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SPONSORING GROUP FOR ICIPE

# REPORT OF THE TRIENNIAL REVIEW OF THE INTERNATIONAL CENTRE OF INSECT PHYSIOLOGY AND ECOLOGY (ICIPE)

WORLD BANK, WASHINGTON, D.C.

PDAAP 306

# Report of the Review Team for the First Triennial Review of the International Centre of Insect Physiology and Ecology (ICIPE)

Nairobi, March/April 1983

Nairobi, 27th April 1983

Dr. Montague Yudelman,
Chairman,
Sponsoring Group for ICIPE,
World Bank, 1818 H St.N.W., Washington D.C.

Dear Dr. Yudelman,

On behalf of the Review Team I have pleasure in sending you our report of the First Triennial Review of the International Centre of Insect Physiology and Ecology (ICIPE).

Our terms of reference, provided by the Sponsoring Group for ICIPE (SGI), stressed the need to examine the management as well as the scientific aspects of the Centre. Consequently, management is discussed at greater length than the donors are probably accustomed to in similar reviews of other international agricultural research centres. However, we have also dealt at some length with the research activities and with the Centre's relationship with other international and national activities.

In reviewing the operations and work of the Centre we have attempted to present both the strengths and weaknesses in a manner that we hope is neither too lavish nor too harsh. We have done so in the knowledge that the donors require a balanced picture of the Centre in order to sustain their confidence for provision of adequate and stable funding. We sincerely hope that this report will give them that confidence, for overall we have found much to praise.

Our terms of reference did not refer to the financing of the Centre but we recognize that funds for international agricultural research are likely to be short in the next few years and thus we have attempted to be realistic in our recommendations. Nevertheless, we would emphasize that ICIPE has undergone a critical period in its financing and that it needs additional help to maintain its research programmes.

We would like to reiterate our concern about the inordinate number of reviews to which ICIPE has been subjected in recent years. We would suggest that before embarking on independent reviews the donors consult with you, as Chairman of SGI, to see how their questions and concerns might be addressed with minimum disruption of the Centre's work.

The report has been discussed with both the Programme Committee of the Board and the Board itself. I was fortunate in being there to attend meetings of both and to explain and defend the Team's views where necessary. However, I should emphasize that the recommendations were those of the Team and that they have not been influenced by the Board's discussions. The Board is preparing a comprehensive statement on its reaction to the review and proposals for dealing with the recommendations therein. I understand that this statement will be forwarded to you in the near future for transmission to SGI along with this report.

I would like to record our appreciation of ICIPE's efforts to facilitate our work by providing us with both air and road transportation, documentation, excellent accommodation and very efficient secretarial services. The scientists of the Centre provided us with succinct yet comprehensive accounts of their work, an effort which made our review infinitely easier.

It is inevitable in a review of this kind, where experts in different sciences take primary responsibility for the preparation of their segments of the report, that differences in style will be apparent. I have not attempted to alter these, but am grateful for forebearance of the writers, especially those for whom Australian is not their first language. We recognize that we are writing primarily for the donors, but there are others who may read the report with varying degrees of knowledge of entomology. Although we have attempted to avoid too much detail, some is necessary for the argument. We trust that we have produced a readable account.

In conclusion, I would like to record my personal thanks to the Team for their hard work, excellent cooperation and dedication to providing this report in a short time. We met as strangers and dispersed as very good friends.

Yours sincerely,

M.F.C. DAY
on behalf of the Review Team

ADDENDUM

Please note that Board Response to Report of Review Team follows Annex 5.

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## PREFACE

It has become customary for donors to international research centres to organize periodic reviews of the centre's management and research programmes. Such reviews are intended to help the donors assess the progress of the centres and to ensure that funds are being used effectively. Carried out on behalf of a group of donors they are intended to replace at least some of the reviews by individual donors and thus relieve the centre of the not inconsiderable burden that frequent reviews impose on management and scientific staff. ICIPE has had an inordinate number of reviews in the past few years, thus the Sponsoring Group for ICIPE requested that a system of Triennial Reviews be instituted to assist it in its responses to ICIPE.

The organization of this review has followed the patterns of quinquiennial reviews of the international agriculture research centres (IARCs) in CGIAR. Terms of reference were developed and agreed by the donors at a meeting in November 1982. Names of potential members of the Review Team were solicited from donors, the ICIPE Foundation and the ICIPE management and the Team was chosen to give a wide range of scientific and managerial experience.

The Team consisted of:

Dr. M.F.C. Day (Australia), Team Leader
Formerly Chief, Division of Forest Research, CSIRO

Dr. P. Atang (Cameroon)
Director, Inter African Bureau for Animal Resources, OAU

Professor J. Boeckh (Germany)
Professor of Animal Physiology, University of Regensburg

Dr. J.K. Coulter (U.S.A.), Secretary
Agriculture Research Adviser, World Bank, Washington D.C.

Mr. J. Griffith
Senior Loans Officer, World Bank, Washington D.C.

Professor F.G. Maxwell (U.S.A.)
Professor and Head of Department of Entomology, Texas A & M

Professor M.J. Way (U.K.)
Professor of Applied Zoology and Director of Imperial College at Silwood Park, University of London

The Team's itinerary is given in Annex 1. ICIPE arranged a full programme in Kenya, during which the Team visited the laboratories and five of the sites of field work of the Centre. The Centre also provided the Team with extensive documentation (Annex 2). Scientists presented their programmes to the Team and while there was considerable interaction between members of the Team and staff members, the Team wished that there had been more. The Team also met with the scientific staff as a group to discuss some of the problems encountered during the past two years.

The report was drafted during the stay of the Team in Nairobi as it was essential to have an agreed draft before the Team dispersed. The report thus represents the collective and unanimous views of the Team.

Acknowledgements

The Director, Professor Thomas R. Odhiambo, went to great pains to ensure that our work proceeded as smoothly as possible. The Deputy Director, Dr. A.A. App, was most considerate and helpful at all times.

The Team received the fullest help and cooperation from the ICIPE staff at every level and the staff put a great deal of effort into preparing for the review. For this we are very grateful.

The many drafts of this report were typed with great skill and efficiency by Miss R. Runo and Miss R. Wgata.

The report was much improved by the expert editing of Helen van Houten of IDRC, Canada, to whom the Team offers sincere thanks.

## SUMMARY OF RECOMMENDATIONS MADE IN THE REPORT

The Team makes the following recommendations:

(Management of ICIPE, Chapter 2)

(a) That the mandate should be formulated in the format used by other international centres (para. 15).

(b) That the core research programme philosophy be endorsed although modifications are suggested in the discussion of individual programmes (para. 18).

(c) That the "ICIPE Strategic Plan" should be the key Board document in the planning cycle and the Team suggests that the relevant sections of its Report be used as a framework for the next planning cycle (para. 57).

(d) That the Board should adopt a policy and no diversion from it be permitted without either the permission of the full Governing Board at its Annual Meeting or by the unanimous approval of the Executive Committee (para. 57).

(e) That the Board now review and substantially amend the Financial Regulations and Rules and, to a lesser extent, the Staff Regulations and Rules so that the Board, the Executive Committee or a quorum thereof (depending on the substance of the rules) would approve changes in the Regulations and Rules (para. 57).

(f) That at least half the Board members be required to constitute a quorum (para. 58).

