LESSONS FROM HISTORY

NAIROBI, APRIL 14, 1985

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Friends of ICIPE: I would like to begin my remarks not with the customary formal acknowledgement of the presence of distinguished guests and participants, but rather with an acknowledgement that we meet here today, whatever our position or station, as friends dedicated to the further development and scientific productivity of a truly remarkable and unique experiment in international institution-building — ICIPE.

It was my privilege to be involved with this experiment from the outset. It is from this perspective that I would like, on the occasion of the 15th anniversary of ICIPE, to share with you some aspects of its early history and evolution. I would particularly like to explore with you the lessons we have learned, and to use these lessons as a basis for consideration of new efforts in developing countries to develop international research institutes and to stimulate other forms of international cooperation in science using ICIPE as a model.

It has been said that serendipity is an essential ingredient in all scientific progress. So too it may be said that serendipity is the glue of institution-building, and certainly this was the case, in so many ways, with respect to ICIPE.

As some of you will no doubt recall, it was in 1967 — 18 years ago — that Carl Djerassi, an organic chemist from Stanford University, addressed the Pugwash Conference on "Science and World Affairs" in Ronneby, Sweden, on the theme of research centres in developing nations. In this address, Djerassi characterised a rather bleak picture with regard to research and scientific manpower in most developing countries. On the basis of his personal experience with a small natural products research laboratory in Mexico, he made recommendations on how to respond to the need for development of local scientific capabilities in developing countries.

Without detailing the many aspects of the Mexico experience in developing research capabilities in steroid chemistry, suffice it to say that in the period from 1949 to 1959 Mexico went from a situation of having almost no PhDs in chemistry, and in particular no research in steroid chemistry, to a situation in which more scientific publications in steroid chemistry emanated from Mexico than from any other country. This was accomplished through international cooperation. A small research firm, Syntex, S.A., brought to Mexico researchers in steroid chemistry from more than a dozen countries to do their work on local plants.

Djerassi described the many benefits to Mexican science from this international involvement. These benefits included the strengthening of the chemistry department of the National University of Mexico — many of the Syntex researchers lectured and guided research in the University — world-wide recognition of the steroid research done there, and the patents for products which resulted from the research. Over 50% of the world's supply of steroids came from Mexico. On the basis of the Mexico experience, Djerassi outlined a model for the establishment of what he termed "centres of excellence in developing countries", based on participation of internationally recognised scientists from all over the world.

I believed this Pugwash address made a unique contribution to what was a very limited body of knowledge and experience of efforts to develop scientific capabilities in developing countries. Consequently, I urged that Djerassi publish the paper quickly and offered to assist by facilitating its publication in the **Bulletin of the Atomic Scientists**. (Full details of the Djerassi analysis and model can be found in the January 1968 issue of the Bulletin.)

At the same time, quite independently, Thomas Odhiambo, then a senior lecturer at University College, Nairobi, was think-

ing along lines very similar to those of Djerassi. In an article entitled, "East Africa: Science for Development" published in the November 1969 issue of **Science,** the journal of the American Association for the Advancement of Science, Odhiambo described the predicament of science in East Africa — poor administration; inadequately trained human resources, particularly in fields related to the science-based sectors of the economy; a view of nature inconsistent with development of science; virtually no public understanding of science; and the absence of a science policy related to national or regional development.

In making the assessment, Odhiambo repeatedly stressed the view that scientific research deserved high priority if significant economic and social development were to be achieved. He identified a critical need for building a new basis for an effective science policy in African countries coupling public understanding of science with radically new approaches to science education.

