THE INTERNATIONALISM OF SCIENCE

By DR. GARNET T. PAGE

THE internationalism of science is a very important consideration in international relations. This present era of nationalistic technologies makes it difficult to realize that science is the only branch of the intellectual disciplines which appears to respect its responsibilities to both the past and the future. We owe much to the early Persian, Egyptian and Babylonian cultures, and we regard their contributions as of outstanding benefit and immediate application to the present.

Centuries ago, the growing body of human knowledge provided the stimulus for the founding of universities, which have continued to be international in their attitude and in their personnel. The attending students were drawn from various nationalties and the national associations were maintained in an international atmosphere. Alexandria served as an early location in which the information of earlier times was gathered. Later this was also true of Montpelier, Bologna, Paris, Oxford and Cambridge, which formed repositories for information which later could be used for the furtherance of pure science and which are readily utilizable by applied technology to present social needs.

Nearly three hundred years ago there was the establishment of a series of institutions which were to have a marked effect upon the international character of science. They arose in that period known as the revival of learning — the intellectual renaissance. The French Academy of Science and the Royal Society of England both came into being at about this time. Here was an era in which there were no typewriters, no television, no radio, and the few newspapers were given over chiefly to items of political interest. Publication was at a minimum and therefore most of the communications which were received by the French Academy or the Royal Society in England were by pen and ink. Handwritten letters were sent to the secretaries of these societies giving the outstanding contributions of the scientists of that period. For instance, various people wrote from Sweden and Norway concerning lens design leading to the development of the microscope and the telescope. Discovery concerning microscopic organisms came from Holland, from Germany, from Austria, all pouring into the secretaries of the French Academy or of the Royal Society. These contributions were then read to the members of the societies and disseminated in this way.

Since that period we have had the development of printing and transport so that scientific information is now rapidly disseminated all over the world. Journals, especially founded for a particular purpose and dedicated to a particular branch of knowledge, carry information concerning discoveries to every country and to every specialized individual in that country. Science aims to make its discoveries of universal distribution. There is no withholding of its major premises, there is no withholding of the mechanisms and methods employed in testing hypotheses which have been advanced. These are open property. Science, therefore, is international in its scope, it is international in its ideas and it is international in its dissemination of ideas. Nothing could have a greater bearing upon the process of how people think of each other than the dissemination of knowledge through scientific literature and through direct and indirect approach by placing one's own thoughts before one's fellow scientists so that they can evaluate them, test them in their own way and further the ends of science. Science itself exists only because this action is behind it. It is not narrow, nor nationalistic, it is universal.

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As is well known, when men know each other they have a common basis upon which they can proceed. One cannot speak with a stranger as he would with an intimate. The scientists form an intimate relation because they have a common interest in a field of thought which is universally disseminated and tested. The places where people work together are the places where they get to know each other. The man who works across the bench from you is well known to you. You may not like all of his characteristics, but you do speak with him, you have a knowledge of his eccentricities, you have a knowledge of his good points. You know whether he is doing good work or whether it is shoddy. All of these things enter into the evaluation of a man and his work. The more we can bring scientists together the greater feeling one scientist will have to the other. Community of understanding involves the evaluation of the other man's work. This is accomplished by bringing people together in the various laboratories, many of which are international. Men come from all over the world to study in the field of physical chemistry in one Canadian laboratory. These men carry back with them Canadian ideals as well as scientific ideas. They take back the newer ideas, the newer discoveries and disseminate the knowledge which we have imparted to them here to students and to others in their immediate surroundings. They will also transmit to

others the changes that have occurred since their last visit here and how our customs have altered. All of these things help in international feelings of understanding.

Other laboratories are professionally international in character; the European Centre for Nuclear Research and the International Computation Centre which have been founded under the aegis of UNESCO; the astronomical laboratories, some in America, some in South Africa, some in middle Europe; the neurological laboratories at Amsterdam; the International Institute of Embryologie at Utrecht; the zoological station at Naples. These are international bodies which are in operation together with North American stations in Woods Hole, Pacific Grove, California, and the astronomical laboratories at Palomar and Mt. Wilson in the U.S.A., and at similar centres in Canada. Here men interested in a single part of the field of science congregate, work together, live together. There is no better way by which our international relations can be effected, for here we have the true appreciation of the individual and his work gained by the intimate contact of living and working with the man. Later his results will be incorporated into contributions to science itself. They will be disseminated by means of our numerous publications, they will be read by others in the field. Because this work has been done, others will be attracted to these centers. As they come into these centers, they will meet with others who in turn will learn of the man and his work. When men work together they learn each other, they learn how far they can depend upon one another and the feelings so generated are those upon which lasting friendships are built. Friendships with others in other countries are the truest way by which we can have an understanding of their difficulties as well as their greatness.