(g) and(h) That the composition of the Board members be modified to include, within the same 16 members, additional professional skills in finance and management (Para. 59).

(i) That as Board retirements occur each year, the Nominating Committee set, as its goal, a target of 4 or 5 members with the above skills (para. 59).

(j) That the Nominating Committee should consist of 3 members of the Board as at present, but should not include the Director, who, inter alia, is charged with the responsibility for suggesting names to the Committee.

(k) That the Programme and Executive Committee be constituted as presently done (para.59).

(l) That ICIPE's legal advisors and Company Secretary prepare amendments to the Articles that would provide for Governing Board members to be company members (as was the case originally), and to increase the company quorum from three, to "ten of whom at least eight must be members of the Governing Board, excluding ICIPE employees or designees thereof" (para. 60).

(m) That there be phased reduction of ICIPE Foundation presentation on the ICIPE Board from 4 to 2 members (para. 61).

(n) That the following information be provided to the Executive Committee of the Board on a quarterly basis: summary of key budget vs actual indicators such as income, total operating expenses, capital expenditures and senior staff movement (para. 63).

(o) That a small computer be purchased for accurate analysis of cash flows and financial planning (para. 65).

(p) That an Assistant Director - Administration be appointed to fill the vacant post now occupied by the Acting Administrative Manager (para. 67).

(q) That the Director delegate the hiring and termination of all staff up to the PQ level to the Assistant Director - Administration and review other areas that could be delegated (para. 67).

(r) That the Manager of the Mbita Point Field Station, the Head of Communications and Training and the Head of Computer Services and Biostatistics report to the Deputy Director rather than to the Director, as at present (Para. 68).

(s) That operating policy papers prepared by ICIPE be reviewed and revised in light of recommendations in this report (para. 69).

(t) That ICIPE refine its personnel policies and prepare additional papers in such areas as Staff Hiring Policies, Staff Performance Review Procedures, Staff Grievance Handling Procedures, Staff Records/Security Policy, that could expand on the Staff Regulations and Rules of ICIPE document and help clarify much of the staff confusion and concern about ICIPE's personnel administration practices (para. 69).

(u) That the new Assistant Director - Administration and the Manager/Assistant Director - Finance together institute a series of control procedures over stores in headquarters and field locations, goods in transit, work in progress and building materials unit price quotations on a current basis (para.70).

(v) That the Planning and Development Unit carefully review all cost estimates to satisfy itself that inflationary factors have been fully taken into account in developing cost estimates for future years' budgets (para. 70).

(w) That ICIPE's budgeting presentational formats be modelled after those of the CGIAR-sponsored centres. This recommendation applies equally to the presentation of operating budgets (para. 70).

(x) That the organizational structure for ICIPE be as laid out in Figure 4 (para. 74).

(Crop Borers Programme, Chapter 3, Section 1)

(a) That an effective Programme Leader be appointed as soon as possible to provide overall, dynamic leadership.

(b) That rice work be phased out in this programme when the present postdoctoral fellow completes his project and resources be concentrated on borers in sorghum, maize and cowpea.

(c) Since there is considerable overlap between the Bases of Plant Resistance and the screening and genetics of resistance research on Crop Borers, consideration be given to consolidating this effort under the broader umbrella of Plant Resistance to Insects (Figure 5: Suggested Organizational Structure).

(d) That plant breeding work be limited to study of genetics of resistance. International and national programmes should do breeding work. The MPFS Crop Borers Programme should evaluate crosses and other materials to confirm levels of resistance in this area to the various species of insects.

(e) That parasite work be transferred to a new Section on Biological Control (Figure 5).

(f) That insect rearing be consolidated into a centralized unit with the present leader in charge of research on rearing and provision of insects (Figure 5).

(g) That as additional land adjacent to MPFS to expand field plot and field insectary areas (cages) is needed, the development of field plots at locations a considerable distance from MPFS should be done only when resources and adequate means of transport become available. Transport should be assigned to the programme.

(h) That scientists in the Crop Borers Programme should be given greater opportunity to attend international meetings to present results of their research and visit with colleagues. Short-term training elsewhere should be supported.

Bases of Plant Resistance to Insects Chapter 3, Section 2)

(a) That cooperation with the international centres and programmes should continue to be strengthened, especially between IITA, ICRISAT, and CIMMYT. Opportunities for exchange and visits of scientific personnel should be encouraged.

(b) That cooperation should be instituted as soon as possible with the AID Sorghum/Millet CRSP. This programme might be willing to station a scientist at MFFS. Close ties should be established with related programmes in the U.S. for germplasm and information exchange.

(c) That travel funds should be made available for scientists to travel abroad periodically for short-term study, meetings, etc. The opportunity to travel to the Host Plant Resistance Workshop held every two years would be extremely important. This is a very important workshop for all workers in plant resistance, especially for entomologists, plant breeders, and chemists.

(d) That rearing should be transferred to a centralized operation with its own Programme Leader covering research in mass rearing and supply of insects for all programme areas.

(e) That all the research associated with breeding (involving 2 scientists) should be merged with the programme of the present Crop Borer Research Programme (Figure 5).

(f) That the name of the merged programme should be Plant Resistant to Insect Attack (PPIA)

(g) That additional plot and insectary area should be provided at Mbita Point Field Station. Additional laboratory space and especially equipment should be made available as soon as possible in order to improve the quality of research.

(Insect Pathology and Pest Management, Chapter 3, Section 3)

(a) That all relevant crop-based programmes be re-aligned into a consolidated Crop Pest Programme with a Crop Pest Programme Leader and 4 project leaders.

(b) That the structure as proposed in Figure 5 be effected to improve the research operation at MPFS.

(c) That the Programme Leader should be assigned a specific budget to carry out the research objectives of his group and should be directly accountable to the Deputy Director for research for his programme.

(d) That the Programme Leader should have a major role in recommendations and decisions on personnel in his programme, concerning travel, leave, promotion, merit increases, and training.

(Livestock Ticks, Chapter 3, Section 4)

(a) That the multifaceted integrated control programme strongly supported by the Team, proceed with its continuance of vaccine, drug use, host resistance to tick infestation, acaricides, and exclusion of game.

(b) That the programme receive more support for field work, using larger numbers of cattle. More transport will be needed.

(c) That multifactorial model of tick population dynamics and host-pest relationships, especially with resistant, vaccinated, and drug treated cattle, should be formulated. It might well become a model for other systems as well as posing important questions and approaches for further investigations in the programme.

(d) That if the plan is to be followed, a substantial section of the Chemistry Research Unit should be involved. Extension of the immunological and protein chemistry studies will present problems since such an approach will require the full range of modern biochemistry with sophisticated methods and modern instrumentation. Staff would need to be trained in the relevant techniques, and other institutions would need to be involved to provide expertise and technical assistance. The essential prerequisite will be a clear definition of research priorities of the cooperating groups, a realistic budget plan and cooperating at an international level. This should include the assistance of an experienced immunologist. It is strongly recommended that such planning be made before the full-scale programme is started.

(Tsetse Research Programme, Chapter 3, Section 5)

(a) That Programme Leader of adequate stature and ability with ecological appreciation be recruited as he is a crucial requirement. Until one becomes available, use should be made of a temporary visiting programme leader who could lay the foundation for future work. A long-standing tsetse expert is not a necessity; a comparative "outsider" could be more innovative.