Finally, echoing in part the words of Djerassi in Ronneby, Odhiambo wrote, and I quote, "It seems to me that Africa's best long-term solution to the problems of conducting effective research is to concentrate the research effort on a few very large centres. To take one example, for research in insect biology, one could imagine the establishment of a large institute in a locale where other ecological conditions are accessible. It would have a small permanent staff, but would draw a large number of post-graduate students and other researchers from many countries representing many disciplines (ecology, biochemistry, toxicology, and others). The institute's programme would be such that it would concentrate all its resources on a few particular problems over a period, thus insuring immediate returns from the funds invested in it. One can see the influence of such large 'centres of excellence'

reverberating throughout the few countries where it has been tried — the Weitzman Institute of Science in Israel, the molecular biology unit in Cambridge, England, and the Pasteur Institute in Paris, France."

These two seemingly parallel notions crossed when Odhiambo read Djerassi's article in the **Bulletin of Atomic Scientists**. In February 1968 he wrote to Djerassi and, commenting on the proposal for establishment of centres of excellence, said, "...Can a move be made to develop one such centre of excellence in mid-Africa, for example in Nairobi? At the risk of appearing presumptuous, I would like to see such a centre — on insect physiology and endocrinology — established in Nairobi. Insects play a most basic role in tropical Africa; insect endocrinology is one of the newer areas in the upsurge of modern biology; and it is waiting to be exploited through interdisciplinary research. Nairobi also happens to be an ideal situation from other criteria (climate, international communications, etc.). Can you suggest how to achieve this? Would you be prepared to help launch such a scheme? I believe that with the recent discoveries in insect physiology and endocrinology, e.g., pheromones, defence chemicals, hormonal regulators of giant chromosomes, the site of action of hormones at the cellular and ultrastructural levels, the control of insect maturation by plant odours, and many others — indicate that we are on the threshold of great things. I am eagerly awaiting your response to this suggestion."

On receipt of this letter, Djerassi telephoned me and said, "I am enthusiastic about Odhiambo's proposal, but it will clearly require an organisational effort to develop. You published my paper, now you have to help me to proceed." I have to confess that I was neither unprepared for the request nor hesitant in my response, the latter because as Director of the U.S. National Academy of Sciences' Board on Science and Technology for

International Development, I had been concerned for some time with the problems to which the proposed centre would respond. Moreover, the focus on insect science, I thought, would blur the distinction between basic and applied research — a distinction which had been the cause of many disputes among researchers and funding agencies concerned with development. Insect science, because of its clear relevance to agriculture and health, among the highest development priorities in the Third World, would be a most attractive focus for a scientific research centre in a developing country.

For a number of reasons, including the need to respond quickly and flexibly, I suggested to Djerassi that the American Academy of Arts and Sciences take the lead in the United States in following up the Odhiambo/Djerassi proposal. The American Academy agreed to explore the interest of the US scientific community in such a centre, and, if possible, to assist in its international development. The choice of the American Academy for the role was most significant, for it had the stature, fiexibility, and staff which proved absolutely critical to the US involvement and to international collaboration. The unsung hero of the American Academy of Arts and Science leadership in this project was John Voss, its Executive Director, who quickly saw the unique importance of the proposed centre and did everything humanly possible to assure its successful establishment. In many respects, it is he who should be giving this speech today, for without his enthusiasm and support, I firmly believe that the path to ICIPE's creation would have been very different and considerably rougher than it was.

Early explorations in the USA, in Europe, and in Africa — meetings of scientists were held in a number of countries — suggested sufficient interest in the proposal that Odhiambo and a local organising committee felt confident in convening an international planning conference in Nairobi to further

develop a rationale for an insect research institute. The meeting was to define an appropriate structure, and to outline steps that needed to be taken to advance the process of formation of the institute. Odhiambo and his colleagues began to make all the arrangements for the meeting, including preparation of draft documents and identification of appropriate participants and sources of funds for travel.