Another medium by which the exchange of scientific persons is brought about is of vital interest to those who are interested in international attitudes. This is by means of gatherings, conclaves of various sorts in which people of various countries are invited to participate. We call them International Congresses. In International Congresses all the individuals in the scientific field with particular specified interest are invited together to speak and discuss their common problems in the fields of the natural and engineering sciences. When one restricts a field of this sort it is hard to realize that it is only in the formal presentation of papers and the listening to them that one is limited to the field of interest. This is the less personal phase and significance of a Congress. There is plenty of time outside of the scheduled meetings during which these particular specialists will gather

together over the dinner table or at the bar and have conferences which bring them into a much wider relationship than that of the narrower scientific fields. The questions of nationalistic movements and other things of similar nature are incorporated in these discussions. Sometimes one learns much more outside of one's field than in it. It is one of the places where international contacts are made which lead to better relationships among the scientists in a particular specialty with reference to their outlook on international feelings.

There is another mechanism by which people are brought even more intimately in contact and that is through the many International Symposia which have been conducted since the Second World War. These meet with only a few dozen individuals, who live together for a period of two or three weeks, present their views to each other, show the logic and experimentation behind the various theses which they have advanced. In all such cases one is assured of a tremendous amount of discussion along collateral lines. Collateral discussions will take us far afield into the living standards of the people, into the conditions of human rights, into all sorts of varying problems somewhat distantly associated with science and yet irreparably bound up with it.

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In the light of the above one can easily see that nationalism is non-existent in the true scientific field since scientific and engineering knowledge must be universal in their dissemination and their application. Facts which are discovered in Canada are in a very few months disseminated throughout the world. Knowledge of a new infective organism will be disseminated in a matter of a few weeks; a new antibiotic discovered in England will be known here, on the Continent and in the Middle East almost as soon as it is discovered. New therapeutic measures evolved from studies in pure science, sometimes lasting over years of arduous work, will be liberated for popular usage as soon as their effects are known. These are measures by which scientists place before you the advances which are founded upon the fundamental knowledge which is so international in character.

The internationalism of science and technology cannot but lead to a happier international relationship in our feelings towards our friends abroad who have given us so much and to whom we owe such a great responsibility.

The Middle East contributed to our beginnings, the European Continent to a founding of many of the institutions that we

have in operation. Modern science owes a lot to its historical background and must assume its responsibility for the creation of a greater knowledge of its international implications and use.

However, scientists and engineers have had a general tendency to want to mind their own business and not to bother with, or be bothered by public affairs. The caricature of the scientist in an ivory tower is not without some historical basis in fact, science and scientists have survived for centuries through turmoil and persecution by the technique of isolation. By being inconspicuous and by being thought useless, and impotent if not harmless, scientists escaped for the most part the political and military troubles of the last three hundred years.

Scientists appear today to be beginning to behave differently. This is relevant to our theme, because a hundred or even fifty years ago scientists and engineers were not, so far as one can tell from historical records, very much interested in the potentialities of their professional contributions to world peace. Even after World War I during the days of hopeful idealism over the potentialities of the ill-starred League of Nations, the place of science and technology, including medicine and public health, was a very minor one in most discussions as to the most plausible mechanisms for preventing war.

Today, however, the entire climate of world opinion has changed. It is now possible for The Prime Minister of Canada to propose in all seriousness that this country appropriate many millions of dollars per year for technical assistance programmes. Not only has it been proposed, but millions have been appropriated and expended. Today, the man on the street senses somehow that the fruits of modern science in its various technological applications, in agriculture, engineering, medicine and other practical realms are definitely involved in the political and military troubles of our day.

In fact, it is a generally accepted view today that the underprivileged peoples in underdeveloped countries of the world constitute hazards to peace, precisely because they are unsatisfied as to the enjoyment of the fruits of modern science and technology and are therefore dissatisfied and anxious for change.

Thus one reason why scientists and engineers are taking an interest today in the contributions they can make to world peace is because at the present time public pressure is forcing them to do so. It would be unfair to scientists and engineers, however, to leave the impression that they themselves have not had much to do with creating the public opinion that made the U. N. Technical Assistance Programme possible for example.

I believe it is permissible for us to assume that the possibility of a peaceful world is somehow related to a wider distribution of the wealth, agricultural and industrial advances produced by modern science. And since science is an on-going venture, the promotion of scientific research and its applications are also activities which are important to world peace. Granting these premises, one still has no obvious basis for a practical programme, however. I have no intention of attempting to spell out a programme in detail. I do wish to point out, however, some general principles which appear to me to be pertinent and basic.