(b) That coherent research programme should be devised using mainly a field ecological and applied ecological approach with the laboratory work designed to answer problems encountered in the field and to test which could lead to novel control methods.

(c) That ICIPE with its strengths and potentials in a range of both physiological and ecological work should take the initiative in collaboration with other major programmes in centres such as ILRAD, ILCA and KETRI with the objective of a truly integrated approach to vector and disease control.

(d) That, without diluting its local research effort, ICIPE should seek opportunities to interest and cooperate with institutions in other parts of Africa so that the tsetse programme can be extended to other Glossina species. In this context, more provision must be made for tsetse scientists to consult colleagues in other countries.

(e) That imbalance between numbers of laboratory and field workers should be corrected.

(f) That overall programme should strike a balance between basic work and practical application. ICIPE should concentrate on good science with the goal of integrated control although they should be cautious about direct involvement in practical control programmes. Use should, however, be made of local control programmes, ideas for control (e.g. insecticide screens) and to provide vital experimental understanding of tsetse population dynamics and hence of improved control. ICIPE workers should also be willing to advise those concerned with immediate problems of control, e.g. the Government organizations concerned with the Lambwe Valley problems.

(g) That work on laboratory rearing of G. pallidipes (in which some progress has been made) should be given priority in the breeding programme so that relevant laboratory and experimental field work can be done with this species rather than with G. morsitans.

(Medical Vectors, Chapter 3, Section 6)

(a) That, as the programme is reaching a stage where epidemiological knowledge needs to be developed into a longer-term perspective, the Programme Leader should consult with other authorities in the problem so that he can request financial support for the best possible long-term project proposals for the project. Much work has yet to be done on the ecology and physiology of the vector.

(b) That this programme be supported, because of the likelihoood of significant increases in knowledge of transmission of the parasites, and the importance of the disease to human health.

(c) That additional vehicles should be provided.

(d) That, as additional laboratory space and equipment are needed in Chiromo, the equipment should include support for rearing, taxonomy, and the immunological work.

(Sensory Physiology Research Unit, Chapter 4, Section 2)

(a) That a search should begin immediately for a Head of the Unit with expertise particularly in behavioural physiology, with interest and insight into ecological problems, and with an understanding of electrophysiology. Core programmes, especially Crop Borers and Tsetse, would benefit from cooperation with a behavioural physiologist.

(b) That electrophysiology should remain a component of research on sense organs and for bioassay.

(c) That morphological work on sense organs should be more concentrated on functional rather than descriptive aspects.

(Chemistry & Bioassay Research Unit, Chapter 4, Section 3)

(a) That the unit should re-examine the objectives and the focus of the work in progress. A group with such limited resources has to concentrate on a few major projects which can be followed through and studied in depth. Decisions on priorities become vital and the criteria for making such decisions should be spelt out clearly.

(b) That, as the natural product chemistry programme is too diverse, it should be confined to a few areas where it is not competing with organizations that have far greater resources.

(c) That, because of the complexity of the research, the study of type 2 resistance in cattle should be carefully planned. The Team recommends that an expert from another institution be consulted in the planning process.

(d) That as the laboratory facilities are quite inadequate and present some health hazards, action to improve this situation be taken soon.

(e) That some major instruments should be replaced (NMR and mass spectrometer).

(Bioassay, Chapter 4, Section 3, B)

(a) That whilst much can be done in the existing simple conditions, rooms or cabinets with temperature control are needed and provision should be made for handling insecticidal or acaricidal compounds in conditions where they will not contaminate other experiments.

(Histology and Fine Structure, Chapter 4, Section 4)

(a) That the Centre should take a major decision about the future role and functions of this unit. The Team suggests that these alternatives be considered:

(1) A service for Fine Structure research be organized using technically well-trained staff. The scientist will then have available properly aligned and functioning equipment but all the scientific work, including special methodology and interpretation, would be left to him. To run the unit an experienced technical officer or engineer or a scientist with good technical expertise would be required.

(2) The unit should function as a research unit at the same level as the other research units in the Centre. To do this a leader with flexibility, imagination, and expertise in terms of methodology and scientific approach would be needed.

(b) That the electron microscopes be replaced or repaired. This has major financial implications but they are at the technical heart of the unit, and work is severely delayed if the instruments are available only 50% of the time.

(c) That as radioautography would make a major contribution to the array of available methods it should be considered as and when funds become available.

(d) That since so many ICIPE projects depend on the reliable functioning of the unit, the skills of the scientific and technical staff should be upgraded.

(Computer Services & Biostatistics, Chapter 5, Section 1)

(a) That ICIPE management should, in consultation with the major users, prepare a staffing plan for the unit. The Team considers that a biostatistician should be Head of the unit.

(b) That some investment in minicomputers at strategic locations should be made as soon as possible.

(Insect & Animal Breeding Unit, Chapter 5, Section 2)

That this unit should continue to service ICIPE research programmes and units as required and that the facilities be upgraded when resources become available.

(Training, Chapter 6, A.)

(a) That the Centre develop a 5-year plan for its training programmes that would capitalize on its unique advantages without, at the same time, overstretching its capacities of staff and space. Such a plan should be thoroughly costed and its demands on research staff time and on facilities should be worked out in detail.

(b) That no further planning work on the FAMESA programme should take place, but that ICIPE should encourage other institutions to develop such a programme and offer limited help in areas where it has expertise.

(c) That the 1984 and 1985 intakes for the ARPPIS programme be determined after the plan for training has been developed.

(d) That selection of trainees from ICIPE's own staff be done with concurrence of Programme Leaders.

(e) That there should be some follow up of external trainees in order to assess the strengths and weaknesses of the training programme. UNEP appears to have some follow up plans in mind.

(f) That closer collaboration be developed with the University of Nairobi in the training programme.

(Communications, Chapter 6, B)

(a) That emphasis should be placed on maintaining high international standards in the journal based on authoritative referring, and on publishing the textbooks with minimal delay.

(b) That a working group of scientists should be set up to recommend possible improvements, as there are differences of opinion on whether the research conferences are structured in order to derive maximum benefit for the staff and the Governing Board.

(c) That open days and field days for the general public and for farmers should continue to be organized since these are especially important for maintaining awareness of ICIPE's valuable role.

(d) That careful constraint be maintained on activities such as communication which might unduly direct the scientists, many of whom are already committed to training and to other non-research activities.

(Library, Chapter 6, C)

(a) That there should be a policy decision on organizing the library for MPFS. Splitting the present financial allocation would downgrade the value of both.

(b) That even though the ICIPE library is part of the library "network" in Nairobi, additional funds are needed and should be provided.

(Cooperation, Chapter 7)

(a) That ICIPE should provide the University with a copy of its 5-year plan for training so that areas of mutual interest can be determined.

(b) That ICIPE should re-examine other arrangements for co-operation to ensure that they are working as well as can be expected.

(c) That ICIPE should make a major effort to persuade the University to allow it to retain the facilities at Chiromo and perhaps develop them.

(Physical Facilities, Chapter 8)

(a) That ICIPE should obtain an independent estimate of the funds needed to complete Mbita Point Field Station. In doing so, it should consider lower specifications for those parts not yet started i.e. the housing for middle and lower grade staff (stage 2). The Team has reservations about even starting stage 2, though it recognizes that some housing for junior and middle staff will be essential.

(b) That the Centre should develop, as a matter of urgency, a budget for scientific and farm equipment at Mbita Point.

