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TRANSLATIONS ON EASTERN EUROPE

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CONTENTS (Continued)

BRIEFS

BLOC SPACE RESEARCH--Czechoslovak, Hungarian, Polish, GDR and Soviet scientists evolved the Uniform Telemetry System. This was first tested on Interkosmos-15 which was launched last year. Whereas primary information could be received mainly by the Soviet Union in the past, the new system permits information to be received directly by the interested countries. This results in a considerable increase in the possibility for experimentation and accelerates the processing of data. As a noteworthy development in space cooperation, the Soviet Union has proposed that citizens of the socialist countries should take part in the space travel of navigable Soviet spaceships and space stations. As a result of talks held last year, it has been decided that between 1978-1983 cosmonauts from all socialist countries taking part in the Interkosmos program will take part in such space trips. This means that within a few years Hungarian and other socialist countries will be able to hear the voice of their compatriots from space. [Budapest HAZAI TUDOSITASOK in Hungarian No 6, 15 Mar 77 p 7]

CSO: 2502

DEVELOPMENT OF COMPUTER TECHNOLOGY, RELATED EXPORT POSSIBILITIES

Budapest SZAMITASTECHNIKA in Hungarian Feb 77 pp 1,4

[Article based on the paper of K. L. Bojanov and H. SZ. Karadzsov]

[Text] In the People's Republic of Bulgaria we regard 1963 as the year when computer technology started growing. This was the year when the Vitosa computer and the Elka benchtop computer were developed at the Institute of Mathematics in Sofia. In 1964, the Soviet Union delivered the First Minsk-2 electronic computer.

The use of a computer is the most effective if the units in one or more automated systems have full program complement and are compatible. The establishment of a system of this kind in one country, however, requires much in terms of resources, both in terms of development and production, as well as maintenance.Recognizing this state of affairs, the socialist countries combined their forces and developed the Unified Computer System (ESZR). In 1969, they established the Intergovernmental Computer Technology Committee, which coordinates on the national-economy level the efforts of the socialist countries toward computer-technology development, production, and applications. Our country specialized on the development of one central unit and 19 peripheral devices from among the many ESZR devices. The ESZ [Unified Computer] 5012 magnetic tape unit is the first ESZR device which has been tested out jointly; its series manufacture started in late 1971. The ESZ-2020 basic processor and the ESZ-1020 (developed from it jointly with the Soviet Union) was the first ESZR device we manufactured. The time since then confirmed the validity of the initial assumptions about the usefulness of cooperation.

In Bulgaria, all activities related to the development, manufacture, export, and service of computer-technological and office equipment is coordinated by the IZOT Economy Association operating under the jurisdiction of the Ministry of Electronics and Electrical Technology. Scientific research and design, as well as manufacturing development is the job of the CNIRD (Scientific Research and Design Center) in the field of computer technology. At the present time, the IZOT is the most dynamically growing economic and industrial association in Bulgaria. Insofar as its production volume and export potential is concerned, it is the largest machine-manufacturing association in the country. The IZOT enterprises are equipped with the most modern technical facilities.

In the People's Republic of Bulgaria, computer technology develops in five basic directions:

1. Electronic computers (central units) and minicomputers.
2. Peripheral devices.
3. Data teleprocessing systems and devices.
4. Electronic calculators.
5. Technological systems and equipment.

Central Units, Control Systems

Within the ESZR, Bulgaria produces the ESZ-1020 devices on the basis of Soviet documentation. The ESZ-1020 is used to solve scientific, technological, and informatic tasks in various design bureaus, research institutions, industrial enterprises, and other establishments. The device is designed in such a manner that it may be easily and quickly connected to other devices. Depending on the needs of the user, it may be made in various configurations. Supplemented with subscriber stations and data transmission facilities, it is also suitable for data teleprocessing.

The ESZ-2020 processor is manufactured since 1972. On the basis of the experiences gained since then, a new, more modern processor was developed in the Soviet Union: the ESZ-2022. This new processor and the ESZ-1022 system (developed from the earlier version) has been manufactured in the Soviet Union since the last quarter of 1975. In Bulgaria, it is manufactured since the second quarter of 1976.

The control units perform the guidance of the high-speed magnetic-tape devices. The Bulgarian-made ESZ-5552 is suitable for the control of the ESZ-5052 replaceable-disk units. This device provides connection between the ESZ-1020 computer and the disk unit channels with the aid of the standard interface. At the same time, is controls eight disk units; it operates on the basis of the microprocessor principle. The ESZ-5552 also performs the data exchange between channel and disk unit; it also checks the information being transmitted. The ESZ-5512 control unit controls the ESZ-5012 magnetic tape device; here, connection with the selector channel can be established only with the aid of the standard interface. Since 1976, we also manufacture a new control device, the ESZ-5561; this is used to control the ESZ-5061 replaceable magnetic disk units. It establishes connection through the standard interface between the ESZ-1022 and the larger ESZ models (2030, 2040) as well as the selector channels of the 20 Mbyte magnetic disk memory. It simultaneously controls up to eight disk units. Twenty-nine Mbyte disk packs may be used for the ESZ-5061 magnetic-disk unit. As a result, the electronic systems will be equipped with twice as fact disk units. With the aid of the single ESZ-5561 device, up to eight (plus one reserve) disk units may be connected to a given selector channel. Up to eight control units may be connected to one selector channel. Together with a suitable number of disk units, the ESZ-5561 device ensures the full software complement (DOS and OS) of the systems.

We developed for the Minsk-32 computer, and manufacture since May 1976, the IZOT 5501E magnetic-disk control unit. It serves for the connection of the ESZ-5052 magnetic-disk memory unit and the Minsk-32 computer. This device significantly expands the application range of the Minsk-32, since the external memories have direct access, are capable of storing large amounts of information, and operate at high speed. We developed software for the use of the IZOT 5501 device in the Minsk-32 configuration. With the aid of this software, we use the magnetic-disk unit as an external memory.

Manufacture of minicomputers is related to the first main development direction. In the People's Republic of Bulgaria we developed the IZOT 310 universal minicomputer, which may be used for scientific and technical computations, automation of production processes, real-time control of manufacturing processes, primary processing of economic information, telecontrol, and data teleprocessing. This computer may also be used as a satellite computer for complex systems. The IZOT 310 has a large instruction complement; it is equipped with a high-speed operative memory and an elastic input-output system; thus, it is an efficient device. Magnetic-tape and -disk units, punched card and perforated tape devices, printers, analog converters, displays, and plotters may be connected to it. The modular design of the device permits us to expand the configurations with simple supplemental blocks. The 4K memory consisting of 12-bit words has a cycle time of two; it may be expanded by 4K blocks to a total of 128K. The high-level software for the IZOT 310 facilitates the operation of the system and permits its joint operation with higher-level equipment.

Development of the new ESZ-2035 central unit is underway. This processor, as well as the ESZ 1035 system based on it, was developed jointly with Soviet institutions. Compared to the earlier ESZ-1022 system, this second-generation ESZR device has much wider use area. With the aid of a microprogrammed emulator it is compatible with the Minsk-32. The ESZ-1035 is compatible with all models of the first ESZR series. Its manufacture will begin in late 1977.

We also plan to manufacture a control unit for new type magnetic tape devices. This unit has a 5 m/sec tape speed; it has a double recording speed: 64 bits/mm. The recording is based on phase modulation, and the recording of the reels is automatic.

Peripheral Devices

The second main direction of computer-technology development in the People's Republic of Bulgaria is the development of various peripheral systems. Our country specializes on the following external memories: magnetic disks and tapes, disk packs, and so forth. The ESZ-5012 magnetic tape recorder contains twice 10^8 bit information; its transmission speed is up to 64 Kbytes per second. Disk packs may be used for the ESZ-5052 magnetic-disk memories; the packs are replaceable. Direct access is provided to the information; it may be used for retrieval, recording, and display. The capacity of the memory is 7.25 Mbytes; the average access time is 60 msec. Information transmission speed is 156 Kbytes/sec. The ESZ-5061 magnetic-disk memory has 11 replaceable disk packs, and the information has direct access. Retrieval, recording, and playback may be performed by the ESZ-5061. The total capacity of the memory is 29 Mbytes; average access time is 50 msec. The speed of information transmission is 312 Kbytes/sec. The ESZ-5052 and 5061 devices use the ESZ-5053 and 5061 disk packs. The ESZ-5053 disk pack consists of six disks; the top and bottom surfaces are not utilized. Maximum information storage capacity is 7.25 Mbytes, at a recording density of 45 bits/mm. Up to 29 Mbytes of information may be placed on the ESZ-5261 disk pack; it consists of 11 disks, with a total of 20 working surfaces. We also pay much attention to the development of external memories for minicomputers. In view of the increasing demand, we started the development of minitapes and minidisks. In our country at the present time, we manufacture three different types of magnetic tape device: the IZOT 5003, in which the tape speed is 0.32 m/sec and the information transmission speed is 12 KHz; the IZOT 5005, in which the tape speed is 0.5 m/sec and the information transmission speed is 16 KHz, and the IZOT 5006, in which the tape speed is 1.0 m/sec and the information transmission speed is 36 KHz. In addition to the foregoing, we also develop two types of minitape; in one, the tape speed is 0.25 m/sec, in the other, 2.0 m/sec. These are designed to have phase-coding capability without the need for returning to 0.

The IZOT minidisks, presently being already manufactured, have the following features: 60 Mbyte memory capacity; 4 disk surfaces, 2.5 MHz transmission speed, 51 msec, recording density of 2200 bpi. We are also developing two minidisks: they have memory capacities of 3 and 12 Mbytes, respectively. All these minidisks listed above have replaceable magnetic disk packs (ESZ 5269 types). They are manufactured in the People's Republic of Bulgaria since 1975. Series manufacture of the flexible disks with capacity of 3.2×10^6 bits has started in the third quarter of 1976. Soon they will be widely used for technological process control in the MSZR [Minicomputer System] and in large computer-technology systems. The reading speed of the punched-card reader developed in the People's Republic of Bulgaria is 318 cards/min; it is capable of stacking 600 cards. Its series manufacture has started in the first quarter of 1976.

Entry of the information into the computer becomes more and more important. This is why we developed on the basis of the tape memory and already manufacture the ESZ-9002 data-entry device. It permits the data on the basic vouchers to be recorded directly onto 12.7 mm magnetic tape. This device may also be used for data recording, data checking, and retrieval of recorded data. The ESZ-9002 system may also operate independently.

Data Teleprocessing

The data teleprocessing systems are directly related to the electronic computers. With the necessary expansion of the software and the ESZ-1020 configuration, we may set up data teleprocessing systems capable of performing a variety of tasks, consisting of the following units: ESZ-8401 multiplexor, modems, signal converters; ESZ-8501 and ESZ-8570 terminals; ESZ-8062 automatic calling devices; ESZ-8027 d.c. signal converters and telegraph signal converters.