An interesting sidelight to this story, untold until now, was that there was considerable concern among my American colleagues, and, indeed, on the part of scientists from other countries as well, that things were moving so fast towards this planning conference that important steps in preparing the meeting might be overlooked. I was sent to Nairobi to discuss with Tom the planning effort to date and to try to persuade him to delay the date of the conference until there was further opportunity to "condition the environment" and work out details. On arrival in Nairobi, I found that planning was so advanced and so detailed, and, I might say, so effective, that I cabled my American colleagues that "the train was leaving the station", and that if they didn't want to be left behind or get run over, they'd better jump aboard. Needless to say, they got on board.

In many respects, the October 1969 planning meeting, bringing together insect physiologists, chemists, geneticists, ecologists, and scientists concerned not only with fundamental research but also with the application of insect research to the solution of practical problems of agriculture and health in Africa was unique. For one thing, the focus was on Africa, a continent new to many, if not all, the participants. For another, the emphasis was on international scientific cooperation for the ultimate purpose of solving critical development problems, providing more and better food to African people and protecting them more adequately from disease. It was clearly understood, indeed stressed, that building up African capabilities to

deal with insect problems in the region was fundamental to the development of an institute.

Somewhat surprising to me was the debate which took place regarding whether the proposed institute should be primarily concerned with fundamental research or whether it should be concerned more with applied research. As mentioned earlier, my enthusiasm for the project stemmed in great part from the fact that this issue, which to my mind was worn out, was not applicable because of the nature of the scientific problems to be investigated. Nevertheless, the distinction apparently could not be avoided, and particularly among certain scientists, resolving the issue was critical in determining their organisations' potential participation in the proposed institute.

After considerable, and often aggressive debate, the matter was decided in a most diplomatic, and, for the future of the institute, constructive way. As the report of the meeting states, "The challenge for the Centre is not to apply existing knowledge and technology but to develop and expand new research. It must be emphasized that the nature of the scientific interests of prospective participants in the Centre all relate to the general field of insects and other arthropods, and it follows that the research activities of the Centre will of necessity be of importance to tropical Africa. The availability of East African insects and plants and pests of critical economic importance will place the work of the Centre within the priorities of the East African scientific community."

Another area of contention among the participants was the degree to which the institution's work should focus on development of biological agents for control of insects, so-called third-generation pesticides. In many respects it was the potential for such developments that excited most of the American participants and some of those from other countries as well. This was particularly true of the late Carroll Wilson, who worked

tirelessly for the creation of ICIPE and on its birth was made Chairman of its first Board of Directors. He felt that the urgency of finding non-chemical mechanisms for controlling pests was a high — perhaps the highest — priority for Africa and, indeed, for developing countries elsewhere. This view was best expressed by Professor Wilson in a background paper for the planning conference in which he wrote:

> The widespread use of DDT and other chlorinated hydrocarbons for insect control has created a state of emergency because of the ever-increasing resistance of insect species and ever-accumulating DDT residues which pose grave dangers to various species of fish, birds, and mammals, and threaten man himself. Recently there has emerged a wholly new means of controlling specific species of insects through the use of insect hormones which derange life cycles. The collaboration of insect physiologists, ecologists, organic chemists, biochemists, and other specialists is essential in studying the direct and side effects of these new pesticides on a wide range of insects in their natural environment and specifically in areas uncontaminated by prior spraying. On a very few scientific frontiers can so many disciplines interact, and indeed must interact.

Others felt that by focusing on this objective, the Centre's work would be far too confined and that the promise of the results of such research was as yet so uncertain that to hinge the success of the Centre on work in this field was to put its very existence at risk

This issue was resolved when the Centre's research role was further elaborated. Nevertheless, the following conclusion was included in the report of the meeting:

> No assurances can be given that the Centre will achieve early break throughs in the problem of insect control, but the combined talents of such an international group of distinguished scientists, whose interests and objectives are relevant to insect control, offers great promise for finding new solutions.

Though these and related questions aroused great debate and tough discussion, as did questions regarding appropriate African involvement, training opportunities, and organisational and administrative issues, the meeting concluded in a near unanimous decision that a centre should be established and that it would have a number of unique characteristics, some of which were based on the model described by Djerassi and Odhiambo in their papers.