(c) That capital funds for even the modified capital plan for Duduville are not in sight. While the Team supports the need for buildings there, the Centre should develop an alternative strategy for operating in the next five years, on the assumption that little further capital development may take place at this site in the short term though it might be possible to provide space for some of the most hard pressed sections e.g. insect and animal rearing and workshops.

(d) That no further investment should take place at any of the other stations including Kuja River until the Board has received a detailed report on the potential usefulness of these sites to the ICIPE programme. Before a site is taken over for a station, there should be an approved plan and budget for its development.

(e) That in the longer term the Centre might solicit suggestions and ideas for the sharing of the site (and the costs) of Mbita Point by national or international organisations interested in the animal and human disease vectors.

(f) That each programme leader should have a permanent allocation of suitable vehicle, over which he has full control. In the Team's experience, vehicle pools do not work.

(g) That some additional funds for capital development be included in each annual budget provided to the Centre for its many and diverse capital needs for buildings, vehicles and equipment. However, the Centre must prepare a detailed study of priorities for the use of such funds.

## Concluding Observations

The Team strongly recommends to SGI that stable furding for ICIPE be given a high priority.

Apart from the recommendations listed above, there are a number of suggestions in the report that the Team believes should be taken seriously by the Board and the ICIPE management.

The Team has been critical, we hope constructively critical, in some areas. This must not be taken to imply that there was little to commend. On the contrary, the Team found much to applaud, but in a short report the criticisms may seem to overshadow the more favorable comments, even though these may be the more apparent.

# Chapter 1

## BACKGROUND, TERMS OF REFERENCE, MANDATE, ACCOMPLISHMENTS, PRIORITIES

### THE FOUNDING OF ICIPE

1. The following paragraph is extracted from a statement prepared by ICIPE for this review and an article written in 1967 by Professor Thomas R. Odhiambo (then of the University of Nairobi) in Science (Annex 3). He advocated the establishment of research centres in developing countries to help solve their science-based problems and increase their scientific manpower. This caught the attention of scientists in the United States of America and led to a small meeting in Boston in 1968 between some senior scientists and administrators and Professor Odhiambo. An agreement was reached on the need to establish an advanced research centre in Kenya on tropical insect pests. A planning conference was held in Nairobi in 1969 which endorsed the establishment of an International Centre of Insect Physiology and Ecology in Kenya. On 7 April 1970, ICIPE was registered under Kenyan law. The Government of Kenya provided land and facilities in Nairobi and at field stations under long term leases and has granted ICIPE a number of privileges under a formal agreement which recognizes the ICIPE as an international centre. ICIPE is one of the very few international institutions in the world that was founded and is directed by scientists from the developing world.

### HISTORICAL PERSPECTIVE

2. It is, in retrospect, difficult to see how the Centre could have been started under more auspicious circumstances. The original vision of it was a far-sighted one. The start was well timed. An outstanding leader was available. An imposing group of world authorities was willing to cooperate, and the proposed programme was thoroughly discussed.

3. The report of the Technical Advisory Committee to the CGIAR (TAC) mission in 1980 describes just how timely were these origins:

> "The establishment of ICIPE came at an opportune time. The total reliance on insecticides was faltering at the end of the sixties. Insect resistance, environmental pollution and elimination of beneficial parasites and predators was forcing scientists to look

elsewhere for control measures. 'Third generation' insecticides such as hormones and other physiological approaches were generating hope for new, more stable, and less environmentally deleterious means of control. 'Integrated control' of pests was being rediscovered and receiving serious attention."

4. There was a ready acceptance of the proposal to establish ICIPE, and some financial support was forthcoming when the Centre was established in Nairobi in 1970.

5. A number of innovative features were embodied in the initial design of ICIPE. These included the concepts of the Visiting Directors of Research, the International Committee, and the African Committee. All were highly appropriate and useful at the time but have been superceeded as necessary - see later.

ICIPE AND CGIAR

6. In 1980, the ICIPE Governing Board made an approach for the second time to the Consultative Group on International Agricultural Research (CGIAR), requesting that ICIPE be included amongst the organizations supported by CGIAR.

7. A review team established to advise on this proposal recommended that ICIPE be included in the CGIAR system, but, at its 24th meeting, the Technical Advisory Committee did not accept this recommendation and so recommended to CGIAR which agreed with the TAC. Following this, some of the main donors to ICIPE decided to establish a Sponsoring Group for ICIPE (SGI).

TERMS OF REFERENCE OF THE REVIEW

8. SGI provided the Review Team with the following terms of reference:

"The overall objective of the review would be on behalf of the group of ICIPE's donors to assess the content, quality and potential impact of the research programme of the Centre and to examine whether the work being funded is being done according to the policies of the Board and to the high levels of scientific excellence expected of such an institute.

"During the course of the review the Team was instructed to pay particular attention to:

(i) The mandate: The relevance of the present mandate to the future work of ICIPE, particularly in relation to its work in Africa and its role in research on crop, animal and human pests and diseases.

(ii) The management: The efficiency and quality of the management from both a scientific and financial point of view; the appropriateness of the management structure for an institute with commitments to basic and applied research dealing with crops, animals and humans; the staffing procedures; the role of the ICIPE Foundation; representation of SGI on ICIPE Board.

(iii) The research programmes: The objectives of the research programmes, their relevance to the problems of agriculture, particularly the needs of small farmers; the basis for determining priorities; the balance among the different programmes and the balance between basic and applied research.

(iv) The quality of the research: The quality as judged by past performances; the quality and performance of the research staff in relation to advancing knowledge and technology.

(v) Resources: The adequacy and stability of funding for the pursuit of the research programmes; the adequacy of support staff; the adequacy of buildings and equipment; the relationship between core and non-core resources.

(vi) Cooperation with national and international programmes with scientific institutions in the developing and developed countries: The present methods of cooperating with these organizations especially ILRAD, the degree to which the Centre is in contact with and utilizing the intellectual resources of basic research institutes as well as FAO, UNEP, and WHO and other relevant specialized agencies; the degree to which it can help national programmes, particularly in Africa.

(vii) The potential impact and usefulness of the Centre's activities: The size and quality of the training programmes including their comparative advantages and impact on undergraduate and graduate education as well as potential for a role in lower-level training; its influence on research in national programmes; the potential value of its new technology; the efficiency and practical value of IPM training courses and their value."

THE MANDATE OF ICIPE

9. The formal statement of the mandate is that included in the most recent agreement dated 4 October 1977 between ICIPE and the Government of Kenya. It is as follows:

"The ICIPE has undertaken the following chief objects in the area of advanced research and training:

(a) To carry on and promote advanced research into insect biology, including fundamental questions in insect physiology, endocrinology, genetics, biochemistry, organic chemistry, biophysics, ecology and other related disciplines;

(b) To provide advanced training in research methods and techniques for pre-doctoral and research fellows;

(c) To promote, organize and participate in conferences, seminars, and symposia for the discussion and exchange of knowledge among the scientific community in Tropical Africa;

(d) To foster and promote, by its activities and by its special relationship with universities and research institutions, the growth of the scientific community in Tropical Africa."

10. This mandate has been interpreted by the Governing Board in a paper dated 30 April 1982 as follows:

> "The mandate of the ICIPE is to contribute to increased food production by undertaking mission-oriented research on pests of major crops, vectors of important livestock diseases, and insect carriers of human diseases critical to tropical rural health; and secondly, to increase the capacity of developing countries in pest management research and the application of the results of this research by training selected scientists and technologists in these fields."

