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East Europe Report

SCIENTIFIC AFFAIRS

No. 786

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CONTENTS

CHANGES IN ECONOMICS OF RESEARCH, DEVELOPMENT NOTED

Budapest MAGYAR TUDOMANY in Hungarian No 6, Jun 83 pp 466-468

/Article by RR: "Discussion of Changes in the Economics of Research and Development/

/Text/ At its March 1983 session, the presidium of the Academy discussed those recent changes which occurred in the economic conditions for research and development in the MTA /Hungarian Academy of Sciences/ area. The review extends to the expected effects of changes in economic conditions.

In his presentation, the secretary general of the Academy reported that in 1981-1982 many restrictive measures were taken at the Academy level, similar to the national trend. The unfavorable effect of some of these measures, it is anticipated, will be felt for a number of years, perhaps to the end of the plan period.

The report on the situation of the Academy summarizes in four areas the present problems, or the longterm consequences of their unfavorable solution.

In the meaning of the 1980 measures regarding personnel reduction at the research institutes, we will have to carry out a reduction of seven percent by the end of 1985 in the research institutes belonging under the supervision of the Academy. With consideration for the incentive advantages of carrying out the orders by an earlier deadline, the personnel reduction, in practice, came to an end in 1982. But it would still be premature to evaluate quality and other consequences. The leaders of the Academy assume that the reduction and the fact that personnel at the research places cannot be increased will stimlulate more productive work.

The presentation dealt in the greatest detail with the reduction of material means--central support and investment--and its effects.

In working out the K + F /research and development/ plan for the period between 1981 and 1985 in agreement with all authoritative state organs, the MTA counted on a budget of about 10 billion forints, but it is now clear--on the basis of 1981-1982 figures--that some of these supports will be substantially less favorable than anticipated. With the reduction in central support for operation and maintenance and the rise in energy and other prices, assurance for the

basic conditions of the work has been substantially endangered. The reduction in the foreign exchange budget for capitalist materials and spare parts as well as for books and periodicals will hamper the maintenance of international ties and the continuation of research works. The shortage of spare parts, research materials and chemicals is already putting restraints on the use of existing equipment and furnishings, and with the exhaustion of reserves the situation will deteriorate rapidly. The presentation emphasized that if the use of the reduced sums in 1983 does not occur because of import restrictions or late delivery of orders, not only certain research subjects but the results of entire institutes will be endangered.

Possession of professional information as one of the basic conditions for K + F work was made much more difficult by the fact that with the reduction of the foreign exchange sums the ordering of foreign periodicals was in a straitened condition in 1983. Moreover, the reduction was carried out centrally and without expertise or the views being asked of those affected; in this way it was the least dispensable periodicals that were frequently discontinued, while some of the less important ones continue on order. A similarly important source of information is attendance at foreign scientific programs. With the narrowing of this possibility, invitations to foreign scientists should be made free, which would make it possible to import significant intellectual capital into the country--for forints. Such intellectual imports, free of foreign exchange costs, are strongly restricted by the fact that the housing expenses and the per diem allowances count--in an inadequate manner--as representational costs. The reduction of actual representation is justified, but the invitations to foreign experts may be regarded as a "redeeming of foreign exchange costs."

In the past 2 years the most difficult situation has developed in the field of K + F investments. It is anticipated that by 1984 and 1985 we can count only on 1983 supports; this would bring to naught, however, the support planned for the extension of necessary investments; we would have to reduce machine and equipment acquisition sums by about 40 percent. Its harmful effects would be felt in two directions: the obsolescence of research means in MTA institutions would be increased and there would be a real danger that in several years the conditions for experimental work would be lacking. Planned acquisitions have been frustrated for such equipment, for example, as the automatic synthesizer for the production of various gene segments, the high performance preparative liquid chromatograph for their separation, the surface investigating equipment essential for solid body research or the 500 NMR /expansion unknown/ as a single large piece of equipment.

Because of the decrease in investment money, some of the previously obligated sums were withdrawn from research programs entrusted to Academy responsibility.

In working out the medium-term plans, the Academy counted on income from research contracts as an important factor. Now this, too, had to be revised, because a considerable decline in the volume of contractual jobs can be expected with a more vigorous withdrawal of enterprise means. Since increased contractual sales can be fulfilled only with appropriate circulating capital goods, liquidity problems appeared to an ever greater degree. (That is to say, the circulating capital goods supply of the central research institutes has not yet been settled, and they are not entitled to credits.)

The shortage in adequate import materials is accompanied by the consequence that, on one hand, the Academy research institutes are not able to produce for industry the research results to promote capitalist export or import replacement, and on the other hand the significant decline in sales may endanger the existence of certain institutions. The largescale deceleration in the formation of the Central Research Fund is leading to where in the second half of the plan period the sums that may be devoted to basic research will decrease significantly.

The third section of the presentation dealt with the necessary subject changes and program alterations as a consequence of changed material conditions. It was stressed, as an example, that the deteriorating conditions may endanger the results of such basic research areas as wheat enhancement; genetic research, without which the further development of agriculture is inconceivable; pharmaceutical research; and the material scientific, computer-technological and computer-scientific and automation research to support the electronics industry.

The research programs and the modification of the program require great circumspection all the more because the chairman of the program representatives and the coordinating councils do not at all willingly initiate the elimination of programs or of subject studies.

The fourth and last point of the presentation concerned the political effects of the changes which have occurred in the K + F economic conditions. It was stated that the reduction measures undertaken thus far and those expected have evoked an unfavorable response both in the Academy bodies and in the views of the researchers. The central measures--the restraint on investments, the reduction in the foreign exchange sums for acquiring machines, equipment, books and periodicals and the restriction on international relations--have naturally worsened research conditions in the Academy institutes, and as a consequence some of the institutes are beginning to lose their research momentum.

It is a serious sociopolitical problem that as a consequence of the economic restrictions in recent years the possibilities and conditions of modern research have deteriorated more than the average research activity. Neither in Hungary nor at the level of the CEMA partners can a modern research infrastructure be provided, or it can with great difficulty; and yet acquisitions and foreign ties are foreign-exchange intensive. Although support for research works in the past 5 years has been largely at the same forint level, this has declined greatly in value. Thus pieces of equipment grow obsolete and cannot be renewed from domestic resources, and with the lack of spare parts in time become unusable. For a time, the research places use up their reserves, and when they have exhausted everything they are compelled to reduce the intensity of their research works, abandon important subjects or turn to less important ones. To solve the problem of the continuing employment and development of our best researchers by way of undertaking foreign work can be only a temporary and individual solution, but for Hungary it would represent an "intellectual export" of doubtful value.

It is well known to Hungarian researchers that in order to overcome economic difficulties many countries--including countries at a level of development similar to ours--are increasing their support of research products, or at least keeping them abreast of inflation. The general recognition abroad that even in

times of recession it is possible and necessary to establish the basis for a later and higher level of production development with new scientific knowledge would also be fruitful for Hungary. On the contrary, we experience a cutback in science, including support for the natural sciences.

Politically and morally perhaps we may describe uncertainty as the most damaging effect of the renewed reductions. The researchers feel that this is the fact beyond the objective difficulties which puts a question mark on their efforts and their work.

As their final conclusion in the presentation, the Academy leaders recommended to the Science Policy Committee that by taking into account on the one hand the economic difficulties and on the other hand the demand for basic research, an end should be put to the uncertainty and the leveling. Appropriate support should be assured for the high-level research works that promise new results--after a thorough selection process. Moreover, available resources should be concentrated at the research places only on definite subjects, thus assuring that in the most important research projects the emergency measures will not hinder progress.

All those who commented at this session of the Presidium expressed their full agreement with the presentation. Some, however, took exception to the more specific proposals for further steps and called attention to the fact that in research--where the demand for longterm adaptation is characteristic--frequent changes of subjects lead to waste, and unused expensive equipment capacity and the lack of spare parts procurement are disquieting.

The members of the Presidium unanimously recommended to the Science Policy Committee that considering the negative consequences it should decide on beginning the reconstruction of the KFKI /Central Research Institute of Physics/ research reactor because it concerns something much broader than science, namely, the Hungarian economy, where despite our present difficulties we can do and are doing something for our future. Many also expressed their deep insight into the country's economic difficulties and the foreign exchange problems, and at the same time they emphasized their willingness to support with all their strength--even in case of minimal support for research works--the efforts to rescue through science the country from its difficult economic problems.

