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TRANSLATIONS ON EASTERN EUROPE  
SCIENTIFIC AFFAIRS  
No. 540

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BIOLOGICAL SCIENCES DEVELOPMENT RAISES NEW QUESTIONS

East Berlin SPEKTRUM in German Jan 77 pp 10-12

[Speech by Academy Member Werner Scheler, director of the Research Center for Molecular Biology and Medicine, delivered at the Conference of the Social Scientists of the GDR in Berlin in November 1976]

[Text] The biological sciences are in a very dynamic period of their development. An essential cause of this is the comprehensive introduction of physical, chemical and mathematical methods in the analysis of life processes, as well as the penetration of biological research into the subcellular and molecular level. Friedrich Engels clearly foresaw this development. Thus, he wrote in his *Dialectic of Nature*: "Here chemistry leads to organic life, and it has come far enough to assure us that it alone will explain to us the dialectical transition to the organism." That Engels is not espousing a simple reductionism here becomes clear from another observation: "Sometime we will surely reduce thought to molecular and chemical movements in the brain, but is the essence of thought thereby exhausted?"

The development of biology has taken precisely the path which Engels foresaw. Nothing more remains of all the vitalistic ideas, even after Engels' lifetime. Biology formed a materialistic structure of life. Today we know the basic chemical principles of heredity and metabolism, we recognize the mechanisms of biological evolution, and are about to explore the molecular processes of memory formation. These and many other advances in the biological sciences are transformed everywhere in the social realm where new possibilities of their technical application are disclosed or where man as a biological and social being is affected.

The findings of the biological sciences also force us continually to deepen and further develop our world view. This involves among other things our conceptions of the evolutionary process with its prebiotic and biotic phase--processes of which particular partial reactions can be duplicated experimentally in the laboratory, especially in connection with the interaction of mutation and selection--accident and necessity. This further concerns the dialectical interrelation of stability and variability in biological systems, of genetic determination and epigenetic adaptability, of individuality and generality. But it is not these questions that I want to go into--especially since cooperation between biological and social scientists has already begun in this area--but rather a few examples of the

technical and technological branches of the biological sciences and of the interrelation between biological and social aspects of humanity.

In medicine and agriculture the biological sciences possess two areas of application with deep historical roots. Their scientific basis and technical level have continually grown. Some time ago, meanwhile, we entered a qualitatively new stage in the development of the biological sciences, roughly comparable to physics in the middle of the last century. Let us remember: out of the findings of physics research there grew a corresponding technology; hence all the mechanical technologies, energetics, electrical and magnetic engineering, optical technology, and more recently nuclear engineering as an outgrowth of nuclear physics. The social revolutions thereby evoked require no further documentation.

In the biological sciences seeds and beginnings of analogous developments are recognizable whose full potential we are presently quite unable to assess. These include technical microbiology, technical biochemistry, technical biophysics or bionics, but also to a large extent the chemical regulation of normal or pathological life processes in microorganisms, plants, animals and human beings, as well as the rapidly developing field of genetic engineering.

Technology is man's instrument for conducting his interaction with his natural and social environment in quantitatively and qualitatively new dimensions. This is also observable in these areas. Genetic engineering, in particular, is causing quite a stir. As recent years have shown, man will be able to create microorganisms and plants which nature itself has not produced. To this end foreign genes were introduced into bacterial, yeast and plant cells which could blend with the genes already present and be reproduced. In this way organisms with new characteristics are obtained. Plants differ from one-celled organisms in that to obtain the same result it is necessary--and also possible--to breed whole plants from isolated single cells. In principle foreign genes can also be successfully introduced into single animal and human cells. But the development of an animal organism from a single cell has so far eluded experimental grasp. At present numerous biological laboratories internationally are conducting intensive investigations into heterologous gene transfer, i.e., successful efforts are being made to transfer animal or human genes into a bacterial or plant cell or vice versa. Prospective goals for this work, among others, are gene therapy for considerable metabolic defects in humans and the production of human or animal protein hormones and similar agents through microorganisms manipulated especially for that purpose.

Closely connected with this problem area are experiments which fuse cells of various origin, thereby mixing the genetic contents of both original cells. In this way it is possible to blend not only cells of related species but also cells of very heterogeneous origin, even animal and plant cells. Such chimeras are not capable of developing, however; they constitute interesting and useful objects of study for the clarification of specific genetic questions, no more and no less.

As these few remarks have already made clear, biological research is opening many new approaches for a deeper penetration of the nature and mechanisms of biological matter. In the process of this advance in knowledge precisely the biological sciences provide ever new proofs that animate nature proceeds dialectically and not metaphysically.

Based on the progress in bacterial and cellular genetics, questions of the genetic manipulation of man have often been bandied about quite unseriously by some Western futurologists and the sensational press. Despite the synthesis of artificial genes, despite better gene transfer and fusion techniques, we are far from a causal therapy of genetic diseases or a genetic manipulation of man. Society must devote significantly more attention to other potential problems connected with the technique of gene transfer--the uncontrolled propagation among microorganisms of genetic information which results in resistance to antibiotics and chemotherapy, which can induce cancer or other possible pathological consequences. A possible military abuse of molecular-genetic technology to create virulent mutants cannot be ruled out.

Socially relevant aspects are also becoming increasingly evident in the case of biologically active chemical compounds which can interfere with life processes. In this connection I do not want to go into medicines, protective agents for plants, active substances in animal breeding, and such things, but only to refer to such active substances as take on mass character regarding their use. This applies, for example, to the large group of psychically active substances in their various shades or to the ovulation inhibitor. Questions of the following sort arise: In what way and to what extent are man's biosocial behavior and his relations to his environment modified by such substances? Do they influence ethical norms in man's communal life or forms of moral behavior? Are we immune from drug addiction and dependency--even if such phenomena do not appear in our foreground? In any case the use of psychopharmaceuticals has further increased in the GDR. What social factors hide behind this increase? Isn't an unequivocal abuse beginning here? What are the motivations in reaching for a depressant or a stimulant? One can continue the palette of such questions. On the basis of my specialized knowledge I know that an important area of interdisciplinary cooperation here for natural scientists, doctors and social scientists demands careful analysis.

Some results and developments of the biological sciences have touched off lively discussions. They concern the problem of biological or social determination of characteristics and modes of behavior. We know that higher animals and human beings behave very analogously in many biological aspects, e.g., in reacting to medicines, in the formation of tumors, and in their metabolism. Man and chimpanzee, for example, possess identical hemoglobin. Nevertheless, every human being has his own quite specific individuality, manifested, e.g., in his tissue antigens, which indeed are so extraordinarily restrictive in transplanting tissues and organs. The quantitatively and qualitatively greatest differences between man and animal consist in the development and differentiation of the brain. This, in turn, results from

the special evolution of man. Friedrich Engels refers to this interrelation when he writes: "Only man has managed to put his stamp on nature.... And he has managed this primarily and essentially by means of his hand.... But his head developed step-by-step with his hand...and with his rapidly growing knowledge of natural laws the means grew for acting on nature in return; his hand alone would never have produced the steam engine if man's brain had not developed with it, next to it, and partly through it." If this statement holds in its entirety for man's ascendancy over the animal, it also holds *mutatis mutandis* for the individual development of man.

We know from manifold investigations that the potentialities inherent in man, physical as well as mental, develop to the extent that they are fostered by interaction with his environment, natural as well as social. Work, sports, and education are built on this principle. In this connection it should be considered that genetically or developmentally conditioned differences exist among individuals. With respect to the outer habitus and bodily parameters there can be no doubt about this. A man who is 1.5 meters tall will hardly break the world's record in the high jump. But a person's mental potentials also have a material substratum, the brain. This is subject in its biological development to genetic regulation and influence by chemical factors which reach the foetus via the mother's circulation, e.g., certain hormones, trace elements and in some cases foreign bodies and the like. In consequence we must assume that interindividual differences exist in the differentiation of the complex structure of the brain.

To recognize the biological variations in the structure and differentiation of the brain is not, however, to join the chorus of those who make allegedly genetically determined differences in intelligence quotients into an alibi for a deformation of the educational system inherent in capitalistic society, or to tailor a "scientific" coat for racist theorists. The social and educational possibilities for completely developing a person's mental capacity are quite considerable. They can overlay the genetic variability to a large extent. This is the basis for one of the cardinal tasks of the socialist educational system. At the same time it is important to discover and resolutely foster those especially talented and gifted people who possess corresponding, often specific potentials. In this connection I would like to point out that the majority of a person's characteristics, including his mental abilities, are determined not by a single gene but by many genes; as a result hereditary correlations become looser in any case. In addition, because of the predominance of social factors in molding mental potentials, quantitative analyses of genetic components are rendered extraordinarily difficult and complex. We would not be Marxists if we had not first of all eliminated the social injustices in access to our educational institutions and thereby offered all young people equal chances to develop their abilities; but we would also negate the materialistic basis of our world view if we wanted to deny variability of the brain as the organ of mental processes and capacities.

The biological development of the brain is almost complete at birth, the multiplication of nerve cells ceases, and the differentiation of the nervous system is complete. These processes of organogenesis take place in the uterus and can be influenced through the circulation of the mother's blood. This applies not only to the formation of the brain but also to the formation of other organs or extremities. To what consequences chemical disturbance of organ predisposition and organ development can lead was shown very drastically by Thalidomide. Although, tragically, this effect was first discovered in humans, subsequent careful experiments on animals likewise produced deformities. Here too there exists a biological congruence between animal and man. That material influence of brain development is also possible is shown by behavioral disturbances in adult experimental animals when the mother is exposed to hormonal disturbances during their embryonic development. Experiments are also known in which pregnant rats were treated with somatotropine, a growth hormone. In this way significantly larger brain weights and higher numbers of nerve cells could be induced in newborn offspring. It is significant, furthermore, that after maturing animals given such intrauterine treatment achieved better than normal learning in conditioned-reflex experiments. We do well to be very restrained in uncritical transfer of such results to human beings. Besides, the chemical influence as well as the genetic regulation of embryonic and foetal development is still in the very earliest stages of research; but it seemed sensible to me to point out these developments, because new questions of social relevance can grow out of them.

We have to consider that in principle behavioral disturbances can also have biological roots, even though in cases of corresponding derailment in people we must assign responsibility far more frequently to social factors than to biological ones. Asocial behavior to the point of criminality is first and foremost of social causation and not programed in the genes, as many apologists of distorted capitalistic culture would have us believe. It is that much more necessary, however, in this area too, for us to subject the interplay of biological and social factors on modes of behavior, mental processes, etc., to a thorough cooperative analysis by social scientists, psychologists, biologists, and doctors.

Sometime, surely, one should discuss a series of further fruitful developments in biological research which demand cooperation with social scientists. We need an active and offensive position in all these areas: much too frequently in past years we have only mobilized ourselves when a Monod, a Lorenz, an Eysenk, et al have moved the public with their questionable philosophical or biological conceptions.

If Lenin already estimated in his day that the natural sciences were advancing so quickly, experiencing a period of such profound revolutionary change, that they would under no circumstances be able to manage without philosophical conclusions, this is even more true of the biological sciences today, and not only in the direction of philosophical consequences, but for other social sciences as well.

PROGRESS AND PLANS IN MATHEMATICS-CYBERNETICS RESEARCH

East Berlin SPEKTRUM in German Jun 76 pp 13-17

[Article by Prof Dr Manfred Peschel, chief of Mathematics-Cybernetics Research]

[Text] On the threshold of the 1976-1980 Five-Year Plan we ask ourselves the questions: How have the collectives of Mathematics-Cybernetics Research developed? What services can they now provide and what should be their future performance?

This research area is relatively young; it was established in April 1973 by combining the Central Institute for Mathematics and Mechanics, the Central Institute for Cybernetics and Information Processes and the Center for Computer Technology. The principal reason for the combining of these research facilities was the need to meet a demand issued by the Eighth Party Congress of the SED, namely that the prerequisites be created for increased effectiveness in the modeling and optimization of processes in the most diverse domains of the economy. For this purpose equal importance attached to the mathematical tools, the resources of cybernetics for the analysis of complex processes and computer testing of proposed strategies--that is, the transformation of methodology into computer technology practice. It was necessary for mathematics, mechanics, cybernetics and information processing to combine if they were to address themselves to the problems of modeling and optimization. Thus in establishing this research domain decisive importance attached to the promotion of interdisciplinary cooperation with all its favorable effects upon development within disciplines, with the goal of enhancing the efficiency and practical effectiveness of these disciplines.

Naturally, cooperation among scientists of different research domains, even within a single discipline, does not come about automatically. There have been and are some degrees of reservation but there exist also good beginnings, the most viable being in the cooperation between mathematicians and engineers. For example, in some collectives which are concerned with the processes of fluid mechanics it is no longer possible to strictly distinguish between mathematicians and engineers.