In particular, as reported in the planning conference document, "One unique feature of the Centre is the commitment by a group of the world's leading scientists to participate in the development of the Centre in the following ways:

- To nominate for a term of a year or more at the Centre qualified research associates at the post-doctoral level or beyond.
- To take an active part in the scientific activities of the Centre by serving on its scientific committee, by visiting East Africa several times a year to guide the work of the research associates, and to assist the Director of the Centre.
- To receive in their laboratories qualified African scientists for training in advanced research methods in preparation for their work at the Centre. Most of these young scientists will be post-doctoral fellows, but there may be opportunities for a few pre-doctoral fellows.

Another critically important decision was that the directorship of the institute would be in the hands of an East African scientist, active in a research field within the scope of the Centre's activities.

Finally, a unique notion of collaboration between academies of science and similar organisations in aid of the establishment of the Centre and its continued scientific support emerged from the meeting. Ultimately evolving into an institution

organised as the ICIPE Foundation, this group of academies (at one time or another there were 15 or more members) was supported initially by the American Academy of Arts and Sciences and subsequently through a Secretariat established by the Royal Swedish Academy of Sciences. It played a critical role in the early development of ICIPE by assuring scientific credibility to funding agencies, by providing advice to the Governing Board and to the Director, by appointing scientific members to the Governing Board, and by ensuring a link to the national scientific communities that the academies represented. This model of cooperation among academies of sciences has since been extended to the establishment of the International Institute of Applied Systems Analysis (IIASA) in Laxenberg, Austria, and the International Foundation for Science (IFS) in Sweden.

At the present time, active consideration is being given to broadening the concern of the ICIPE Foundation to include considerations of a wider range of activities in international research cooperation in developing countries. It is thought that the ability of academies to call on scientific experts, from their respective countries, to assist national and international agencies in designing, implementing, and evaluating programmes for relating science and technology to economic and social development would respond to a critical need. Whether it will be possible to transfer the experience of the ICIPE Foundation to other areas is currently being assessed.

Coming back to ICIPE's history, from the planning meeting, an International Interim Organising Group was formed to work out the details of the formal establishment of ICIPE. The chairman, Tom Odhiambo, working closely with his colleagues abroad, had a myriad of problems to resolve and questions to answer before formal establishment could be assured. In reviewing my files of this period, I find it truly amazing how Tom was able to get anything accomplished at all, for my files are

absolutely crammed full of almost daily communications between Tom and the rest of us serving on the interim organising committee. No question was too large or too small for Tom to respond to directly. Were it not for the efficiency of the postal service between Nairobi and other parts of the world, I don't know how we ever would have reached the "creation".

Slowly but surely, the pieces began to fall into place through the tireless efforts of Tom and his international team, who were aided most effectively by a new enthusiastic and energetic recruit, Ruth Adams, then of the American Academy of Arts and Sciences, who made a truly significant contribution to the organisational development of ICIPE, as many in the audience know full well. She subsequently became a member of the ICIPE Governing Board.

The Kenyan government and the University of Nairobi from the beginning made substantial commitments to ICIPE's development, providing land and a wide array of essential support services. In addition, foreign support in many forms began to come forward, especially the first substantial contribution for support of buildings given by the Dutch Aid Agency, and arranged by a devoted ICIPE supporter and former Governing Board Chairman and Chairman of the ICIPE Foundation, the late Jan de Wilde. Dr. de Wilde was to his death a believer in the unique importance of ICIPE and he worked very hard to see its potential realised. Other countries, Sweden, Germany, the USA, and the UK, to name but a few, in their own ways helped to further the cause.

