for cooperation between all scientists working in the field of high-energy physics in all Soviet and US centres.

I was at the accelerator in Stanford where Professor Panofsky is working. They spoke enthusias-

tically there about the cooperation with Soviet scientists in evolving the basic equipment for the large linear accelerator operating at Stanford University.

Question (S. Kozlov, APN): It's common knowledge that Soviet and US scientists are working in the Antarctic. Do they cooperate, and what is the significance of research in the Antarctic?

M. Millionshchikov: I can say this. While in high-energy physics success depends on how well they manage to pool efforts, in Antarctic research it depends on the effort being properly shared.

I am referring to the coordinated distribution of the areas of research, the geographical localities in which the Soviet and American expeditions are working. On the whole, these groups cooperate where they can be of assistance to each other.

As for the significance of research being carried on in the Antarctic, this is not of a merely regional nature limited to the southern regions of the earth. The condition of the enormous mass of ice concentrated in the Antarctic may affect the condition of the rest of the earth's surface, even in the Northern hemisphere.

Even though the air masses in the Northern and Southern hemispheres function independently enough, it is still possible to say that ice conditions in the Antarctic may affect climate in the Northern hemisphere as well.

Question (V. Zhukov, APN correspondent): Would you please say a few words about the role the Pugwash movement is playing in the cooperation between scientists of different countries, and Cyrus Eaton's role in this connection?

M. Millionshchikov: I must say that the Pugwash movement, which was launched as a move-

ment of scientists fighting the nuclear menace and which unites scientists of many countries, has played a great role in building up cooperation between scientists not only in relation to the struggle for lofty ideas but also in relation to the practical arrangement of exchanges between scientists, in particular between Soviet and American scientists.

American science is represented in the Pugwash movement by prominent scientists who not only are in the very vanguard of modern science but who also have great influence on public opinion and carry considerable weight in scientific and political circles.

I must say that when we meet at Pugwash conferences we often have arguments with American scientists because of the clash in our points of view. But then if everybody thought alike, we might not need to meet perhaps.

Anyway, when we have such arguments we know that we are stating our point of view to people capable of understanding another point of view. They may not accept it, yet they are sufficiently qualified to understand a different point of view.

As for Cyrus Eaton, he played an outstanding role in the calling of the first conference. He convened it in his home town, and so they are called "Pugwash" conferences after the township of Pugwash where he was born. He is still firmly convinced that the Soviet Union and the United States should cooperate—that there should be extensive cooperation and extensive economic exchanges, which will ensure understanding between our peoples. He has stated this view in the many conversations we have had, and he expressed the

same point of view in his speeches recently published by the American press.

Question (T. Shabad, *The New York Times* correspondent): One would like to know to what extent the newly inaugurated Joint Commission will make for expanded cooperation as compared with the present-day exchange in the fields of science and technology. Are joint studies of Soviet and US scientists expected or stipulated for in these fields?

D. Gvishiani: To answer the first part of the question, one must have an idea of what the exchanges are like at present.

As was mentioned earlier, exchanges are effected through diverse channels. There is an agreement on exchanges in the field of science, technology, education, culture and other spheres which, as is known, has been renewed for each two succeeding years ever since 1958. The agreement–concluded just now for 1972-73–has a section on science and technology. There is also a section on agriculture. These two sections stipulate twelve delegations for technology and ten exchanges for agriculture. Over recent years the agreements have been only 50 per cent fulfilled on average. We have more private contacts with representatives of US industry, science and technology, outside the framework of this agreement. These take the shape of sightseeing trips. In 1970-71, for instance, about 200 US specialists went to the Soviet Union under the exchange agreements, and nearly 20,000 as tourists, visiting Soviet industrial establishments and ministries on a professional basis.

Obviously practice calls for broader agreements to be concluded, and we have constantly urged the need for measures to make more fre-

quent meetings possible. I feel it would be inexpedient to try to fix all the exchanges in agreements. Therefore we consider it highly important that something should be done to enable certain interested US organisations to come into contact with certain interested Soviet institutions apart from the official list of exchange.