The following are the basic parameters of these devices. The multiplexor controls the multiplexor channel of the ESZ-1020 to the message transmission lines. It operates in the start-stop mode. Information transmission speed is 50, 75, 100, 200, 600, and 1200 Baud. In the case of 1200 Baud, the number of channels capable of being controlled is up to 32; at 200 Baud, up to 64. In addition, the multiplexor permits information transmission without computer between the terminals connected to the various channels. It is also possible to connect the ESZ-8401 to two multiplexor channels. The multiplexor channel permits automatic selection in leased lines. The modem and signal conversion family includes the ESZ-8001, ESZ-8002, ESZ-8005, and ESZ-8027 teletype signal conversion device. In the near future, we will use newly developed versions, programmable terminals, video terminals, and the like.

Calculators, Printers

Another major direction of computer-technology development is the design and production of electronic calculators. Among the socialist countries, the People's Republic of Bulgaria was the first to produce and export such devices. Among the existing electronic calculators the most interesting one is the ELKA 77 TL recording cash register. It may be operated alone or in conjunction with the IZOT 310 computer. The device may be used in department stores instead of the presently used electromechanical cash registers. Utilizing the potentialities offered by the minicomputer, we may use the system for merchandise flow monitoring and analysis and for stock control purposes. We can also use it to calculate the profits. The Elka 45 electronic calculator is made with highly integrated MOS circuits. It is a highly reliable device, and its use areas are expanded by its word length, auxiliary registers, and automatic operating mode. The Elka 40 devices are also widely used; they have numerical display. They are used primarily for the processing of economic information. The Elka 101, the Elka 130, and the Elka 135 mincomputer family is of particular interest. The members of this family are highly suited for performing a variety of arithmetic operations and data recording. They are designed for individual use, and are built with highly integrated circuits. The Elka 103 is intended primarily for economic calculations; the Elka 130 and 135 are intended for scientific and engineering calculations. The Elka 99 calculator is highly versatile. Its special function is the automation of the calculations of scientific research institutes, laboratories, and design establishments. It is built with MOS circuits and features the typical properties of computers: it is programmable, it performs the full variety of arithmetic and logical operations, it displays the numbers, it is simple to operate, and has stacked memory organization.

For the documentation of information, printing devices have also been developed in the People's Republic of Bulgaria. The IZOT 132D alphanumeric line printer is built with MOS circuits; it has its independent control and has a printing speed of 32 milliseconds. It is used in the MSZR systems. It was on its basis that we developed the data input/output devices used in the minicomputers. The Miniprint 77 electronic cash registers, recording cash registers, and other automatic recording devices may be connected to it. The Miniprint 45 parallel printer is primarily used as the output unit of calculators.

Technological Systems

Technological systems are also manufactured in Bulgaria to ensure smooth production. For example, on the basis of an original invention we started the manufacture of the ESZ-A507 control disk pack, which is found to be more sensitive that the products of some Western manufacturers. The system was developed on the basis of the minicomputer, interface-adapter, and the ESZ-5552 control device. The following are its uses: testing of magnetic-disk devices and magnetic disk packs under industrial conditions. With the aid of the ESZ-5552 control system we may check all real-time operating modes of the magnetic disk unit or the magnetic disk packs. Control of the device is accomplished by a minicomputer, connected through an interface-adapter. The interface-adapter operates in the minicomputer together with the service program monitor; thus, the entire instruction complement of the ESZ-5552 may be utilized. The program monitor and the interface program monitor permits the connection of any device equipped with standard ESZR interface. This makes the device universal and capable of testing any peripheral unit in the ESZR system. For the hardware described we have appropriate software, incorporating two test-program components for the magnetic-tape and the magnetic-disk packs. In addition, we have domestically developed an operational system consisting of control and service programs. The entire software is located on the resident disk unit. There may be up to seven simultaneously checked magnetic-disk packs and units; the eighth is used as the resident. The Szank 0310 system is the automating device of one of the most highly labor-intensive operations in the manufacture of the numerical devices of connecting systems. With the aid of the system, the manual winding between connectors is automated. This improves the quality of the assembly, its speed, and its reliability. The system consists of the IZOT 310 minicomputer, the C 103 group controller, the winding semiautomaton, the ER 40 perforated-tape reader, and the ASP 33 teletype device.

Computer Technology Export

Between 1971 and 1975, the computer technology trade of the People's Republic of Bulgaria amounted to 907 million rubles in the socialist market. We illustrate the growth of computer technology trade on a year-by-year basis with the following data:

Year (growth in percent): 1971 (100); 1972 (206); 1973 (430); 1974 (537); 1975 (588).

These data show clearly the computer technological growth and the export expansion of our country. Bulgaria realized 22.4 percent of the computer technology trade volume of the socialist countries in the 1971-1975 period. Thus, it was second behind the Soviet Union in this respect. We shipped most of our computer technology equipment export to the Soviet Union, the German Democratic Republic, Poland, and Czechoslovakia. Predominant among the computer technology export products of the People's Republic of Bulgaria are external memories. They represent 64 percent of the total volume of the shipments. Next are the computers, representing 14 percent. During the period of the Sixth Five-Year Plan (1971-1975), the export growth was as indicated below:

Year (growth in percent): 1971 (100); 1972 (263); 1973 (650); 1974 (861); 1975 (1033).

These data indicate that we have fulfilled the task outlined by the Communist Party of Bulgaria at its Tenth Party Congress, namely to increase the computer technology export volume tenfold.

In order to expand the export volume and to ensure that the national economy is supplied with modern computer technology equipment, the IZOTIMPEX state foreign-trade enterprise was established nine years ago. This enterprise performs the export and import of computers, peripheral units for them, and data-recording equipment. It cooperates closely with the enterprises of the IZOT, and assists the buyers in installation of the equipment, in servicing, and in the training of foreign experts. In addition to computer technology equipment, the IZOTIMPEX also exports electrical engineering products such as integrated circuits, semiconductor devices, resistors, ferrite capacitors, and so forth.

Compared to the achievements of the last five-year plan, the export of computer technology products will double in the 1976-1980 period. External memories will remain in the forefront (about 67 percent), and computers will remain second (14 percent). During the Seventh Five-Year Plan, we will start the series manufacture of larger capacity and higher speed external memories of new design. In 1974 there was a resolution for the introduction of the Minicomputer System. Thus, soon we will start manufacturing devices in this series. Our country intends to continue to participate actively in the cooperative scheme among the countries participating in the ESZR project.

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CSO: 2502

BULGARIA

POLITBURO DECISION TO DEVELOP BIOLOGICAL SCIENCE DISCUSSED

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 pp 5-18

[Article by Academician Khristo Daskalov: "Decision of the BCP Central Committee Politburo on the Condition of the Biological Sciences and on their Accelerated Development"]

[Text] On 3 August 1976 the BCP Central Committee Politburo passed its special decision number 315 "Condition and Development of the Biological Sciences in Our Country and Their Accelerated Development." This decision vividly proves, yet once again, the great concern displayed by the party for the development of our science, and the party's ability to see promptly the ripe problems and to earmark measures for their proper and timely solution.

The Politburo decision was the basis for extensive data on the biological sciences prepared by the management of the BAN [Bulgarian Academy of Sciences] and the Joint Biology Center. In the course of over two years the managements of the BAN and the Joint Center implementated a number of measures aimed at discussing the condition of our science of biology. This matter was considered at a session of the BAN general assembly and by the BAN Presidium. A special Bulgarian delegation was sent to the Soviet Union to study Soviet biology. A Soviet delegation consisting of noted academicians-biologists visited our country. Its members studied in detail our biological institutes and issued valuable recommendations. The drafted decision on the biological sciences was also coordinated with senior scientists from the Soviet Academy of Sciences, the Science Department of the CPSU Central Committee, and the Bulgarian Academy of Sciences. All these materials were the basis for the Politburo decision.

Proceeding from the view that the biological sciences are of exceptional importance to the development of the socialist society and that very realistic possibilities are developing enabling us in the immediate future to influence purposefully the vital processes in the animal and vegetal worlds, which will be of tremendous importance to extending the creative period of man and upgrading animal and plant productivity, and, on the other hand, that, in general, our biological science is lagging compared with world achievements, particularly in some important modern trends, the Central Committee Politburo issued a special document which considers in an overall, profound, analytical, and concrete way the condition of our biology. Actually, the decision is an expanded program earmarking measures for rapidly surmounting such a lagging and creating an upturn in the development of our biological science.

What are the main aspects of the Politburo decision?

The decision indicates, above all, the most important scientific problems and directions in which our biological units must focus their efforts now and in the immediate future.

The need to surmount the lagging in the field of molecular biology was emphasized. Studies must be developed on the biophysics of membranes and bioenergetics, and on the development of biophysical equipment and the cybernetization of biological research. Basic directions of theoretical genetics must be developed in order to determine evermore completely the possibilities for controlling heredity mechanisms in order to create in animals, plants, and microorganisms valuable economic qualities and utilize genetic laws in the struggle for the protection of human and animal health. In the field of microbiology basic and applied research must be developed in connection with the use of microorganisms in protein biosynthesis in agriculture and industry. Cellular ultrastructure and functions must be studied; the intimate mechanisms of division, differentiation, immunogenesis and malignant growths and viral carcinogenesis must be studied. The studies in plant, animal, and human physiology must be focused on the main problems of the physiological mechanisms of regulation, self-regulation, and the purposeful guidance of vital processes in the organisms.

Attention has been paid to problems of the rational utilization, restoration, and improvement of biological resources, and the protection of Bulgarian nature and its biological balance, which are of exceptional importance to the country. We must energize our studies of the structure and dissemination of Bulgarian flora and fauna, of quantitative dynamics and qualitative changes in populations and biocoenoses, forest biology, development and productivity of land and water ecological systems, and biological plant protection.

It has been emphasized that priority should be given to biological problems which are now in a leading position in the biological sciences, and that planning and management of scientific research should be directed toward preliminarily forecast results needed by the national economy. It was emphasized that the BAN and Sofia University must develop the general biological sciences but closely linked with practical work, and that the general biological and strategic significance of such sciences demands that they outstrip the development of biological production and have an active impact on sectorial biological sciences. The need was emphasized for maximal purposefulness of basic research in the biological sciences.

This aspect in the Politburo decision is of particular importance to the proper orientation and guidance of the problems related to our general biological sciences.

As we know, the general biological sciences constitute the theoretical foundation on which agrobiological, medical-biological, and technical-biological sciences are based. Without a properly guided set of topics in the general biological sciences and without closely linking them with sectorial biological sciences we cannot link basic with applied research and with practical work. Without such a direction or linkage among the biological sciences basic research remains seperated from practical requirements.

As we know, any real theory should, in the final account, lead to practical use, theoretical or practical. However, whenever theoretical research is aimed at a target set in advance, remaining basic in its essence, such research brings about the faster and more successful solution of an applied problem.

It seems to me that the problems facing most biological units of the BAN should be directed at the present, to a greater extent, to resolving precisely the basic problems which contribute to the solution of applied problems benefiting practical work or, as the decision stipulates, that they must outstrip the development of biological production and actively influence sectorial biological sciences.

