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SOUTH AFRICA AND ISRAEL-
DIFFERENT COUNTRIES WITH COMMON PROBLEMS

by

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Israel.

The Algerian Foreign Minister, Mr. Abdu Aziz of Algeria has recently made a statement in which he mentioned South Africa and Israel together as "Africa's irreconcilable and imperialistic enemies". I do not think we have to be very upset by the implications of this statement, coming as it does from Algeria, but we might ask ourselves whether there is any point at all in the comparison between these two countries which are so obviously different in two respects - South Africa is large, Israel is small: South Africa is rich and Israel is a very poor country. I do not intend to speak of the purely political aspects of this comparison, firstly because I am not an expert in politics and, secondly, I have been in South Africa too short a time to be able to judge the political situation properly. The parallelity in the different political fields between the two countries, however, is too obvious to need elaboration, but in one important aspect particularly, the two countries are similar. They have neighbours and near-neighbours who are enemies surrounding them on all sides, apart from the one bordering on the sea. More than that, these enemies, more or less fierce, are all influenced by the one great power - Communist Russia.

So far as possible, I would like to limit myself to science. I have known the South African sciences, especially South African chemistry, from the literature, and I have always had the impression that South African chemists are dealing with approximately the same problems, and have reached approximately the same level of scientific achievement as we have in Israel. I have also had the privilege of knowing personally some of the South African scientists: for instance, those which I used to meet at the Assemblies of the International Atomic Energy Agency in Vienna. I am, therefore, most grateful to my friends, Dr. and Mrs. Jack Penn, who have made it possible for me to come to this country to try to verify my impressions, and although this may perhaps seem immodest, I would like to say that my impressions have only been strengthened by my visit here.

The similarity in the science problems between our two countries derives from the geopolitical location which is similar. Both of them are located in subtropical zones and are, therefore, relatively far removed from the main stream of scientific effort; only part of the population in our two countries is as yet capable of contributing to the scientific effort of their country.

As the scientific effort determines in some measure the place of the country in the commity of nations, I would like, firstly, to compare the science policy of the two countries. Indeed, both countries have realised that their standing in the world is, to some extent, a function of their scientific and technical achievement and, at least as far as I have ascertained, this is certainly realised by most of the South African scientists. But in the field of public relations, a Government-published booklet in South Africa seems to me to devote much less attention to the great scientific and technical achievements of the country than a booklet of this type would in Israel.

The fundamental question with which the two countries are faced is that of self-sufficiency, an urgent problem in view of the political situation and the probable development of this situation in the future. A priori, it should be easier for S.Africa to reach self-sufficiency because, as I said, it is a richer country and full of natural resources. However, there is today in our technological society a definite trend away from raw materials towards new inventions and new discoveries or, in other words, the value of an industrial project is less and less determined by the value of the raw material required in its production, and more and more by the investment of scientific inventiveness and technical skill in the final product. Therefore, fundamentally, both our countries are faced with the same problem, and I would now like to discuss some of the aspects of this problem of self-sufficiency.

Of course, the fundamental question is "Have the countries a reasonable and sufficient amount of scientific and technical man power to fulfil all the demands of a modern technological society?" I believe that in both cases the answer to this problem is still "No". Unfortunately, the production of man power and the supply of man power is not a problem which can be solved quickly. Education is slow and, therefore, long-term planning and the judicious application of the planning to the situation is essential in order to solve this problem, at least on a long-term basis. The possibility of solving this problem, perhaps on a short-term basis, is that of the best utilisation of existing man power. In Israel, we find quite frequently that scientists and engineers are being used in the industries or in Government institutions of technical character in managerial positions or, at least in positions in which their creative capability and their talents are not used to the full. This, undoubtedly, is a waste of man power. In South Africa the situation is somewhat different, but fundamentally raises the same question. I understand that industry in South Africa is not yet interested, on the whole, in having scientists who will furnish industry with new discoveries and new inventions, and they are rather inclined to utilise young people who have only had three years of university training to carry out the routine work which every modern industry requires.