Although the presentation analyzed the data and possibilities of the Academy's research institutes, those who commented expressed the view that the problem should be studied from the viewpoint of the whole Hungarian research base. For the sake of competitiveness, it is necessary to concentrate on development with a selective policy.

The concept of K + F must also be clarified more precisely. Some expressed the view that half of the research institutes are not performing research work although their activities are valuable. It would be important to clarify the concept in order that only actual research work would be counted as such.

As its final conclusion, the Presidium discussions sought to direct institute and research attention to a positive solution of the difficult situation. The

summary emphasized: we must not only outline the situation but the tasks. It follows from the responsibility of the Academy to science that it should continue with well-founded arguments to support importance of research work. On the other hand, responsibility to the country and the political leadership dictates that it should strive even at the cost of greater efforts to extend and give more research results that can be used in production. This is not an easy task, for there may be pitfalls to goal-oriented selectivity in the present situation. Sometimes the best and highest-level research projects are the most fragile and the medium-level ones are the most durable. The Academy must manage and plan with great circumspection and sense of responsibility in such a way that it will use the critical circumstances for clarifying the situation and the better subsequent development of scientific conditions.

The session delegated an ad hoc committee to study the problem further and to come up with appropriate recommendations.

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ACADEMY PRESIDENT CRITICAL OF SCIENCE ATTITUDES

Budapest MAGYAR TUDOMANY in Hungarian No 6, Jun 83 pp 414-422

/Address by Janos Szentagothai: "On the Condition of Our Scientific Life"*/

/Text/ It is impossible these days to open up a newspaper, listen to a snatch of commentary on the radio or television without being confronted by one problem or another that causes uneasiness in our present situation or evokes our anxiety about the future. It is also well known that the "competent" and the "less competent" agree in a farreaching manner about the solution--to the extent that it can apply to the citizens of a small country like ours--namely, that "we should work better and more efficiently" and adapt more flexibly" to the rapidly changing conditions, above all with an imagination that "undertakes more creative and daring risks"; that we should grant greater scope to the talented youth, who are not as yet worn out and are less inclined to be resigned, and to similar decisions with respect to our own encouragement. Up to this point there could be a complete understanding. But as soon as we begin to discuss the difficulties of our reaction or adaptation to objective difficulties or the causes of their incorrect removal as to direction or timing and in particular the factors that are responsible for it, harmony disintegrates into a cacophony that would mock the wildest beat music.

In a situation like this, which is experienced by all of us and certainly not disputed by anyone, I feel it is my duty to attempt a somewhat deeper analysis of the present condition of our scientific life.

In most of my previous General Assembly reports, I tried to shed light on one or another aspect of the whole picture; I confess I did so with modest success. Since then, of course, the objective difficulties have become intensified in every area, and more difficult with time. The situation of the economy has constrained the government to take quite a few measures designed first to slow down the rate of the rise in living standards, then to halt it and finally to bring about a perceptible retrogression. Our colleagues feel--and at its March session our Presidium had to state this as a serious phenomenon--that these curtailments were of greater scale in respect to the real value of investment, work and personnel credits available to the cultivation of science in former years and--even more serious--with respect to convertible currencies than

*A somewhat abbreviated text of a speech delivered at the General Assembly concluded on 5 May.

generally in the field of living standards and socialist building. It is certainly worthwhile to consider whether a reduction of this scale is advisable from the point of view of the future in regard to outlays that are available to science--which were previously difficult to determine also in their statistical features--but in the final analysis are rather modest as compared with the total volume of the economy.

Is such a worsening of the objective conditions of scientific life an actual necessity or a policy that has not been adequately thought out? In any event, I would like to assure my colleagues that the presidium of the Hungarian Academy of Sciences, as well as its more restricted leadership, has moved firmly and with some success, and will continue to do so in the future, through every constitutionally available forum to prevent the conditions of scientific operation from suffering even the slightest or temporary harm. I am happy to state that I had the opportunity at the April session of the MSZMP Central Committee to present our concerns of this nature. I ask that, if possible, we should not now debate the difficulties caused by periodical subscriptions which are not only aggravating but also cause serious harm. We know and emphasize that it is necessary to practice economy at every turn, but this is effective only if it does not cause greater troubles and rests on rational principles and appropriate expert knowledge. Because it would hardly be a proper goal of ours if in response to the well-known Western political pressure we were to pile on limits of our own. Our colleagues should be convinced that the leadership of our Academy regards the curtailments at least as much as do the researchers working at their various posts--for it feels the conditions in their totality--and will do everything it can to prevent reductions that exceed absolutely necessary measures.

In this sphere we do not need specially to reaffirm that the rightful viewpoints of science can be defended only with the possession of appropriate moral credit, that is to say, the "creditability" of the research community. Let us look first to see where we stand in this area.

I believe that the papers and debates at our general assemblies in recent years bear witness to the fact that the upper level of leadership of our bodies and our own research networks, by facing the facts with candor, has reviewed--in many instances with self-criticism going to the point of self-laceration--its scientific achievements and their reflection in international scientific consciousness. In this "facing of the facts," the only fault may be that we are still excessively restricting our knowledge to our own research network--and, moreover, even to the immediate work group of our members--and we do not adequately consider the fact that our bodies are also responsible nationally for research work as a whole. In summary, I may only reiterate that we cannot be satisfied with "our reputation in the world" even though the positions we hold in international scientific societies and associations and the number of requests for papers at the more important plenary sessions or other important forums are showing a much more favorable picture than is evident from a comparative analysis of cited scientific works. But we should not delude ourselves with this, because this also has special political cuases to an important extent. This picture, which is very ambiguous in its totality, cannot obscure the fact that in the 1970's our scientific work maintained, and even strengthened, several of its

important leading positions despite weak "medium and low ranges" which greatly lowered the average. In this regard we must mention the molecular-biological research projects at the Szeged Biological Center, the successful activity of the Central Physics Research Institute, the Central Chemical Research Institute, the Computer Technology and Automation Research Institute, the Nuclear Research Institute and several Academy and non-Academy agricultural research institutes. It is my feeling that in the past several years the application of computer science and computers in research has undergone not only a certain change in outlook but also that long-awaited, breakthrough "change of life form" is also starting to develop without which today modern science cannot even be imagined. We are now in a somewhat better position with the so-called small and special computers as well as "personal computers" than in respect to the now necessary "computer hardware infrastructure"--terminals and appropriate noiseless and specially secured information channels (cable networks). In the broadly interpreted biomedicinal sciences we have attained the international level in the use of immunological methods and in the entire scale from molecular receptor research to the now almost macroscopic neuroanatomical magnitude. Instead of immune serums "brought home in the pocket," we have in hand immune serums produced by our researchers and forming a serious exchange base--in a quality that stands up to every comparison. Not only ago, it was reported at an Academy inaugural lecture that success had been achieved in raising the sensitivity of the immune cytological method by two magnitudes. It is appropriate here, of course, to mention that our peptid chemical research created the indispensable chemical bases. Our pharmaceutical research, which also gives occasion for qualms, has at least two results which give hope for lasting world success, the Cavinton and Jumex. The more important basic research projects in economics, economic management are achieving outstanding results in social research as well as theoretical work to establish an appropriate outlook in national identity, and in several important sociological and demographic research projects.

But all these things are at best the first glow of dawn, and for this to be followed by the sunrise of scientific research, given in particular the present objective endowments, it is essentially necessary for superhuman efforts and the fulfillment of several conditions to be detailed in the following.

The weak average--the "impact"--of international effectiveness of our sciences should itself call our attention to the fact that the little-mentioned and the few unmentioned results and directions share in the necessarily reduced outlays, one at the essentially lower than average "medium range" and the other at the below-level "low range." Since as a result of the country's objective economic situation the outlays will remain necessarily below the level of the 1970's--assuming optimistically that we will succeed in preventing further erosion--this will constrain us to be much more selective than heretofore. Unfortunately the present condition of our scientific life in this area does not give us cause for optimism.

With the reform of scientific grading being conducted at present we hoped that with the establishment of a unified system of scientific continuation training, which has not existed up to now in our country, we will at the very beginning of their research careers extend serious help to young people who feel a calling for research work and who show talent. The result for the time being is a great outcry because under our "prestige focus," the central idea of our thinking,

those who were "left out" of the list of research places designated for priority research training work are offended. I acknowledge that it may have been superfluous to compile a list like this, and it is our firm resolve that we will not even take this into account at good workplaces. I would still counsel those who were left out and were offended by our thinking to be active at their workplaces among the young people who are on their payroll--they will find enough to do--until on some subsequent list, if there will be another, they also can find a role in place of those left out because of nonprimary activities.