Let us take botany as an example. Today the main trend of research is the systematization and taxonomy of our flora. This is useful and necessary and substantial results have been achieved in this respect. It seems to me, however, that in the spirit of the Politburo decisions the efforts should now be directed to a greater extent toward the detailed study and rational utilization of economically useful vegetal resources and the all-round study not only from the morphologically descriptive viewpoint but from the genetic viewpoint as well--the creation of a genetic stock, and physiological, ecological, phylogenic, and other studies which, in the final account, will lead to their practical utilization. The purposeful overall botanical study of useful wild and cultured forms may be of tremendous importance to our plant-growing and selection work. Knowledge of useful wild and cultured flora through genetic, physiological, biochemical, phylogenic and ecological studies will offer us rich and valuable data for direct practical utilization, on the one hand, and the creation of new and valuable strains of cultured crops by selection institutes, on the other. Botanical research of vegetal resources in our country must deliberately lead to their practical utilization. Such botanical research should be related to a greater extent with the studies conducted by our genetic, selection, and plant-growing institutes on the basis of joint developments for the solution of the main problem: upgrading the productivity and quality of cultured plants and utilizing useful wild flora.

Let us consider zoology. The study of our fauna and the determination of animal forms found in Bulgaria and their description is of unquestionable importance. In this respect our zoological science has scored great successes. It seems to me, however, that now, in the spirit of the decision, the problems worked upon by the Zoology Institute should also be directed to a greater extent toward certain theoretical problems which would contribute to the solution of important national economic problems. By this I mean, for example, the biological struggle against the enemies of cultured plants. We are familiar with the tremendous damage caused by the various pests in terms of lowering crop yields. We are also familiar with the real danger to man stemming from the use of various insecticides and pesticides used in the struggle against plant enemies. Hence the tremendous national economic significance of the biological struggle against the enemies of cultivated plants. However, the solution of the problem of waging a successful biological struggle against crop enemies presumes the preliminary clarification of a number of theoretical problems pertaining to the complex interrelationships between crop enemies and their parasites, between environmental conditions and parasites, and so on. These are, above all, zoological problems.

The clarification of such problems presumes theoretical research and clarification of complex basic problems of zoology. This calls for the clear interaction between theoretical studies to be carried out by the BAN Zoology Institute and applied research carried out by departmental institutes. Their interaction alone could enable us to resolve the major problem of successful biological struggle against the enemies of cultivated plants.

The tremendous concentration of animal husbandry in our socialist agriculture now raises certain new problems related to caring for livestock under extreme conditions such as immobilizing, putting a large number of animals in the same area, and so on, and, as a result of this, the appearance of a number of adverse phenomena in industrial animal husbandry. In this connection a number of new problems arise to be resolved on a high theoretical level, as well as physiological, neuro-mental, and other changes triggered by the extreme conditions in which such animals are placed. Such studies are of basic and applied nature and relate to zoology as well. These problems could be studied by zoology in close interaction with the respective departmental animal husbandry institutes.

Or else let us consider studies in the field of plant physiology. Generally speaking, the problems discussed so far have been suitable and the results already obtained have been significant. However, in the spirit of the decision these problems should now focus even further on the solution of problems which, in the final account, will enable us to implement important production tasks. By this I have in mind an important national economic problem such as that of programing crops. Crop programing could be successful only on the basis of extensive theoretical studies in the fields of plant nutrition physiology, the regimen of plant water physiology, optimizing photosynthesis, and so on. Actually, crop programing means optimizing the vegetation factors which determine yields on the basis of parameters established as a result of extensive physiological research. Therefore, when we speak of plant nutrition physiology, water system physiology, optimizing photosynthesis, and so on, we must always be aware of the final objectives of such studies, i.e., the preliminary forecasting of results, and their purposeful utilization in increasing crop yields and quality. It is precisely in the case of such a major national economic problem--crop programing--for which purpose the Ministry of Agriculture and Food Industry set up a special big laboratory aimed at avoiding unnecessary duplication--that we should apply a comprehensive target program. The BAN Institute of Plant Physiology should assume the bulk of the necessary basic research. On the basis of basic physiological research it should develop the parameters required for crop programing.

The situation with genetics is similar. The Institute of Plant Genetics and Selection is working on important problems of general genetics. Here again, however, elaborating such problems, we must always bear in mind the final purpose of such studies, i.e., their application. Such is the case in studies of experimental mutagenesis, cytology, remote hybridization, immunogenetics, population genetics, heterosis, and so on.

Plant genetics is the theoretical base for crop selection. It should be elaborated and provide the type of theoretical concepts and methods used by practical selection, leading to the fastest and best selection results. Here again, in plant genetics, theoretical studies must be directed at specific purposes and such studies must be linked with applied research leading to the end results--the development of valuable strains and forms benefiting the national economy.

The situation of animal and medical genetics is similar.

Most generally speaking, we could say that only when the set of problems studied in the field of general biology acquires a definite clear purpose aimed at the solution of basic problems which contribute, directly or indirectly, to the solution of specific applied problems of important national economic significance would the general biological sciences actively influence sectorial biological sciences; only then could we implement the basic research- applied research-application cycle and implement the Politburo decision that the general biological sciences must outstrip the development of biological output.

The Politburo decision emphasizes the organization, planning, and management of scientific research based on the systematic application of the program-target approach.

It is recommended to the Committee for Science, Technical Progress, and Higher Education, the Bulgarian Academy of Sciences, and the interested departments to develop jointly comprehensive-target programs for scientific research, applied science, and implementation activities covering biological problems of particularly important scientific and national economic significance.

The new feature here is that extensive rights are being granted the heads of programs and the head institutes in organizing, coordinating, financing, and reporting comprehensive scientific research. The comprehensive programs operate under single management and on the basis of single financing. This is the most essential prerequisite for the effective management of target programs and for their successful implementation. Basic research could be properly linked with applied research prior to practical application by formulating comprehensive target programs under single management and with single source financing.

On the basis of such comprehensive programs the general biology institutes of the BAN will engage in the type of purposeful basic research without which problems cannot be resolved, and which will assist applied research conducted by departmental biological units until the final objective set in the program has been implemented. Today the practical situation is such that the departmental institutes themselves undertake to carry out the basic research they need, thus duplicating the BAN institutes, while lacking the necessary base and trained cadres for the purpose.

For example, comprehensive target programs could be elaborated on the following problems: biological struggle against enemies of cultivated plants; crop programing; study and utilization of vegetal resources; study the condition of animals living under extreme conditions as a result of animal husbandry concentration, and so on.

The Central Committee Politburo decision emphasizes that the development of biological sciences in our country could be based on the closest possible integration with Soviet biology. The Soviet biology institutes have established a solid material base. They have highly skilled cadres and their work is on the level of the highest world standards. We must acknowledge that so far integration between Bulgarian and Soviet biology has not been sufficient, particularly as regards the highest and most effective form of integration: the establishment of joint collectives and the elaboration of joint programs for working jointly on problems and topics. The initial steps only have been taken in this direction. The establishment of such cooperation presumes a considerable intensification of contacts between our biological units and cadres and Soviet biological institutes and scientists. Only when such close contacts have been established, and when scientists from the two countries become acquainted with one another and familiar with their work would it be possible to set up joint collectives and engage in joint research. The Central Committee Politburo decision of creating conditions for the establishment of closer contacts and of such conditions should be utilized maximally.

The Politburo decision emphasizes the exceptional importance of rapidly surmounting the lagging in the field of training highly skilled scientific cadres. Particular attention has been paid to this important problem. The Committee for Science, Technical Progress, and Higher Education, the BAN, and Sofia University have been asked to formulate a long-term program for the development of a cadre scientific potential in biology. The possibilities which Soviet biology offers in this direction have been specifically indicated. In this connection let us stress a circumstance which is exceptionally favorable to us: the readiness of the leadership of the Soviet Academy and of Soviet biological institutes to accept a large number of Bulgarian young and promising scientific workers to do extensive work as trainees. This will enable us to resolve rapidly the problem of upgrading cadre skills particularly in some strategic biological directions such as, for example, molecular biology, molecular genetics, biophysics, physiology, and others. The program of assigning cadres to the Soviet Union should take into consideration modern biology scientific centers such as the Biology Center in Pushchino, the Novosibirsk branch of the Soviet Academy, the institutes of molecular biology in Moscow, of general genetics, of development biology, of plant physiology, and others. We should also have in mind some republic academies which offer excellent conditions for the specialization of our specialists such as, for example, the Ukrainian Academy, Belorussian Academy, Moldavian Academy, and others.

The BAN has been entrusted with the elaboration of a special program for the training of highly qualified cadres in the USSR in the most important scientific directions and problems, paying attention mostly on methods which enable scientific associates to be assigned to work groups in Soviet scientific institutes over lengthly periods of time of one or more years.

In order to staff the most important yet lagging scientific units in the areas of promising biological directions the Politburo decision calls for opening in the Biological Center, for specific purposes, 20 regular scientific positions per year for the five-year plan. The decision directs the attention to enhancing the level of work of biology departments in higher educational institutions, Sofia University in particular. The curricula and programs for biological subjects must be made consistent with the contemporary level of biological sciences, using evermore extensively mathematical, physical, and chemical methods in the scientific interpretation of biological phenomena.

The decision emphasizes the great lagging of material facilities in our biological institutes and departments. It earmarks specific measures for its rapid elimination. Particularly tangible and valuable is the decision according to which the BAN will be granted one million leva for meeting the most urgent needs of the biological units for equipment, materials, and installations purchased from the capitalist countries, and 1.5 million leva for same purchases from the socialist countries. It is exceptionally important now for such funds to be used most expediently. The management of the Joint Center for Biology and Medical-Biological Problems should make a detailed study of the condition of the material facilities in each unit, establish factual needs, and formulate a program for the most thrifty and sensible utilization of the funds granted.

It is particularly important to establish a base for the joint use of one-of-a-kind equipment and the creation of a servicing base for the maintenance and repair of eqiupment. This task must be immediately undertaken by the Biology Center using part of the funds granted.

The Politburo decision is of great importance in terms of enabling the BAN to use the official position openings based on sectorial personnel table number 1 of the Ministry of Public Health, number 20 of the Ministry of Machine Building and Metallurgy, and number 38 of the Ministry of Agriculture and Food Industry. This means that it will be possible to pay better scientific and technical cadres. This will enable us to select for our units highly skilled auxiliary technical cadres. This is of exceptional importance to improving the quality of experimental work.

The decision emphasizes the exceptionally important role which the party organizations must play in raising the level of the biological sciences. They must mobilize the collectives and engage in a tireless struggle for a real change in biology. The party organizations must keep track of the tasks related to the reconstruction on the biological front and, particularly, on upgrading the qualitative composition of cadres and implementing the target and comprehensive scientific research programs. The BCP Central Committee Politburo decision on the condition of the biological sciences and their accelerated development offers all the necessary prerequisites for rapidly enhancing them and placing them on the type of scientific level which would enable us to obtain far greater valuable theoretical and applied results. The decision offers conditions for a real upturn in Bulgarian biology.

The leadership of the BAN and the party leadership have formulated a detailed plan-program for measures which would result in the implementation of the Politburo decision.