Such close unity cannot be expected in all areas. But the impulses introduced from one scientific specialty into other disciplines should be significantly strengthened. In this connection we can already record certain successes. For example, before the founding of this research area statisticians were neither aware of nor informed about the so-called black box methods of cyberneticians and conversely the methods of mathematical statistics were undervalued by cyberneticians. If today one looks at the working methods of comparable groups one observes a remarkable kinship of viewpoints.

In the short period of existence of our research area results have been achieved which have been successfully applied in social practice. Here-- as representative of other types of performance--only a few can be listed.

The "nonlinear analysis" collective worked out modern functional analytic methods of solving nonlinear equations of mathematical physics and methods of identifying free parameters in such equations. The processes were derived by using computer techniques and were applied in chemical process technology, for example, in the Parex process, in column dynamics and in the determination of diffusion coefficients in the Schwedt PCK [Petrochemical Combine], in the Ilmenau Glassworks and in the analysis of both viscous flows and of flows composed of several coupled phases.

The "probability and mathematical statistics" collective of the ZIMM [Central Institute for Mathematics and Mechanics] has developed a closed theory for parameter estimation, for forecasting and for setting up statistical linear models. With methods of analysis of variance based upon this theory they contributed to stabilizing magnetic tape technology in the Dessau Magnetic Tape Factory.

The solid state engineers are investigating the behavior of mechanical systems under the action of randomly excited external effects such as wind. In their investigations they combined the theory of probability with mechanical-mathematical models. Hitherto the results were applied primarily at the architectural academy of the GDR and in vehicle construction but they have been of increasing importance in machine construction. The fluid engineers have created, in common with the "analysis" collective, principles for analyzing the velocity profiles of viscous fluids; their research has been applied in petroleum and silicate chemistry. Of special importance in mechanics are contributions to the theory of turbulence and to multiphase flows; these contributions are of practical value in process technology in refrigerating and climatizing technology in pumps and in compressors.

A characteristic feature of cybernetic research was the effort to achieve discipline-determinative and stable orientations and to achieve increased effectiveness in the economy. Although it is of the nature of cybernetics research to achieve results of multivalent usefulness, the concretely achieved usefulness depends essentially upon the collective's ability to

demonstrate in some breadth the effectiveness of the developed methods in selected projects. In the current situation, this applies especially to knowledge gained in the area of classification and in computer-supported designing of industrial control systems. Here, along the lines of the Central Institute for Mathematics and Mechanics, groups concerned with application should take up important projects.

The "artificial intelligence" collective, starting with detailed analyses of human behavior has made important contributions to man-machine communication in the areas of classification, learning and problem solution and is now working intensively on question-answer systems. Here the scientists created a complex classifying system which is capable of learning and has manifold applications for diagnostic purposes in the area of health, for meteorology and for process surveillance and control in industry. The complex program system RENDIS for the logical design of industrial control systems on the basis of new ideas relating to the analysis and synthesis of automated machines has been worked out by the "computer-supported design" collective. RENDIS could substantially lighten the designing task for the planning engineer, reduce the expenditure of structural elements and enhance the reliability of the design. But it requires a transformation of the working procedure. A reason for the existing difficulties in reducing this to practical application consists in the want of disposition on the part of industry to spontaneously take up modern methods and independently contribute to research in technology transfer.

Throughout the entire socialist camp applications are being found for the studies conducted by the "pneumatics" collective which developed the DRELOBA pneumatic control system which has in the meantime proven itself practically. It has recently been augmented with fluid components.

These and other results make us confident. In this research area it has not yet been possible to initiate practical projects of sufficient importance to require a comprehensive utilization of the existing capacities. We are only now in the process of testing procedures which require the common cooperation of mathematicians, engineers, cyberneticians and computer technologists. Such projects may be found in the new five-year plan in the areas of automation technology and of water management.

In past years it has been possible to create prerequisites for the first central project of this research area which was the construction of a computer network for research and training. Even before this research area was established the Center for Computer Technology was entrusted with the task of providing the research facilities of the academy with adequate computing capacity. This compelled us to intensify discipline-oriented research in the area of information processing because it was necessary to set up an efficient operating system for the BESM-6 and to achieve direct coupling of process computers.

Of special economic importance were the introduction of remote data processing and investigations related to the construction of multiple computer systems. In designing process computer operating systems use was made of previous experience with the operating and programming system for the BESM-6 computer (BAMOS) and the MOST system for simultaneous independent control of several experimental devices and types of apparatus was developed. The program systems were directly applicable in X-ray analysis of crystal structure and in the analysis of economic-engineering problems. This research area has given much attention to the development of computer science. It has been assigned responsibility in the primary research direction which is concerned with information processing systems. It has been possible to stimulate effective collectives of mathematicians in advanced schools to achieve productive cooperation. The science-organizing performance of this primary research direction, especially the rigorously united cooperation and the concentration upon a common goal is exemplary also for other primary research directions. We shall in the future intensify this cooperation and dedicate ourselves at the same time especially in the area of numerical process engineering.

In the past there has also been occasion for critical remarks to the effect that mathematical research was being carried out at the academy along lines which were too practical and that it was--to overstate it somewhat--being sacrificed to a shortsighted "project" type of thinking. These criticisms were justified with regard to some areas. It is true that projects oriented toward practical applications have produced good results but it is also true that some areas of importance for the further disciplinary development of mathematics have been lagging. We are now attaining stabilization also in these disciplines. Our idea of mathematical research contemplates the further development of mathematics as a uniform science. It has the goal of creating prerequisites sufficient to make the Central Institute for Mathematics and Mechanics in fact and in the near future the center of the scientific life of mathematics in the GDR.

In the 1976-1980 Five-Year Plan where shall we concentrate our efforts? We also orient ourselves toward substantially enhancing our contribution to intensification of the national economy. For this research area the documents of the Ninth Party Congress of the SED indicate the necessity of cooperating more intensively than hitherto in work upon the following central issues of the national economy: the efficient production and transmission of electrical energy, improvement in the reliability and durability of technological installations and structures, the development of efficient regulating and control processes (especially for the purpose of intensifying effectiveness in machine construction), in developing and applying procedures of computer-supported planning, scientific contributions to the protection of health, enhancement of efficiency in the utilization of computer technology.

Ambitious achievements which are productive from the point of view of the national economy can be accomplished only when by means of discipline-oriented basic research the necessary primary forms of knowledge have

been obtained. In this connection in mathematics there should be further strengthening in the directions of analysis, stochastics, algebraic geometry and number theory. Focal points for research in the discipline of mechanics are questions having to do with turbulence and efforts to establish closer connections between mechanical problems and stochastics. In cybernetics what is needed is a further profiling of the discipline-determinative directions of computer-supported design, artificial intelligence, cybernetic instrument technology and the principles of global modeling.

Information processing is confronted by the task of rationalizing the application of computer technology to the research process. In addition it is necessary to create principles for the design and construction of experimental and production networks.

In the coming 5 years our colleagues must accomplish the following important tasks: in addition to intensified research within particular disciplines it is necessary in the Central Institute for Mathematics and Mechanics to create so-called schools of applied mathematics with the goal of increasing the practical effectiveness of mathematics and mechanics. This relates especially to the domains of "mathematical-statistical model construction" and "chemical process analysis."

The studies carried out in fluid mechanics and in solid state mechanics must more than previously be oriented toward the needs of machine construction. The resulting questions of process analysis and identification, questions of strength, stability and susceptibility to vibration, etc., require close cooperation between mechanics and cybernetics. There is in particular a need for further development of the area of hydraulics/pneumatics on the part of engineers and cyberneticians. Important for process computer engineering but also for the further development of automation in machine construction, in the field of energy and especially in the construction of power plant facilities is the initiation of studies relating to cybernetic instrumentation technology. However, this goal can be achieved only if the scientists of the academy, of the advanced school domain, and of the VVB [Association of State Enterprises] cooperate closely. Together with solid state mechanics, purposeful research should be commenced in the area of acoustical diagnosis in engineering installations.

To an increasing extent complex systems of the national economy are being analyzed by means of efficient computers especially by means of simulation languages: Here we perceive real opportunities for cooperation with social scientists. Systems analysis studies must be continued based on concrete projects in the area of transport, environment protection, water management and chemical process analysis; in this way it will be possible to better regulate processes of the national economy and to gradually obtain an efficient program for the analysis of complex systems in the sense of global modeling. Here a focal point of systems analysis is provided by the studies which are being conducted in relation to the electrical grid system in socialist countries.

Forms of research which lie within specific disciplines and which relate to information processing are oriented toward the problematics of computer networks. In socialist joint efforts with scientists of the advanced schools various subproblems are being worked upon cooperatively. Studies relating to the methodology of programming serve the effective planning of large-scale programming systems. We must make significant efforts to provide large-scale computer capacity and to utilize it more intensively.

The scientific tasks confronting us and their solution require a high level of utilization of all our colleagues, rigorous coordination of research and close cooperation with our partners in the national economy as well as in the socialist fraternal countries.

#### PHOTO CAPTIONS

1. p 16. For the automation of mental processes an algorithm (meta algorithm) has been developed and programmed by the Central Institute for Cybernetics and Information Processing. This algorithm is capable [sic] of learning classification procedures by means of examples and of thereafter classifying unfamiliar objects.

Up to the present this meta algorithm has been used in the diagnosis of cardiovascular illnesses by means of viewing screen projections from national X-ray series examinations.

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NEW SYSTEM OF STATE SUPPORTS ADOPTED FOR COMPUTER TECHNOLOGY

Budapest SZAMITASTECHNIKA in Hungarian Feb 77 p 7

[Text] The article entitled "Computer-Technology Credit Policy (published in SZAMITASTECHNIKA, No 12, 1976) elicited a wide response. We received several enquiries dealing with other areas of computer-technology application investments. We referred the questions related to the state support system in effect during the Fifth Five-Year Plan period to Dr Janos Radnoczi, deputy main department head of the National Development Bank. This article summarizes the responses of Dr Janos Radnoczi.

The State Planning Committee has decided in April 1976 that certain administrative and computer-technology institutions and enterprises are to be granted preferential credit and state support to permit them to realize investments aimed at the development of computer-technology utilization systems for increased efficiency in their operations. These features may be obtained from 1 January 1977 onward. The applications had to be submitted before September 1976 at the National Computer Technology Application Bureau of the KSH [Central Statistical Bureau]. The applications received are reviewed by the National Planning Bureau, the Ministry of Finance, and the Central Statistical Bureau, through a committee constituted of their representatives. Insofar as the funding sources are concerned, it is desirable that they include in addition to the state support also the organization's own development funds and perhaps also a repayable bank credit. If bank credit is used, the Hungarian National Bank must state the possibility of granting credit to the Support Committee. Of course, the leadership of the enterprise concerned also attends the committee meetings.

According to the announcement, "support may be granted to organizational institutions, computer-technology enterprises performing national functions,

computer-technology establishments of industrial branches, major government entities, and multi-enterprise associations formed for this purpose. Organizations operating under budgetary managements are not eligible." (Insofar as the latter organizations are concerned, we will publish another report in a forthcoming issue, after the Council of Ministers have announced their position on the matter.)

The investments realized under state support must serve a specific purpose. Such purposes may include enterprise production organization, work and factory organization, management organization, decision process organization, planning for the annual and short term, optimization, enterprise administration organization, complex enterprise-management systems, technical industry branch research institutions, technical computations of research establishments, simple computer-technology processing operations at the industry-branch level (for example, budget preparation based on national work norms), industry-branch management operations (at the higher level), computer technology tasks, part tasks for individual and industry-branch operations, and wage management. The feasibility of the individual tasks is also evaluated by the Support Committee.

In addition to the foregoing, the applying enterprise must also participate in the regular operation of the computer systems to be established on the industry-branch level or the ministry level, and in the establishment of demonstration systems. The methods and computer-technology systems used must also be adaptable to other enterprises. Introduction and development of the computer-technology systems must be accompanied by the development of unified or standardized methods for increasing production and enterprise management. Care must also be exercised to ensure that the development and the entire activity complex is implemented in practice, and that its results are spread and evaluated everywhere.

In view of the foregoing, the regulations governing the preparation of support applications detail clearly the contents of the application. The text must analyze in detail and justify adequately the present state of the art in the field of computer technology in the field concerned; it must describe the planned development, the expected results, the efficiency, the economic impact, and the reasons why the development cannot be accomplished from the applicant's own resources. The conditions under which the state support is granted to the successful applicants are outlined in Decrees 2010/1976 MT [Council of Ministers] and 8/1976 (IV.30) PM [Ministry of Finance] covering the state support of enterprise and cooperative investments. The conditions of the state support of computer-technology investments were established in accordance with the provisions of the above decrees. So far, applications for state support amounting to almost one billion forints have been received;

approximately 20 percent of the financing is expected to be from internal resources and another 20 percent from bank credits. The remainder is expected to be financed with state support. In view of the fact that the planned amount for 1977-1980 amounts to 200-300 million forints per year for this purpose, the above amount practically exhausts the investment capability of state support, assuming that all are approved.