We should like to see direct exchanges between centres concerned. Therefore it is highly significant that both the exchange agreement for 1972-73 and the new agreement on scientific and technical cooperation stated that they were not the only official channels of scientific and technological intercourse, but that there would also be direct contacts between organisations concerned.

All in all, I should say that we must expect a considerable growth of exchanges in the field of science and technology all along the line, both under official agreements and by way of contacts between the institutions concerned.

As for joint research, I can reply that both parties are prepared to cooperate in that respect. Precisely in what fields? That will be determined by the commission which is presently to be formed. But on the strength of the contacts with numerous US companies, it is already possible to say that very many interesting scientific-technological projects are in the offing.

I don't want to dwell on this too long, but if anyone is interested I could name quite a few representatives of US firms, who have visited or are going to visit the Soviet Union, and Soviet experts going to the United States.

Question (Axel Krauze, *Business Week* correspondent): How do you see the role of advanced third-generation computers in the development of your economy? What are the prospects in terms

of orders to be placed with IBM and other major US companies in the next five years?

D. Gvishiani: As far as third-generation computers are concerned, we are developing this computer family jointly with the European socialist countries–members of the Council for Mutual Economic Assistance.

The work is going ahead successfully so that we shall be able to provide to an appreciable extent for the needs of organisations wanting such computers and systems.

Simultaneously intensive work is also in progress on fourth-generation computers. To avoid lingering at the third generation, as some other countries have been able to do, for example, we shall try to advance at a more rapid pace. It is a big task. Among other things, during the current five-year economic period we shall have to introduce six times as many automated systems as during the past five-year period.

Regarding the prospects of commercial ties with IBM and other companies, it is now, of course, hard to say anything definite and concrete since the contacts are just being established. But I can say that we are considering with great interest the offers we have received from US and European computer companies.

A delegation of Soviet specialists in computers is in the United States at present. They have visited IBM, Control Data, CBS, General Motors and many other companies especially to find out what concrete possibilities for cooperation may be expected.

Question (T. Shabad, *The New York Times* correspondent): A US exhibition of computer peripheral equipment is now on in Moscow. Does the

Soviet Union foresee any compatibility between Soviet and American computer peripherals?

D. Gvishiani: As far as the exhibition is concerned, I can say that it has aroused great interest among Soviet specialists. In particular, the midget computers, the so-called mini-computers shown there are of great interest. In general, the question of mini-computers is of great significance and in present-day conditions it may somewhat alter the whole approach with regard to computer systems. As for compatibility, we think that the more compatible all this equipment could be, the better it would be for all nations and each nation in particular.

Unfortunately we do not see such compatibility even in the United States, where each company develops its own computers which are incompatible with those of other companies. When we expand cooperation, for instance, with our French colleagues or with our West German colleagues—the Siemens, let us say—we nevertheless try to ensure computer compatibility, not only between individual models, but also with respect to the best computer achievements encountered anywhere in the world, including in the United States. You can well imagine how difficult it is today both from the technological and economic points of view. Here I must plainly state that until recently the policy pursued by US companies and the administration far from helped the exchange of information in this field, which certainly made it difficult even to pose the question of compatibility. Since the situation has now begun to change perceptibly, it is becoming possible to pose the question of compatibility in a more serious way.

Question (Ole Stonholm, Swedish Radio correspondent): Is the Soviet Government's decision

not to participate in the Environment Conference at Stockholm final?

D. Gvishiani: This question is not a new one, I must say. We are profoundly convinced that questions such as the pollution of the environment are of exceptional importance to the whole of mankind. They cannot be tackled successfully without the participation of all nations concerned. A country such as the German Democratic Republic, which occupies a major place in Europe economically, scientifically and technologically, can make its contribution to the solution of this problem, and it appears to us utterly wrong for political and practical reasons alike to discuss these issues at the Stockholm conference without its participation.