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The ultimate aim of programmes to raise living standards in the interest of building a peaceful world is not to promote science. But the ultimate and the intermediate aims will never be accomplished without taking first steps first. The trouble with so many idealists is that they have their eyes so firmly fixed upon an ultimate goal that they fail to see the necessary first steps to achieve it. They are so far-sighted that they need optical assistance to enable them to see the job as it really exists. Of course, there are the near-sighted too, to proceed with the analogy, who cannot see the end objective. But they are not likely to be in our company today. They are sitting back home writing scathing letters and editorials and news columns, and giving radio speeches, telling about how futile the U.N. and its agencies are and how much better this country would be if we abandoned our co-operative foreign policy.

If one wishes to promote engineering, scientific agriculture and medicine in underdeveloped countries one must find ways of training personnel capable of sustaining such programmes. The importation of foreign talent to do the major job has never yet been accomplished. It probably never will be. Therefore, as far as one can see the education of indigenous experts is necessary. If this is to be done, the science basic to these applied fields must be developed. This means the general promotion of science education, exchange of scientific literature and promotion of basic science research. Thus it seems obvious that if one wants to promote technological advancement one has to promote basic science development at the same time. I am afraid, that this point is not well understood by laymen. I cannot over-stress the prime importance of promoting science education and research on an international basis as an indispensable basis for technological development.

I wish also to mention the relation between the scale of support of science and technology through U.N. Agencies and the "time scale" of anticipated results. In general, scientists are patient people. We are not alarmed by the prospect of waiting fifty or a hundred years for our work to bear fruit. Engineers are perhaps a bit less tolerant about long time-lags, but they are realistic enough not to expect miracles to happen. The statesman, the diplomat and the man of the street want results tomorrow, or at the latest, next year.

Of course, major technological developments are not going to be accomplished in less time than decades. This should be made clear. But the time scale is going to be very much longer than it need be if present levels of support are not increased. At present the Canadian contribution to the whole regular UNESCO budget is about one-thousandth of one per cent of our national income. No one can say that this is an extravagant investment in the promotion of peace through international cooperation in education, science and culture. In fact, in my own opinion, it is a tragic evidence of the little faith we as a nation have in the power of science, education and the arts to contribute in the long term to the promotion of peace. We do not treat any of the other specialized U.N. Agencies any better. WHO is struggling on a small budget to do a job that simply cannot be done without at least twice as much. And so it is with other agencies such as FAO. Fortunately, Technical Assistance Funds are supplementing these budgets for specific jobs. However, in any realistic appraisal of what scientists and engineers can do to assist in the promotion of peace through the U.N. system we shall have to say, if we are candid, that we cannot do a great deal that will affect the prospects for peace within the next quarter century unless more funds are made available. I am not suggesting or implying that even the little we are doing is not worthwhile. I consider it very much worthwhile because I am very much interested in the long term future of the world community. But I readily confess that I wish the policy makers in all nations were willing to make a larger effort to allow more to be done through science and engineering to promote world peace in our times.

Too frequently persons who are working for or in highly idealistic enterprises allow their wishful fancies to cloud their judgment as to what their pet organizations have accomplished or are likely to accomplish. I trust that you will agree with me that as scientists we should avoid undue pessimism. Further we should not propose projects which are impossible of achieve-

ment at the time rate at which their proponents would like to see them go. This last is likely to be a major difficulty. The non-scientist does not comprehend the kinetics of autocatalytic chain reactions. In the application of science to the improvement of conditions for human life we do deal with an autocatalytic chain reaction. It can be hastened by supplying larger quantities of certain elements in the reaction but it is important to remember that time itself is a major factor.

One additional general point I wish to make. A general prerequisite for international co-operation in science and engineering is a willingness to share information, experience and skill. In this connection secrecy in science and impediments to international travel by scientists are very serious problems. It is essential that there be free exchange of basic scientific knowledge and that economic, political and other barriers to such easy interchange be reduced as rapidly as possible.

FUNDY

By EILEEN CAMERON HENRY

Go, build your dyke to keep away my hands,
That, hunger driven, reach from out the sea
For loam, and rich, sleek grass — I have the sands
That once were stone — I can wait patiently,
And come by night, sly, and smooth, and knowing,
When moons are mist, and sea-gulls, frantic, ride
The gale force wind, wet with fog, and flowing
Out of me, building waves in monstrous tide.

Plow deep the earth in spring, sow well your seed,
And harvest lusty fruit of salty taste —
And watch the sky, and test the wind, and heed
The crumpled cliff, the broken rock — make haste
To brace your mighty dyke, build deep and strong —
I shall come back, in time, where I belong.