11. A further elaboration is provided in a paper prepared by the ICIPE Board for this first Triennial Review. In this the mandate is referred to as follows:

> "The mandate of the ICIPE is twofold. The first is to undertake high-quality research on critical aspects of insect life which will lead to the design of novel methods for the management of major pests in a long-range, selective manner and within an acceptable ecological framework. The second is to carry out high-level technical and scientific training of young, gifted scientists and senior technicians from Africa and other developing countries in the field of insect and insect-related sciences."

12. It is clear from the above that the interpretation of the mandate has changed from emphasis on fundamental towards applied research. This is to be commended in the sense that the successful solution of practical problems in pest control is now demanding increasingly sophisticated research in both the laboratory and the field. Therefore, the high academic standards of the ICIPE can be fully maintained whilst at the same time the Centre can contribute crucially to the improvement of food production and human health in the tropics.

13. In order to bring the new perceptions more in line with current activity, the Review Team is of the opinion that the original mandate needs reformulation, and this may necessitate amendments to the formal agreements mentioned above.

14. The team suggests that a statement based on the following sentiments might be useful in this new formulation:

"The objective of the ICIPE is:

To undertake biological research on insects and related arthropods, so as to acquire knowledge relevant to the solution of problems of economic and social significance in the tropics. The research will involve the study of the identity, abundance and distribution of insects and arthropods and of their ecology, behaviour, physiology, pathology and genetics and the application of these to problems of pest control."

15. We would not wish to alter the statements related to training, the exchange of knowledge, the sponsoring of other activities related to the main purposes. The team recommends that the mandate should be reformulated in the format used by other international centres.

THE PROGRAMME

16. The research programmes and the projects within them, both current and terminated, are succinctly summarized in Figure 1(pages 5a and b). This illustrates the duration of all projects and the funds expended on them.

17. The explanations for the termination of projects are varied. For some, donors may have withdrawn funds. For others, the original aim has been achieved or found to be unproductive. In general, there has been in recent years a substantial move away from basic or curiosity-oriented research to more applied research.

18. The Team endorses the core research programme philosophy although modifications are suggested in the discussion of individual programmes.

ICIPE ACCOMPLISHMENTS

19. Some of the accomplishments of the Centre are outlined in the sections of this report dealing with the scientific programmes. The following is a list of some of these. It will be appreciated that they are in various stages of development in so far as they might contribute to practical control measures against arthropod pests.

(a) mechanisms of action of pest-resistant cultivars of several important crops

(b) value of some plant constituents as insecticides or repellants

(c) role of termites in grassland ecology

(d) control by various means of livestock ticks, and tick-borne diseases

## RESEARCH PROGRAMMES

| | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | Total Cost K£(Ch) (000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. a. Reproductive Physiology (Tsetse & Ticks) | | | | | | | | | | | | | | 414 |
| b. Reproductive Physiology (Tsetse) | | | | | | | | | | | | | | 3,853 |
| 2. Acoustic Component of Communication in Tsetse | | | | | | | | | | | | | | 336 |
| 3. a. Tsetse Salivary Gland Physiology (Its Relation to Trypanosome Development) | | | | | | | | | | | | | | 8,920 |
| b. In Vitro Culture of Trypanosome | | | | | | | | | | | | | | 3,370 |
| 4. Isolation Mechanisms and Diversity in Tsetse | | | | | | | | | | | | | | 8,583 |
| 5. TSETSE RESEARCH PROGRAMME (incl. 1 – 4) | | | | | | | | | | | | | | 514 |
| 6. Aestivation Diapause in Some Equatorial Insect Pests | | | | | | | | | | | | | | 885 |
| 7. Maize-Borer and Sorghum Shootfly Research Programme (emerged from 6) | | | | | | | | | | | | | | 127 |
| 8. Sorghum Shootfly Research Project (succeeded 7) | | | | | | | | | | | | | | 2,058 |
| 9. CROP BORERS RESEARCH PROGRAMME (includes 8) | | | | | | | | | | | | | | 13,009 |
| 10. ARMYWORM RESEARCH PROGRAMME | | | | | | | | | | | | | | 6,365 |
| 11. Termite Research Project | | | | | | | | | | | | | | 3,697 |
| 12. GRASSLAND TERMITES RESEARCH PROGRAMME | | | | | | | | | | | | | | 6,937 |
| 13. a. Tick Research Project | | | | | | | | | | | | | | 1,297 |
| b. Tick Physiology | | | | | | | | | | | | | | |
| 14. LIVESTOCK TICKS RESEARCH PROGRAMME (refocused programme from 13) | | | | | | | | | | | | | | 10,637 |
| 15. Chemical Studies of Natural Regulators | | | | | | | | | | | | | | 346 |
| 16. Ecological Studies in *Aedes aegypti* | | | | | | | | | | | | | | 295 |
| 17. Mosquito Research Project (including 16) | | | | | | | | | | | | | | 1,390 |
| 18. MEDICAL VECTORS RESEARCH PROGRAMME (incl. leishmaniasis and 17) | | | | | | | | | | | | | | 8,468 |
| 19. LEISHMANIASIS RESEARCH PROGRAMME | | | | | | | | | | | | | | 462 |
| 20. Insect Pathology Research Project (within 18) | | | | | | | | | | | | | | 1,780 |
| 21. INSECT PATHOLOGY AND PEST MANAGEMENT RESEARCH PROGRAMME (includes 20) | | | | | | | | | | | | | | 1,817 |
| 22. BASES OF PLANT RESISTANCE TO INSECT ATTACK | | | | | | | | | | | | | | 13,514 |

## TRAINING PROGRAMME

| | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | Total Cost KShs (000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Technical Training (Non-ICIPE) | | | | | | | | | | | | | | |
| 2. Postdoctoral Research Fellowship | | | | | | | | | | | | | | 1,725 |
| 3. Postgraduate Training | | | | | | | | | | | | | | 5,154 |
| 4. ARPPIS | | | | | | | | | | | | | | 199 |
| 5. High School Science Bursars | | | | | | | | | | | | | | 465 |
| 6. ICIPE/UNEP Group Training Course | | | | | | | | | | | | | | 3,039 |
| 7. Technical Training (In-house) | | | | | | | | | | | | | | 173 |
| 8. Language Course | | | | | | | | | | | | | | 13 |
| 9. Training in Communication Skills | | | | | | | | | | | | | | 8 |
| 10. Management Training | | | | | | | | | | | | | | 457 |
| 11. Staff Development (Includes together items 7 – 10) | | | | | | | | | | | | | | 6 |
| 12. FAMESA (Exploratory Phase) | | | | | | | | | | | | | | 227 |
| 13. International Training Course in Insect G, D, and B | | | | | | | | | | | | | | 211 |

KEY
Terminated
On-going programme

## RESEARCH SUPPORT UNITS

| | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | Total Cost KShs (000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Electrophysiology Research Unit | | | | | | | | | | | | | | 824 |
| Sensory Physiology Research Unit | | | | | | | | | | | | | | 5,737 |
| 2. Fine Structure Research Unit | | | | | | | | | | | | | | 1,779 |
| Histology and Fine Structure Research Unit | | | | | | | | | | | | | | 4,345 |
| 3. Chemistry Research Unit | | | | | | | | | | | | | | 1,783 |
| Chemistry and Biochemistry Research Unit | | | | | | | | | | | | | | 5,857 |
| Chemistry and Bioassay Research Unit | | | | | | | | | | | | | | 1,920 |
| 4. Bioassay Research Unit | | | | | | | | | | | | | | 2,447 |
| 5. Biostatistics and Computer Service | | | | | | | | | | | | | | 479 |

(e) tsetse physiology and ecology

(f) biology of the vectors of leishmaniasis.