Unquestionably, our biologists will rate highly the great attention and aid of the Central Committee Politburo given our science of biology. They will mobilize all their efforts and will implement the decision enthusiastically and with adamant work, making a change in this very important scientific area. Through their results they will make their contribution to the building of a developed socialist society in our country.

Statements

Corresponding Member Atanas Maleev:

The August Politburo decision on the condition of our biological sciences is considered by us as being entirely timely. We consider that the measures it earmarks meet an objective necessity: accelerating the development of the biological sciences.

Expressing our agreement with and total support of this document, and bearing in mind the immediate and long-term prospects and needs of the biological and medical sciences, we shall express some of our considerations and suggestions concerning the development of the medical sciences as well.

The Politburo decision on the development of the biological sciences notes on several occasions the fact that the biological sciences are of importance also to the development of the medical sciences, to extending the human life span, upgrading human effectiveness, and so on. Yet, there are no suggestions whatever on the development of the biological sciences in the field of medicine, in health protection. The necessary measures for the development of the science of medicine have not been earmarked. Yet, we know that medical successes and achievements closely interact with the biological sciences. Basically, most of the medical sciences are essentially biological sciences. It is no accident that a unified medical-biological scientific front exists.

The main directions adopted at the 25th CPSU Congress and the 11th BCP Congress stipulate intensified research on determining the mechanisms of vital processes. This is of major importance to industry, agriculture, health protection, and veterinary medicine. The main directions indicate as a fully substantiated task that of intensifying research in the fields of molecular biology, and the physiological and biochemical foundations of the activities of the human organism with a view to accelerating the solution of the most important medical-biological problems of the struggle against cardiovascular, oncological, viral, and professional diseases, diseases of the nervous system, and others.

The science of medicine studies and elaborates social and biological problems related to human health. It is engaged in basic and applied research in the various fields of theoretical, clinical, and prophylactic medicine. It promotes progress and the effectiveness of health protection. It is clear today that medical successes in the struggle against cancer and cardiovascular, viral, and other diseases would be inconceivable without basic medical and biological research. That is why basic and applied research is being done covering a broad range of medical and biological problems by the Medical-Biological Institute and all other institutes and university departments. The results of these studies represent the scientific foundations for the clinical and prophylactic branches of medicine.

I shall give as an example the question of organ transplants. Our country is lagging considerably in the field of kidney transplants compared with all our Balkan neighbors. The expediency of heart transplants is arguable. However, we are lagging in this area mainly as a result of a lagging in the fields of biology, immunology, and so on, and have undertaken the solution of this problem within the shortest possible time. This shall be accomplished.

Unquestionably, however, in this respect in the field of medicine we must have the understanding of the leading authorities in our country, the Central Committee, and the Science and Education Department represented here. We are doing a great deal of work in the field of biology and its reflection in medicine. Our medical-biological institutes have developed conditions which are more favorable than those of the Medical Institute. At the same time, however, allow me to emphasize that we are lagging in a number of problem areas in biology.

By virtue of a certain tradition both in our country and abroad medical training has been kept on the same level over a number of years. Undertaking the training of medical students, future physicians, we should pay greater attention to their training in biology, beginning with high school. Subsequently, this knowledge is to be used at the Medical Institute.

We are maintaining close ties and contacts with the Soviet colleagues. Close business relations exist between our Medical Academy and the Soviet Medical Academy. At the same time, however, we feel that we are lagging precisely in the field of basic sciences, such as biology, for whose development we must take measures. The Soviet Union has its Medical-Biological Institute whose task is to contribute to the development of medical-molecular biology. Obviously, our science must engage in a broad exchange of experience in this respect both with the USSR Academy of Sciences as well as the academies of the other socialist countries.

The scales and pace of developing the skills of our scientific medical workers in highly qualified leading institutes and laboratories in the world are lagging considerably behind our objective requirements. We must develop our own specialists in such very necessary disciplines so that they may develop as good scientific cadres. That is why serious measures must be taken in the training of cadres and resolving the other problems in this field.

I also believe that the BAN faces a large number of technical problems as well. The average capital-labor ratio per scientific worker is rather low, and considerably lower than that of Czechoslavakia and the other socialist countries, not to mention the USSR. We must pay attention to the question of duplicating the material base of the academy. We must avoid duplication in supplying the joint center and the Medical Academy. Greater coordination must be achieved in the operation of these two units as regards the biological sciences. We have a number of units jointly managed by us and the BAN. This question must be considered and discussed. Implementating the Politburo decision we shall attentively review the scientific research done by the Medical Academy in this field. We shall study and assess the current condition of scientific cooperation between the Medical Academy and the BAN and earmark measures aimed at improving this work. Since it is also a question of the name of this institute allow me to say that by eliminating the word combination "...and medical-biological sciences" I would like to believe that here the slogan "Omenes et omen" should not be applicable, for this may result in a certain decline in the interest in medical-biological sciences.

We believe that the time is ripe for the elaboration and adoption of a corresponding decision and for accelerating the development of the medical sciences. We are ready to participate actively in the elaboration of such a respective draft decision.

Academician Bogdan Kurtev:

I am not fully prepared to make a statement. However, I am somewhat concerned by the statements made here and that is why I voice my opinion. The comrade chairman said quite correctly that this decree obligates us a great deal and that we must accomplish a great deal. What do I mean? I fear greatly that the additional funds allocated now will be wasted without results. The results we expect would not come. The second thing is cadre training. We must take into consideration the changes occurring in the sciences themselves. When I was in high school I studied more chemistry than is being studied today. Today the amount of organic chemistry studied by our university students is one-half the amount I studied. I cannot imagine how our medical workers who greatly reduced the study of chemistry are unable to understand that this is the first round, the first stage in the training of future medical workers, the study of organic chemistry. I became an assistant professor in medical chemistry in 1940 and today I cannot agree with the question as it was formulated a short while ago. It seems to me that when a Soviet delegation visited us to discuss such problems what was meant, above all, was molecular biology rather than the scattering of all forces simultaneously. The USSR allocated large funds for the development of molecular biology. However, this does not mean scattering our efforts in all areas as is the case in our country.

I believe that all of us must pay attention to such problems--cadre training, equipment, experimental methods, and achieving higher results.

Academician Georgi Nadzhakov:

I too am somewhat concerned if I understand properly Comrade Kurtev's statement.

Knowledge in the basic sciences is needed for the development of the biological sciences at this stage including medicine. The basic sciences, to the best of my knowledge, covering all such biological sciences are physics, chemistry, and general biology.

Some 40 to 50 years ago basic courses in physics, chemistry, and general biology were needed to teach the biological sciences. In those fields I, Asen Zlatarov, and Metodi Popov were lecturing. Today this has been reduced to a minimum. That which we had to absorb 40 years ago has now been reduced by one-half. Yet, these sciences have developed a great deal. The trend today is different. It must be understood that in high school such sciences must be studied also by those who would like to become lawyers, philologists, and others. They too must be familiar with the foundations of physics, mathematics, and others. I would ask all colleagues involved in the superstructures of such sciences to think about the following questions: Where are physics and biology compared with the situation a few years after World War One? Is it possible to develop these new sciences without this? Several weeks ago, Comrade Kiril Bratanov and I were in touch with the greatest representative of molecular biology in the USSR, Academician Engelkhard. "Do you know the type of equipment I need?" he said. "A single apparatus costs two million rubles in foreign currency. I shall get it." Therefore, do not reduce that which is necessary for the modern superstructures of the biological sciences.

Corresponding Member Elisey Yanev:

Allow me to direct your attention to a general biological discipline of great importance: immunology. It is occasionally mentioned. However, I feel the need to discuss its possibilities with you.

Immunology itself appeared together with the modern diseases. However, 30 to 40 years ago non-infectious immunology developed and turned out to be even more important than infectious immunology. Today the modern physician cannot be modern at all unless he can see an immunology component as the basis of all diseases. Let us take as an example the question of cancer discussed by Comrade Maleev. It is a toy, a biological phenomenon. Each living being has its own biological phenomenon. Start with the amoeba--everything has its biological phenomenon. That is why this is a general biological discipline. The essential thing, however, is that immunology has methods which could resolve a number of other problems and help many biological disciplines. It could be said that there is no biological discipline which could ignore immunological methods, particularly if your bear in mind that immunological methods are far more sensitive compared with a chemical reaction.

However, with a view to obtaining the end results we are seeking, we should resolve certain other problems in this respect, protein synthesis for example. The question of obtaining proper proteins with the help of microbes has become a program task for our microbiologists. In no case would we be able to control genetic research without exercising immunological control over the production of a given protein or of a biologically active substance. Yet, obtaining such a matter is an exceptionally important problem from the viewpoint of health protection, of human health. In general, the optimal effectiveness parameters must be provided for modern immunology with a view to reaching the proper level--the level of red blood cells, white blood cells, blood pressure, and so on. Actually, immunity is a specific indicator of the organism concerning the most accurate methods for disease registration. Or else, considering the matter of nutrition, the question arises of whether or not to increase production or produce high quality wheat from the nutritional viewpoint. Such problems can be resolved immunologically only.

What I mean is that the science of biology cannot develop without the help of the science of immunology. Yet, its present development is in a sad state. Perhaps the situation at the Medical Academy is the best. It has a good set of problems to work on. Naturally, it is working on health protection problems. Yet, the documents we are considering say nothing about immunology. That is why I have tried to stress the importance of this science, and its significance to the cadres which will apply it in order to gain maximal results.

Corresponding Member Veselin Petkov:

The BCP Central Committee Politburo decision reflects accurately the condition of our biological sciences and offers a clear view of their development, successfully determing the basic directions to be followed in this development. The guiding principles for the organization, planning, and management of scientific research have been provided. The stipulation in the decision of granting extensive rights to the heads of scientific programs and leading institutes in organizing, coordinating, and financing of scientific research and the planned distribution of funds, giving priority to the implementation of the most important scientific programs will unquestionably introduce a big change in the development of the biological sciences.

The items in the Politburo decision calling for the priority construction and financing of the joint center, the target allocation of considerable funds in socialist and capitalist currency in 1976 and 1977, as well as the surmounting of a still-existing isolation among institutes, departments, and laboratories in which the biological sciences are developing will be of exceptional importance to the development of the biological sciences.

To sum it up, the Politburo decision insures a good start enabling our biological sciences to enter the "century of biology" which lies in our immediate future. As we know, today biology is converting into one of the leaders in the wide set of sciences which is beginning to determine not only the basic directions in the development of the natural sciences but is reorganizing to an ever-greater extent the production process as well as the other realms of human activities. I shall cite only two examples of the ever-clearer trend toward the biologizing of the production process: On the one hand, the possibilities for the practical future utilization of the results of the studies of chemical synthesis taking place in the living cell at standard temperatures, and, on the other, the possibility for the direct conversion, with a very high effectiveness coefficient, of chemical reactions into mechanical work, as in the case of the muscular system. The modeling and reproduction of muscular functions will enable us to develop essentially new motors.