Monitoring of the investments realized with state support is by means of annual checks performed by the KSH OSZI [Central Statistical Bureau, National Computer-Technology Applications Bureau] in conjunction with the State Development Bank. The control extends to the annual schedule adherence of the investment project, the proper utilization of the computer at the required level, and similar considerations. Each and every enterprise which has received state support must submit a report at the end of the project to the supervisory authority and the KSH. The contents of this report are specified in Appendix 7 of the Decree 3/1974 (VIII.6) OT-PM [National Planning Bureau-Ministry of Finance]. Another report must be prepared for the startup of the facility, and the appropriate assets must be activated.

The hope is that the new support system and the regulations governing the application of computer technology will contribute to the development of a stable economic operation and to the establishment of better computer-technology fee structures commensurate with our price structure. This aim is also served by the preferences established for the credit policy. We also mention that in the first half of the amortization period (increased to seven years) the enterprises are only charged with 10 percent of the equipment costs because of the startup problems expected to arise in the first few years. During the remaining years, the percentage is 15 percent each year. This measure represents a 4 percent discount to the enterprises during the year of the investment. In order to facilitate the introduction of the stable economic operating system referred to above, it would be desirable to issue guidelines for calculations also. This is a project now being worked on by the appropriate authorities.

2542

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HUNGARY

AWARDS FOR 1976 LONG TERM SCIENTIFIC RESEARCH PUBLISHED

Budapest AKADEMIAI KOZLONY in Hungarian 21 Jan 77 pp 7, 8, 9, 11, 12, 14, 15, 16, 22

[Excerpts] 1976 Awards for Achievements in Long-Range Scientific Studies

Major National-Level Research Themes

Hungarian Academy of Sciences

1. Studies in the Field of Solid State

1. Arpad Barna, Ferenc Beleznyay, Imre Mojzes, and Gyula Stark (MTA MFKI [Hungarian Academy of Sciences, Research Institute of Technical Physics])

"Investigation and applications of large-scale phenomena: Study and realization of the experimental manufacturing technology and metrology of Gunn diodes."

The applicants developed and organized the methods and apparatus for measuring the epitaxial layer needed for the preparation of Gunn diodes and the Gunn-type structures. They developed an instrument — a microfurnace — which permitted the contacting and capsulating of the Gunn diodes in a single step. By means of these development achievements, which were based on a detailed theoretical study of the manufacturing process and the physical processes on which the manufacturing process is based, it is now possible to produce these semiconductor devices in a reproducible manner under very favorable technical parameters, in large numbers, and economically.

Awards: 7,000 forints for Arpad Barna, 9,000 forints for Ferenc Beleznyay, 4,000 forints for Imre Mojzes, and 4,000 forints for Gyula Stark (total: 24,000 forints).

5. Andras Lutter (MTA KFKI [Hungarian Academy of Sciences, Central Research Institute for Physics])

"Manufacture of hard laser mirrors with oxide components"

The method developed for the preparation of thin layers capable of being used as laser mirrors is indispensable for the development and technical utilization of new types of laser.

Award: 6,000 forints.

6. Mihaly Gal, Karoly Nemeth, and Gyorgy Eppeldauer (MTA MFKI)

"New method for the measurement of the optical absorption of thin semiconductor layers"

The applicants developed a new method and created a complete system for the measurement of the optical constants, composition, and contamination of thin layers. The method and the apparatus may be used for the evaluation of thin layers, for checking the procedures involved in layer growing, and for discovering hidden defects in the manufacturing operations, all these in a non-destructive manner.

Awards: 4,000 forints for Mihaly Gal, 3,000 forints for Karoly Nemeth, and 3,000 forints for Gyorgy Eppeldauer (total: 10,000 forints).

7. Istvan Foldvari and Rudolf Voszka (MTA Crystal-Physics Research Laboratory)

"Optical study of pure and halogen-homolog contaminated single NaF crystals"

The applicants prepared single NaF crystals which are much purer than those described in the literature and which are better in all other respect than those. By means of vacuum ultraviolet optical measurements they established that the appendage of the absorption edge of the single NaF crystals follows the Urbach rule, contrary to observations reported earlier.

Award: 4,000 forints for Istvan Foldvary. Scientific Director Rudolf Voszka is not entitled to receiving awards because of his position. Of course, this fact does not detract from the moral recognition of his contribution to this achievement.

8. Andras Janossy (MTA KFKI)

"Single-particle spin waves in paramagnetic metals"

The recognition of the role of non-resonant single-particle spin waves is a major scientific accomplishment. The new experimental technique described in the paper and the recognition of a new phenomenon permits the elucidation of more precise details in the electron structure of metals, for example some non-average properties in the pulse field.

Award: 5,000 forints.

2. Bioregulation Mechanisms

2. Tibor Farkas, Adonisz Belea, and Laszlo Vigh (Biochemistry I and Genetics I departments, MTA SZBK [Hungarian Academy of Sciences, Biochemical Center in Szeged])

"Effect of temperature on the fat metabolism of wheat"

We have no information about the biochemical mechanism of frost resistance and the related physiological reactions of plants on the membrane level. We do not know the physico-chemical state of the membranes as they are affected by environmental effects, nor the control mechanisms involved. The results summarized in the paper may be regarded as initial steps in this important research subject.

Award: 9,000 forints, equally distributed among the applicants.

4. Bela Fekete, Gabriella Gasztonyi, Laszlo Kalmar, Istvan Lang, Julia Levai, and Kristof Nekam (Experimental Research Laboratory and IInd Clinic of Internal Medicine, SOTE [Semmelweis University of Medical Sciences])

"Complex study of substances which influence immunity"

The authors investigated the effects of various substances which influence the immunosystem by means of techniques which test the immunocellular reactivity and the cyclic nucleotide system. In these studies they developed and standardized the methods for lymphocyte separation, marking, and functional evaluation.

Award: 18,000 forints, equally distributed among the applicants.

6. Bertalan Varga, Edit Horvath, and Gabor Folly (MTA KOKI [Hungarian Academy of Sciences, Research Institute for Experimental Medicine])

"Effect of the adenocorticotropic hormone (ACTH) on the hormone secretion of the ovary"

The authors approached the problem by means of modern hormone analyses and generated new results in methodological terms. The detailed analysis of the extra-adrenal effect of ACTH is important for the understanding of the physiological and pathological control of the hypophysis-suprarenal gland axis.

Award: 9,000 forints, equally distributed among the applicants.

8. Ferenc Obal (Institute of Physiology, SZOTE [University of Medical Sciences in Szeged])

"On the cybernetic systems of the control of vegetative functions [in English]"

The studies described in the paper follow the modern trend of intestinal and vegetative functions and their control mechanisms. They may be helpful and may well supplement the methods used in the study of the effect mechanisms of the pharmacons in the central nervous system. They may also raise interesting problems in terms of phenomenological studies.

Award: 5,000 forints.

#### 5. Study of Biologically Active Compounds

1. Janos Fischer, Gabor Toth, Jozsef Rakoczi, Jozsef Borsy, and Andrea Maderspach (EGYT [United Pharmaceuticals and Nutrients Factory], Fifth Institute of Organic Chemistry, SOTE, and Drug Research Institute, Budapest)

"Study of new pharmaceuticals affecting lipid metabolism"

The paper contributed to the elucidation of the relationships between chemical structure and the lipid-reducing effect in the field of flioxyacid derivatives.

The stereo-chemical ramifications of the paper are commendable, as are the deep, well-supported applications of  $^1\text{H}$  nuclear magnetic resonance spectrometry on model compounds.

Very valuable conclusions may be reached for ring systems containing S, S oxide, and S,S bio-oxide instead of the methylene bridge.

2. Sandor Antus, Ferenc Boross, Agnes Gottsegen, Zsuzsa Kardos (Mrs Balogh), and Mihaly Nogradi (Central Research Institute for Chemistry, MTA; Alkaloid Chemistry Research Group, MTA)

"Development of a new method for the synthesis of isoflavones, based on the oxidative rearrangement of chalcones with thallium(III) nitrate, for the preparation of isoflavonoids of natural origin"

The paper describes a method for the synthesis of isoflavones which starts from chalcones, involving the oxidative rearrangement of the latter with thallium(III) nitrate. The method is general and may be regarded as novel. The authors prepared numerous, sometimes complex, isoflavonoids. The particular advantage of the new method is that it may also be applied to the preparation of isoflavonoid glucosides.

Award: 20,000 forints, equally distributed among the applicants.

3. Gerzson Vegh, Bela Tanacs, and Istvan Mucha (Isotope Institute, MTA, Budapest)

"Labeled prostaglandine type transformations on thin layers"

The paper describes a micro method which may be used not only for a specific group of compounds but also in practically all areas of biochemical analysis and synthesis, by using the most suitable thin layer for the compound types concerned.

Award: 12,000 forints, equally distributed among the applicants.

4. Berta Knoll and Kalman Magyar (Pharmacological Institute, SOTE, Budapest)

"A new method for the pharmacological influencing of the serotonerg cerebral mechanisms"

The authors investigated the relationships between the structure and the effects of new amphetamine derivatives and found the basic fact that the dual effect on the training and remembering functions of amphetamine rats, which is dose-dependent, is the result of the joint effect on the catecholaminerg and serotoninerg system. The achievements of the authors form an organic and valuable part of the internationally acclaimed research carried out at the Pharmacological Institute of the SZOTE in the field of phenylalkylamines.

The authors' achievements with V-111 and Deprenyl (phenylisopropylpropinyl-methylamine) offer new possibilities for the investigation of the cerebral biogeneamine mechanisms.

Award: 10,000 forints, equally distributed among the applicants.

6. Borbala Toth, Miklos Toth, Marton Tuske, and Laszlo Varjas (Plant Protection Research Institute, Budapest)

"Synthesis and examination of potential insecticides: antiecdisone-type compounds"

The paper describes studies aimed at the development of new insecticide types. A very interesting aspect of the paper is that it demonstrates the pupa delaying effect of triarimol; this is a new discovery.

Another interesting and valuable scientific achievement of the study is that the authors developed two new test methods, capable of being used in Hungary, for phytophage and zoophage insects. These methods permit the fast and dependable screening of antiecdisone-type compounds.

Award: 12,000 forints, equally distributed among the applicants.

#### 4. Studies in the Field of Transplantation

1. Peter Kupcsulik, Karoly Stekker, and Maria Nemeth (SOTE, First Surgical Clinic)

"Investigation of tissue enzymatic activity and lactate metabolism by means of laboratory and enzyme histochemistry in the course of experimental liver ischemia"

The new scientific result of the paper is the examination of liver tissue by means of complex biochemical and enzyme-histochemical methods.

Although the data reported are only partially new, and the studies dealing with the LDH isoenzymes require additional work, the results already presented provide an insight into the metabolic changes taking place in normal and ischemic liver.

The joint application of complex biochemical and enzyme-histochemical methods brings us closer to the clinical evaluation of livers considered for transplantation.

Award: 9,000 forints, equally distributed among the applicants.

## 6. Ethio-pathogenesis and Therapy of Tumors

1. Matyas Borzsonyi, Alan Pinter, Andras Surjan, Marta Csik, and Laszlo Nadasdi (OKI [National Institute of Public Health], Budapest, and MTA, peptide Chemistry Research Group, Budapest)

"Mouse tumors induced by carcinogens originating from carbamate and guanidine type pesticides"

The N-nitroso compounds play an important role among the carcinogens encountered in the environment since such compounds may also form in vivo. The precursors exist in the human environment: in food, in drugs, and in chemicals. For example, carbamates and guanidines may transform into tumor-generating N-nitroso compounds both in vivo and in vitro. The data presented in the paper indicate that this may also take place with pesticides used in agricultural operations. A new finding is the fact that this mechanism is also operational in a transplacental route. The relationships between the N-nitroso compounds and the oncornaviruses deserve special attention.

Award: 15,000 forints, equally distributed among the applicants.

2. Sandor Pacsa, Lajos Kummerlander, Bela Pejtsik, Karoly Krommer, and Kalman Pali (POTE [University of Medical Sciences in Pecs]; Regional Hospital, Pecs; POTE, Department of Obstetrics)

"Herpes simplex virus specific antigens in exfoliated cervical cells from women with and without cervical anaplasia [in English]"

This paper contains both theoretical and practical conclusions. An important statement is that there is virus-specific antigen in 9 percent of the normal cervical cells; this indicates that the "preference" theory is of relatively little importance in the viral etiology of human tumors. Although the applicants' studies cannot be regarded as new in view of the studies which had been carried out in Bethesda, they are trailblazing in the domestic sphere.