This so-called unified scientific continuation training also includes a great compromise, primarily regarding the further fate of those who participate in the unified training. But it must also be taken into account that the transformation to the new system will take time. I am not convinced that the present compromise is good, and even less convinced that we will be able to solve all the contradictions at present existing in the reform of the actual grading procedure. Our reform intentions are obvious, but we should not expect miracles! It appears to me it will be impossible radically to change the grading system (affecting more and more specialists every year) which has been functioning since the 1950's. What is possible and necessary, on one hand, is the full and level-raising realization of the basic requirements which were developed earlier and are still valid today (this is particularly true at the doctoral-degree (level); and on the other hand a resolute effort at solving urgent problems that await solution (for example, increased attraction of degrees, modernization of material incentives and a further increase in the role of the universities, research institutes and chiefly the divisions of the Academy in grading procedures). Perhaps it is not necessary to emphasize that, for example, our candidate degrees--according to the evaluation of the TMB /Committee on Scientific Qualifications/--as compared with corresponding degrees in the friendly socialist countries, belong among the higher-level degrees and, compared with the system native to the West, is comparable to the PhD degree at the better universities. But no matter what kind of reform we succeed in working out, we can do it poorly if specialists who are to be taken into the evaluation and specialized committees and into the plenum do not hold their ground on a strict theoretical basis. Unfortunately, the longer I am not merely an observer but a participant in such efforts the more I am convinced our basic problem is that we make a fetish of institutional frameworks; to quote the Bible, the principle that "man was not made for the Sabbath but Sabbath for the man" is being neglected. We can come up with any kind of regulation that is craftily balanced and perfectly entrenched in the legal sense; it is the basic feature of institutionalized systems to move in the direction of their own devaluation and degradation, and be realized relentlessly and independently of the subjective will of the participants. As long as we imagine that we are defending ourselves against our own weaknesses and lack of principles by means of institutionalized bastions, the qualitative renovation of our scientific community will remain an empty figment of the fancy. As long as we do not see to it that we can reward extraordinary scientific achievement free from all formal requirements, in special cases even with the title of doctor of sciences or membership in the Academy, and vice versa, that despite exact fulfillment of formal conditions higher scientific training cannot be given to one whose achievements are not creative and do not embrace in spirit the criteria for the various degrees, I will not believe in the possibility of any kind of improvement. I do not mean to say that we should

not take the necessary, modern reform measures in the interest of our scientific grading and the qualitative renovation of the leadership in our research places; but without placing creative achievement above all this, we cannot expect much success.

Here we may speak of our research network, its internal atmosphere in some places and its weakness in or lack of self-renovation. There are a number of higher-ranking positions which are filled by "ex-researchers" who were unsuitable or turned out to be unsuitable. Specifically which positions these are is better known to the collective of the institutes concerned than myself. But a considerable number of the positions are filled at the lower leadership level, and even below, with personnel who have proved incapable of development, thus barring the young who are entitled to greater expectations. Unfortunately, these people cling fiercely to the positions they have attained and--according to the prevailing attitude--it would be "inhumane" to counsel them into places where they could capitalize on their undoubtedly great specialized knowledge to the benefit of society, or put into process their pension status which they deserved a long time ago. According to my rough estimate, removal from a leadership position for lack of development capability--let us say at the age of 50 to 55 years, by which time it should be clearly manifest, even with a pension 50 percent greater than salary--would result in enormous benefit to the country and science. (I shall mention only parenthetically that in Japan at the age of 50 to 60 years everyone is pensioned from the state university with rather wretched pension payments if another workplace is not found). In defense of the existing situation, certain institutes, unmoored from their original goals, have become a loose accumulation of scientific sinecures for their own ends, and hotbeds of struggles among factions.

But the situation of the research institutes and the supported research places is still much better than of most universities, where it is impossible to count on the miracle of self-renovation despite any kind of partial measures or virgorous leadership. No matter how much we occupied ourselves with the introduction of institutionalization and the rotation of institute and faculty leadership, the situation has continued to deteriorate to an increasing extent. It will suffice perhaps to point to the debate conducted in the first half of the year and in the preceding year regarding the structure of mathematical instruction at ELTE /Lorand Eotvos University of Arts and Sciences/ and other universities. To my knowledge, nothing has been realized to carry out the important recommendations made by the presidium of the Academy and as affirmed by several higher organs; and given the local "hedgehog defense," there is hardly any hope for this in the foreseeable future.

In large part, we ourselves are the cause for these errors which threaten us with irreversible impairment if things go on like this. One of the prevailing guiding principles of our scientific life is the following: "Neither your convictions nor principles should incite you to make trouble for someone who has not harmed you."

For a full analysis of the situation of our scientific life, we need to study, in addition to the foregoing, the kind of atmosphere and social consciousness medium in which it functions. Older people may recall the prestige enjoyed in 1949-1950 by science--at least in externals--to the extent that it was

uncomfortable to the researchers themselves. (I should not have to point out that with this many voluntarists elements were already trying out their wings.) We still recall the slogans of "scientist aid," "scientist bonus" and "scientist club" which rang strange and not entirely true to those of us with more refined ears but were received with respectful amazement by the public if not the researchers. But what was once excessive has now become a shortage. The anti-science attitude is a worldwide phenomenon and like other even more unpleasant world processes it is having an "impact" on us--as we used to say with cultured euphemism. I would not for a moment desire to commit even in thought the crime of slander, but in some frank revelation it may slip out in the heat of debate--to quote again from the Bible and the elegant language of Gaspar Karolyi, "the mouth speaks from the fullness of the heart"--and it may be possible to hear something like this: we do not need science here, but imported license--technology, what our research produces is only a "cloud-cuckoo land," in truth Western technology....

But it would be very much a schematic way of thinking if one wanted to narrow the antiscience emotions to the contradiction of domestic versus license results which actually does not even exist--or to put it more exactly "ought not to exist." The troubles are much more general than this: the "impact" of the wave of irrationality which is prevailing in the world. One of the signs is that in our press here and there modest mention is made of the astrological prognoses that are in style in the West. Being unsuspecting to the point of naivete, I would erase this rapidly from my consciousness if I had not witnessed it on a popular TV series in which after an eminent writer, in response to a query, informed us that stealing is a natural accompaniment of youth, and a discussion of astrology followed. It became clear that this eminent writer of ours casts the horoscopes of the imaginary persons who appear in his works in order that he might successfully analyze personality in its full nature. But then in addition, the report queried the "professor of the Cosmobiological Institute" of the Buddhist mission which is officially permitted in Hungary. The professor enlightened the Hungarian viewers by informing them that astrology is in fact a science although not in the same sense as used by Western jouranlists. Fortunately, a journalist was present who was not ashamed to state that astrology is a pseudoscience. But what remains with the TV viewer? A single, balanced sentence spoken by an intelligent reporter, or the previous palaver?

Since the world pseudoscience has come up, it would do no harm to pause and analyze it for a moment. At one of the general assemblies in an attempt to quiet the general indignation stirred by the then new institution of "candidacy" (now 30 years later it stirs indignation of course if we touch this sanctified institution), my esteemed predecessor, Istvan Rusznyak, said: "it is a very broad trough." Well, pseudoscience is also a very broad trough in one of whose extreme zones belong spiritualism, psychokinetics, extrasensory perception, the magic wand, astrology and so forth among the obvious pseudosciences (I do not fully understand why for an obvious deceit we need to use the concept of science even though muted by a prefix). The next zone consists of the so-called "naive science." Here I might mention the multitude of inventions by the enormous number of well-intentioned men who, however, do not understand the principles and methodology of science.

And then this trough of a "pseudoscience" has a gray left (or if you prefer right) zone, that is to say, something which may be a science but also may not be. It is well known from the history of science that the ideas of Einstein were for a long time considered by many to be a pseudoscience. No less a man than Max Planck threw out Onsager with his equation that was later honored with a Nobel Prize and established the basis for the study of cooperative phenomena. The line of Prigogine is not called a pseudoscience by many because he received the Stockholm seal of approval. Rene Thom's catastrophe theory, Haken's hypotheses of synergism, the concepts of the autopoetic systems of Maturana and Varela and so forth have not as yet been accepted by the scientific establishment. I myself have tried a timed stroke of the oar in disturbed waters like this regarding theories of the brain. Well then, let us ask: is this, too, a pseudoscience? Yes and no: as long as I know that I have overstepped the secure zone of strict scientific deductions and I say it, then this is a border zone of scientific cultivation strongly colored by intuition, which is not a pseudoscience, but something underway, and something may come of it, even something new in a revolutionary manner. But it becomes a pseudoscience at that moment when my bold speculations rise to a life of their own, and I believe--in fact, I try to make others believe--that this is science, and not the reproducible result that is wrung out with bloody sweat. (For example, such is the debate over the article "Life Machine" which appeared in a literary weekly that I otherwise respect highly.) I recommend that we make it our strict and generally accepted basic principle that at every level of our scientific grading the basis of evaluation should be decisively formed by the attained result that evokes a reproducible and assured reaction, and not by some kind of appealing or loose hypothesis.