We explained our position in detail, and it is quite plain. Whether or not the Soviet Union will participate in the Stockholm conference, depends on whether the question of the equal participation of all countries is solved. Since, up to the present, there has been no indication of any change, we should rather speak of our non-participation.

Question (M. Davidov, *Daily World* correspondent): A team of US psychiatrists visited the Soviet Union in 1967 and then published a favourable report on that visit. Are there any plans for cooperation between the USSR and USA in this field and what can be said about them?

D. Gvishiani: It seems to me that further exchanges and cooperation in this field largely depend on the intentions of both Soviet and American psychiatrists. In my view, this is a very important question, and a special agreement on medicine will promote exchanges among other things. Problems of psychiatry must be analysed, not only in purely professional terms, but also in

terms of developmental tendencies, especially as regards the production of drugs, a field which is developing quite rapidly.

Many specialists in this field, both Soviet and American, reasonably predict a further growth of research in this field and the appearance of new, still more efficacious drugs. That is why, apart from everything else, this is becoming a matter of great social significance.

In theory, judging from experiments, it is hard to deny that drugs may improve or impair memory and man's other faculties.

Therefore, in this field of research, plainly requiring large-scale experiments and checking, it is, in our view, worthwhile joining the efforts of scientific centres of the United States and the Soviet Union—to make it possible to study the favourable and unfavourable effects.

Question (Z. Romanowski, Polish Interpress Agency correspondent): We would like to know more about Soviet futurology, i.e., about genuine scientific forecasting of the development of Soviet society in the spheres of demography, town-building, transport and environment.

D. Gvishiani: First of all, we do not use the term "futurology". We speak of "forecasting" and "long-term planning", as "futurology" is often identified with rather unscientific discourse on the possibilities of the future.

On the one hand we are studying forecasting techniques. We have some research centres in Moscow, Leningrad, Kiev, etc., which test and refine the existing techniques and apply new forecasting techniques. Although, of course, nearly a hundred such techniques are extant in world literature, they mostly use the extrapolation technique to assess future events.

The other line of research is preparing the forecasts. I have already mentioned that as far as scientific and technological forecasting is concerned this effort is sponsored by the State Committee for Science and Technology jointly with the USSR Academy of Sciences.

This is a voluminous task, implying, among other things, the drafting of a general plan of development of the Soviet Union up to 1990, as was pointed out at the 24th Congress of the Communist Party of the Soviet Union.

Question (R. Daglish, *Anglo-Soviet Journal* correspondent): Could one say that science, despite its major achievements, is still unable to ensure harmony between man and his natural environment?

M. Millionshchikov: That is a highly complicated question. Not so long ago I was interviewed on environmental protection by a correspondent of *The New York Times*. The interview was published and, as far as I know, was taken up by the American press and radio. During the discussion, different parties holding opposite views each quoted me in support of their own point of view.

To make things easier for these different parties I shall say both Yes and No.

I should say Yes because there are some problems concerning the environment for which science has not yet developed any solutions. On the other hand, I should say No as there are numerous other problems that could well be solved if the achievements of science capable of providing methods for environmental protection were applied in practice.

These methods are not often applied because they do not always pay economically. But their economic assessment may be different depending

on the angle from which the problem is approached, for it may be approached from different social positions, if you like.

For instance, if we take the cost of environmental protection measures at a given enterprise, it may turn out that it does not pay, indeed, so far as the individual factory or company is concerned.

On the other hand, should we consider the benefits accruing from such measures and techniques, or from technologies which do not pollute the environment, and should we consider the expenses incurred, not merely by the factory or company applying such techniques, but also what the people living in the neighbourhood have to spend on health service, on medicine, the cost of these protection measures, etc., not only at the enterprise but on the entire adjacent territory, then the assessment of economic expediency will be altogether different.

Therefore it is an extremely complicated problem. It is neither purely technological nor is it purely scientific. It is connected with social problems, and we are sure that given a correct approach it can be solved, yielding very good results.

НАУКА И ПРОГРЕСС ЧЕЛОВЕЧЕСТВА
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Цена 6 коп.