The requirement of improving the creative links and interaction both among the biological sciences (within the BAN system and outside it and, above all, including the Medical Academy) as well as the other natural sciences, included in the decision, will play a particularly great role to the development of the biological sciences. It seems to me that one of the first tasks in implementing the decision would be to earmark specific means for the utilization of the advantages offered by such cooperation. In this case a number of possibilities could be found. However, the search for them must be systematic and purposeful.

Assuming that molecular biology today is the most progressive trend in biology, we must clearly realize that for this purpose molecular biology must imbue all biological sciences. As a pharmacologist allow me to cite an example which indicates the possibilities for the development of pharmacology offered by molecular biology. The fact that the pharmacologists concentrated on the study of the biochemical and, of late, of the molecular foundations of the effect of medicines was of decisive significance to the exceptional progress achieved by pharamocology in recent decades. The rich experience we have acquired convincingly proves that data on the chemical structure of compounds are not sufficient in the creation of new drugs with a programed effect. Obviously, we need an essentially new strategy in the efforts to create new drugs of great therapeutic activeness and possibly minimal undesired effects. Sufficient grounds exist to believe that this new strategy must be based on molecular biology which contains possibilities for insuring the high effectiveness of the work and means invested in the development of new drugs.

Allow me to conclude as follows: considering the existence of the 3 August Politburo decision which provides the basic prerequisites for the rapid development of our biological sciences, the question of whether or not in the next few years they would be able to reach a leading position in the development of the biological sciences on an international scale will be resolved now exclusively and directly by the people working in this area in our country, their scientific-organizational skills, their methodical and methodological preparedness, their knowledge, their ability to think independently or, briefly stated, the type of brains working in this area, for mediocre minds could not implement a program we consider tremendous on our scale, demanded by the decisions. This could be accomplished only by intelligent people.

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BULGARIA

DEVELOPMENT OF SCIENTIFIC INSTRUMENTS DISCUSSED

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[Article by Dr. Kiril B. Serafimov: "Problems of the Development of Scientific Instrument-Making"]

[Text] The universal truth that today science is turning into a direct productive force is demonstrated most simply and clearly by the development of scientific instrument-making. Many of us can clearly see the ties between science and practice as shown at exhibits, fairs and other demonstrations of scientific accomplishments mainly through the manufacturing of scientific instruments which illustrates clearly and impressively the results of scientific research. Therefore, directly and clearly scientific instrument-making reflects one of the main functions of science--to lead ahead social practice. Furthermore, in a number of cases, such instrument-making is the material proof of the results of scientific research. On the other hand, scientific instrument-making is a powerful factor in the development of science, for it gives it new experimental facilities, equipment, apparatus, instruments, and installations. It is a well-known truth that modern science is using the most modern and leading technical facilities--from bathyscaphes to satellites, from gigantic accelerators to cryogenic systems, from electronic microscopes to interplanetary ships, and so on. The production of scientific instruments creates the absolutely necessary material base which gives us new experimental data generating new theories and leading to new experiments requiring new methods and instruments. This is a cycle determining the progress not only of science but of overall social developments.

Consequently, the development of scientific instrument-making is quite necessary both for the development of science itself as well as for establishing its links with practical work for stimulating overall scientific and technical progress. This social need has been expressed also in the fact that, compared with all other industrial areas, from the economic viewpoint such instrument-manufacturing is the most effective. Thus, the studies of the economic effectiveness of scientific instrument-making show that it is 8 to 10 percent more advantageous compared with the building of locomotive engines, 2 to 3 times more effective than the manufacturing of computers, and so on. This is entirely natural, for scientific instrument-making is the materialization of the most advanced research ideas and the latest scientific results.

Such general thoughts and information could be backed by numerous examples borrowed from our reality, in which the Bulgarian Academy of Sciences justifiably enjoys a leading position in scientific instrument-making. Equipment created by the BAN such as the superspectrophotometer-170, the series Binion pumps, the INTERTEST automatic diagnosis instrument, and others are being manufactured on a serial basis and are yielding considerable economic benefits. Other groups of instruments such as outer space instruments of the P and PR series, electrophotometers for natural optic emissions, and others, are drastically modernizing experimentation, raising it to a new level, and yielding information and data which are revolutionizing science.

They have enhanced the scientific and technical prestige of the country. Indirectly, this leads to the more effective marketing of modern, expensive, and highly effective goods. In a number of cases such instruments could be sold or traded for others, thus leading to direct economic results. Therefore, in Bulgaria as well (specifically in the BAN) scientific instrument-making is most effective from the economic viewpoint.

The general foundation of the significance and effectiveness of scientific instrument-making is its direct link with the major basic accomplishments and, through it, the materialization of the most substantial scientific results. Such has been the case in our country as well. For example, it is not accidental in the least that the method of brilliant copper-plating and the related experimental apparatus, means, and technologies were developed precisely on the basis of universally acknowledged basic achievements of Bulgarian physical chemistry, the successes in space instrument-manufacturing are closely linked with the traditions of our geophysical school, and others.

1. Consequently, the first problem in scientific instrument-making in general is the existence of basic ideas, results, and data implemented in corresponding new technologies, methods, means, and apparatus. The reason is that scientific instruments without original designs, based on familiar methods and data, are hardly in demand. Usually they are produced serially and their economic effectiveness is lower. The long-term development of our science under the capitalist conditions of a backward country, and the relatively recent development of a small material and technical scientific base triggered a considerable abundance of original ideas and basic results insufficiently used not only in practice but even in scientific experimentation. With proper experimental tests such ideas and results could materialize in valuable original scientific instruments. Consequently, in this

area the BAN does not face major difficulties providing that a certain psychological and organizational barrier separating theoreticians from experimentors and manufacturers of equipment (to be discussed subsequently) is eliminated, and in the future purposeful (rather than scattered) basic research is conducted.

2. The second major, essentially Bulgarian problem is the development of the material and technical base of science and its instrument-making. Without a powerful material and technical base we cannot obtain essential scientific and experimental results. Yet, without them scientific instrument-making is deprived of its core and essential advantage. We must greatly emphasize that both foreign and modest Bulgarian experience confirm categorically the senselessness of attempts to build separate special modern instrument-making units for the development of instrument-making outside the institutes. Results in terms of corresponding instruments can be achieved under the guidance of researchers only on the basis of modernly equipped research units. Naturally, this requires instrument-making units possessing their proper technical facilities. However, such facilities have their specific nature which is frequently ignored in our country. The usual tendency is to create instrument-making units using standard mechanical, electronic, optical, and chemical equipment. Subsequently, such equipment, together with its corresponding standard specialists, is described as a "limited material and technical base." Usually, this means not the lack of lathes, cutting and shaping machines, and other mechanical types of equipment or the lack of adequate machines for grinding lenses, glass blow pipes, and electronic control facilities, but the shortage of strictly specialized machines and equipment and of corresponding specialists. Machine or electronic workshops developed in a number of BAN units may be found possessing an almost identical structure in other institutes, enterprises, cooperatives, and so on. It is clear that that is not what is lacking and it is not the direction along which we must focus our efforts, as we shall prove with the following example. In 1973 I and the deputy chairman of the BAN in charge of administrative and economic problems visited Czechoslovakia (Prague and Brno) to study the experience of the Czechoslovak Academy of Sciences in the development of scientific instrument-making. We were particularly impressed by the fact that the most effective instrument-making was the casting of toroids for plasma research at the Czechoslovak Academy of Sciences Institute of Electronics. In two days a foreman with one assistant produced goods worth between $20,000 to $40,000 with materials worth a few pennies, in a modest premise and with an unlimited market. However, the kilns, furnaces, and all other equipment had been developed by the collective of the institute itself. Therefore, we do not need small general purpose workshops of a type found everywhere but specific instrument-making units built according to scientific designs and based on the main work projects, equipped with special (mainly one-of-a-kind) apparatus, machines, and equipment. In this respect we must make a revolution in our material and technical facilities, for otherwise anything we are planning in the field of scientific instrument-making would be converted into a pious wish.

Developing the material and technical base of scientific instrument-making we must surmount two erroneous trends existing at the present stage. The first is the splintering of technical facilities by creating a large number of small workshops of low production capacity and frequently duplicating each other. The second is an alternative to the first and is based on the idea that big results may be achieved only in a few workshops (or even, in absolute terms, in a single central workshop). It has been suggested that such workshops be considered as plants. Both trends are erroneous and we believe that optimizing this major scientific problem (in a number of cases even a main problem) could be achieved by implementing the following measures based on the study of our conditions and foreign experience.

A certain minimal number of machines, instruments, and even installations is needed by any designer, constructor, and maker of scientific equipment. A general purpose lathe used by several developers of scientific equipment, a vertical drill with extensive possibilities, grinders, power cutters, and other mechanical equipment for a development team consisting of several people are mandatory. In the USSR, United States, Czechoslovakia, GDR, and other countries such small groups of machines are installed for common use at each floor or scientific and technical subdivision (development group, manufacturing collective, and others). We emphasize at this point that such machines are in addition to the instruments, equipment, small drills or lathes, and others, assigned to every foreman. Unquestionably, such assigned machines and instruments will be used to a lesser extent compared not only to industrial equipment but even to the technical facilities used by the other executive scientific units. However, only thus could we create factual conditions for real intensification of scientific work in an area which will enable us to upgrade substantially its social (including economic) effectiveness. Let us particularly mention here the need to decentralize certain standard technical facilities, for there is an obvious need for equipping the specific developers of scientific equipment with specialized machines, apparatus, and equipment of adequate quantity and quality.

Development work requires a number of standard or almost standard general purpose parts or assemblies. They should be produced by well equipped institute workshops. The latter should also do the finishing operations on the final stages, resolve designer problems, multiply already developed parts, assemblies, lenses, and others, and manufacture instruments in small series. The material and technical equipment of such institute workshops should be far more powerful and include an efficient set of specialized and general purpose machines. Under our circumstances, for example, the machine workshops of institutes should have cutting and shaping machines, heavy duty general purpose lathes, vertical (and, in some cases, even radial) drills, gas and electric welding equipment, [punktshvays], grinders, and other machines, to which we should add the one-of-a-kind apparatus and equipment specifically required for the purpose.

In some joint centers for science and cadre training (such as, for example, physics, chemistry, earth sciences, and biology) it would be expedient to create central workshops as well as the main area of the basis for development and application. The tasks of such workshops should include the manufacturing of known standard or lacking standard elements, parts, and assemblies in large quantities, the duplication of completed prototypes in small series, assisting in the completion of heavy one-of-a-kind equipment, helping institute workshops by providing very expensive, rare, or one-of-a-kind machines, apparatus, or equipment, helping institute units in processing documents and in insuring the technological completion of goods, and others. Such general purpose workshops should be equipped with the full range of machines including some one-of-a-kind machines found only in the BAN (or even in the entire country), or very expensive equipment. They should include some highly productive general-use machines and installations. Thus, for example, the joint center for physics and physical and technological problems could have a machine for the production of lenses or highly productive revolving or automated lathes serving the entire center.