An African committee was created to ensure that the African focus would be appropriately developed and supported. Odhiambo, using, as we say in the US, paper clips and bailing wire, put it all together and by April 1970, ICIPE was a working model fully incorporated under the Companies Act of Kenya as an international institution of advanced research activities in

Nairobi. The first Governing Board reflected the institute's international character with two members from East Africa, two from the USA, and one each from the Federal Republic of Germany, the Netherlands, and the UK. As a membership organisation under the Company's Act, a much larger group of insect scientists from all over the world associated themselves with the Centre. Tom, of course, was named ICIPE's first Director.

Initially, the research of ICIPE was organised in four sections: insect ecology and genetics, insect sensory physiology and behaviour, insect hormones and chemistry, and biophysics of insects. Five target insect species were selected because of their critical importance to Africa and because they represented those unique opportunities for research of interest to the international scientific community. They were tsetse fly, ticks, African armyworm, termites, and yellow fever mosquito.

Organised under the leadership of visiting directors of research, according to the Djerassi model, research areas were developed and strengthened through active participation of local African researchers and technicians. Library resources, equipment for laboratories, and support systems were evolved, and in what to many of us now seems an incredibly short time, active research was accomplished with results appearing in journals of international stature. It is truly impressive that in 1973 the first Annual Report of ICIPE contained nearly 160 pages of reporting on research developments.

We are now fifteen years down the ICIPE road. We are a thriving, world-recognised research institution. Others look with envy at what we have accomplished and our potential for doing even more. Still others would like to emulate ICIPE and initiate similar institutions in other fields of critical concern for developing countries. We have suffered the organisational, administrative, and financial pains typical of many evolving institutions and we have survived them. We have been analysed

and reviewed in every possible way and we have responded to the conclusions and recommendations as an evolving dynamic institution should. We have established close working relations with other research institutions, both national and international, in Africa and abroad. What can we say on the basis of our experience? Would we advise others to try to start a new international institute now? What were the critical ingredients of the successful recipe for ICIPE? How has the recipe changed over the years? These are some of the questions I would now like to briefly address.

Anyone who knows anything of successful cooking realises that a recipe is only as good as the chef, the quality of the ingredients, the time and manner in which the various ingredients are added, and the spices available to enhance the important characteristics. Some would add that the kitchen and cooking utensils are also important. Similarly, the recipe for institution-building depends on a **creative "chef"**, in this case, Dr. Thomas Odhiambo — I have never met a more creative, enthusiastic, and capable "chef" than Tom. His single-minded devotion to creation of an international institute based on research of international standards was an inspiration for all of us associated with him in this effort. He never took no for an answer, and was never satisfied with less than success. His faith in the correctness of the model and the critical need for it sustained us in the inevitable periods of doubt and discouragement that at least some, if not all, of us experienced. The **quality ingredients**, the cast of insect scientists involved in ICIPE at its inaugural, would have been the envy of any university in the world, for it was a "dream faculty" of world-renowned researchers, all committed to an exciting, innovative idea in international cooperation — ICIPE . **Critical timing and appropriate introduction** were provided by starting the research programs with the visiting research director scheme, thus assuring the credibility of the

Centre and launching its program with vigor and true international involvement. The involvement of national academies of sciences and other organisations in the establishment of ICIPE and its development provided the **spices**, giving a unique international character of distinction which was critical to gaining national scientific and financial commitments to ICIPE and gaining international funding as well. Moreover, the involvement of African scientists through establishment of an African committee assured that African concerns and interests would be reflected in ICIPE's program.

Finally, as good chefs know full well, a good recipe gets better as experience demonstrates that certain ingredients can be added, subtracted, or otherwise modified as new or better ones are incorporated. So it has been with ICIPE, whose "chef", together with the owners and managers of ICIPE, have modified the structure, operation, and indeed the substance of the research program to respond to evolving needs, and, even more important, to emerging opportunities. They have correctly recognised that a thriving, scientifically productive institution must be a dynamic one, one which maintains its overall philosophy and direction, but which recognises that the needs of today are not necessarily the needs of tomorrow. Thus, the model of the Visiting Directors of Research, so critical to the establishment and early development of ICIPE — indeed, I do not believe for a moment that ICIPE could have been created or, if created, survived without this novel model — was in 1979 replaced with a more appropriate model of permanent program leaders resident in Nairobi. Though the recommendation for this change was not popular with many of my fellow founders of ICIPE, I believed that ICIPE had evolved and matured to the point that program research decisions and guidance had to be provided full-time locally. Nevertheless, the

continued involvement of the international scientific community was and always will be essential to ICIPE vitality.