Award: 15,000 forints, equally distributed among the applicants.

## 7. Pathology and Therapy of Injuries

1. Antal Renner (National Institute of Traumatology, Budapest)

## "Prosthesis for replacing injured finger joints"

This is the first time that someone in Hungary used a prosthesis for replacement of a finger joint. The author performed scientifically valid after-surgical evaluation after the replacements and presented the data in the paper. The result: from among 34 documented cases of injury, 31 became fit to work in their original trades. The paper describes applied, rather than basic, studies, using refined methods. Although the importance of the paper is in its specific area, the experiences may be used in connection with other joint-replacement operations also.

Award: 5,000 forints.

## 9. Genetic Studies

### 1. Peter Juhasz and Jozsef Szeberenyi (POTE, Institute of Biology)

"New data on the functional significance of the phosphorylation of non-histone nuclear proteins"

The authors demonstrated that the CAMP-dependent protein kinase plays a regulatory role in the phosphorylation of the non-histone cell-nucleus proteins in the case of informoer proteins also. They pointed out that the phosphorylation of the transport proteins facilitates the transfer of the RNA into the cytoplasm. The results presented in the paper contribute to a better understanding of genetic control since they indicate that the phosphorylation of the nuclear non-histone protein plays an important role not only in the gene expression but also in the regulation of the gene activity.

Award: 6,000 forints, equally distributed among the applicants.

## 11. Study of the Basic Aspects of Plant Protection

### 1. Zoltan Barabas, Akos Mesterhazi, and Janos Mautz (Research Institute for Grain Crop Growing)

"Theoretical and methodological aspects of disease resistance in wheat"

The paper provides new data for the resistance improvement of autumn wheat rust and mildew, both in methodological and improvement terms. The "central rotating system" as a new and economical technique for resistance improvement and the induced mutation system for selecting resistant mutants are worthy of special mention. The results presented in the paper contribute significantly



to the future availability of new types of wheat with resistance against these diseases.

Award: 21,000 forints, equally distributed among the applicants.

2542

CSO: 2502

## HUNGARY

### RADIOACTIVE POLLUTION OF FOOD IN HUNGARY EXAMINED

Sofia KHRANITELNA PROMISHLENOST in Bulgarian No 8, 1976 pp 12-13

[Article by Engineer Doctor Andras Szabo (Institute for Control and Research of Foodstuffs, Gyor\*): "Some Data on the Radioactive Contamination of Foodstuffs in Hungary"]

[Text] The steadily expanding application of atomic energy (experiments with atomic bombs, atomic power plants) and radioactive isotopes is giving rise to systematic research into contamination by radioactive substances. In Hungary, systematic studies were begun in 1960, and the central directing institution is the Central Institute for Control and Research of Foodstuffs (KEVI). This central institute coordinates the work being done by a whole network of institutes.

Twelve institutes participate in the research (Budapest, Gyor, Kecskemet, Miskolc, Bekescsaba, Debrecen, Nyiregyhaza). They are systematically investigating the radioactivity of various foodstuffs and farm products. During regular measurements the beta-activity is determined; formerly this was done with Geiger-Muller counters, but now almost exclusive use is made of scintillation counters.

#### Results of Investigations

Table 1 contains the average values of activity which the twelve institutes obtained in processing samples from 1971 to 1974.

Table 2 shows the radioactive contamination of several foods which play a vital role in public provisioning. These samples were taken during a period from 1972 to 1973 in the Gyor-Sopron region. The tabular values show the average values of the activity of all five samples.

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\*The author is presently working in the Unified Institute for Atomic Research in Dubna (USSR), neutron physics laboratory.

In February, July, and October 1974 investigations were carried out one after another, over five consecutive day periods, covering the whole range of foods. These foods were consumed by students in one of the secondary schools of Győr. The results of samples from the range of foods are shown in Table 3. It shows the activity of  $^{90}\text{Sr}$  additionally in  $\mu\text{Ci}/\text{grams Ca}$ , which is frequently used in the specialized literature.

#### Discussion of the Results

From Table 1 it may be concluded that the activity of  $^{40}\text{K}$  forms the predominant part of the overall beta-activity and that the activity of the man-made isotopes is lower by about one factor. In general,  $^{137}\text{Cs}$  (together with  $^{90}\text{Sr}$ ) is the worst of all man-made radionuclides and, in addition, forms the largest concentration. But a short time after atomic bomb experiments, foodstuffs also become contaminated with many other isotopes. These isotopes have relatively short disintegration periods—for example,  $^{131}\text{I}$ ,  $^{89}\text{Sr}$ , and  $^{140}\text{Ba}$ .

The most severe radioactive contamination in Europe was detected in 1963. In Hungary the greatest contamination was measured between 1961 and 1964. After that the contamination showed a diminishing tendency (the 1963 Moscow Agreement on Prohibiting Atomic Weapons), but continued systematic investigations are justified. Thus, for example, contamination due to the growing number of power plants needs to be controlled. In addition, in the recent past nuclear explosions have been carried out by China, India, Great Britain, and France. The effect of such atomic experiments goes on for decades, because the resulting radionuclides have a long disintegration period (for example,  $^{90}\text{Sr}$  has a disintegration period of as long as 28 years) and of the radioactive isotopes which get into the stratosphere only about 10 percent fall onto the surface of the earth (through fallout, rainout, washout). According to the estimates of some specialists, for example, milk contaminated with  $^{90}\text{Sr}$  (if no further contamination gets into the biosphere) will still, in the year 2000, contain between 30 and 80 percent of today's radioactive content.

1) Хранителен продукт	2) Година	3) Подроб- но число	4) 5) Общо	Активност	
				<sup>40</sup> K	<sup>90</sup> Sr
6) Спанак	1971	93	63,5	47,4	1,8
	1972	106	60,3	50,8	2,1
	1973	82	54,9	48,3	1,1
	1974	78	62,2	56,1	1,8
7) Киселец	1971	96	45,8	35,9	1,7
	1972	125	45,9	37,7	1,7
	1973	83	40,4	34,6	1,0
	1974	70	46,2	37,9	1,6
8) Салата	1971	109	57,3	49,1	1,7
	1972	124	57,4	48,7	2,0
	1973	80	58,8	49,7	1,3
	1974	76	59,1	51,4	1,6
9) Риба	1971	40	8,0	6,9	0,1
	1972	66	9,8	8,3	0,2
	1973	71	10,6	8,8	0,2
	1974	43	33,3	31,3	0,5
10) Мляко	1971	299	134,0	120,0	1,1
	1972	426	134,8	120,4	1,2
	1973	305	125,2	119,6	1,2
	1974	318	136,5	122,5	1,3

Radioactive Contamination of Foodstuffs (In Vegetables and Fish the Radio-Activity is Given in pCi of Dry Matter; in Milk--in pCi/100 grams of Milk)

Key:

1. Food
2. Total
3. Specific figure
4. Activity
5. Total
6. Spinach
7. Sorrel
8. Lettuce
9. Fish
10. Milk

The data of Table 2 support the above mentioned fact that the greater portion of the radioactivity of foodstuffs is of natural origin. Comparison with some already published values shows the following: from 1972 to 1973 <sup>90</sup>Sr contamination of milk in the United States was 5 pCi/liter. According to (Kayl) the concentration of <sup>90</sup>Sr in carp is 370 pCi/kg of dry meat. Radioactivity in the form of <sup>90</sup>Sr in vegetables, according to Herbst, ranges from 10 to 30 pCi/kg of dry matter.

Radioactivity of Certain Foods, Ci/gram of dry matter

Хранителен продукт 1)	2) Радиоактивност		
	3) Общо	<sup>40</sup> K	<sup>90</sup> Sr
4) Ябълки	7,2	6,2	0,4
5) Круши	7,0	6,1	0,3
6) Сливи	15,0	12,8	0,9
7) Чушки	27,1	24,2	1,1
8) Грозде	12,1	11,8	0,1
9) Праскови	5,7	3,6	0,7
10) Краставици	2,1	1,9	0,1
11) Кестени	8,7	8,5	0,0
12) Зелe	22,1	21,4	0,3
13) Картофи	13,1	11,5	0,4
14) Хляб	2,3	1,9	0,1
15) Паризер	5,5	5,3	0,1
16) Мешано	4,7	4,4	0,1
17) Шунка	4,6	4,5	0,0
18) Нача	2,2	1,8	0,2
19) Насет от чер дроб	3,0	2,6	0,1
20) Белтък	11,3	9,0	0,7
21) Жълтък	2,4	1,2	0,5

Key:

1. Food
2. Radioactivity
3. Total
4. Apples
5. Pears
6. Plums
7. Peppers
8. Grapes
9. Peaches
10. Cucumbers
11. Chestnuts
12. Cabbage
13. Potatoes
14. Bread
15. [Parizer]
16. Cold cuts
17. Ham
18. Head cheese
19. Liver pate
20. Egg white
21. Yolk

If we compare  $^{90}\text{Sr}$  contamination of vegetable and animal products, we find that vegetable contamination is much greater than that of animal tissue. The reason is to be found in the animals' good discrimination capability with respect to  $^{90}\text{Sr}$ . Thus, for example, only a little of the radioactive content of fodder gets into milk. Table 4 shows the radioactivity of milk and fodder and the discrimination factors of milk and fodder. The table shows the average values of  $^{90}\text{Sr}$  activity and the discrimination factors. The samples were taken in Mosonmagyaróvár, regularly and in parallel, from 1968 to 1974 (one sample of milk and fodder each month).

#### Results of Investigation of Diet

1) Номер	2) мг		3) Активность pCi		5) $^{90}\text{Sr}$ активност, pCi/g Ca	
	K	Ca	4) общая $^{40}\text{K}$ $^{90}\text{Sr}$			
1.	1540	1050	1450	1375	21	20
2.	1410	1410	1296	1259	10	7
3.	1950	780	1794	1741	12	15
4.	2030	810	1951	1813	11	13
5.	1180	930	1070	1054	8	9
6.	2130	710	2021	1902	7	10
7.	1660	880	1629	1482	17	19
8.	1580	690	1652	1411	17	25
9.	2790	620	2650	2491	23	37
10.	3280	690	4375	2929	31	45
11.	1640	870	1729	1465	13	15
12.	2500	920	2422	2233	17	19
13.	1830	1100	1682	1634	15	13
14.	2020	1010	1998	1804	19	19
15.	2470	1040	2353	2206	14	13
6) Средно:	2001	901	2005	1787	17	91

#### Key:

1. Number
2. Milligrams
3. Activity of pCi
4. Total  $^{40}\text{K}$   $^{90}\text{Sr}$
5.  $^{90}\text{Sr}$  activity, pCi/gram Ca
6. Mean:

The data of Table 4 show that the contamination of milk by  $^{90}\text{Sr}$  is lower than that of fodder by a factor of one. Similar phenomena can be observed in the human organism. The organism of the mother protects the suckling child against radioactive strontium, because contamination of mother's milk is much weaker than that of food products.

Milk/Fodder Discrimination Factor

1) Година	2) $^{90}\text{Sr}$ активност		5) Дискриминационен фактор
	3) Мляко	4) Фураж	
1968	4,6	92	0,05
1969	4,3	47	0,09
1970	14,4	136	0,11
1971	5,2	50	0,10
1972	16,6	106	0,16
1973	4,4	71	0,06
1974	12,5	71	0,18
6) Средно:	8,8	82	0,11

Key:

1. Year
2.  $^{90}\text{Sr}$  activity pCi/gram Ca
3. Milk
4. Fodder
5. Discrimination
6. Mean:

It is categorically necessary to stress, however, that such good discrimination is characteristic only in the case of  $^{90}\text{Sr}$ , whereas for  $^{137}\text{Cs}$ , human and animal organisms discriminate poorly.

The data of Table 3 show that the human organism takes in a daily average of about two grams of potassium and almost one gram of calcium. The amount of beta-emitting isotopes taken in by incorporation runs as high as about two nCi, and  $^{90}\text{Sr}$  activity runs only to about one percent of the total activity. For purposes of comparison with the dish values, Table 5 shows some data from specialized publications.