The so-called "small science," the science of what is not worth knowing, is not a pseudoscience in the original sense of the word, but it causes a great deal of harm in our scientific work. That is to say, the multitude of numerous, occasional "modest results" that see the light of day in university or other local publications. Of course, Endre Ady himself wrote such occasional poems about which he later said in antique terms that they were "not worthy of Parnassus." Posterity welcomes such scattered semiprecious stones from Endre Ady and even from substantially lesser writers. But why must I enjoy the writings which were not destined for Parnassus (or did not at least get there) of an eminent chief or subordinate doctor, a chief or subordinate agronomist, a chief or subordinate engineer or perhaps a university professor who otherwise cultivate their profession at a high level? But this is still not so bad: in such publications and series it is still possible by way of swapping to acquire modest rather than good external information; we stabilize perishing raw material for the sake of local history. But to put it mildly, it is comic that we should have to maintain department announcements for such works--as has been proposed in several of our departments--and that we should retract the "ill-advised" decision of the presidium to suspend these publications.

I believe that this overall picture, outlined with broad expressionist strokes of the brush and burdened with many contradictions, will stimulate--if nothing else--reflection, discussion, self-study and perhaps revaluation of our situation--even though it may not be described as appealing in many details.

The white books compiled by our colleagues comprise the main data on the work of the departments and the presidium in the past year. We have finished with most of the significant number of inaugurals which accompany the 1982 selection of corresponding and regular members. On the whole, it is my impression that as compared with the inaugurals of the previous selection cycle a significant rise in level is evident. The much-reproved elimination of the department announcements and the start of a new series of dissertations and memoirs also indicates something of a positive result. At the same time, I must mention our Hungarian-language journals which have been continued or in some cases are newly started and mainly the editorial committees of the ACTAs. In addition to the resolved decision of the presidium to continue with the ACTAs, it wishes to follow a study to be conducted in 1984 to decide--and I hope with the same determination and without regard to the opposition of certain circles as in the case of the department announcements--which ACTA editorial boards and writers have failed to understand the voice of the times and have failed to advance in respect to the material that is published and the level of editing--and I emphasize not in respect to profitability. In these cases, in addition to maintaining the level of foreign-language publication possibilities, it is our firm intention to eliminate or reprofile some of the ACTAs and to start new journals in other, newly-appeared areas that are wanting.

In conclusion, let me point out that during the past year the most varied organs, bodies, members and specialized administrative bodies of the Hungarian Academy of Sciences participated to a greater degree than before in the planning work of the most varied branch and interbranch leaderships and authoritative organs of higher party leadership. A considerable amount of data on this is included in the documents that have been distributed. Perhaps it is not exaggerated optimism on my part to repeat that the party and state organs require the opinions of the scientists, their responsible obligation and their professionally well-founded foresight. We cannot expect or demand, or course, that what we consider best should always be reflected in political and state administrative decisions, but our expert opinions and our recommendations are now being reflected in decisionmaking more than before. It would require another analysis as long as this one if I wanted to analyze in detail our participation in the tasks. Still I would like to make special mention of two matters.

One of these is our successful role in last summer's world conference on the situation of the elderly sponsored by the UN. Beyond the satisfaction of stating it, I hope this will direct our attention to unpostponable tasks. This is related to the report which in accordance with last year's General Assembly resolution our Research Organization Institute, under the leadership of our colleague, Sandor Szalai, prepared on the age composition of Academy members and its demographic projection. This material is extremely interesting and in no way points to a reassuring future. Its recommendations call for careful and manifold deliberations. I quote verbatim from Sandor Szalai on the danger posed by membership aging: "It is true that advanced age gives a certain scientific-political wisdom. But science develops extremely rapidly, a scientist who is between 60 and 70 years old knows directly only the works of his students, and the new fields of research are for the most part unknown to him. How can he judge his younger colleagues, how can be grade and evaluate their activity, how can he pass a value judgment over them? It is always the young who represent

the new disciplines, which are now being born every 10 years--while the present average age of the members of the Academy is 63.9 years." The Academy's membership selection is characterized by the following data: between 1951 and 1964 the Academy selected 77 new corresponding members; of these only 3 were under the age of 40 years, and of the 180 selected between 1965 and 1982 only 5 were under the age of 40 years!

The work is not yet finished, but we can already state that the interdisciplinary committee of the presidium--and to mention by name our colleagues Sandor Szalai and Imre Dimeny in another leadership body--is performing an extremely important role regarding the problems that are becoming acute in the utilization of Danube surface water, which up to recent times has not been given adequate attention. It is our obligation to point out that Hungary as the biggest geographical region of the entire Danube area and the central country, that is, the most centrally situated in the pathian Basin, has certain special and rightful demands. All Carpathian Basin pollution is carried to us, and in that part of Yugoslavia which is situated on the Danube below us the water is supplemented by Yugoslavia's own ample tributaries and is less endangered or can be better controlled. Even given the greatest socialist understanding there are environmental and water protection priorities which can rightfully force other priorities into the background. It is the obligation of our Academy to keep this idea alive before our own government and the scientific opinion of our neighbors. Of course, we also have other environmental, regional and producer land-protection problems, but fortunately most of these can be solved within our own sphere of authority. Their scientific analysis was one of the important tasks of the Academy in the past year. It may perhaps be justified to state that here the Academy has contributed to a decisive extent to national-level perceptions and hopefully executive decisions regarding the danger to the waters of the Balaton.

I have outlined here, although with many omissions, the present situation of our Academy. My report reflects primarily my own views, and therefore I request my colleagues to direct their rightful criticism and possible anger against my person. In the first part of the report that referred to the present difficult situation of the Academy I tried to represent the majority position of the presidium--actually dulling a bit the sharpness thereof--and on other matters I allowed a bit of greater freedom to my own ideas. I request your kindly acknowledgement of my report.

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ACADEMY FIRST SECRETARY WRITES ON PRESENT, FUTURE AS REFLECTED IN SCIENCE

Budapest MAGYAR TUDOMANY in Hungarian No 6, Jun 83 pp 423-432

/Article by Pal Lenard: "Our Present and Future as Reflected in Science"/

/Text/ At last year's General Assembly I tried to give a comprehensive report on the state of Academy research, its results and shortcomings. I do not believe it is necessary now to go once more into long reflections on this, and I hope that our General Assembly will agree. In the past year, however, several things have happened which caused uncertainty among research workers, aroused feelings and at times led to such extremist questions as "Do we need research in Hungary?" Or "What is a scientist worth who is a Magyar?" and so forth.

It is not my intention to cast doubt on the rightness of the concerns, for I myself encounter every day the circumstances that make research work difficult, and in trying to dispel them I sometimes meet with success and sometimes with defeat. For our researchers and Academy members it is obvious that as a matter of conscience we are obligated to defend the true values of science, which at the same time, of course, are the objective interests of our society although, unfortunately, not always easily acceptable. I believe that in carrying out this obligation we can rely on a secure base. At its April session this year, the Central Committee passed a resolution which in part concerns science, and even if it does not immediately put an end to the justified or unjustified anxieties and their unfavorable effects, it communicates a clear position on the role of science and serves as an appropriate base for social progress and the action necessary to defend and develop research works serving the interests of science.

I quote: "In establishing the basis of our future, the role of science is increasing. The Central Committee evaluates highly the contribution of science to the solution of our present and longterm tasks and helps in its development. It regards as necessary that scientific research should concentrate its attention on the most important tasks facing the country and help in the meeting of social demands. In following our science policy principles, we must increasingly support natural and social science research work which establishes the bases for longterm goals and serves the present demands of practice as well as the responsible use of research results. It is an urgent task to coordinate the still mostly separated tasks of research, technical development, production and marketing, and to create the conditions necessary to do this. We must rely more on the results of science in preparing sociopolitical decisions."