There are those who believe that implementation of the recommendation for changing from a visiting director of research model to a full-time program leader model would result in a virtual elimination of international interest and participation in ICIPE's further development. An even brief review of the last Annual Report of ICIPE and a look around this hall will be enough to convince one that they needn't have feared; this has not been the case.

Similarly, the evolution of ICIPE from a rather narrowly focused research institution to one broadly concerned with insect science, including training and extension as well as research, has been a very positive development. The *1983 ICIPE Annual Report* describes in detail the impressive accomplishments achieved in what are now called core programs, in research units, and in training. I am particularly impressed with efforts to train African insect scientists as demonstrated through the African Regional Postgraduate Programme in Insect Science (ARPPIS). For many of us involved in ICIPE's establishment, the effort to create African capabilities to solve African problems was and continues to be a high priority objective. That ICIPE is contributing significantly to the achievement of these objectives is a source of gratification to us.

As it is for all research institutions, financial support of ICIPE is a critically limiting factor. The best scientists in the world cannot function in the absence of proper infrastructure, instrumentation and supplies. ICIPE was created with the help of various private foundations, national technical assistance agencies, and international organisations. It depends on funding from outside sources and always will. How to assure this support in a time of economic difficulties all over the world is a

matter that must concern all of us involved in the development of international research cooperation. Research does not thrive when financial support is uncertain. It certainly does not thrive when there are discontinuities in funding. We must find a way to make research support for international research centres less vulnerable to political and economic fluctuation. That is a challenge worthy of all of us concerned with international cooperation in science. Under the present circumstances, it would be hard to imagine creating a new centre like ICIPE.

And yet the need continues, and is even stronger than before. The growing recognition world-wide that science and technology are required for solving critical development problems has created a desire — indeed, a demand — for greater involvement of scientists and engineers from the Third World in the process. Mechanisms are required to develop local capabilities and to organise them effectively so the potential contribution of science and technology to national development can be realised. This is why ICIPE is for many of us such an important model.

As indicated earlier, and as you all well recognise, ICIPE is truly an international success story and continues to be so. Its scientists come from all over the world, publish extensively in international journals, attend and address international conferences, organise international seminars and symposia, and conduct training programs for scientists and administrators world-wide. To those who were skeptical that an international research institute of world standard could be created and thrive in Africa, I can only say ICIPE has proven them wrong. We have survived growing pains and occasional problems of vitamin deficiency (funds, in our case) to become stronger and more vital than before. If lessons are to be drawn from this experience, they are that strength and vitality relate to a clear sense of

purpose, a dynamic leadership, an enthusiastic and capable staff, and the recognition world-wide that important contributions are being made.

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ISP GUEST LECTURE SERIES NO. 1

Dr. Victor Rabinowitch is the Executive Director of the Office of International Affairs, U.S. National Research Council. He is a trained ecologist, with a Ph.D. degree in Zoology and International Relations. His concern with the problems associated with the impact of science on society has been extensive. For more than 15 years he has been an active participant in the Pugwash Conferences on science and world affairs; and for the past 18 years he has been associated with the programmes of the U.S National Academy of Sciences/National Research Council relating to science, technology and international development.

Dr. Rabinowitch played a major role in the early meetings convened to discuss the establishment of the ICIPE, and also served on its Governing Board from 1970-1971.

This lecture was given on the occasion of the ICIPE's 15th anniversary, in Nairobi, on April 14, 1985.

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