Obviously, South Africa is a fortunate country which is rich enough to rely on its abundance of raw materials and, therefore, may not require so much in new ideas, new inventions and new discoveries as a country like Israel does, but in the long run South Africa, too, will have to go this way and encourage creativity in the scientists, not using them for jobs which can be filled by technicians. The long-term solution to the problem of man power lies naturally in the hands of the universities, and both our countries are planning new universities in addition to the existing ones, as I believe it is the legitimate ambition of every modern large city to want to have its own university. However, one must be very careful in planning new universities, and one must not forget that the university without adequate teaching staff of the level of the modern university is bound to fail and, therefore, it is necessary to think before one plans the building of a new university, of the education of the necessary teaching staff, otherwise universities have either to be satisfied with a relatively low scientific and professional level or, alternatively, they have to cannibalize the old universities and take away the staff from them.

Another problem which arises in connection with man power is the problem of what is being called today 'the brain drain'. In Israel we have not, fortunately, had serious difficulty in this direction, although we have already

experienced a brain drain in two instances. The first was the planned recession which the Government introduced about three years ago, which led to the phenomenon that a number of engineers did not see their future in Israel and they emigrated. Secondly, we have the curious situation that not all the students who wanted to study B.Sc. or engineering could be accepted by the existing academic institutions because of the lack of teaching facilities. Some of these young people emigrated to other countries where it was easier for them to obtain a place in the universities. Fortunately, we have recently become convinced that these young people, even if they have been abroad for a considerable number of years, are now willing to return to Israel. If I analyse this situation, and I think this is valid not only for Israel but also for other countries, including South Africa, I do not believe that the problem of the brain drain is a question of money. It is in the character of the young generation today that the financial question is probably secondary, and if one can provide them in their own country with the same type and the same scope of research facilities as those available in the richer and more highly developed countries, I think that one can stop the brain drain completely, and probably even reverse it. Obviously this involves very heavy expenditure on the part of the Government and the universities in investment in new apparatus and new equipment, which is very expensive today but without which modern research is almost impossible, but this step will have to be taken if one wants to solve the problem of the brain drain.

This brings us to the general question of budget, which again is approximately the same for Israel and South Africa, not in size but in principle. Israel, and I understand that this applies also to South Africa, obtains a considerable amount of Government money for the universities, but this Governmental budget is determined by the number of students and, therefore, it is a teaching budget and not a research budget. In fact, there is no figured provision made by the Government for the encouragement and the support of scientific fundamental research in the universities. I believe that in both countries the solution to the problem would be an organisation of the type that has been established in the United States - the National Science Foundation which has a considerable Governmental budget and which is responsible for the allocation of this budget to the universities only for fundamental research, completely independent of the applied research which such universities are carrying out for various Government institutions. On the whole, the problem of Governmental research versus academic research is a problem which occupies both our countries and practically every other country in the world.

This is an old problem which was formulated in the clearest manner in the 1920's, in the famous controversy between Professor Berna in Cambridge and Professor Pollani in Manchester. Professor Berna wrote a book called "The Social Functions of Science" in which he declared that the scientist in our generation has to serve the country and, therefore, all the research should be organised and directed by the Government. Professor Pollani in his answer, which was called "Contempt of Freedom", came to the conclusion that Government-owned and Government-directed research is not scientific research at all. I think that, in the meantime, most countries have tried to find the golden mean between these two extremes and indeed, today, it is accepted that scientists have, first of all, to do that type of research and to deal with those problems in which the country is interested. Furthermore, it is quite clear that, whether one likes it or not, the mere fact that the Government is responsible for the largest part of the budget of an academic institution leads to the necessity that the Government will have a say in the direction of the trend of development of such institutions.

I do not think that the fact that Government research institutions exist, should be taken as an impediment to the development of university research. The Professors at the universities today are so burdened with the task of education in the supply of scientific man power to the country that they cannot devote all their time to research, although the research projects in which the Government is interested and which have to be solved in a given predetermined time limit, should not be carried out by the universities but by Government research institutions. It is a fact that there is no reason why this should impede the development of fundamental research in the universities and also their participation in the applied research of the country.