20. Frequent reference has been made in documents produced by the Governing Board (for example, the Policy Statement dated 30 April 1982) or by the Centre, of the potential value of ICIPE discoveries. Some phases may produce unwarranted optimism and hence unfulfilled expectations. Optimism is part of man's makeup, but it must be tempered with realism. There are inherent limitations to the rate of transfer of results from the laboratory to the development of a useful control strategy. The Team is concerned that a realistic appreciation of the importance of these limitations has sometimes been lacking and suggests that future statements be scrutinized from the view-point we have expressed.

PRIORITY SETTING

21. There are a number of procedures laid down by the Centre aimed at ensuring that the setting of priorities of ICIPE is given the most careful consideration. This is shown, for example, in Figure 2 (page 6a) which illustrates the feedback that should occur following discussions by the Programme Committee and the Annual Research Conference.

22. It is obvious from Figure 1 that scientific programmes have changed greatly over the years. The Team commends the current arrangement of core programmes - tsetse, livestock ticks, and medical vectors. The Team has recommended some alterations in the arrangement of programmes concerned with crop pests (para 117). The Team has recognized the financial limitations facing expansion of the ICIPE programmes and its recommendations are made in this light.

23. The Team considers that any new activities in the ICIPE programme should be started by redeployment of existing staff positions. ICIPE is of sufficient size to be effective. We are confident that the present staff can, given adequate support, make a substantial contribution to the ICIPE mandate.

24. Our concern is not whether the system of priority setting is adequate, but how it functions in practice. We have evidence that there has been insufficient feedback to the scientific staff and that their views have been given insufficient attention. The Team recommends greater attention to "bottom-up" planning in the areas of setting priorities in the scientific programme (para. 72).

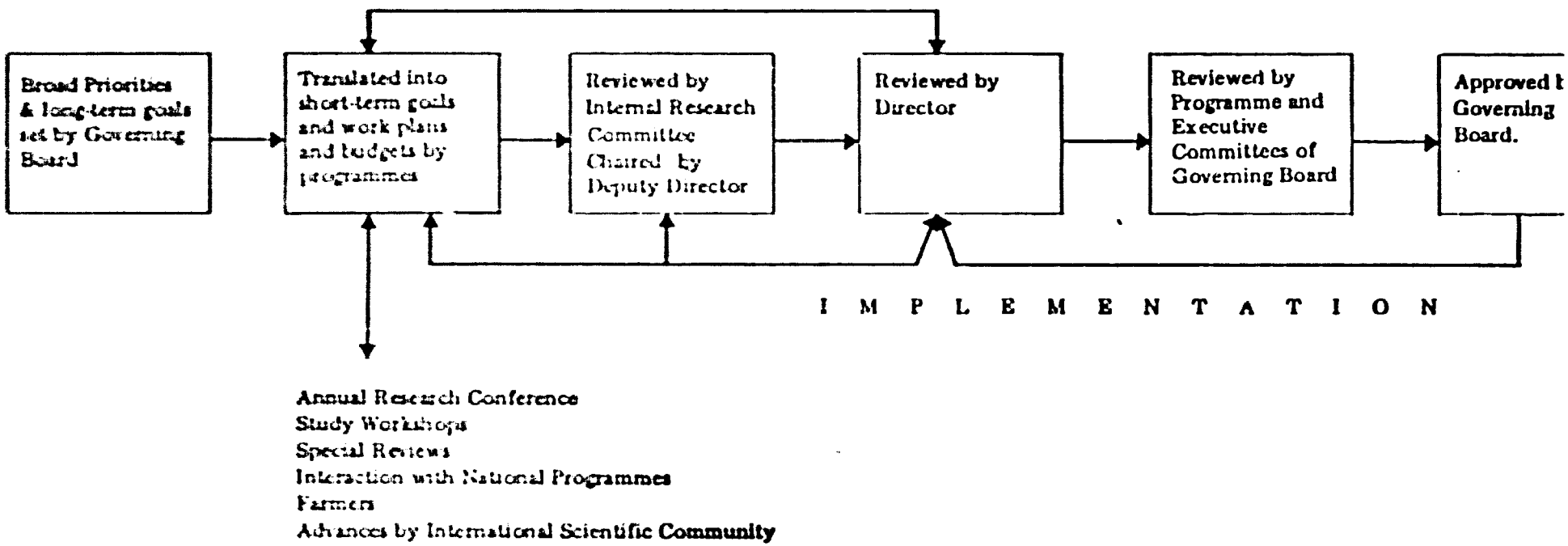



**Figure 2: ICIPE Strategic Planning Cycle**

25. The Team has noted the views of the Governing Board:

"That the ICIPE will operate with 45.7 professional staff-years in 1982, and not more than 44 professional staff-years in 1983 onwards for the intermediate future. Although the Board sees the possibility of eventual growth to a maximum of 50 professional staff-years, it will not consider staffing above 44 professional staff-years until the deficit is retired, appropriate investments in scientific infrastructure have been made, and emoluments have been adjusted."

26. The Team endorses this view.

# CHAPTER 2

## MANAGEMENT OF ICIPE

### SECTION 1: EXISTING MANAGEMENT STRUCTURES - A DESCRIPTION

27. The ICIPE organization exists under the legal entity of THE ICIPE COMPANY, incorporated in Kenya under the Companies Act on 7 April 1970 as a non-profit-making company, limited by guarantee, not having a share capital. The ICIPE operates within an Agreement between the Government of the Republic of Kenya and ICIPE dated 6 October 1971 as amended at later dates. This agreement stipulates, inter alia, the extent of the tax-exempt privileges, customs, national service and exchange control exemptions, the provision of land and, interestingly, the requirement that "ICIPE give priority, within its own competence and administrative limitation, to research requested by the Government of Kenya". The Team understands that there is, in train, a further amendment of the agreement to widen the privileges of the international staff. Under Kenyan Company Law, the ICIPE Company holds an Annual Meeting, receives the Audited Accounts and elects the Governing Board. It has no other purpose at present. Company membership consists of some 79 members, at last count. Attendance at meetings has ranged from 15 to 28 members. A quorum for a company meeting is 7 members; two members are currently ICIPE staff members (Professor Odhiambo and Mr. Ojal). A simple majority decides any company items put to vote. Members of the Governing Board are not required to be members of the ICIPE Company, although some Board members serve in both capacities.

28. The Governing Board, established under the Company Memorandum and Articles of Association, is the overall, legally constituted authority of ICIPE. It presently consists of 16 members of which 3 are appointed by, and represent the Government of Kenya, 4 by the ICIPE Foundation (of which more later) and 9 by the Company. The Board is self-perpetuating. Each member serves a term of 3 years but may be elected to serve a second term. Thereafter he must retire. The Chairman is appointed by the Board and serves until replaced. The Director of ICIPE is a full Board member. A quorum for transaction of Board business is 7 members. The

Board has responsibility for formulating ICIPE's scientific and financial programmes, for appointing of senior officers, and for the overall supervision of the execution of these programmes. It meets, formally, once a year, usually around April. An Executive Committee acts on behalf of the full Board during the year and meets in April and November, or as necessary. It consists of the Chairman, the Director, and 4 other members. A Programme Committee of 9 members, including the Director, suggests and endorses programmes of research. A Nominating Committee consisting of 3 members, including the Director, handles nominations for the Governing Board and its committees.