Finally, the manufacturing of scientific equipment at the BAN requires a powerful, modern central workshop effectively linked with the joint centers and institutes. It should undertake to satisify general academic requirements by producing standardized or mass non-standardized parts, assemblies, or items unavailable on the market. It should produce equipment in larger series or whenever several pieces of such equipment must be produced on a manual basis, over a 5 to 10 year period. Finally, it should make possible the joint use of one-of-a-kind machines and equipment of common interest to all units. It should include the production of some items needed by all units (such as, for example, the production of liquid nitrogen used by the joint centers for chemistry, physics, earth sciences, and biology, and by outside units). Such a workshop should have a general academy warehouse carrying the full variety of materials, elements, and assemblies (such as, for example, all type condensers in terms of capacity, reaction power, tension, tangent-delta, and other indicators). Such a warehouse could eliminate the overstocking of centers and institutes.

The role of academy plants in the development of scientific instrument-making will be discussed subsequently. Here, naturally, we discussed some organizational problems as well directly linked with the development of the material and technical base.

A study of the present condition of the base for scientific instrument-making at the BAN would reveal substantial negative deviations from the thus developed concept of a rational organization and equipment of our units. Despite the general and very severe shortage of machines, equipment, and materials, a number of units have big, unnecessary, and even unknown material stocks or idling one-of-a-kind highly effective machines. We frequently deny a unit or individual worker a Bulgarian-made small drill while letting expensive machinery remain idle over long periods of time.

Adequate availability of relatively inexpensive machines and apparatus which, according to the plan, would not be used extensively is a basic intensification problem. Conversely, highly productive machines or even machine units should have a good load of work even on a multiple shift basis.

Whereas the tendency to break down the material and technical base of instrument-manufacturing is understandable and is consistent with other still-existing obsolete ambitions on the scientific front, activities aimed at excessive integration are based on the small dimension of our workshops, frequently coinciding with the modest set of machines which should be made available to the individual developer or even foreman. The entire world has accepted the low level utilization of such machines allocated to a single person or to several people, yielding tremendous results from their intensive use by the developer who is the motive force in scientific instrument-making and the source for its high economic profitability.

3. Therefore, naturally, we have reached the question of the person-instrument maker or, in its standardized aspect, the personnel problem. Unquestionably, it is closely linked with problems of the material and technical base and the organization of scientific instrument-making. Yet, it has its specific aspects as well. The general aspect of this problem is that modern scientific instruments are created by talented, exceptionally skilled and erudite scientists and specialists. Some BAN circles, nevertheless, still believe that the creation and manufacturing of scientific equipment should be the concern, at best, of foremen or beginning engineers. The experience of the USSR Academy of Sciences, Czechoslovak Academy of Science, and GDR Academy of Sciences and of other socialist academies of sciences and the great acknowledgement which is justifiably given to the creators of big and important instruments and the fact that they are regularly listed among national laureates or elected as full members of academies or corresponding members have confirmed the erroneousness of such concepts. We are encountering difficulties even in awarding degrees and titles, particularly in the case of people who have created instruments but whose number of published works is relatively small. The time has come for everyone to understand that a highly specialized modern scientific instrument is a basic element not only in scientific experimentation but in science in general, and that the creation of such an instrument requires original ideas, talent, knowledge, and a great deal of work which are basic to all research. Therefore, we should surround our creators of scientific instruments with far greater attention. We should make possible their steady growth and encourage their achievements. This is fully in the spirit of the decisions of the 10th and 11th BCP Congresses which reasserted the role of directed basic research and its ties with practical work.

The special courses on technical subjects offered at the Kliment Okhridski Sofia University, or some parts of the basic subjects studied at higher technical schools are of particular importance in training young cadres in scientific instrument-making. A worker in radioelectronics, familiar with the foundations of physical chemisty, would be quite useful to our chemistry units the way a plasma physicist who has mastered radioengineering could implement a great deal of the interesting results achieved by the physicists. Such combined training could be easily obtained in our joint centers in terms of university disciplines whose study must be properly organized in our higher technical schools.

The most effective training of our middle level specialists and foremen should take place in the instrument-making units themselves where the young people will acquire additional specialized skills.

4. The problems of the structure of scientific instrument-making and its organization are quite important and some of their aspects have already been discussed. Basically, there are two possible ways for the organizational development of scientific instrument-making: the establishment of separate instrument-making institutes or the development of the system described in point two of the present article (minimal potential in each unit and laboratory, institute workshops of joint centers, and a central instrument-making workshop). The experience in creating universal instrument-making institutes has been negative. Thus, for example, the Czechoskovak Academy of Sciences set up an instrument-making institute in Brno in 1957. Currently all its auxiliary tasks have been eliminated and it is engaged only in the making of instruments for several scientific areas (electronic microscopy for example). However, a general academic seminar must be organized on the general problems of scientific instrument-making; the scientific assessment of achievements may require the setting up of a specialized scientific council fully entitled to award degrees and titles. Adding to this the full coordination of general material and technical supplying, cadre strengthening, and the joint solution of instrument problems by institutes and joint centers we would acquire an organizational structure which does not require the establishment of specialized instrument-making institutes. The publication of a general academic periodical on scientific instrument-making would close the chain of integration measures in this area and would sharply stimulate the development of this important scientific sector. Such periodicals are published in the USSR (NAUCHNYY PRIBOR), the United States (a number of periodicals such as, for example, SPACE SCIENCES INSTRUMENT), and other countries.

5. The use of scientific instruments and the economic problems of scientific instrument-making (in particular its scientific and economic effectiveness) are most important and responsible problems not only for this scientific sector but for our overall scientific and technical development. Had we developed on time the INTERTEST instrument we would have received substantial orders from the socialist countries, India, Austria, Finland, and others,

providing considerable economic benefits. At the present as well we have far larger orders for the Superspectrophotometer-170 than we have production capacities for the manufacturing of this highly effective instrument. Furthermore, a number of instruments have had an even worse fate: they were not given prompt recognition, were not used, and their production was not increased, as a result of which we have lost excellent ideas, work, and materials.

The great advantage of scientific instrument-making is the possibility to apply it within the BAN system, in our exchanges with the socialist countries, or within the framework of the Committee for Science, Technical Progress, and Higher Education. This would largely eliminate departmental obstacles to the production of such instruments, letting the BAN assume total responsibility for the manufacturing and utilization of such equipment.

If the application cycle may not be closed within the BAN we should extensively use the Rapid Application Center of the Committee for Science, Technical Progress, and Higher Education. This particularly applies to major orders received from foreign countries which would provide substantial economic benefits to Bulgaria.

In the case of orders from abroad and, particularly, of important offers to purchase instruments in convertible currency no incentive whatever is offered to the organization which has developed the instrument. In such a case we should apply the principle of authorship rights--70-80 percent of the foreign currency should be given to the manufacturing unit which could use such foreign exchange to add to its own material and technical facilities. In the case of bigger deals (such offers have been received by the BAN from the FRG, Canada, and other countries but have not been acted upon) some of the foreign exchange could be used to increase the very modest funds allocated to the entire academy.

A certain percentage of the scientific instruments could be manufactured for sale, thus acquiring direct economic effectiveness. The sales price usually includes all expenditures (including the costs of basic research to the unit which has developed the instrument), a legitimate profit for the producing unit, as well as other legitimately earned amounts. In the case of sales to foreign countries the price is based on other instruments used as a guideline. In the case of one-of-a-kind items the price is arrived at by multiplying the domestic price by several hundred percent. Some of the most timely problems are those of the economic effectiveness, price-setting, the economic aspects of development trends, incentives, and international relations in the field of scientific instrument-making. For example, in 1973 the Ukrainian Academy of Sciences was employing some 2,200 scientists and specialists in the social sciences (about eight percent of the total personnel); of these, some 1,800 were working on the problems of the economic effectiveness of academic sciences, a substantial share of which are economic problems of scientific instrument-making.

A substantial share of the scientific equipment, however, is directly installed and used in scientific institutes and does not have any direct economic effectiveness. However, this is no problem, for the accelerator, the batiscathe or the satellite provide the scientific collectives with the type of knowledge which makes science effective. Consequently, whether or not it has any economic effectiveness scientific instrument-making is very important and should be encouraged. The application criterion is very important in this respect. Quite correctly the USSR considers that an instrument has been applied also when it is used by the scientific organization. For example, an instrument successfully launched in outer space is considered as applied rather than written off as our financial accounting authorities have suggested.

6. Domestic and international integration in this field is a major problem facing scientific instrument-making. A number of successes achieved in the field of our scientific instrument-making have been precisely the result of joint activities with the socialist countries and, particularly, our good work done together with institutes of the USSR Academy of Sciences. In this respect the effective internal integration among BAN units and, particularly, among joint centers is insufficient. A number of measures (such as those listed in point four) should be implemented in order to guarantee, encourage, and regulate joint efforts in this field as well as the better utilization of the general academic instrument-making potential.

Great opportunities are offered also by cooperation between academic units and departmental institutes and, particularly, between them and our industry (particularly in building one-of-a-kind installations with built-in standard instruments and systems).

Considerable unused possibilities may also be found in cooperation along the line of CEMA, scientific and technical cooperation with capitalist countries, and others.

7. A number of psychological and ethical problems of scientific instrument-making have been insufficiently developed and clarified. Scientific instrument-making frequently combines within a single product the efforts of base and experimental research scientists, organizers, and skilled inventors. Usually, the scientific instrument is a collective product and all difficulties in the activities of the scientific collective are focused in this delicate work. We shall not consider in this article the primitive nihilism displayed by some segments of our academic circles toward instrument-makers, an attitude which creates additional difficulties for the instrument-makers.

Some of the problems such as patent protection, publication, and others could be studied in a separate article.

The solution of these and many other problems of our scientific instrument-making will decisively help the scientific and technical development of our country, yield considerable income in foreign exchange, and become an essential factor in academic activities aimed at the "spiritual and material enrichment" of our people.

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CSO: 2202

SCIENTIFIC COOPERATION WITH GREECE EXPANDS

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 pp 63-68

[Article by Academician Nikolaos S. Louros: "Scientific Cooperation with Greece is Expanding"]

[Text] At the invitation of BAN [Bulgarian Academy of Sciences] Chairman Academician Angel Balevski, the noted Greek scientist, public figure, and statesman Academician Pnayotis Kanelopoulos visited our country from 6 to 13 September 1976. On 6 September he met with members of the BAN Presidium. BAN Chairman Academician Angel Balevski presented greetings to the Greek guest. In a friendly atmosphere thoughts were exchanged on the positive trends in the development of ties and relations between scientists from the two countries, and the Bulgarian and Greek peoples. Academician P. Kanelopoulos also presented greetings and emphasized that he was very happy to study the successes achieved by Bulgaria in all fields of economic and cultural life. The following day Academician Kanelopoulos delivered a lecture to the academy scientific workers on "Pessimism and Optimism Regarding the Future of Mankind."