Investigations of Foods

1) Година	2) Място	3) Активност pCi				
		$^{40}\text{K}$	$^{90}\text{Sr}$	4) $^{90}\text{Sr}/\text{g Ca}$	$^{137}\text{Cs}$	
1964	Япония	5)	—	—	—	107
1965	ЧССР	6)	—	—	34	95
1972	ЧССР	6)	—	—	6	11
1965	Полша	7)	2310	—	—	60
1966	Полша	7)	2470	—	—	47
1971	Полша	7)	—	23	—	—
1967	ЕНО	8)	—	12	17	—
1967	ГДР	9)	—	13	—	—
1969	Холандия	10)	—	11	—	27

Key:

- |                                 |                   |                     |
|---------------------------------|-------------------|---------------------|
| 1. Year                         | 5. Japan          | 9. GDR              |
| 2. Location                     | 6. Czechoslovakia | 10. The Netherlands |
| 3. Activity pCi                 | 7. Poland         |                     |
| 4. $^{90}\text{Sr}/\text{g Ca}$ | 8. EEC            |                     |

In conclusion it can be stated that the radioactive contamination of foodstuffs in Hungary does not exhibit any marked difference compared with the average levels in Europe. Radioactive contamination of foodstuffs is not great--in the case of  $^{90}\text{Sr}$  it runs to between 5 and 10 percent of the permissible level; this means that no purification treatment is needed. In Hungary the highest level of contamination was detected between 1961 and 1964, after which the levels declined and since 1970 no substantial change has been noted.

5003

CSO: 2202



HUNGARY

ROSTER OF NEW CANDIDATES AND DOCTORS OF SCIENCES PUBLISHED

Budapest MAGYAR TUDOMANY in Hungarian No 2, 1977 pp 141-144

[News From the Committee on Scientific Qualification. New Doctors and Candidates of Sciences, October-November 1976]

[Text] I. The Committee on Scientific Qualification declared

Attila Borhidi, doctor of biological sciences, on the basis of his dissertation entitled "Fundamentals of the Geobotanics of Cuba"; the opponents were: Pal Jakucs, academician; Laszlo Kadar, doctor of geographic sciences, and Tamas Pocs, candidate of biological sciences;

Sandor Damjanovich, doctor of biological sciences, on the basis of his dissertation entitled "Theoretical and Experimental Study of the Regulation of Enzymatic Activity"; the opponents were: Ferenc Antoni, academician, Laszlo Boross, doctor of biological sciences; and Tamas Keleti, academician.

Imre Faredin, doctor of biological sciences, on the basis of his dissertation entitled "Biotransformation of Androgen Steroids in the Human Skin"; the opponents were Elemer Endroczi, doctor of medical sciences, Gyula Telegdi, doctor of medical sciences, and Tibor Feher, candidate of biological sciences;

Jozsef Imre, doctor of medical sciences, on the basis of his dissertation entitled "Methods and Possibilities for Improving the Safety and Success of Esophagus Surgery"; the opponents were: Gyorgy Bornemissza, doctor of medical sciences, Imre Littmann, doctor of medical sciences, and Pal Rubanyi, candidate of medical sciences;

Jozsef Juhasz, doctor of technical sciences, on the basis of his dissertation entitled "Calculation of the Reserve in Porous Water Reservoirs"; the opponents were: Gyorgy Kovacs, doctor of technical sciences, Miklos Kozak, doctor of technical sciences, and Arpad Kezdi, academician;

Mihaly Korom, candidate of historical sciences, on the basis of his dissertation entitled "Establishment of the Temporary National Government and the Changeover of Hungary to the Side of the Anti-Fascist Coalition"; the opponents were: Andor Csizmadia, doctor of political and legal sciences, Sandor Orban, doctor of historical sciences, and Andras Zsilak, candidate of historical sciences;

Gyorgy Koszegfalvi, doctor of technical sciences, on the basis of his dissertation entitled: "Some Aspects of Settlement Development and Infrastructure Development"; the opponents were: Gabor Preisich, doctor of technical sciences, Antal Stark, doctor of economic sciences, and Jozsef Borsos, candidate of technical sciences;

Istvan Lipka, doctor of technical sciences, on the basis of his activities dealing with "Design and Accuracy Studies on Machine Tools and Their Components," published in theses; the opponents were Samu Borbely, academician, Gyula Strommer, doctor of mathematical sciences, and Jozsef Drobni, candidate of technical sciences;

Eva B. Lorinczy, doctor of linguistic sciences, on the basis of her dissertation entitled: "System and Laws Governing the Diacritics in the Hungarian Language"; the opponents were: Janos Balazs, doctor of linguistic sciences, Laszlo Deme, doctor of linguistic sciences, and Miklos Kazmer, candidate of linguistic sciences;

Istvan Montvay, doctor of physical sciences, on the basis of his dissertation entitled: "Stochastic Many-Particle Generating Processes"; the opponents were: Gyorgy Marx, academician, Karoly Nagy, academician, and Alfred Zawadowski, doctor of physical sciences;

Gyorgy Nagy, doctor of medical sciences, on the basis of his dissertation entitled: "Clinical Aspects, Pathology, and Modern Therapy of Polycythaemia Rubra Vera (PRV)"; the opponents were: Ivan Bernat, doctor of medical sciences, Sandor Eckhardt, candidate of medical sciences, and Ferenc Graf, candidate of medical sciences;

Istvan Pais, doctor of agricultural sciences, on the basis of his dissertation entitled "Objective Chemical Studies on the Elucidation of the Role of Some Nutrient Elements in Horticultural Plants"; the opponents were:

Erno Pungor, academician, Sandor Szalay, academician, and Vilmos Frenyo, doctor of biological sciences;

Szilveszter Petho, doctor of technical sciences, on the basis of his dissertation entitled "Evaluation of Separation and Homogenization Processes, With Special Emphasis on Computer-Aided Control and Monitoring"; the opponents were: Bela Beke, doctor of technical sciences, Miklos Hosszu, doctor of mathematical sciences, and Endre Vincze, candidate of mathematical sciences;

Ali Mohamed Hassan Salit, doctor of biological sciences, on the basis of his dissertation entitled "Problems of Mouse-Like Rodents"; the opponents were: Gyula Fabian, doctor of biological sciences, Tibor Jermy, academician, and Barnabas Nagy, candidate of agricultural sciences;

Istvan Simonovits, doctor of medical sciences, on the basis of his dissertation entitled "Some Aspects of the Reduction of Domestic Infant Deaths and of Certain Perinatal Damages"; the opponents were: Odon Kerpel-Fronius, academician, Gyula Petranyi, academician, and Egon Szabady, doctor of demographic sciences;

Pal Szilas A., doctor of technical sciences, on the basis of his dissertation entitled "Production and Transportation of Petroleum and Natural Gas Products"; the opponents were: Janos Zambo, academician, Jozsef Varga, doctor of technical sciences, and Gyozo Zoltan, candidate of technical sciences;

Gyula Tokody, doctor of historical sciences, on the basis of his dissertation entitled "Counterrevolution in Germany Between 1918 and 1919. (Reorganization and Power Situation of Prussian-German Conservatism.)"; the opponents were: Laszlo Zsigmond, academician, Gyorgy Ranki, academician, and Emil Niederhauser, doctor of historical sciences;

Aladar Turi, doctor of technical sciences, on the basis of his dissertation entitled "Evaluation and Study of Resistance of Crystallizational Fracture in Welding Operations"; the opponents were: Laszlo Gillemot, academician, Mihaly Kaldor, doctor of technical sciences, and Pal Romvari, candidate of technical sciences;

Ferenc Varga, doctor of medical sciences, on the basis of his dissertation entitled "The Role of the Propulsion Motility and Blood Supply of the Digestive Tract in the Absorption of Pharmaceuticals"; the opponents were: Gyorgy Gardos, doctor of biological sciences, Janos Menyhart, doctor of medical sciences, and Kalman Magyar, candidate of medical sciences; and

Karoly Weichinger, doctor of technical sciences, on the basis of his dissertation entitled "Design Aspects of Above-Ground Construction and Urban Redevelopment in Terms of Economics and Esthetics"; the opponents were: Laszlo Gabor, academician, Mate Major, academician, and Frigyes Pogany, doctor of technical sciences.

## II. The Committee on Scientific Qualification declared

David O. Anyoti, candidate of political and legal sciences, on the basis of his dissertation entitled "Facts and Considerations — Effects of the Legal System of International Agreements on Enterprises in Tanzania";

Gyorgy Bagi, candidate of biological sciences, on the basis of his dissertation entitled "Isolation and Characterization of the Active Fraction of Chromatin Template";

Csanad Balint, candidate of historical (archeological) sciences, on the basis of his dissertation entitled "Southern Hungary in the Tenth Century";

Istvan Bitskey, candidate of literary sciences, on the basis of his dissertation entitled "Humanist Erudition and the Baroque Image of the World";

Mrs Laszlo Bod, candidate of art-historical sciences, on the basis of her dissertation entitled "Industrial Art of the Agricultural Towns of the 17th Century (Kecskemet, Nagykoros, and Debrecen)";

Istvan Boronkai, candidate of literary sciences, on the basis of his dissertation entitled "The Beginnings of Our Humanist Prose Literature (the Literary Works of Janos Vitez)";

Jozsef Borossay, candidate of chemical sciences, on the basis of his dissertation entitled "Investigation of the Ionization and Dissociation Processes in the Mass Spectrometer";

Ho Tho Cau, candidate of mathematical sciences, on the basis of his dissertation entitled "Studies in the Field of Approximation Theory";

Vu Kim Cau, candidate of biological sciences, on the basis of his dissertation entitled "Erythrocyte Size, Erythrocyte Count, and Osmotic Resistance in Caprinidae Grown Artificially in Hungary, and Relationships Between These Factors";

Afaf Abdel Alime Dessouki, candidate of biological sciences, on the basis of his dissertation entitled "Preparation and Use of Complement-Binding and Hemagglutinating Antigens of Some Toga and Bunya Viruses";

Perfecto Dipotet, candidate of mathematical sciences, on the basis of his dissertation entitled "Heuristic and Probability Considerations on the Model of an Information Retrieval Process Based on Classification";

Laszlo Dobszay, candidate of musical sciences, on the basis of his dissertation entitled "Melodies of Mourning Music in Our Musical History and Folk Music";

Jozsef Doszpod, candidate of medical sciences, on the basis of his dissertation entitled "Investigation of the Relationship Between the Human Chorionic Somatomammotropin (HCS) Level in the Mother Serum and the Intra-uterine Retardation of the Foetus";

Istvan Eros, candidate of pharmaceutical sciences, on the basis of his dissertation entitled "Investigation of the Structure of Ointments by Means of Rheological Methods";

L. Gyula Farkas, candidate of biological sciences, on the basis of his dissertation entitled "Paleoanthropology of the Early Eras of the Southern Great Plains";

Istvan Fried, candidate of literary sciences, on the basis of his dissertation entitled "Hungarian Reception of Southern-Slavic Folk Poetry From the Time of Kazinczy to the Time of Jokai";

Robert Gal, candidate of sociological sciences, on the basis of his dissertation entitled "Some Sociological and Pedagogic Relationships Governing the Training of Youth to Become Skilled Workers";

Nabil Mohamed Mohamed Ghoneim, candidate of chemical sciences, on the basis of his dissertation entitled "Investigation of the Microstructure and the Electrical Properties of BaTiO<sub>3</sub> Dielectrics and Semiconductors Prepared by Joint Chemical Precipitation";

Bela Goldschmidt, candidate of medical sciences, on the basis of his dissertation entitled "Hemostasis Interferences in Patients Afflicted With Cyanotic Vitium";

Gyorgy Granasztói, candidate of historical sciences, on the basis of his dissertation entitled "Framework of Urban Life in Feudal Hungary (The Society of Kassa During the Middle of the 16th Century)";

Mrs Elod Halasz (Anna Maria Szasz), candidate of literary sciences, on the basis of her dissertation entitled "Representation of Social Movement Trends and Literary Peculiarities in Family-History Novels Written in the 20th Century";

Mohamed Asaad Mohamed Hassan, candidate of mathematical sciences, on the basis of his dissertation entitled "Studies on the Theory of Finite Groups";

Husam Saleh Jaber, candidate of technical sciences, on the basis of his dissertation entitled "The Slow Filter and Its Role in Water Purification";

Miklos Kaan, candidate of medical sciences, on the basis of his dissertation entitled "Investigation of the Prosthetic Significance of the Chewing Bite";

Zoltan Kerek, candidate of economic sciences, on the basis of his dissertation entitled "Price-Cost Income Syphoning-Off and Support Payments: Their Potentials in Food Economy";

Istvan Kiss, candidate of chemical sciences, on the basis of his dissertation entitled "Investigation of Water Activation and Ionizing Radiation Effects on the Preservation of Fruit Juices";

Jozsef Kiss, candidate of historical sciences, on the basis of his dissertation entitled "The Peasants of the Jaszkun Area During the Era of the German Teutonic Knights Between 1702 and 1731";