End of quote. I should like above all to note that in the drafting of this part of the resolution--as well as other parts--the recommendations developed by the Academy presidium in the discussion prior to the drafting of the resolution played an important role. This shows that what the Hungarian Academy of Sciences emphasizes and proposes with responsible care carries weight. We can also state with conviction that as the most authentic organ of domestic scientism the Academy has a recognized important role and increasing responsibility for initiatives and actions serving the social, economic and cultural elevation of the nation.

The sentence in the resolution that the Central Committee evaluates highly the contribution of science to the solution of our present and longterm tasks prompts me to mention the happy recognition accorded to Academy research and the members and researchers of the Academy in this year's awarding of State Prizes. Fourteen of our Academy members received awards, which does not indicate that we must struggle in answering the high-sounding question: "What is a scientist woth who is a Magyar?"

Let there be no misunderstanding, I would not want to proclaim a erphoric atmosphere to dispel our actual problems. I only wanted, if necessary, to increase somewhat our confidence in our worth and in the solidity of the sources capable of recognizing these. I would be happy if the prizes would also bring joy to those who, although excellent and worthy of recognition, can now only give their congratulations.

Size and Subjectivity

We frequently mention that we are a small country, and this smallness has many consequences with which we must reckon. Recently, I read an interesting essay by Garfield on the consequences deriving from the smallness of communities. Garfield quotes the ideas presented by Milgram about 15 years ago on the standards of smallness. With certain simplifications it is possible on the basis of the following considerations to define these. Let us select at random two members of a community and examine through how many links of acquaintanceships we can go from one person to another. Let one person be X and the other Y. If X does not know Y, then X knows A, who knows B, who knows C, who knows D, who finally is a friend, relative, boss, subordinate or simply an acquaintance of Y. The number of links leading from X to Y (the number of elements in the chain of acquaintanceship) we may regard as the extent of the community's smallness. The fewer the elements in the acquaintanceship chain the smaller the community which forms the subject of the study.

I would like to go now into detail and discuss the methods by which we can determine the number of elements in the chain. The fact is that between two freely chosen persons in a community of 8 to 10 million persons the number of elements on the average is hardly more than 5; on the other hand, in certain specialized areas of science--in a community of several thousand persons--the number is 1. What can we deduce from this? Above all, that the realization of the norms of impersonality is impossible in decisions and opinions. Anyone who must take a position on something is usually familiar with the person concerned in the matter, and thus the emotional and other ties between them

almost prevent the position (for example, on an article or competitive price etc.) from being impersonal. This condition is coupled with the characteristic of small communities that positions--with some exaggeration--are in circulation even before they are born. Naturally, because of the immediacy of the relation, the originator of every position will also be well known. Thus in forming their opinions the position originators take into prior account the consequences deriving from the impossibility of realizing the norm of impersonality, and objectively this promotes subjectivity.

Why am I speaking of this more or less trivial phenomenon? Above all, because I regard it as desirable that we recognize its objective existence--for it does exist--and we reckon with it. This is more rational than to refer to higher ethical requirements and assume a full objectivity, which, in fact, does not exist. Despite the limits deriving from smallness and given the greater extent of dependence, there is a way to the clear, candid--naturally not free from subjectivity--taking of positions, because fortunately in our country the political atmosphere is such that there is an open road to scientific debates. It is true, evidence exists that there are cases which show that we do not adequately exploit the possibilities of frank debates that moderate the limits of smallness.

On the Benefits of Science

In recent years and in certain circles it has become stylish to make skeptical statements about science and chiefly about its benefits. What could I reply first of all to those who ask: do we need scientific research; is it a permissible luxury to spend money on it, or a stubbornly demanding necessity?

The reply will hardly be convincing, if I list how much various countries--from the most developed to the modestly developed--spend from their annual national income on such goals. These figures only reveal the expenditures, but say little about their success or the national economic role of the research works. And these quantities cannot be compared anyway since the success of research and development--we do not speak here of the role of social and human factors--are sensitive not to the ratios but to the mass of expenditures. This depends, however, on the state of development and the economy of a given country and on the concentration of the outlays on socially important problems. Although such lists of figures are not persuasive, they still give us warning: our economy and our entire society will sooner or later meet with the results of the research-development activity being conducted elsehwere when it comes to competition in the sphere of international work distribution. It is a basic task, therefore, to espouse the new scientific trends, to prepare the new relations and to put pressure on the present limits even though this is accompanied from time to time by material sacrifices, by risks and sometimes by failures and unpopularity. We must consciously accept the role which it is necessary to play in order to establish the scientific-technical base of a given production culture and to shape the socioeconomic relations suitable to acceptance of the new.

I would like to point out, in outline, several contributions of the Academy which in the past 2 or 3 years, supported precisely by this consciousness, helped in our progress even under difficult circumstances.

We have often emphasized that among the internal environmental conditions of our further development we regard as most urgent at present the development of factors that shape an increase in efficiency and an improvement in public attitude. Our social researchers, economists and sociologists also played an important role in the past in invigorating the socialist entrepreneurial spirit, the enhancement of various business forms, making enterprise structures more variable, the development of activity (engineering, marketing etc.) between research and production, the establishment of the scientific basis for practical activity serving to raise the social value of entrepreneurial success and so forth. Here we can also include those Academy efforts which are developed in areas of education that are important from the viewpoint of developing human factors (reform of training for technicians, the general introduction of computer education into the school system etc.). I believe that I am only reiterating an old truth when I state that the goals and centers of gravity of scientific research are not only motivated by the internal development of science but are significantly influenced by the situation and orientation of the society and economy and the combined effect of the exigencies and degrees of freedom deriving therefrom. In the present critical world economic situation, we can well feel those shifts in direction which emphasize research tasks that are more purposeful, profit-oriented and better serving of a more rapid technical development. The recognition of the situation which stems from this crisis supports these orientations, but this by itself is too little. This process is the most successful in those countries which there is an important and highly-qualified research cadre that functions well within organizational limits; this represents the basis of their adaptability and their receptivitiy to accepting impulses coming from the economy.

It follows from a realistic judgment of our domestic social, economic and cultural relations that we, too, need to go on forming our research and development tasks, modifying organizational and interest relations and developing a situation where because of economic interests the producer and marketing organizations are compelled to absorb and pay for technical-scientific results (both domestic and foreign alike) that are actually usable.

We must know that it is necessary to relate the tone of preparation that forms the basis of further development with the equilibrium-guarding basic tone of the present situation. If we were to give up making preparations, the upswing that will occur sooner or later in the world economy would leave our country in a disadvantageous situation that we could not overcome. Even if the situation should worsen, we have great need for preparation. Therefore we emphasize--and this was also expressed in the most recent resolution of the Central Committee--that despite our difficulties we must increasingly support natural and social science research which provides the basis for longterm goals and serves the present requirements of practice, including of course technical and agrarian research.

I believe it is unnecessary for me to prove that both in overcoming present difficulties and in establishing the bases of our further development an outstanding role is played by the state of development in intellectual level, readiness to adapt, work culture and so forth. This is the sphere which we can actually influence and in which scientific research has continued and will

continue to have basic importance. Here belongs the activity which we must perform every day in order to raise substantially the mode of people's thinking, their individual-social; culture and their ethical level. Thus, otherwise also, we must emphasize the improvement of adaptability and of general conditions because it is hard to predict world economic processes, and our ability to influence them is slight although our situation and development greatly depend on them.

Temporal and Substantive Characteristics

Under our current difficulties and particularly under the influence of the moments that have become more strained in the past 8 to 10 months, questions have been put that express impatience at times: why do we need so many research institutes and publications, why are so many researchers on the payroll if they are unable to provide immediate answers to the overpowering problems of the day and if even in difficult situations they "only" conceive goals that are primarily far in the future? The questions are clear, and it is our obligation to give an answer. I believe that our answer must extend to several general--not unconditionally well-known--circumstances and be comprised of concrete facts which clearly show that the contribution of research to the operations of the economy are much more important than appears at first glance.

We must above all speak of the temporal and substantive characteristics of research activity independently of desires and emotional biases. It is characteristic of the activity that there is a significant time differential between the beginning of the work and its successful appearance. (Simultaneity in other processes conceived in the economic plan and put into motion generally occurs only in the use of money sources.) The differential comes to 5-6 years, but in some cases even more. It follows from this that those results which are usable today and which may represent an answer to the solution of present problems were started 5 to 6 years ago or more, at which time they derived from research projects which may have been described as "far in the future."

--If at the given time, for example, we had not started research works related to nuclear reactors, the Paks Nuclear Power Plant, which will have its delayed start in December, would have run into very great difficulties.