Speaking about applied research, I would like to say that I have been very much impressed by the organisation of the C.S.I.R. which I was privileged to visit. The fact that all Government research is concentrated in one location undoubtedly leads to a better utilisation of man power and to the mutual inspiration of the people working in the same place, and I wish that Israel could have organised scientific research in the same way. In fact, such a proposal was made in Israel about ten years ago, but it was ultimately rejected because of the expense involved in the transfer to one location of the various Government research institutions in the country.

Now, ladies and gentlemen, it is not only in science policy that the two countries are similar. In fact, it seems from what I have observed, that in certain disciplines work is carried out in both countries on identical lines. I would only like to mention, as an example, the interesting work that is being done in South Africa on insect control in the Institute of Food Research at Stellenbosch, which I was privileged to visit. I was surprised to see that exactly the same approaches are being tested in this Institute as those in Israel - - the use of sex attractions, the elimination of the insect by eradication and sterilisation of the male, biological control and so on.// Obviously, in many fields the problems are similar, and I would like to enumerate some of them in which there is a similarity today, but in which, in my opinion, even greater similarity is to be expected in the future between our two countries. First of all, if one speaks of self-sufficiency and independence, one thinks of military independence. Israel, after the six-days war, has decided, for reasons which are only too obvious, that she should engage in the production of her own aircraft, of her own tanks, and of all the scientific development that is needed in the background of such industries. I should think that South Africa is politically in a similar position.

In the theatre of electronics, which is one of the more important ingredients of a modern weapon system, I believe that Israel has made a little more progress than South Africa. On the other hand in the field of metallurgy, which is equally important for the development of the modern weapon, South Africa has undoubtedly had more experience and has done more because, in Israel, which is poor in natural ores, very much less attention could be paid to this specific branch of science.//In the field of agriculture there is some similarity and not only from the point of view of insect control, which I have mentioned already. I have heard in South Africa from several scientists, the complaint which is also not entirely uncommon in Israel and that is, that people consider agriculture is less important than industry, especially in scientific endeavour. I believe this idea is entirely incorrect, because in addition to the food supply which, of course, is an essential factor in the self-sufficiency of a country, agriculture is likely to become the basis of our chemical industry in the same measure and to the same extent to which we exploit our natural

resources in petroleum, which is today more or less the basis of our chemical industry. And indeed, in the second World War an effort was made to create this new approach to modern technology which is based on agricultural products, especially on carbohydrates, and which uses fermentation in order to produce from carbohydrates the same type of fundamental raw materials which are today the basis of the so-called petrol chemical industry.

This new approach to industry based on agricultural products but leading to the same finer products which the industry produces today, has been called "chemergy". You might perhaps be interested to recall a memorandum which Dr. Weizmann, our first President, submitted to the British Government during the second World War. In this memorandum, Dr. Weizmann pointed out that with the development of such products as aircraft fuel and natural rubber from petroleum, the available resources of petroleum would become exhausted in a number of years, which is now being estimated to be before the end of this century. Then the only alternative which could be a foundation for the chemical industry would be the fermentation of carbohydrates. "And", continued Dr. Weizmann, "for this reason Great Britain should pay less attention to Asia with its petroleum resources, and more attention to Africa which is the continent that, for natural reasons, has the largest production of carbohydrates in their various forms - sugar, starch and cellulose".

The development of agriculture, as I said, is likely to follow two lines - the line towards an industry based on agricultural products and, secondly, the line of food production. Now, if it is true that by the end of this century the number of people living on our globe will have reached six billion, it will be essential to produce more food, and this can only be possible if we reclaim the arid zones which cover a large part of our planet. This is a problem which, in Israel, is more urgent than in Africa, but which undoubtedly will become equally important in the future for Africa with her vast arid and semi-desert areas. In this field, the essential prerequisite is the supply of water and I believe that in this field, Israel has made more progress, or has at least given the question more thought, than other countries. It is then possible that a country like South Africa will be able to utilise Israel's work in this regard. One field connected with sweet water supply in which Israel and South Africa have had some collaboration and also some friendly competition, is the desalination of brackish water by what is called electrodialysis. This is a problem the solution of which will be useful on a short-term basis, but ultimately it can only be solved by sea water desalination, and this is a challenge in which international co-operation is essential, both from the point of view of the time required for the solution of the problem, and from the point of view of the investment necessary in carrying out such a project. On the whole the two countries, South Africa and Israel, should be interested in supplementing their industries, based on the soil and on the natural resources of the country, by what we call today "science based industries".