Janos Kisari, candidate of veterinary medical sciences, on the basis of his dissertation entitled "Investigation of the Etiology, Factors Affecting the Syndrome, and Methods of Specific Therapy of the So-Called Goose Influenza (Derzsy Disease)";

Julianna Kocsis, candidate of medical sciences, on the basis of her dissertation entitled "Investigation of Experimental Renal Cortex Necrosis Pathomechanism by Means of Angiorenography";

Laszlo Kosa, candidate of historical (folklore) sciences, on the basis of his dissertation entitled "The Potato in Hungary";

Nguyen Xuan Ky, candidate of mathematical sciences, on the basis of his dissertation entitled "Weighted Polynome Approximation";

Tharwat Fawzy Mohamed Abou El Lal, candidate of mathematical sciences, on the basis of his dissertation entitled "Spline Functions and Cauchy Problems";

Maria Lengyel, candidate of medical sciences, on the basis of her dissertation entitled "Significance of the Heart-Wall and Heart-Valve Movements in Intact and Pathological Circumstances";

Karoly Mesterhazy, candidate of historical (archeological) sciences, on the basis of his dissertation entitled "Development of the Nationality Structure and Class Structure in Hungary During the Time of the Original Settlement of the Country";

Istvan Meszaros, candidate of medical sciences, on the basis of his dissertation entitled "Toxicology of Hymenoptera Afflictions";

Emil Molnar, candidate of mathematical sciences, on the basis of his dissertation entitled "Absolute Geometrical Applications of the Mirroring Concept";

Akram Ahmed Nasser, candidate of technical sciences, on the basis of his dissertation entitled "Investigation of the Tools of NC [Numerically Controlled] Machine Tools, With Special Emphasis on Permissible Chip-Forming Parameters and Deformation";

Andras Pellionisz, candidate of biological sciences, on the basis of his dissertation entitled "Structural-Functional Analysis of the Neural Networks of the Cerebellum by Means of Computer-Aided Simulation";

Etedal Ibrahim Aly Rahmy, candidate of mathematical sciences, on the basis of his dissertation entitled "Numerical Studies in Connection With Toeplitz and Hankel Matrices";

Gyula Razso, candidate of historical sciences, on the basis of his dissertation entitled "History of the Mercenary Institution in Hungary During the 14th and 15th Centuries";

Gyula Sallai, candidate of technical sciences, on the basis of his dissertation entitled "Designing Transverse Filters by Imaging and Compensating";

Lajos Sasvari, candidate of biological sciences, on the basis of his dissertation entitled "Regulating Role of the Economically Important Sparrow Species in Terms of Social Behavior Based on Population Dynamics";

Pal Sillar, candidate of medical sciences, on the basis of his dissertation entitled "Pathological, Radiological, Biomechanical, and Gerontological Study of the Degenerative Changes in the Shoulder Joint";

Attila Somfai, candidate of earth sciences, on the basis of his dissertation entitled "Pressure Conditions of the Hydrocarbon Deposits Discovered in Hungary Over the Hungarian Portion of the Large Plain of the Carpathian Basin; Geological Causes of the Development of the Pressure Levels";

Pal Schweitzer, candidate of literary sciences, on the basis of his dissertation entitled "Beauty and Totality. Meaning of the Concept of Beauty During the Last Creative Period of the Life of Ady";

Ferenc Szakaly, candidate of historical sciences, on the basis of his dissertation entitled "Taxation in Hungarian Occupations";

Zsuzsa Szell, candidate of literary sciences, on the basis of her dissertation entitled "Ego Losses and Apparent Community";

Ivan Szenes, candidate of historical sciences, on the basis of his dissertation entitled "Reorganization of the Revolutionary Party of the Working Class in Hungary Between 1956 and 1957";

Pal Szepesvary, candidate of chemical sciences, on the basis of his dissertation entitled "Accuracy and Design Aspects of the Determination of the Composition of Multi-Component Mixtures";

Imre Taksas, candidate of historical sciences, on the basis of his dissertation entitled "Problems of Communist and Workers' Parties, and of Youth in the European Countries of the Socialist Community Related to the Building of Developed Socialism During Recent Years";

Erno Taxner, candidate of literary sciences, on the basis of his dissertation entitled "The Portion of the Drama Creation Period of Vorosmarty Ending With the Writing of 'Csongor and Tunde'";

Istvan Tenyi, candidate of medical sciences, on the basis of his dissertation entitled "The Renin-Angiotensin System in Hypertensions of Various Pathological Origins, and the Mechanism of Renin Release";

Jeno Tomasz, candidate of chemical sciences, on the basis of his dissertation entitled "Synthetic Studies in the Field of Nucleotids";



Tibor Toth, candidate of historical sciences, on the basis of his dissertation entitled "Management of the Estate of Mernye From the Liberation of the Serfs to World War I";

Laszlo Varga, candidate of medical sciences, on the basis of his dissertation entitled "The Role of the Sympathicolisis in the Anesthesia of Abdominal Catastrophies"; and

Ferenc Viragh, candidate of historical sciences, on the basis of his dissertation entitled "The Role of the Poor in Megye Bekes, and Their Struggles in the Era of Dualism (1867-1914)."

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## BIOGRAPHIES OF NEW CORRESPONDING ACADEMICIANS

Budapest MAGYAR TUDOMANY in Hungarian No 2, 1977 pp 96-107

[Bibliographies and statements of new corresponding academicians elected at the 1976 general meeting of the Hungarian Academy of Sciences]

[Excerpts] Ferenc Antoni was born in 1928 in Budapest. He completed his university studies at the University of Medical Sciences in Budapest. He was granted the title of doctor of sciences in 1969, on the basis of his dissertation entitled "Application of the Biological Effects of Ionizing Radiation." He is professor and department head at the First Institute of Chemistry and Biochemistry of Semmelweis University of Medical Sciences; since 1973, he is the president of the university. His field of research is the biochemistry of human lymphocytes. His major publications are the following: "Manual on Radiation Haematology" [in English], IAEA, 1971; "Descriptive Biochemistry", published by Medicina in 1972; "Post-Synthetic Modification of Macromolecules" [in English], published by the Academic Press in 1975; "Biophysics; Section of Anabolism-Catabolism," published by the Academic Press in 1975-1976.

Tibor Czibere was born in 1930 in Tapolca. He completed his higher education in 1953, when he qualified at the Faculty of Mechanical Engineering of the Technical University for the Heavy Industry in Miskolc. At the present time, he is professor and department head at this institution, in charge of the Department of Flow and Thermal Machines. In 1967, he was awarded the title of doctor of technical sciences, on the basis of his dissertation entitled "Potential-Theoretical Solution of Two Major Problems of Hydrodynamic Lattice Theory." He is presently engaged in research in the field of theoretical and applied hydrodynamics. His major publications are the following: "Method of Designing Straight Vane Lattices With Strongly Curved Profiles, Parts 1 and 2" [in German], published in ACTA TECHN. HUNG. (Vol 28, 1960, pp 43-71 and 241-248); "Iteration Method for the Profile

Determination of Straight and Radial Vane Lattices Using Arbitrary Carrier Diagrams of Hydrodynamic Singularities" [in German], published in PERIODICA POLYTECHNICA M V/1 (1961), pp 65-77; "Calculation of the Vane Profiles and the Flow Around the Vanes in Flow Machines," published [in German] in INGENIEUR ARCHIV, Vol 33, 1964, pp 215-230; and "Use of the Singularity Method for the Compressible Flow Around Turbine Vanes" published [in German] in HYDRO TURBO 74 CELOSTATNI KONFERENCE O PROUDENI VE VODNICH STROJICH, Luhacovice, 1974.

Janos Kornai was born in 1928 in Budapest. He is a scientific advisor of the Institute of Economics of the MTA [Hungarian Academy of Sciences]. In 1966, he was awarded the title of doctor of economic sciences on the basis of his dissertation dealing with mathematical models of planning. In the course of his work covering problems of socialist economy, he specialized on mathematical techniques of planning and economic analysis. His major publications so far are the following: "Excessive Centralization of Economic Management" (1957); "Mathematical Planning of the Economic Structure" (1965); "Anti-Equilibrium" (1971); all published by the Economics and Law Publishing House; "Forced or Harmonic Growth" (1972), published by the Academic Press.

Janos Meszaros was born in 1927 in Nadudvar. In 1951 he graduated at the University of Veterinary Medical Sciences. At the present time he is the director of the Research Institute of Animal Health of the MTA. He defended his thesis entitled "Fight Against Infectious Diseases in Large-Scale Animal Husbandry Establishments" in 1973, and was awarded the title of doctor of veterinary medical sciences. His field of study is veterinary epidemiology, microbiology, and immunology. His major publications are the following: "Specificity of Serological Tests and Their Value in the Fight Against Mycoplasmosis" published in MAGYAR ALLATORVOSOK LAPJA, Vol 19, 1964, p 227; "Studies on the Pathogenesis of Gastroenteritis in Swine" (co-authored with Laszlo Pesti) [in English], published in ACTA VETERINARIA ACAD. SCI. HUNG, 1965, No 15, p. 465; "Immunobiological Aspects of the Fight Against Brucellosis" published in MAGYAR ALLATORVOSOK LAPJA, Vol 22, 1967, p. 589; "The Virus-Predicated Respiratory and Digestive Diseases of Cattle" published [in German] in WR. TIERAERZTLICHE MSCHR., Vol 62, 1975, p 174; and "Infections Diseases of Domestic Animals" (co-authored with Manninger), published in 1976.

Laszlo Marko was born in 1928 in Debrecen. At the present time he is professor and department head at the Department of Organic Chemistry at the University for the Chemical Industry in Veszprem. His field of research is the chemistry of organometallic compounds. He interpreted the poisoning phenomena of the organocobalt catalyst systems, which are known but still represented something of a mystery, employing complex and thorough studies.

It was on the basis of this work that he was awarded the title of doctor of chemical sciences. He has accomplished much in the field of dinitrogen metal complexes, especially in terms of their catalytic properties. Together with his associates, he published more than 120 papers in domestic and foreign journals about his results. He is part inventor in 19 patents.

Aladar Sipos was born in 1927 in Kiskore. He graduated in 1951 at Marx Karoly University of Economic Sciences; he became doctor of economic sciences in 1972 on the basis of his dissertation entitled "Effect of Technical Progress on the Agricultural Conditions of Developed Capitalist Countries." At the present time, he is professor and department head at the Department of Political Economics of the Political College of the MSZMP [Hungarian Socialist Workers Party]. In his research he studied current capitalism and socialism, with special emphasis on agriculture, industry, and relationships between them. He published articles, monographs, and university textbooks, and also the following major books: "Effect of the 1929-1933 World Economic Depression on Hungary" (as member of an author team), published in 1955 by the Academic Press; "The New Agricultural Crisis in the United States", published in 1963 by Kossuth publishers; "Socialist Re-Production and Economic Depression in Capitalism" published in 1965 by the Economics and Law Publishing House; "Agricultural Conditions in Western Europe" published in 1967 by Kossuth publishers; "Political Economics in Capitalism (as member of an author team), published in 1969 and 1974 by Kossuth publishers; "

"Posledstviya industrializatsii sel'skogo khozyaystva v stranakh Zapadnoy Evropy." [Consequences of the Industrialization of Agriculture in the countries of Western Europe] (as a member of an author team), published in Moscow, 1975 by NAUKA Izdatyelstvo publishers.

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ACADEMY OF SCIENCES ACTIVITIES DURING 1976 REVIEWED

Warsaw NAUKA POLSKA in Polish No 12, Dec 76 pp 94-116

[Excerpts] Magnetic Induction Meter

At the Institute of Physics of the Polish Academy of Sciences [PAN] in Warsaw, a team under the leadership of Dr Engr Wlodzimierz Zbieranowski and Engr Zbigniew Potocki has developed, within the framework of the key problem, an automatic magnetic induction meter operated by magnetic nuclear resonance. High working parameters of the meter permit measuring induction in magnets and electromagnets with a slowly-changing field ranging from 0.16 to 2 tesla with a very high accuracy and with the ability to increase the range of measurement depending on the need.

This achievement is a result of the fundamental work conducted at the PAN Institute of Physics in the domain of solid state physics by the methods of magnetic nuclear resonance and practical application of this phenomenon. The device being developed has very good measuring characteristics, necessary in many fields of experimental physics and metrology.

Similar devices have been produced thus far in the United States and the Federal Republic of Germany, costing about \$5,000. The interest elicited by measuring laboratories and scientific institutions in Poland and abroad resulted in the decision to put this meter into production at the PAN United Enterprises for the Production of Scientific Equipment.