--If at the given time, we had not established the basis for moelcular biological research, we would have no monoclonal antibodies, and we would not be working with plant cell and tissue cultivation, with gene surgery and so forth.

--If at the time we had neglected solid state research we would today be lacking the scientific background and a staff of computer specialists in the field of solid state electronics.

--If we had not established at the right time the framework for computer technology then the advances in efficiency resulting from computer technology would be even slower and more difficult than they are today.

--If at the given time we had not devoted sufficient attention to grain research, we would not have achieved present production averages even with modern agrotechnology.

--If in the spirit of our political position on scientific research freedom we had not developed social and economic research, we still would lack many answers to the history of the past 10 to 12 years.

I will not continue this because I believe it is clear that today we can only debate the success or failure of research works that were started 5 to 10 years ago, and whatever we do now--apart from certain exceptions--can come under analysis "only" 5 to 10 years from now. Our main responsibility now is to see that we undertake good initiatives, that we support the most important goals and actual values of programs now in process and that we do not permit a decline in our intellectual effectiveness.

We cannot quantify research successes every year in some kind of index system or call for an accounting of results from money being spent now. The evaluation cannot be made uniform, because a considerable part of the results are not quantifiable; their effect merges into the general process of development, and in most instances it is the scientific accumulation deriving from outlays of the past decade and chiefly from its works that appear today as effective factors.

It was this accumulated knowledge, understanding and internationally horizontal experience that helped the scientific workers to contribute with increasing responsibility and circumspect thoroughness to important, specific and actual government decisions, as, for example:

--determination of the goals of the domestic microelectronics program;

--the passing of measures that serve to restore and protect Balaton water quality;

--the selection of certain goals for economic material consumption and technological modernization;

--the working out of new features of the computer technology program;

--establishment of the basis for resolutions serving to develop further the economic guidance system and so forth.

In answering the question about the right of research to exist, I would like to note that it was preponderantly the workshops of domestic research that mediated to the consumers the results achieved in electronics, biology, environmental protection and energetics, the production of new basic and structural materials, information technology, computer technology, automation and so forth, and these tasks could hardly have been solved without broadscale preparation, trained research cadres and an appropriate institutional system.

We may boldly state that in the interest of development, the adaptation of new results and the promotion of our own perceptions we must be present on all those most important fronts of world scientific development where our possibilities and economic goals justify this. Our situation prompts us to participate strongly in scientific research and international work distribution, and if the domestic basis is solid enough we will feel the limits of our smallness only to the extent that we must act more carefully, circumspectly and with greater preparedness for adaptation than those who must occupy themselves with everything because of their bigness.

I mention it only by way of an example that the outstanding results of our agriculture are in close relationship with the development of domestic agrarian research as shaped by a sense of proportion and circumspection. Of course, we are not saying that every applied procedure is the result of domestic research but the important work of Hungarian researchers and experts is latent in the successful adaptation of foreign results (better types, materials, techniques, technologies and herbicides. It is impossible to list the results. I would only like to show how the investments in agrarian science research are returned. Grain research--by making new types available to producers--contributed about 30 to 35 percent to the increase in the national production average. The research expenditures that created the results make up one percent of production costs. The annual value of the additional production deriving from research comes nationally to about 2 billion forints; the annual cost of the grain program on the other hand is 60 million forints.

Our Academy has done a great deal to establish the bases of social and economic perspectives and the longterm economic plan. The survey of the agrarian-ecological potential of the country and the preparation of the forecast for the future of scientific development were works of great effect, and we can expect comparably important results from the largescale work on the use of biological resources, which has already begun and is near completion, the results of which have already been discussed at our department sessions. Our research has contributed significantly to establishing the scientific basis of social policy.

Research and Practice

I could go on listing the results, but all that I have said would appear as immodesty if I did not add that we still cannot be satisfied. We have had failures and also research undertakings which brought only bitter results. It was our experience that in many cases the results did not give stimulus to practice. There are many reasons for this. To reveal these, a special work group studied those specific cases which clearly showed the existence or development of the intention between research and practice. The main lesson of the study was that without an identity of interest there is no true cooperation, no innovation. It is an experience worthy of note that those sectors, large enterprises and cooperatives of the economy which function under stronger competitive conditions become the best partners of the scientific workshops and use their services and results again and again. It may be expected that, although delayed, this process will be strengthened and broadened in all areas of industry.

Research establishes the bases for and helps this process through many channels. Its role is as essential as, for example, that of education; and possible retrogressions--as in the case of education--lead, because of momentary economic straits in the long run, to serious difficulties that can hardly be compensated for. Edwin Mansfield recently wrote of this: "When the government faces balance and inflation problems, it feels constrained to see that its financial policy curtails research and development targets. However, if this research and development would have resulted in a more rapid growth of productivity, it will result to the same extent in an undesired slowing down of the productivity increase, in a deterioration of balance and in increased inflation. The organizations

which do the regulatory work should compare the social benefit and damage of every piece of regulation, including the effects and consequences of regulation in its restraint on innovation."

Economy in every area, including research and development, must have its own obvious requirements, and not only in difficult times but always. But economy, like every other form of behavior, is profitable only if it is rational and if its side effects do not cause harm greater than the direct benefit of the savings. Although it shows up most spectacularly in financial balances, a restriction of research budgetary expenditures, particularly investments, is not unconditionally the most successful way to savings in the research and development field. The cutting back on research and development and particularly on basic research is not a given constructive answer to economic problems; it is rather the increasing of work intensity; better, more rapid and effective use of existing potentials; and the better alignment of tasks to the long and short-term demands of the economy. Such activity is not accompanied unconditionally by increasing expenditures, and in fact may be accompanied by a temporary decline. Actual economy, for example, means that we solve our tasks in a shorter time (with greater concentration of resources, better incentive and so forth), and thus the results may be available to the consumer more quickly. This is a complicated task which requires activity that not only affects the scientific sphere--and is not, of course, only a matter of savings--but every level of guidance and execution. In making research more efficient we have at present more reserves in organizational, structural, material and moral interest, and here also scientific management has tasks to do.

Emergency Measures

I would like to speak of those emergency measures which in the past 10 months have also affected the research sphere. I am convinced that these measures were necessary, the country's ability to pay was protected, and the fact that we met our payments obligation and closed the 1982 capitalist payments balance with a surplus of $400 million not only strengthened our own reputation but also served in general the interests of socialism. In carrying out the measures, the side effects caused tensions, and in some cases distortions occurred. These measures affected Academy research with particular sensitivity in three areas:

--targets for equipment and machine investments were significantly reduced, and in practice imports from the capitalist market came to a halt;

--the nonsocialist currency budget for purchase of materials, chemicals and spare parts was reduced to a large extent, and in this area as well imports almost came to a halt;

--limitations that were not circumspectly considered were put into effect in the field of book and periodical acquisition and for scientific travel using nonsocialist currency.

On the basis of advice from certain members of the Academy, its leadership and among others the presidium, a number of corrective measures have been taken in the past month or two--with the intervention of political and state leadership--or are now being worked out, which will make the restrictive measures more

tolerable. Even within the approved limits the acquisition of the most necessary equipment, spare parts and chemicals remains a big problem since the otherwise fully justified licensing procedure also extends to the demands of scientific research. I would like to hope that by assuring appropriate discipline, we will receive greater possibilities for mobility also in this area. I would like to urge that those institutes which receive capitalist payment instruments from their research results should be able to get a certain ratio of the net income as a surplus foreign-exchange sum which they are entitled to use quickly for research purposes under simplified licensing procedures. In addition, a number of other intiatives are being prepared, but I will not go into these now.

Several Deductions

We need to rethink many things as the situation has developed: we need greater discipline and responsibility. In the interest of our people and country, we must protect our values, and the scientific workers must also participate in this work. I can hardly avoid calling attention to the important task affecting social science research, on the successful solution of which our economic progress also depends to an important extent. I mean to say that from pragmatic or other kinds of considerations we have not up to now dealt profoundly enough with the ideological consequences of the changes which have occurred in the economy, the structure and value system of society, the mode and style of life, although in the interest of developing social consciousness and mainly of understanding and strengthening our socialist economic policy, we have great need to develop further in a considered and moderate way Marxist theory at the basis of ideology since there are clearly recognizable contradictions between facts, practice and old ideological theses. Ideology can draw not only forward but backward if it protects the old and obsolete. Our socialist image has changed very much in the past 30 to 40 years, and the changes have been particularly rapid in the past 10 to 12 years. It is necessary to follow the changes with scientific thoroughness, reveal the causes and make clear that in the future, too, we must reckon with changes and transformations according to the objective laws of social development. This is the essential accompaniment of a socialism that is capable of renewing itself. Renovation carries in itself abiding values, the possibility of guarding socialist achievements, for it is in renovation in the Marxist sense that those new forces are created which protect and add to old and true values and at the same time create new ones.