29. The ICIPE Foundation, headquartered in Stockholm, is an advisory body consisting of representatives of a number of scientific academies which appoints 4 members to the Governing Board and advises, informally, on ICIPE's research mandate and staffing.

30. The Office of the Director comprises Professor Odhiambo, as Chief Executive and Chief Scientific Officer of the Centre, and a small support staff, including the Planning and Development Unit (PDU), established in 1981, which undertakes economic appraisal, assess the strengths and weaknesses of the Centre at the Director's request, generate alternative strategies, and translate programme plans into budgets. PDU also undertakes the internal audit functions. The Director is the Board's agent charged with the responsibility for carrying out the mandate of the Centre within the policies and regulations promulgated by the Board.

31. The Deputy Director acts for the Director in his absence, sits on a number of administrative committees, chairs the Internal Research Committee and has direct responsibility for implementing the research mandate of ICIPE. Therefore, the Research Programme Leaders report to the Deputy Director. Each programme leader is responsible for the research programme under his/her leadership (Chapters 3 and 4). The Head of Communication and Training reports to the Director (Chapters 6 and 8).

32. The Administrative and Financial Divisions report to the Director and are responsible for the necessary administrative and financial guidance, control and performance reporting required by the Director in exercising his authority as agent of the Board. The Administration Division, headed by an (Acting) Administrative Manager, consists of a staff of approximately 5 senior staff and 85 support staff (38% of total staff) with responsibility for personnel management, office management, transport, security and janitorial services, both in Nairobi and at the field stations, the Duduville International Guest Centre, Mbita Point International School and clinic staff. The Division thus has both an "administrative" role and also a "management" role in respect of the staff of the Centre, Mbita Point International School and the medical clinic. The Finance Division, headed by a Financial Manager, consists of some 5 senior staff and 11 support staff (5% of total staff) and is responsible for the keeping of financial records, preparing the accounts and managing the Supplies and Stores Department. This latter responsibility places the Finance Division in a "management" role as well as the more general "administrative" role.

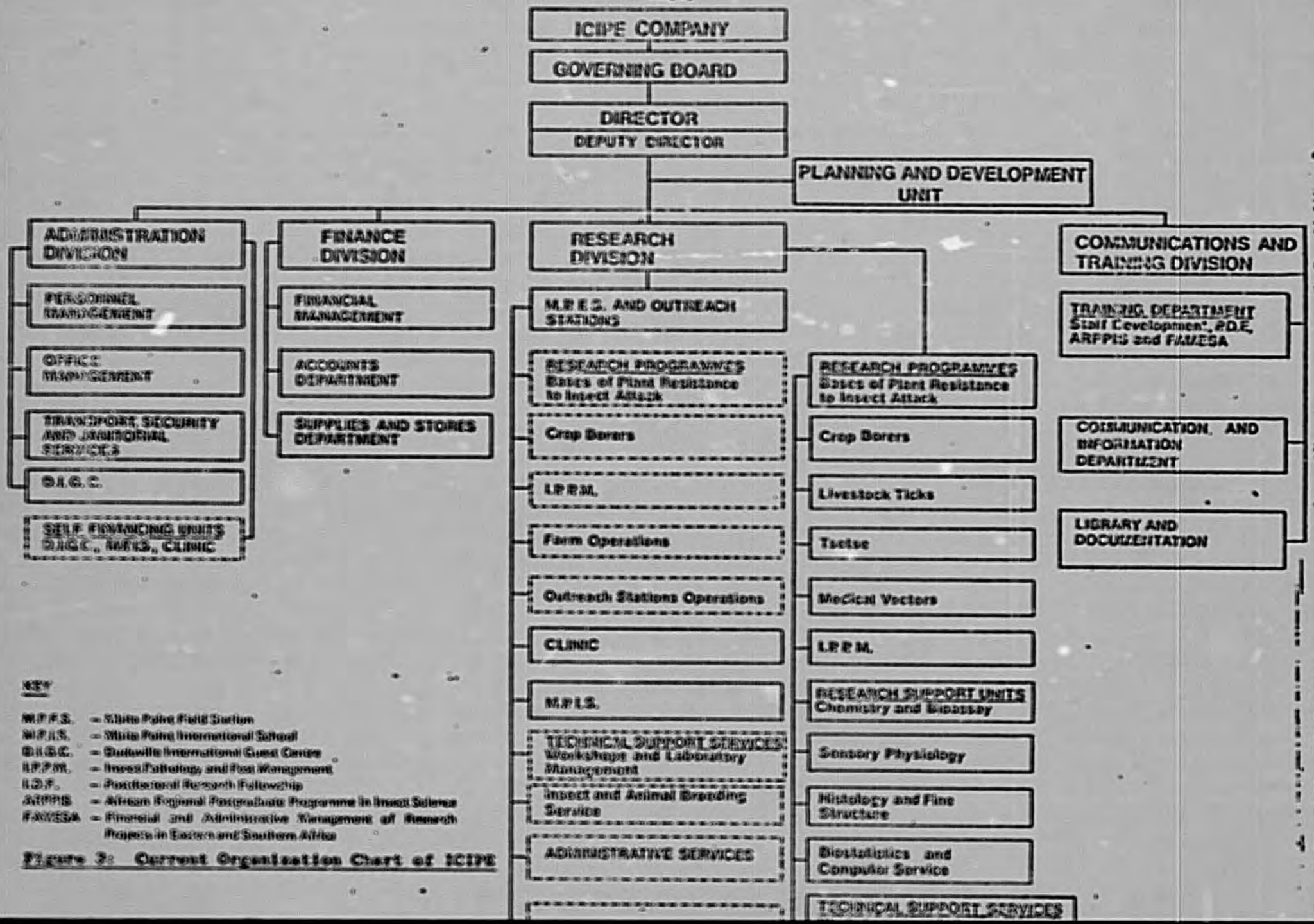
A current organization chart for the ICIPE is shown in Figure 3. As presently operated, however, only the Heads of Research Programmes and Research Support Units report to the Deputy Director.

## SECTION 2: EXISTING MANAGEMENT PROCESSES - A DESCRIPTION

33. The Role of the Governing Board can best be described as delegation of the majority of decisions to the Director while keeping an overview of general operations. It retains the responsibility for approving senior staff appointments on the basis of the Director's recommendations but does not have responsibility for renewal or termination of appointments. The full Board approves the Programme and Budget for the upcoming biennium (generally in April) and the Executive Committee (meeting around November) approves the Revised Budgets for the current year about to be concluded and the forthcoming year. At other times during the year, the Director requests the Chairman's approval, on behalf of the Board, to other changes - e.g. increased expenditure on capital over and above budgeted levels.

34. In delegating responsibilities to the Director the Board relies inter alia on two key documents, the Financial Regulations and Rules of ICIPE, and the (proposed) Staff Regulations and Rules of ICIPE. In reading both these documents, the Team notes the very high degree of delegation of authority to the Director. The 47 Regulations contained in the financial paper primarily describe the financial functions to be performed (external audit, 6 Regulations; dates and formats of the Programme and Budgeting processes, 8 Regulations; treatment of funds, 24 Regulations, sundry and other items, 9 Regulations).