Invited by the BAN Presidium, Academician Nikolaos Louros, chairman of the Athens Academy, visited Bulgaria from 25 to 28 September 1976. On 27 September an agreement was signed on scientific cooperation between the Bulgarian Academy of Sciences and the Athens Academy. The two scientific organizations will cooperate most closely in the field of Balkan studies through the exchange of information-documentary materials, scientific publications, and scientific workers and specialists. The document was signed by Academician Angel Balevski, chairman of the BAN, and Academician Nikolaos Louros, chairman of the Athens Academy. Present at the signing ceremony were members of the BAN Presidium, noted Bulgarian scientists, as well as Alexis Stephanou.

In the course of his visit Academician Louros visited Plovdiv and toured some of the city's landmarks in the company of Academician A. Balevski, BAN chairman. He met with Corresponding Member Atanas Maleev, Medical Academy rector.

The noted Greek scientist was presented with the Marin Drinov anniversary medal of the BAN, and the honorary badge of the Medical Academy.

On 27 September Academician Nikolaos Louros spoke on "The Responsibility of Science" in his address to the academy scientific workers.

Following are the texts of the lectures presented by Academician P. Kanelopoulos and Academician N. Louros.

The Responsibility of Science

From its very beginning the 20th century has been paralleled by outstanding scientific achievements. The quantum theory developed by Max Planck, Freud's psychoanalysis, Husserl's phenomenology, and Einstein's laws of relativity drew universal attention and had a profound impact on the human spirit.

Despite this, we cannot claim that our century began with the end of the 19th century. It was rather the end of World War I that marked the dividing line. It was only then that daily life and society began to experience gradual changes. Old customs and traditional activities paled. New concepts appeared. The revision of values pertinent to that time was undertaken. Nevertheless, such phenomena characteristic of the time following World War I were caught up by the catastrophic lightning of World War II. Millions of people were killed by previously unknown weapons and no one would be able to determine what contribution such victims of civilization could have made to mankind.

In any case, the main characteristic of our century is the spectacular development of technology which covers all scientific sectors and which, it appears, has dethroned spiritual culture as we have become accustomed to consider it. Technology became technocracy. This fact increased the distance, not to say developed a profound gap, between generations. Therefore, it could be said that not only the old generations but even the younger ones have almost totally lost their ability to adapt to the relations which exist at a given moment. From the cradle the young feel the burden of uncertainly for which reason they fall under the influence of primitive insticts and artificially created happiness. The old make almost no efforts to awaken from the lethargic dream of traditions and attempt to unravel what they do not understand. This has led to the tragic social loss of balance so that views which, in the past, were firmly believed in clashed with the reality created by man. Meanwhile, time flows mercilessly and we are unable to predict when and where a balance may develop.

Therefore, it is certain that technology has found its way into life two ways. The first facilitates daily life and offers financial opportunities which benefit the interests of the state and the individuals. The other, however, despite the intention of creating better conditions for the people, accumulates excessive economic burdens and other shortcomings which makes it a serious threat to survival. For this reason we almost do not dare speak of real progress. That is why we are content to consider this development as evolution.

Despite this, however, the development of technology is in important and rapidly acceptable contribution to daily life. Technology represents a restraining factor in terms of intellectual values, free thought, humanism, culture, and the desire to clarify philosophical problems. It raised difficult problems even in the very important field of education which I cannot discuss here.

The consciensiousness of technology, naturally, is unquestionable for it is aware of these dangers. Therefore, occasionally it engages in self-accusations and seeks the aid of culture and of God, led by the honest wish to preserve human values. Famous nuclear physicists such as Heisenberg and Oppenheimer, biologists such as Monod, and others became philosophers as well. The cultivated many-faceted personality rather than the one-sidedly developed specialist is the element who will always try to achieve this precious balance! We must not forget that the purpose and objective of analysis is reverse synthesis.

Nevertheless, we must bear in mind that the technical and economic progress needed for the necessary reorganization of life has pushed into the background the significance of classical culture in favor of technical advantages. Technology is a subject of universal interest. This is a circumstance which benefits capitalism whose greedy claims demand technicians to meet the ever-growing capitalist investments. Furthermore, the need for greater speed is not limited to the field of transportation but is also directed to the fact that words are no longer pronounced as separate units but are represented by their initials. The remaining decapitated (verbal) corpse is ignored. This contributes to the distruction of the linguistic national wealth as the only true historical heritage.

Another clear example in this respect is that of medicines whose purpose is to serve man. Regardless of eventual secondary harmful influences which may be caused by some such medicines, they have been subjected to such a development that they could have a fatal influence on the human spirit. There are no problems in using aspirin for headache. Today both men and women carry innumerable pills and tablets which could have an adverse effect on their mental and spiritual balance. For example, there is an antibiotic--piromycin--which could have an influence on amnesia. Is this not a potentially dangerous weapon? Some studies lead to believe that after awhile man would be able to change his heredity substance himself, perhaps to the benefit of eugenics but, in any case, however, against the will of nature! Furthermore, who could guarantee that such biological perversity would not bring about a catastrophe?

For this reason, the path of so-called scientific progress is developing as a prehistoric monster. We cannot imagine its influence on human life and development. Despite this no one would accept that freedom of research should be restricted. Currently attempts are even being made to pass new laws against nature with a view to coming closer to problems so-far considered as metaphysical. The common man is asking himself, however, with fear and trepidation, as to the ultimate results of such lack of control. It is asked, for example, whether or not research should be useful and should be allowed only on the basis of curiosity. Let us accept, for example, that it would be indeed possible to have a child of the desired sex. Regardless of whether or not this is controlled individually or by the state, it represents a tremendous danger, for the disturbance of the balance which may result may lead to unimaginable consequences.

At the beginning of the 19th century French philosopher August Compte predicted the type of reciprocal relations which are today being developed through scientific achievements. He thought that a coordination body should be convened to establish trends in scientific research to benefit the common interest.

Such ideas are being formulated again today. However, they clash against the power of independence which bears the flag of freedom, which offers no guarantees and which rejects all comprimising.

Let us cite some other examples: transplanting human tissue has not as yet been given a final juridical approval like euthanasia, artificial insemination, abortion, birth control, and others.

On the other hand, have demographic problems found an acceptable socio-political trend? Some parts of our planet are overpopulated whereas others are deprived of valuable manpower as a result of abortions, infant mortality, and emmigration. In underdeveloped countries where technology has not penetrated as yet or exercised its secondary harmful influences, the mass destruction of people due to a low cultural standard is a shame for so-called civilization. I believe that if we compared the number of beings saved by science with that for whose death science is responsible the difference would be insignificant. Suffice it to leaf through the daily press to see that the victims of omnipotent technology are immeasurable.

The urgent delimma facing us is how to continue with scientific research without dealing a mortal blow to the freedom-loving spirit. No one wishes to hurt it--neither statesmen, nor scientific workers and researchers.

For the time being, the problem remains doubly unsolved. This is not yet being realized properly. However, the dilemma is casting its shadow so that, perhaps, it would not be exaggerated to claim that this is resulting in a number of conflicts between the state and the individuals.

The helplessness of the state may be seen today in all countries throughout the world. Everywhere we find symptoms which reveal an uncertainty in the face of established reality and call for a constitutional adaptation. Management systems are becoming evermore complex without better results being reached. Big world coalitions are trying to safeguard the peace for which purpose they are spending material funds exhausting the countries. Moral principles, violated in most cases, are being proclaimed loudly. In the mad antagonism which has developed reality is being pushed aside, precisely that reality for whose benefit we should choose the best way for insuring the protection of man and the course of his development.

This leads to fanaticism which triggers social disturbances which could be eliminated only by excluding the reasons for misunderstandings, naturally without the use of force. Allow me to remind you that Homer himself emphasized in the Illiad that only the advantages of the soul could defeat its main enemy--force. All countries face almost identical problems. Even the man who stepped on the moon would be hardly able to satisify to a certain extent his financial claims or protect or cure himself from the common cold. Unquestionable, industry is a practical and a civilizing factor of major economic significance. Yet, it has also become the source of destruction both of nature and of people as a result of the lack of oxygen and environmental pollution. The inconceivable speed of the machine blocks all predictions. Meanwhile, however, it is the cause of innumerable victims. Medicines or canned goods today advertised on television may cause dangerous side effects tomorrow. The ecological and housing policies are unsatisfactory. The cities are suffering from asphyxiation, decentralization is difficult, and it is difficult to earn our daily bread. Young people are leaving the villages where only melancholic old people are left. Even this generation is threatened by degeneracy. Aldous Huxley alarmingly wrote that "science removes with one hand that which it creates with the other." Profound thinking and great caution are needed if any kind of acceptable objective is to be reached. This would be an objective whose prerequisite would be a profound awareness of conscience and responsibility. This means the following: even if it may be inconceivable to suppress the freedom of research, on the other hand it is exceptionally important and expedient for the results of research to be consistent with the interests of the people. In other words, scientific responsibility must have social conscience so that the shortcomings of research may not be neglected. The pharmaceutical industry is even insisting that it is applying such control measures. However, they will remain inadequate as long as the researcher himself applies them. The victory and glory of conquest are insufficient. The other side of the coin should be considered seriously in advance so that progress will not be accompanied by unfortunate consequences.

As we know, following the catastophe of Hiroshima Oppenheimer experienced deep remose for having contributed to the division of the atom which brought glory to him and to science yet, at the same time, which also brought about an apocalyptic destruction.

In other words, scientific achievements should not be considered in their material aspect alone.

We must be concerned with excluding the possibility of turning them into factors adverse to mankind. Such control must be established preventively only by the researcher. This could be accomplished only on the basis of his inflexible conscience. Unless illusory, this prerequisite is the only means for avoiding eventually false imaginary steps. If research is conducted in the future without a social feeling of responsibility, the glory of the human spirit will be accompanied by the possibility that a catastrophe may develop.

The French writer Francois Mauriac has written that the most tragic phenomenon in the world is not the suppression of man but the fact that so many people remain indifferent to it. Consequently, it may be expected that if they are to serve man better the brilliant technocrats and profound philosophers as well as clever politicians would have to think about such unusual problems. Nevertheless, decisions must rest objectively and without fanaticism on love for mankind. In this area errors are an inadmissible luxury. We must consider as a general prerequisite the profound feeling of responsibility and duty since, before having fulfilled his obligations, man has no right to demand his rights.

Ladies and gentlemen, I would like to announce that these views are the content of a speech I made in September of 1974 at the Sorbonne in Paris for a colloquium on "Biology and the Development of Man." Under the sponsorship of the Sorbonne, as a result of the decisions passed at the colloquium, the World Movement for Scientific Responsibility was created.