I have mentioned the electronic industries which are an essential prerequisite for the development of modern technology in modern society, and I would like to mention, as a second possibility, the pharmaceutical industry which, in our countries, is only very much in the beginning of its career. In both countries, the situation up to now has been such that the pharmaceutical houses imitate products which have been made in other countries, doing this under a licensed agreement, but undoubtedly it will be necessary for our two countries and for other countries in the world, to develop new ideas and to produce new

lines in order to be able to compete with the world market and with local markets. There are such areas in which the development is just at its beginning and, therefore, the ability of the given country is more important than its experience or its set-up. There are areas in countries such as Israel and South Africa which can then compete with the more highly-developed countries in this field.

Perhaps I have spoken too much about applied research, and I would like to emphasise that also in the field of fundamental research there are undoubtedly similarities between the two countries. I would like to mention only one. Here in Johannesburg, at the University of the Witwatersrand, there is an excellent group of scientists which deals with the application of the radio-active hydrogen, the element of Tritium for hydrological research - research of movement of water in the soil and in the rock - and for similar problems which are of fundamental importance for the planning of the water economy and, therefore, of the agriculture of the country.

In general, I have found that in nuclear physics the two countries are verging on not only similar, but almost identical lines, and it is no secret that today in the theatre of nuclear physics, in which the instrumentation is extremely expensive and every experiment is equally expensive, there are indications of a move towards international collaboration instead of the isolated work of a national science establishment in spite of the fact that such an establishment is, of course, the pride of every country.//It is difficult to indicate, if one speaks of fundamental science, whether South Africa or Israel is the more highly developed. I think that in both countries the development is uneven, and there are many areas in which Israel undoubtedly can learn from South Africa, for instance, in the field of medicine. There are areas in which Israel has been forced to be more progressive, and in which, perhaps, a country like South Africa could learn from her.

Returning to my starting point, I think that all I try to point out leads to the same conclusion - that the most urgent problem of a country, even from the point of view of her long-term planning, is education. There is no doubt that both our countries have, to some extent, the same problem of finding new methods of education and new tools of education, adapted to that part of the population which does not have the European tradition of learning and scientific research. We have tried some measures in this field; we have had some success and we have had a number of failures, but I believe that Israel has recognized this problem and is devoting an effort to it, exactly as South Africa does today. Of course, our problem is a little easier than that of your country, because the Jews coming from the Arab countries, although they have been reduced to the intellectual level of the Arab countries, have a tradition of learning and a respect for learning, at least in the period of the Middle Ages, and I believe that it is possible to rekindle the flame of intellect which, under the influence of Arab domination, has been extinguished for so many centuries.

In conclusion, ladies and gentlemen, I would like to say that I have been impressed by the similarity between our two countries in the field of science, and I would like to stress the points that I have only touched on - a very small number of points in which such similarities are obvious. I have discussed with many of my colleagues whom I have met in this country and with whom I have created some personal and professional links, the question as to whether, in view of the circumstances, a collaboration between the two countries might not

be of some value. I was glad to find a very enthusiastic response and the willingness to think of the exchange of professors, the exchange of graduate students and the exchange of information, and in going back to Israel, I will try to do my best to further and perhaps formulise such a contact between the scientists of our two countries. Because in the last analysis, I think we can formulate the common problem in the similarity of our two countries by saying "Neither of us has neighbours to whom we can speak and to whom we are going to be able to speak in the near future. If we are in this position of isolation, perhaps it might be best for both our countries to speak to each other".

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