These meters are used in research work carried on at the PAN Institute of Physics in the field of radiospectroscopy, and at the same time they have been made available to the University of Warsaw, the Joint Institute of Nuclear Research in Dubna, the Institute of Nuclear Research in Swierk, the Polytechnic of Wroclaw and other scientific centers, where they have been used for measurements in special electromagnets (cyclotrons, nonconducting magnets, etc).

Within the framework of cooperation with the GDR Academy of Sciences, the first series of these devices was exported to the GDR.

## Electroacoustic Apparatus for Measuring and Analyzing Noise

The Department of Cybernetic Acoustics of the PAN Institute for Fundamental Problems of Technology has developed the conception and designed and constructed working models of 10 electroacoustic devices destined for measuring noise and acoustic diagnosis of machines, motor vehicles and other technical equipment, especially of the industrial type. The authors of model elaborations are: Prof Dr Engr Janusz Kacprowski; Engr Jerzy Motylewski, M.A.; Engr Hubert Chmielinski; and Engr Tomasz Zmierczak, M.A.

The models are composed of two types of standard condenser microphones, three types of standard condenser microphones, three types of sound level meters, three types of spectrum analyzers and two types of special acoustic diagnostic devices. Modern electronic solutions characterized by originality and innovation of conceptual and design solutions were applied to the equipment, and their technical parameters satisfy requirements of international norms and recommendations.

The modern electroacoustic measuring devices were developed in close cooperation with the Laboratory of Cybernetic Acoustics of the PAN Institute for Fundamental Problems of Technology [IPPT PAN] with the experimental laboratory TECHPAN at the IPPT PAN. TECHPAN, using the device as a basis for models and scientific research documentation, undertook serial production of these devices. Up to the end of the past year about 200 devices were produced, worth about 9 million zlotys. Prospects look good for a further increase in the production of the developed measuring equipment, and the resulting nationwide foreign exchange savings during the next years may be estimated at 15 million zlotys for international settlements.

The electroacoustic measuring equipment is widely used in scientific research and industry. Many specialized scientific centers requested that the PAN Institute for Fundamental Problems of Technology provide them with the corresponding scientific research and technical documentation. The most important elaborations of seven working models have been patented.

## Principles of Town and Country Planning--the Synthesis of Investigations

At the PAN Institute of Geography and Town and Country Planning, a team under the guidance of Prof Dr Kazimierz Dziewonski has carried out in 1971-1975 research aimed at a broad and thorough study of the scientific basis of the town and country planning in Poland within the framework of the key problem of "Principles of Town and Country Planning." The results of fragmentary research have been put together, broadened and interrelated, synthesizing the research and constituting as a result a very important scientific achievement.

The problems comprised in the elaboration are as follows: the structure of town and country planning of Poland as a result of the realization of the plan up to the year 1990, and the problems which the town and country planning will

have to solve after the year 1990; a dynamic conception of the development of the regions of agricultural economy in Poland; conditions of the proper development of the respective means and systems of transportation within the framework of the integrated transportation system, taking into account the existing interdependence between the magnitude of transportation problems and labor intensity and capital intensity of the proposed alternative solutions.

Also determined: limitations of the possibilities of development resulting from the absorptiveness of the natural environment in relation to pollutions; technical dependence of water economics in successive stages of its development, connected with the changing proportions between the necessity and possibilities of their satisfaction within the framework of the limited and regionally differentiated water resources; feedbacks arising between migration laws and natural movement of population and their influence on the development and transformation of the settlement system in the country and especially in urban agglomerations.

The results obtained in the course of elaborations count among the best on the international scale.

In the course of research, the conception and methods of the analysis relating to the appraisal of the values of the natural environment, regional zoning of forestry economics, localization of industry, social infrastructure, tourism and rest-resorts for the population, were systematized and developed. Proposals and conclusions concerning the improvement and development of the methods of town and country planning of urban agglomerations, and regional centers of the rural growth and settlement have been worked out. Conclusions were also formulated concerning practical applications of the modern methods of statistical and cartographical analyses in town and country planning.

The results of the research done by the team under the guidance of Prof Dr Kazimierz Dziejowski are currently being utilized in the town and country planning of Poland and they will also be used in the elaborations for further periods after the year 1990. The results of this research will also be utilized in working out plans of the development of the macroregions and in planning the development of the new voivodships.

#### Conference of Physicists

On 22-25 June 1976, an International Conference of the European Physics Society was held in Krakow. About 160 outstanding scientists from 17 countries took part in it, including a Nobel Prize laureate, the author of the method of "Roentgenoscopy: of atomic nuclei and elementary particles with fast neutrons, Prof Robert Hofstadter (Stanford University of California); Physics Prof Vladimir Neudachin (USSR); Prof Peter Brix, director of the Max Planck Institute of Heidelberg; Prof Young N. Kim (Technical University of Texas), specialist in mesonic atoms; Prof John W. Negele (Polytechnical Institute of the State of Massachusetts), and others.

The problem of "the Radial Shape of Nuclei" was the theme of the conference which was opened by the rector of the Jagellonian University, Prof Mieczyslaw Karas. The inaugural address was delivered by PAN Vice President, Chairman of the Krakow branch and Academician Marian Miesowicz. As a result of the discussions, the range of practical applications of the achievements of nuclear physics and physics of elementary particles was broadened, the present state of knowledge about the distribution of matter inside atomic nuclei was ascertained, and a future program of research in this field was mapped out. The results of the research will find their application in practice, for example in power engineering and nuclear medicine, radiobiology, automation of industrial production processes, etc.

#### Electronic Structure of Actinides

The Institute of PAN Low Temperatures and Structural Research organized on 13-16 September 1976 in Wroclaw the Second International Conference on Electronic Structure of Actinides. This institute is internationally respected in the field of research in electronic structure of actinides.

The first symposium on this subject was held in 1974 in the United States at Argon National Laboratory.

Specialists from 15 countries took part in the Wroclaw Conference.

#### Debates of European Seismological Commission

The 15th General Meeting of the European Seismological Commission, which this year [1976] celebrates its 25th anniversary, was held from 22 to 28 September in Krakow. Some 270 specialists representing dozens of European countries, as well as Japan, New Zealand, the United States, Egypt and Algeria, took part in debates of the commission which for the first time were held in Poland.

At the 8 symposia, 128 specialized reports, including 8 from Poland, were delivered. Among the topics were the mechanism of the occurrence of earthquakes, seismicity of Europe, deep terrestrial structures and the problem of mining shocks that increasingly occur. A great number of pronouncements related to natural earthquakes, among them those that occurred in northern Italy (Udine) on 6 May 1976. Seismologists from France, Federal Republic of Germany, and Austria spoke on this subject.

Deputy Director for Scientific Affairs of the PAN Institute of Geophysics in Warsaw, Corresponding Member of PAN Roman Teisseyre has been elected president of the European Seismological Commission.

#### Vibration Mechanics

On 27-29 May 1976 the Seventh All-Polish Symposium on the subject "Vibrations in Physical Systems" was held in Blazejewsk near Kornik. It was organized by the Poznan Branch of the Society of Theoretical and Applied Mechanics and the Institute of Technical Mechanics of the Poznan Polytechnic.



Over 120 persons--scientific and engineering research workers from higher educational institutions, PAN scientific institutes and other specialized institutes of Poland--took part in the symposium.

About 70 reports on the results of fundamental research of a cognitive nature and on problems connected with their direct practical application were delivered. In the first group of problems the focus was on mathematical methods and in the second group on dynamics and vibroacoustics of machines and installations.

Symposia of this type have been organized for several years by Poznan scientists.

#### Cooperation in the Field of Mechanics

A meeting of directors of the institutes of mechanics of the academies of sciences of Bulgaria, Czechoslovakia, the GDR, USSR and Poland, devoted to a discussion of the problem of coordinating cooperation of these academies in the field of mechanics in 1976-1980, was held in Jablonna near Warsaw on 20-22 June 1976. An agreement concerning the publication of a joint periodical entitled "Achievements in Mechanics of the Academies of Sciences of Socialist Countries" was signed.

In accordance with the decision taken, this periodical will be published by the Polish Academy of Sciences, Corresponding Member of PAN Jan Rychlewski was elected editor-in-chief.

#### The Problem of Electronization of the National Economy

The Society of Polish Electrical Engineers (SEP), with the cooperation of the department of machine-building industry, organized on 9-10 September 1976 in Katowice the Second All-Polish Conference on Electronization of the National Economy. Several hundred of the representatives of science and industry took part in it.

Discussions were devoted to problems of the electronization of the systems of industrial automation--that is, of the means of production and technological installations. The conference afforded an occasion for strengthening the cooperation of producers of electronic equipment with workers of science and consumers. About 30 informative reports were delivered. In addition, an exhibition was organized which supplemented the conference.

The first conference of this cycle was held in 1974, where problems connected with the development in Poland of a base of electronic subassemblies were discussed. The third conference on the subject of the place and role of electronics in various domains of social life is planned for 1978.

## Intermolecular Interactions

The Third International Symposium on the subject of intermolecular interactions has been held on 20-22 September 1976 in Karpacz. This problem interests physicists, chemists, biologists and technicians specializing in materials technology. The intermolecular interactions decide the course of various biological processes and constitute an essential factor in the development of the chemistry of plastics.

The symposium was organized by the University of Wroclaw and it was attended by about 100 representatives of the Polish scientific research centers and over 120 foreign guests, chiefly from European countries as well as from Japan, Canada and the United States.

## Conference of Biochemists in Lublin

The 14th All-Polish Meeting of the Polish Biochemical Society was held on 4-5 September in Lublin. About 500 Polish biochemists and foreign representatives of this discipline participated.

Over 300 reports devoted to the latest theoretical achievements in the field of biosynthesis and properties of protein and its use in the production of valuable feeds from industrial waste were presented.

## Isotopes in Agriculture

An International Conference on the subject of the use of nuclear techniques in agricultural research and in food production was held on 13-17 September in Warsaw. The conference was organized by the European Society of Isotopic Methods in Agriculture (ESNA) and by the Agricultural Isotopic Commission of the Department V of PAN, Agricultural and Silvicultural Sciences.

About 200 specialists from Poland and many European countries took part in several working groups and sections for special problems. The reports and discussions were concentrated around the application of isotopes in vegetable and animal production, the application of radiation methods in the preservation of food and agricultural produce, environmental protection, etc.

## New Methods in Histochemistry and Cytochemistry

The 14th All-Polish Symposium of the Polish Society of Histochemists and Cytochemists devoted to the effect of industrial and agricultural poisonings on the histochemistry of organs and tissues was held on 26-28 May 1976 in Poznan.

About 180 representatives of Polish medical schools, delegations of the institutes of the Polish Academy of Sciences, the Institute of Labor Medicine, and specialists from Yugoslavia, the GDR, Hungary and the USSR participated in the symposium. About 100 reports devoted, among other things, to new cytochemical

and histochemical methods and cyto- and histochemical changes in industrial and agricultural poisonings were delivered.

#### Symposium of Toxicologists in Lublin

The Fifth Toxicological Symposium, organized by the Toxicological Section of the Polish Pharmacological Society and the Institute of Medicine of Labor and Rural Hygiene, was held on 16-19 September 1976 in Lublin.

About 250 reports and communications relating to problems of clinical and industrial toxicology and contamination of the environment, as well as the problems of toxicology and pesticides, were delivered. The programmatic report "Toxicological Problems in the Modern Life of Man," was delivered by Prof Wladyslaw Rusiecki (Institute of Nutrition and Food in Warsaw).

The symposium, in which the workers of science from all the research centers in Poland dealing with problems of toxicology took part, afforded an occasion to discuss the present achievements of science related to toxic substances and hazards resulting from their use, to accurately define the requirements in this respect, and to specify directions and methods of work relating to further toxicological research.

#### Courses of the Application of Mathematics

The 30th Course of Applications of Mathematics organized by the PAN Institute of Mathematics, the PAN Computing Center, and the Department of Mathematics and Mechanics of Warsaw University, with the cooperation of the PAN branch in Wroclaw, will be held in the new academic year.

The courses are being held in Warsaw, Gdansk, Katowice, Lodz and Wroclaw. Their program will include 18 semestrial cycles and exercises devoted to selected subject matter from the following topics:

1. basic mathematical theories for various applied sciences and applications and practical elaborations;
2. probabilistic and statistical methods;
3. optimization methods;
4. tasks and methods connected with computers or utilizing electronic computer technology.

Especially great emphasis in this year's program will be laid on statistics. A two-semester postgraduate course in statistical methods for engineers-technicians, doctors and agriculturists will also be initiated.

## The Second School of Value Engineering

The Scientific Society of Organization and Management organized in May 1976, in Gdansk, a training seminar, "The Second School of Value Engineering." It was joined by specialists, instructors and consultants in the field of value analysis from the entire country, representing various industrial branches and scientific centers.