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CSO: 2202

BRIEFS

COMPUTER PROGRAMS--The Institute of Water Problems has formulated eight mathematical models and programs for computers for the selection of the most effective flow parameters; structure of intra-series connections; and adoption of a suitable method for the mathematical description and modeling of the flow. The result is based on the use of more advanced methods in designing hydro-engineering projects and systems for the hydrological foundations of water research. The elaboration and the programs have been applied by the Vodproekt IPP [Design Institute]. They will be used by Energoproekt as well. Another six computer mathematical models and sets of programs have been drawn up on controlling the flow by the Monte Carlo method, applied on the basis of a contract with Energoproekt in connection with the designing of the (Mitidja) water resource system in Algeria and the planning of other industrial water systems. [Text] [Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 p 82] 5003

BOTTOM RIVER DRIFTS--The Institute of Water Problems has developed a method and equipment for measuring river drifts, or so-called drift taps. Such equipment enables us to determine more accurately the overall volume of bottom drifts carried by the rivers at high flood. The size of the equipment is based on the size of the river and its erosion possibilities. It is successfully used in small and medium rivers. [Text] [Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 p 82] 5003

DAM FILTRATION--The Institute of Water Problems has developed a method and an instrument for mapping filtration centers through the bottom of dams. This contributes to the fast and reliable detection of water filtration areas at the bottom and the banks of dams, irrigation canals, and equalization basins. The instrument has been installed and is being effectively used by the Water Resources DSO [State Economic Trust] in its hydro-engineering work. It has been granted invention status. [Text] [Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 p 82] 5003

SPRAYING SYSTEMS--The Institute of Water Problems has developed a series of hydro-engineering systems for remote control of objects with fluid-transportation systems and, more specifically, in spraying technology, using remote control. Four designs have been accepted for utilization by the Water Economy DSO. The production of the initial series will be undertaken by the Ministry of Agriculture and Food Industry. The economic results of the application of such systems are based on the automation of the production process in irrigation with the use of semi-stationary and stationary spraying systems [Text] [Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 p 83] 5003

RADIOWAVE DISSEMINATION--The Central Laboratory for Space Research has developed an original method for determining the global planetary distribution of main ionospheric parameters--critical frequency (the maximally reflected radio frequency in a vertical direction) and the height of the maximal electron concentration in the ionosphere. These two parameters determine the reflective possibilities of the ionosphere for short radio wave lengths and constitute the main values of ionosphere maps which are the base for computing radio tracks and grids. The developed method enables us to compute the critical frequency and maximal height in an experimental determination of the red oxygen line and satellite probing. If necessary two optical satellite measurements or a single satellite measurement combined with ground optical recording may be used. The method can be used for retrospective intervals in the course of which the ionospheric parameters are adapted to different solar activities and other conditions. The use of this method enables us to determine the ionospheric parameters over the world's oceans, deserts, and other areas where no ionospheric stations are available. [Text] [Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 p 83] 5003

BULGARIAN-FRENCH COOPERATION--Following the invitation of the Bulgarian Academy of Sciences Presidium, a delegation of the French National Center for Scientific Research, in Paris, headed by its director general Professor Dr. Robert Chabal visited our country from 4 to 6 October. In the course of its stay the delegation held talks on the extension and expansion of scientific cooperation with the Bulgarian Academy of Sciences. Furthermore, a protocol for scientific cooperation between the Bulgarian and French scientific organizations was signed. The document emphasizes that the results of the implementation of the 1975 agreement create a good foundation for the expansion of joint studies in the fields of physics, chemistry, biology, earth sciences, and social sciences. The protocol earmarks a specific program for cooperation in these fields. It was signed by Academician Angel Balevski, Bulgarian Academy of Sciences chairman, and Professor Dr. Robert Chabal, director general of the French National Center for Scientific Research. In addition to the members of the Bulgarian Academy of Sciences Presidium, the signing ceremony was attended by representatives of the French embassy in Bulgaria headed by Albert (Pavek), charge d'affaires. On 5 October Nacho Papazov, chairman of the Committee for Science, Technical Progress, and Higher Education met with Professor Dr. Robert Chabal. The meeting dealt with the organization of scientific research in Bulgaria and France and possibilities for the further development of scientific and technical cooperation between the two countries. [Text] [Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1976 pp 85-86] 5003

CSO: 2202

HUNGARY'S ROLE IN AUTOMATION OF SCIENTIFIC RESEARCH HIGHLIGHTED

Budapest NEPSZABADSAG in Hungarian 16 Mar 77 p 6

[Excerpts] The head of the academies of sciences of socialist countries met in Moscow from 15-18 February to discuss ways of improving the efficiency of scientific research work and to investigate the possibilities and advantages of complex automation. To avoid duplication of effort, it was decided that production of 167 instruments was to be specialized. The research institutes of the Hungarian Academy of Sciences and a few factories are interested in 20 of these, partly as responsible for coordination of fabrication and partly as institutions cooperating in production.

Modern research and experimentation frequently call for a mass of electronic equipment. This includes both instruments and electronic computers. Nowadays some experiments are so complex, so rapid and provide such a quantity of data that they cannot be carried out without computer control. A method is needed for linking the computer to the experiment. The data provided by the experimental equipment must be put into appropriate form for computer input, and the results of data processing--again in suitable form--must be used to control the experiment.

It is for this reason that simple, relatively cheap elements which can be varied and exchanged must be put into a module system. With their aid practically any type of experimental equipment can be readily linked. It was for this purpose--primarily in the field of scientific research, later gradually for all tasks which require linkage between technical devices and computers--that the Camac module system was worked out.

The Camac system evolved gradually through cooperation of researchers in capitalist and socialist countries. At present 70 firms produce over 1,000 different kinds of modules. The Central Physics Research Institute of the Hungarian Academy of Sciences took part in the development work from the very beginning. Its researchers investigated the applicability of research results to other parts of the economy continuously. Consequently the industrial Camac system was first developed at the Institute and patented on its recommendation: this is a series of Camac modules which are fully suited to and meet all requirements of industrial process control. Notable results have been achieved in Hungary through use of the Camac module system at power plants, at factories and at the laboratories of some state farms. The Moscow conference accepted the Camac system as a basic device for automating experimental work. At the same time it ordered a large number of Camac modules from the Hungarian Academy of Sciences. The order was so large that it exceeded by far the Institute's capacity for trial production. At the same time an agreement was arrived at concerning the types of computers to be used. It was decided that a uniform system of minicomputers would be best suited for the work under consideration. Task oriented computer systems are being developed to make process control more expeditious. The agreement of the heads of the academies calls for development of 10 such computer systems by 1980. A few in which Hungarians are participating: system for processing the spectral information of biological objects; a system which can be mounted aboard ship for processing data from oceanological research; a system suited to plasma physics and thermonuclear research. The first of these is worth noting because it illustrates that task orientedness does not mean a system that is suited to only one task: the biological object could be a cell or an organism while spectral information can mean breakdown by virtually any unit of measurement. The third task is of interest because it concerns research aimed at solving mankind's energy problems. Soviet researchers have built a number of TOKAMAK devices. Hungarian researchers of the Central Physics Research Institute began participating in the automation of the experimental work involved as early as 1976. Their new development achievement is that with the aid of the microcomputer-controlled intelligence Camac control unit they were able to improve utilization of information generated in the course of plasma experiments by about one order of magnitude.

CSO: 2502

INTEGRATED CIRCUIT PLANT ON VERGE OF PRODUCTION

Budapest HETFOI HIREK in Hungarian 28 Mar 77 p 5

[Excerpts] The IC [integrated circuit] assembling and calibrating plant of United Incandescent in Gyongyos will go into production this summer. Up to now integrated circuits have been made on a trial basis only in Hungary. Once the plant goes into operation, Hungary will make these circuits at world standard level. By 1980 the plant will save the economy an outlay of 60 million dollars.

Last summer United Incandescent concluded an agreement with the American Fairchild firm for establishment of an IC plant having an annual capacity of 15 million units. The builders will turn over the assembling plant in late April; the deadline for the 700 square meter service building is the end of June. This will house the nitrogen, the ion exchange water producing equipment as well as the first Hungarian selective gold plating equipment. The first of the production equipment will arrive in Gyongyos next month. After careful examinations, 25 technical and physical workers were selected who took part in an accelerated language course. They then went to various Fairchild plants to acquire the special skills that will be needed for their work. Some are working in California; others in the FRG, Switzerland, Japan and Singapore. On their return they will train the 260 workers of the Gyongyos plant.

Construction is progressing on schedule so there is every hope that 6 million integrated circuits of 80 different kinds will be produced this year. This will make it possible to meet the demands for this product of the computer industry, the instrument industry and the consumer goods industry.

This development which is new to Hungary is sure to have a sequel: talks are now being held between United Incandescent and Fairchild concerning establishment of an IC plant in Budapest.

CSO: 2502

BRIEFS

SOVIET-HUNGARIAN LINE PRINTER COOPERATION--At the December 1976 meeting of the intergovernmental committee on Hungarian-Soviet scientific technical cooperation it was decided that the two countries would produce and develop jointly small alfa-numeric line printers. Certain components are to be produced in large series by the Videoton Factory and shipped to the Soviet partner whereupon the former would, in turn, buy some of the finished line printers. Videoton will begin manufacturing the actuators and the impact hammers in 1977. Videoton has concluded a 4-year shipping contract with the Elektronorgtechnika foreign trade association for delivery of 2,500 sets. A total of 20 will be produced this year, and 1,200 components in 1980 by Videoton on Soviet orders. During this 4-year period Videoton will buy 272 finished line printers from the Soviet foreign trade association. They will be connected to computers operating in Hungary. According to the contract exports will be worth 15 million rubles and imports 4.5 million rubles. The contract also specifies development of alfa-numeric line printers: Hungarian and Soviet partners will solve this task jointly, too. At present printing speed is 400-500 lines per minute. After 1980, production of line printers having a speed of 1,000 lines per minute will begin. According to long-term plans 2,000 line printer sets will be made at Videoton between 1980-1985; a total of 2,500 will be made between 1977-1980. [Budapest VILAGGAZDASAG in Hungarian 19 Mar 77 p 3]

CSO: 2502

TOOTHPASTE INGREDIENT FROM GREAT BRITAIN CONTAINS STRONTIUM

Maribor VECER in Slovenian 4 Feb 77 p 3

[Text] The Border Health Inspector of the Federal Committee for Health Care and Social Security Dragomir Dencic of Nis, according to VECERNJE NOVOSTI, has banned the import and sales of 7,000 kg of "mass WH 248" preparation obtained from the London T.C.C. firm. The preparation was earmarked for the Nevena Medicine and Cosmetics Factory in Leskovac where it was to be manufactured into toothpaste. The Commercial Association Siko of Belgrade had wanted to import it.

The routine analysis of all imported foodstuffs and consumer goods that the preparation was subjected to, in the words of inspector Dencic, showed that the aforenoted preparation was harmful to human health because it contains a larger amount of heavy metals than Yugoslav regulations permit. Vlada Adamovic, head of the biochemical division of the Institute for Health Protection of Serbia, where the analysis was conducted, stated that the "mass WH 248" preparation in particular contains an excessive amount of strontium.

Inspector Dencic informed the Leskovac Nevena enterprise and the importer immediately about his decision. Both enterprises had the right to protest the decision banning the import and sales of the aforenoted preparation, however, neither did so, and therefore the decision is binding under the law.

This example demonstrates pretty well that a stricter check on such products and their components which we import as well as those items that we produce at home continues to be necessary. The ever greater assortment plus ever more complex and demanding technology can "Offer" us goods with ingredients that tend to be unacceptable for man's health and well-being.

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