In order that the very important social science research works which are under way should be able to exert their effect and be available for use in the preparation for the next MSZMP Congress we must by next year translate the scientifically proven results into political language. I believe that this is a task that brings honor to social science research.

That part of the Central Committee's April resolution which deals with ideological questions points out the danger of nationalism. We well know that in the past, too, nationalism has brought great harm to our country, but the nationalism of the present--the development of which can be traced back to many known and unknown and scientifically inadequately revealed causes--is no less dangerous than that of the past, because it can ruin good relations among the peoples of the socialist countries and weaken their unity for which now a particularly

great need exists. The Central Committee resolution states: "We must devote great attention to showing our history, our socialist achievements, the development of national feeling and a real national self-understanding." In order to oppose natinalism on a scientific basis it is necessary to reveal the complex interaction of cause and effect and to analyze with great care the factors influencing the relations and cooperation of Central and Eastern European nations. By adhering strictly to facts, our historians have already made noteworthy efforts to make it possible for living generations better to understand historical processes and have helped the historical consciousness of society to develop in accordance with reality. The results are encouraging but by no means sufficient. Science must participate much more intensively in preventing nationalist dangers and in the work being conducted depict the recent past in an actual and ethically unexceptionable way.

I do not wish to speak in detail now of future tasks, which are being conceived partly in the scientific workshops of the present age and are derived partly from the compelling needs of social, economic and cultural progress, for I believe the tasks are outlined in what I have said above. At any rate, I would like at the 1984 General Assembly to put for discussion--after complex preparation--those concepts which will be called on until the turn of the century for working out the research policy to be followed by the Academy. Finally, we must work in the most varied areas of science, in a direct or indirect manner, in order to increase the performance capability of society and particularly now of the economy. We have no formula, we must find the new paths by ourselves. Creative ideas are essential to pathfinding. There is great need for action for an outstanding and sometimes risky undertaking of deeds. The essential activity in scientific research has always been the seeking of the path and the finding of the solution and the selection of well-conceived questions. It is the task of those working in the service of research management to help, support and initiate old and new actions serving the present and the future.

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INTERFERON PRODUCTION FROM HUMAN LEUKOCYTES

Budapest MAGYAR HIRLAP in Hungarian 28 Jul 83 p 8

[Summary] Researchers of the Pharmochemical Factory [Gyogyszervegyeszeti Gyar] are experimenting with production of Interferon using human leukocytes. To date, production is still in the initial stage: no clinical testing has begun.

According to Dr Kornelia Szilassy, head of the blood donor section of the Institute of Hematology and Blood Transfusion, Hungary needs 200,000 liters of blood annually. This quantity is ensured by 600,000 blood donors. The refrigerated blood has a shelf life of several years. Since most patients need only certain blood fractions and the leukocytes must generally be removed before transfusion in any case, the leukocytes have been used even up to now for experimental purposes. At present some of them are being provided to the Pharmochemical Factory for its work on Interferon.

Contrary to a recent public misapprehension, even when Interferon is actually produced, it will be exported only in case of a domestic surplus. Hungarian blood is never sold abroad.

CSO: 2502/50

BRIEFS

MICROLITHOGRAPHY FOR ULTRA SMALL CHIPS--According to certain specialists, a recent Soviet discovery can bring about a revolution in the production of microchips. A publication of the Soviet Academy of Sciences [unnamed] reports that by using a hydrogen light source and ultraviolet light at a wavelength of 115-200 nanometers, it is possible to etch one billion bits of information on a polymer-coated chip no larger than one square centimeter. Allegedly, the irradiating device is simpler and cheaper to fabricate than anything previously used. It can be operated in a non-controlled environment, even sunlight. The contours of the etchings produced by this form of microlithography are unprecedentedly sharp which makes for more accurate and reliable chips. The process is still in the experimental state so that the question of when it will become an industrially usable technology must remain unanswered for the present. [Text] [Budapest OTLET in Hungarian 7 Jul 83 p 20]

SOVIETS TRAIN HUNGARIANS ON PROCESSING LINE--The Microelectronics Enterprise, established slightly more than a year ago, is preparing to use technology and equipment purchased from socialist partners. This represents a new stage in the central development program for electronic parts. For the time being, the first complete production line destined for Hungary has been set up for trial production at the Kishinyov Mezon factory in the Soviet Union. This enterprise will provide its Hungarian partner with the technological and fabrication know-how needed for preparing imported silicon chips. At the same time it is training future Hungarian personnel. Thirty Hungarian engineers and technicians are studying the Soviet microelectronics industry on the spot and are learning in practice the operation of the production line which will arrive in Budapest in the near future. If all goes as scheduled, the production line will become operational at the Microelectronics Enterprise in September. By next year, the production line is to be operating in two shifts. [Text] [Budapest SZAMITASTECHNIKA in Hungarian Jun 83 p 13]

CSO: 2502/46

COMPUTER DEVELOPMENTS, PROBLEMS DESCRIBED

RYAD-60 Disc Capacity Increase

Krakow GAZETA KRAKOWSKA in Polish 5 Jul 83 pp 3, 4

[Article by Leslaw Peters: "Specter of Disaster on the Horizon of Krakow Science-Computer Disc-Distress"]

[text] "You always come when something bad is going on," greeted me at the Community Computer Center [Cyfronet]. To be sure, when I visited Cyfronet a year ago the center was having problems with its magnetic disc units. Recently the situation repeated itself, only now it is more than trouble--it is a drama.

In Krakow there are few installations that are as important to the scientific community as are the disc at Cyfronet. They are the fundamental device in the operation of the digital computer CYBER 72. Every major fault in the operation of the CYBER causes a heart tremor in many people--from students working on their thesis to members of the Polish Science Academy. Therefore I decided to take a closer interest in the discs.

Two Year too Long

Computer scientists call them mass storage devices, which are used to store large amounts of information in a form easily accessible to the machine. A disc pack consists of a package of elements similar to phonograph records, but with the difference that they are coated with a magnetic substance. The writing and reading of information is done using heads that operate on the same principle as those in a common tape recorder.

There are other methods of mass storage, but discs are the most convenient. It usually requires tens of seconds to rewind a magnetic tape. Often the operator must first locate the correct spool on a rack and mount it on a tape drive--taking for granted that at that given time all the tape drives are not being uses. Seconds then become minutes. Discs, however, enable access to a large amount of information in hundredths of a second. The advantage of a disc is that the information stored on it may be accessed by several users similtaneously, while only one user at a time can access a tape. In a multiprogrammed machine like the CYBER, this has great significance, for several tasks are executed at the same time.

One more item since we are on the topic of disc advantages. To date they had been more reliable than a tape at Cyfronet. However, a year ago their reliability began to degrade noticeably. From so-called system messages issued by the machine after program execution it was evident that the CYBER computer was having increasing problems in communicating with its disc. It was becoming more and more difficult for the heads to read the information written on the disc. Not having the resources to purchase new heads, or repair the old ones, it was decided at Cyfronet to take down one disc drive unit and move the less-used heads to positions which had been most used on the other two drives. This limited the utility of the CYBER, but within limits that still allowed more or less normal operation of the machine. This state lasted a year, after which the situation repeated itself. In this way, a few days ago, the second of the three units was deactivated so that at least the last remaining unit may continue to operate. This time, however, the operation had serious consequences causing a change in the quality of system operation. The operating disc has become a bottleneck, and Cyfronet these days has been deluged by mountains of cards containing uncompleted calculations. In these abnormal conditions the CYBER operates below 30 percent of its full capacity.

Really, it is difficult to be surprised that things like these are happening. The normal service life for the heads is 5 years, while on the Krakow CYBER they have functioned for 7 years. That which was done with the disc drives at Cyfronet has probably not been tried at any other computer information center in the world.

Three Thousand Worried People

A year ago in an article entitled "Computer Runs Out of Breath" (GAZETA KRAKOWSKA 25-27 June 1982) I tried to explain in detail the part that the CYBER plays in the Krakow scientific community. Therefore, just a few words on this subject.