Accomplishments of this seminar consist of materials entitled "The Value Analysis in Planning," which include reports of the participants of the school and discussion. These materials form a kind of archives of value engineering and are chiefly designed for the managerial cadre and technical-economical enterprises which in their practice apply value analysis.

These materials, entitled "The School of Value Engineering," will be published annually as a yield of the training seminar of value analyzers in Poland.

## Recent Publications

The Laboratory of Town and Country Planning of the PAN Institute of Geography has compiled, according to the conception of PAN Academician Stanislaw Leszczynski, director of this institute, the "Atlas of the Industry of Poland." It comprises 150 maps on 80 full-scale plates.

The "Atlas" is designed primarily for purposes of planning and management.

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PAN Academicians Boguslawa Jezowska-Trzebiatowska, Stanislaw Kopacz and Teofil Mikulski are the authors of the work "Rare Elements," whose Part 1, "Occurrence and Technology," has now been published (PWN, Warsaw, 1976, pp 314+ tables and bibliography).

The book is a monograph devoted to problems of the occurrence and technology of rare elements. It covers the ores and minerals in which these elements occur, as well as the methods of their production. Much space is devoted to the chemistry of rare metals and their physicochemical properties, with special regard to the structure and reactions of complex compounds.

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ROMANIA

SIGNIFICANT TECHNICAL ACHIEVEMENTS DESCRIBED

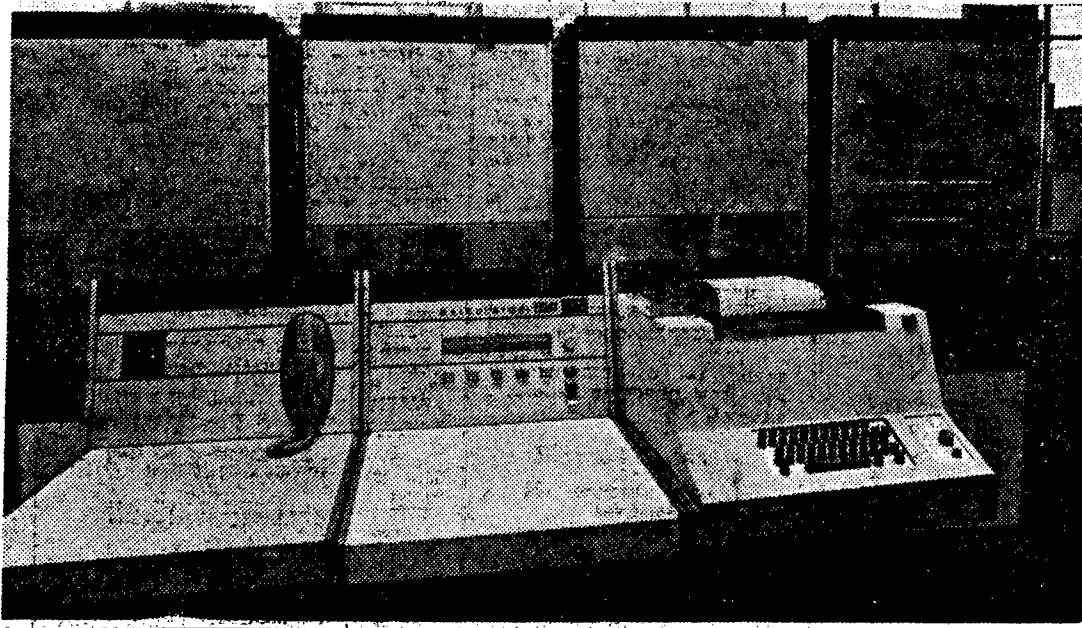
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[Article by Ion Vaduva-Poenaru]

[Text] "Significant results have been obtained in research, in technology, and in the introduction into production of new advances in science and technology. These achievements will make a greater contribution to the fulfillment of the new goals of the five-year plan." Nicolae Ceausescu, Speech to the Plenary Session of the Central Committee of the Romanian Communist Party, 2-3 November 1976

During the contemporary era, science has become a direct force in production, and has definitely been a decisive element in the development of the modern economy. That is why the 11th Party Congress has declared the 1976-1980 five-year plan to be the one which strongly represents the modern technical and scientific revolution, and which applies to production the most outstanding advances of science and technology. Reflecting the special emphasis placed on the broad development of domestic scientific research, and on the promotion of Romanian technical creativity, the achievements of the first year of the plan vividly demonstrate the fruitful dialogue between production and science, through the introduction into the national economy of the most important solutions provided by the foremost technologies of automation, computers, machine-tools, professional electronics, electrical engineering, and so on. The result has been that in 1976, a new product of high technology and competitive on the world market of ideas was introduced every three days. This fact is extremely significant if we consider that one of the important goals of the current five-year plan is the technologic endowment of the economy, primarily on the basis of machinery and equipment manufactured in Romania from Romanian designs. And in fact, the technical achievements which we present here, with more to follow in the future, more than prove the technical capabilities of the Romanian specialists, and the full affirmation of the modern technical and scientific revolution in all domains of the national economy, during this first year of the current five-year plan.

## The Felix C-512 Computer



A modern industry necessarily requires an increasingly greater use of that advanced technical instrument, the computer. For the Romanian economy, during this five-year plan of the scientific and technical revolution, this has become an indispensable need, which is met through the continued enrichment of the Felix family of Romanian computers. In this respect, the most important success sustained in 1976 by our domestic technical designers, is the Felix C-512 computer, which is considered as a third generation, intermediate capacity system. Designed by the specialists of the Research Institute for Computer Technology, in close collaboration -- for the physical construction -- with the collective of the Computer Enterprise, Felix C-512 is intended for application in various areas, and primarily for solving economic problems, and for technical and scientific calculations. In other words, for materials records and management, production costs records and analysis, planning and transportation problems, as well as for matrix programs, special functions, and so on. With its universal repertory of 117 instructions, Felix C-512 processes binary, and fixed and floating decimal data at an average of 250,000 operations per second. The capacity of its memory varies from 128 to 512 kilo-octets (expandable to 1024 kilo-octets), and the memory is provided with an address maintenance system and protection during reading and writing.

The first year of the five-year plan was very fruitful for computer technology. Plant tests were conducted during the first quarter, followed immediately by the installation at Hoghiz of the first Romanian-designed

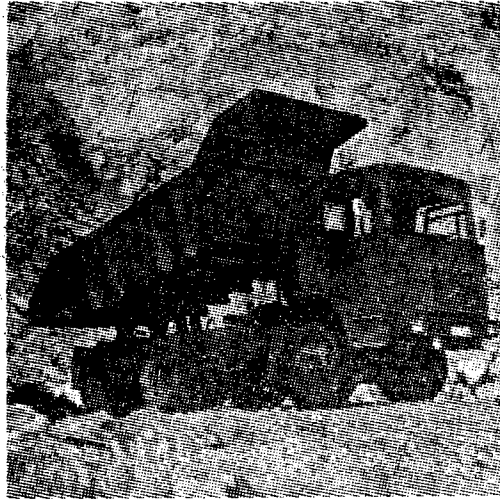
process computer, the Felix C-32 P, which performs complex functions of technical control. But this modern control system designed by IPA (Research and Design Institute for Automation), and built in cooperation with various enterprises and institutions, is only a first notable success in the implementation of computer technology in manufacturing processes. That is because during 1976, IPA has built new types of process computers. All of which proves that the first year of the five-year plan is profoundly inscribed in the technical and scientific revolution.

#### Drilling to a Depth of 10,000 Meters

It is well known that Romania places second in the world in the production of petroleum equipment, and third in the exportation of these perfected and competitive installations. Their continually diversified assortment was enriched during this first year of the technical and scientific revolution by the F-500 drilling installation, designed for well drilling to depths of up to 10,000 meters. It adds itself to the series of modern drilling installations produced by the 1 Mai Enterprise of Ploesti, and designed by the Design and Research Institute for Petroleum Equipment (ICPUP). Meeting the most exacting demands of modern drilling technology, the F-500 installation is provided with Diesel-electric power, in the guise of a micro power plant for direct current generation, which supplies the electric motors which operate the drilling winch. Some of its specifications are an installed power of 3000 HP at the winch, and a large hydraulic power which makes it possible to use modern drilling techniques such as jet drilling. It also has a 7.6-meter-high superstructure, which allows the installation of the most complex installations for preventing blow-outs. It is also very important that this ultramodern equipment is completed by a high capacity installation for mud processing, circulation, and storage, which is provided with all the accessories needed for the newest techniques. The new Romanian installation is designed to simplify installation operations and site preparation. Moreover, the functional independence of the major subsystems makes it possible to arrange them in optimum configurations with a relatively small number of compact assemblies. All of these characteristics make it one of the most powerful and modern drilling installations, carrying further into the world the renown of the technologic capabilities of Romanian specialists and of our socialist industry.

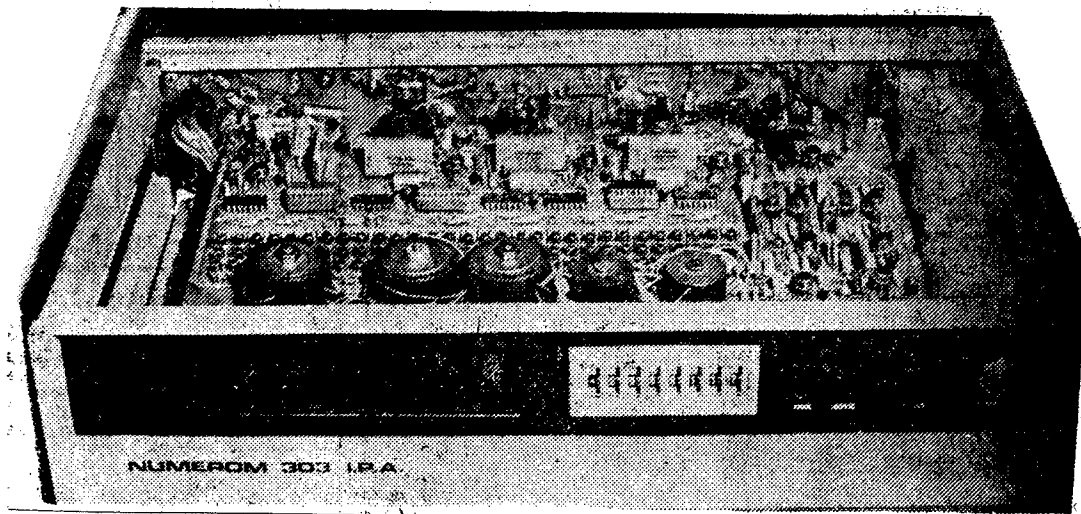
#### A 19-Ton Dump Truck

At this year's Bucharest International Fair, one of the outstanding products of the machine building industry was the 19.215-ton Roman FK dump truck. It is generally used to transport bulk materials, construction materials, ores, and any other products which can be slide dumped. The dumping is to the rear, and is obtained by means of a hydraulic installation consisting of an oil pump, control valves, hydraulic lift, and necessary connections. The technical characteristics of this product manufactured at the Mirsa Mechanical Enterprise,



are a useful load of 14 tons, a rear ground clearance of 325 millimeters, a tilt-bed length of 7.345 meters, and a maximum speed of 70 km/hr from a 215 HP diesel engine. It transports three times more material than the 5 ton dump truck -- and thus has three times the productivity -- and twice as much as the 8.135 ton dump truck for twice the productivity. These are the characteristics which have earned it the gold medal at the Leipzig International Fair.

#### Numerical Control Equipment for Machine-Tools



The third generation numerical control equipment for machine-tools, which has been recently developed by IPA, is characterized by peak performance and modern technology, based on integrated circuits of intermediate and high complexity.



This generation was designed and built as a comprehensive, unified assembly of devices with different operational complexities, from simple numerical displays (NUMEROM 303), two-axis positioners (NUMEROM 311), and three- and four-axis linear processors (NUMEROM 321), up to two-axis (NUMEROM 331) and three-axis (NUMEROM 341, being developed) pattern followers.

The variety of the functions which they can perform, the precision of their 0.001 mm resolution, and their high reliability derived from modern technology, provide the members of this generation with the prestige of an advanced achievement in the automation industry.

Using integrated circuits, the equipment is much smaller and less expensive than its second generation counterpart, which was based on a less advanced technology of discrete components. Its integrated measurement systems assure objective dimensioning, eliminating operator errors and helping to speed operations by eliminating interface controls. But the basic and most important characteristic of the numerical control, is the flexibility of the new equipment when used in small and medium sized installations. Thus, any change of time per part is rapidly obtained by changing a punched tape which supports the program, whereas under normal conditions, such a change means a readaptation of the operator to the new part. For all these reasons, the new equipment will become more widespread in the use of machine-tools during the five-year plan of the technical and scientific revolution.

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