The machine, to be brief, processes 75 percent of the work done by the Jagiellonian University Physics Institute, 60 to 70 percent of the research by the Nuclear Physics Institute, more or less 50 percent of the activities of the Mining and Steelworking Academy, and a good part of the problems solved by the Krakow Polytech, the Economics Academy, the Medical Academy, the Agricultural Academy, and other science-research centers. These numbers are only estimates but give a good picture of the situation. Tied to the benefits derived from Cyfronet are many doctoral and habilitatus thesis, and the solution of problems, by scientific institutes, important to the industry and economy of the nation.

In total the CYBER has about 3000 users. If this capability was taken away from them, perhaps they would not be totally unemployed, but might have to take up work of doubtful value. As I wrote a year ago, that which could be worked out in science using pencil and paper had already been calculated.

"We can give the number of mainframe computers we have," said P. Zanella, a worker at the European Center for Nuclear Research in Geneva, recently," we

also know the number of medium-size machines, but we have no idea how many microprocessors we have." Simply, today, microprocessors are routinely built into scientific apparatus at the manufacturer's plant so that they become an integrated part of the device. In Poland not all are aware of the change coming about in the world in this field and its consequences on the progress of science. "Those that think we can, today, practice science without computers," states Jerzy Kolendowski, Cyfronet's director, "must think that we could have books without Guttenberg's invention. Of course, books could be handwritten. But could we return to this method of producing books?"

Computers are more than a type of machine. They have become a determinant of civilization, perhaps even a new form of its existence.

No one To Finance

One can ask why this situation has come to be. The answer is extremely simple--the lack of foreign exchange. For years, funds for CYBER spare parts have been allocated in smaller quantities than needed. Now the Ministry of Science, Higher Education, and Technology has drastically curtailed the flow of foreign exchange. The only explanation given is the magic word--crisis. Officially it is uncertain when the foreign exchange will flow again. Promises are foggy and unrealistic. Cyfronet, from the ministry's point of view, is only a small gear in a huge machine. The, the Krakow institutions of higher learning and research centers which derive great benefit from the use of the CYBER do not feel obligated to fund the center because they are not formally obliged to do so.

The tremendous effort of the Cyfronet workers who have been trying to keep the computer center operating inspite of the lack of resources has desensitized those who, through financial decisions, could favorably influence and even enhance the serviceability of the computer center. There is an impression that Cyfronet will always manage to keep going. Such thinking does have limits. The moment is coming when problems will arise with which even the Cyfronet specialists will be unable to cope.

A Hundred Megabytes

At Cyfronet one speaks with envy about the United Nuclear Studies Institute in Dubna, USSR. But to explain why, first a word about bytes. Computer scientists use this term to describe the basic computer memory cell. In practice the term megabyte, meaning a million bytes, is used. To illustrate by example, it may be said that 1,000 pages of standard typewritten text are equal to about 2 megabytes.

It happens that the aforementioned institute in Dubna has a computer center equipped with three large CDC-6500 machines, manufactured by the same company as the CYBER but somewhat older, with 12-disc drives totaling 800 megabytes in capacity. A RYAD-60, recently activated, that has 6 discs with a capacity of 180 megabytes. It is expected that it will be equipped with 12 discs giving a total of almost 800 megabytes. A third machine, BESM-6 has 16 discs of comparatively smaller capacity, in total 350 megabytes. Adding

quickly that comes to over 2,000 megabytes. That is not all for the computer center has a whole array of minicomputers, and independently in certain laboratories of the institute there are machines, often large, such as the PDP 11/70 whose disc memory totals 800 megabytes.

The nature of the computer center in Dubna is different from Krakow's Cyfronet. A direct comparison is difficult. But if similarity of function is what we are talking about, then one can mention the community computer center that services the institutions of higher learning in Hanover. It has three machines from the CYBER family and one SIEMENS. In total there are 25 discs with a collective capacity of 3,000 megabytes.

And here? We, at Cyfronet, have--warning!--100 megabytes, the capacity of the last remaining disc. The resulting limitations impact the speed of the processor unfavorably, and the fact that the memory capacity of the disc is small forces the conclusion that, according to international standards, we have at our disposal what amounts to a large minicomputer. This, less effective, let us say, than a VAX minicomputer.

What Is Profitable?

The developments at Krakow's Cyfronet are the direct opposite of world trends. It is in conflict with the needs of science, and consequently the economy of our nation. As the need for computer information services grows, degradation proceeds on the only high capacity computer in Krakow. This has been a discussion about discs but this is not the only worry for Cyfronet. Integrated circuits are burning out, mechanical parts are wearing out. As far as the decision makers are concerned the CYBER is still running; for the users who can get less and less work out of it is slowly ceasing to exist. If conditions continue this will really happen.

Has anyone in Krakow thought about what will happen when the CYBER drops to several percent of its calculating power or stops altogether? Has anyone tried to imagine the consequences of a sudden halt in hundreds of various research projects? Has anyone calculated the losses which would result from the noncompletion of various contracts between research institutes and industry? I think these matters should be considered and seriously calculated in the various institutes. The institutes then should contemplate whether to invest some funds, not a great sum, so that Cyfronet could regain its posture, or to suffer the consequences of having the CYBER shut down. It is plain to see the results of these calculations. The important thing is that the knowledge of impending disaster should prompt the correct response from the community of persons responsible for science in Krakow--so that the college of rectors of Krakow's institutions of higher learning would make a definite decision on this matter without waiting for the ministry to notice Cyfronet, or for a miracle to happen.

New ODRA-1305 Installation

Bialystok GAZETA WSPOLCZESNA in Polish 21 Jun 83 p 4

[Article: "In Lomza--Computer Awaits Customers"]

[Text] The Computer Service Office [ZETO] in Lomza has received the latest generation computer, an ODRA-1305. The operating memory of this newly purchased computer has a capacity of 64K--twice the size of that previously used. It also has the advantage that its processor is 7 times faster. In practice this means that the ZETO in Lomza can increase the number of executed calculations by at least 50 percent.

After all, it was time for this, for the previous computer was used to the maximum, with hardly any reserve capacity left. Now the possibilities of gaining new customers have increased. Those customers already using ZETO's services for many years will also benefit. The Lomza center can now assure faster execution of the various assignments.

At this time 23 firms and institutions use the equipment at the Lomza computer center. One of the newest users is the Milk Processing Center in Ostroleka for which ZETO calculates the fees paid to farmers for milk deliveries.

At this time it is not known what will happen to the used-up ODRA-1304 computer, which is no longer suitable for work at the ZETO center, but it could be used with success at one of the schools to provide hands-on experience.

SM-4 Minicomputer Installation

Olsztyn GAZETA OLSZTYNSKA in Polish 28 Jun 83 p 5

[Interview with Baguslaw Guzlawski, director of Olsztyn Computer Service Office by Adam Bartnikowski: "Daily Interview--Computer for Service."]

[Text] [Question] You have the lowest price rise, the lowest prime costs contribution, the greatest yield per worker. Does this mean that you have the best computer service office in the country?

[Answer] I cannot answer a question put this way. But it is true that the economic indicators we received for last year place us in the top group for establishments of this type. We are most happy that we managed to achieve this without a drastic rise in prices (only 4.4 percent). In addition we are expanding our services.

[Question] Can industrial and other concerns still afford computer services in spite of the crisis?

[Answer] Computer systems help us practice good management. The investment always repays itself. More managers utilizing modern thinking methods realize this.

[Question] What equipment does the Olszteyn ZETO have at its disposal presently?

[Answer] Last year was a period of intensive buying. The concern gained 128 words of operational memory of the newest (semiconductor) type. Thanks to this our calculating potential is one of the greatest in the country--196,000 words.

We purchased 8 disc drive units, a printer, and a multiplexer for 4 lines (a device for direct access, or communication, by ZETO customers with the computer). We have replaced or purchased many other small devices.

[Question] How is this potential utilized?

[Answer] We have noted an expansion of services in the past year. Some of our past current customers have requested expansion of services. Presently one of our most important customers is the Social Insurance Concern. We have totally taken over the calculation of annuities and pensions. It is worth emphasis that we have finished this extremly difficult operation before 15 May 1983. The national deadline is the end of June, but some centers won't make it.

We have activated a new system for a bank--our second important customer. For them we use the ROSO system, that stands for Calculation of Systematic Saving Results.

[Question] What about cooperation with industry?

[Answer] We have prepared a major system for the Foriegn Trade Enterprise [BUMAR] in Mragowo. This is a system of planning and technical preparation for production. It will go into operation sometime next year. The concern is buying an SM-4 minicomputer, which is to direct production in the future. We are preparing the software, and also the organizational structure which, because of the computer guidance, is different from that of a concern that uses traditional methods of management.

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