35. Regulation 04.1 provides the Director with the authority to incur expenditures and make payments for any purpose regardless of whether provisions have been made in the approved budget. The Regulations are supplemented by a set of 100 Rules that detail the operations of ICIPE's finances, the last of which, Rule 114.2, provides the Director with authority to amend the Rules at his discretion in a manner consistent with the Regulations. As examples, the Team noted the following: Rule 104.2 and Regulation 09.4 give the Director the authority to vary budget allocations between any subsection of the budget, provided he keeps within budgetary limits; Rule 106.4 delegates to the Director the authority to administer any Trust Funds, Reserve or Special Accounts either in accordance with the existing Rules or otherwise as provided by the Director; and the Board has delegated to the Director the authority to provide any goods and services to Governments, UN organizations, national or international institutions, non-governmental organizations, universities, private foundations, industrial concerns on a reimbursable, reciprocal or other basis as may be approved by the Director (Rule 113.2 refers). The Staff Regulations and Rules document is to be considered by




KEY

M.P.F.S. = Mbita Point Field Station
M.P.I.S. = Mbita Point International School
D.I.G.C. = Duduville International Guest Centre
I.P.P.M. = Insect Pathology, and Pest Management
I.D.F. = Postdoctoral Research Fellowship
ARPPIS = African Regional Postgraduate Programme in Insect Science
FAMESA = Financial and Administrative Management of Research Projects in Eastern and Southern Africa

Figure 3: Current Organisation Chart of ICIPE

the Board in April 1983. The Team did note, however, that proposed Regulation 03.1 - the first regulation in the proposal states, inter alia, "interpretation (of the Regulations and Rules) shall rest with the Director, subject to the right of appeal for a final and binding decision from the Governing Board".

36. As regards the role of the Governing Board, SGI should be aware that the ICIPE Company (with its partly in-house membership and low quorum requirements) is the supreme authority on all activities of the Centre. It delegates the responsibility of managing the Centre to the Governing Board.

37. The Director's role, as recipient of the authorities delegated to him noted in (35) above, is to carry out the Board's mandate in a scientifically and fiscally responsible manner. In the early, formative years of the institute, the Director personally approved virtually every action of the organization. In the very difficult, later years, the lack of funding stability meant that the Director has had to hold very tight control over the institute's spending activities, particularly over the 1980-1981 crisis period. Thus, over the life of the institute, the management processes can be best described as highly centralized in the Office of the Director. In some areas, e.g. capital expenditures, the Director has in effect sole authority for approving expenditures on capital items. The Director appoints and establishes the terms of reference for the internal committees. The Team also notes that the Director can, as a full Governing Board member, also form a quorum of the Board with one other Board member.

38. The Head of the Administration Division reports to the Director. Given the comments on centralization noted above, it would appear that the individual divisions (Administration, Finance, and Communications and Training) have the responsibility for implementing the directives of the Chief Executive Officer - the Director. In the Finance Division, however, the Team notes the high degree of initiative shown by the departmental heads in streamlining the systems and procedures used in implementing the activities of ICIPE. Accounting procedures are being tightened; financial reporting on operations is being substantially upgraded. The two primary financial control mechanisms are regular comparisons of budget-vs-actual performance together with a payment requisition process that confirms funds availability in that budgetary category prior to authorization for expenditure.

39. The Research Functions: The planning cycle for the determination of research programmes follows the lines set out in Figure 2. Further details of the management of the research programmes are given in Chapters 3 and 4.

## SECTION 3: MANAGEMENT PROBLEMS AND LESSONS LEARNED FROM THE 1979-1981 CRISIS

40. A Financial Review of the Crisis: As background information, Table 1 below summarizes ICIPE's financial situation during the period 1979 through the end of 1982.

Table 1: INCOME AND EXPENDITURE SUMMARY 1979-1982

| | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|
| **Operating Grants** | | | | |
| . unrestricted | 1852 | 2427 | 2800 | 3204 |
| . restricted | 1264 | 2404 | 1832 | 2852 |
| . other income | 96 | 36 | 31 | 165 |
| | 3212 | 4867 | 4663 | 6201 |
| **Operating Costs** | | | | |
| . all programme | 5163 | 5973 | 4616 | 4767 |
| Operating Surplus/ (Deficit) | (1951) | (1106) | 47 | 1440 |
| **Capital Development** | | | | |
| . grants | 1750 | 1890 | 73 | 485 |
| . expenditure | 1512 | 1614 | 867 | 609 |
| Capital surplus (deficit) | 238 | 276 | (794) | (124) |
| Total surplus (deficit) | (1713) | (830) | (747) | 1316 |
| Cumulative surplus (deficit) 1750 | 37 | (793) | (1540) | (224) |

41. As can be seen from the above table, expenditures in 1979 and 1980 exceeded income by just over US$3 million in core operations and there was an offsetting surplus in capital grant income over expenditure of US$0.5 million for a net deficit in these 2 years alone of US$2.5 million. The problem was further exacerbated in 1981 when, although operating costs were cut substantially (23% approx.), capital expenditures exceeded income by approximately US$800,000, thereby further increasing the cumulative deficit. By end of 1981, ICIPE was in tenuous financial situation with a cumulative deficit since its inception in 1970 of just over US$1.5 million. Suppliers were not being paid, and the staff contributed, by way of withheld benefits, something in excess of US$1 million. Had any creditors in Nairobi or one of the staff instituted collection proceedings against ICIPE, the Company would have been placed into official receivership. Fortunately, this did not happen. How did this situation arise?

42. A Management Review of the Crisis suggests that there were a number of contributing factors: External factors over which ICIPE's management had little or no control but for which adequate contingency planning did not take place; and internal management factors that point to areas where improvements or changes are needed. The major external factor was, of course, the drop in income below budgeted levels in a number of years as shown in Table 2:

Table 2 - Budget-vs-Actual Income (US$000)

| | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|
| Approved (original) budget | 6510 | 6936 | 7961 | 5876 |
| Actual | 4962 | 6757 | 4736 | 6686 |
| Surplus (deficit) | (1548) | (179) | (3225) | 809 |

43. As can be seen from the table, in 1981 ICIPE overestimated income from donors by more than US$3 million. The Team believes that ICIPE's planning and budgeting processes should include alternative funding scenarios showing the effects of funding levels less than expected so that the Board can judge the priorities inherent in the alternative scenarios. Internally, however, the Team believes that a combination of a number of less-than-optimal decisions taken by the Board during this period, together with the lack of adequate management controls resulted in actions that were detrimental to ICIPE's welfare, both financially and from a scientific viewpoint. The Board, in 1980, agreed to a programme and budget for 1981 that included deficit financing of some US$1.1 million. For an institute such as ICIPE, which is dependent on donor grants that typically cannot be guaranteed by the donor governments for more than one year, such a decision can only lead to the difficulties that were, in fact, encountered. That the decision was taken at a time when world economies, in general, were in bad shape and deteriorating quickly suggests that the Board did not think through the likelihood of getting donors to subscribe additional "make-up" funds in the following years to eliminate the deficit. To assume that Bank overdraft facilities, creditors' "kindheartedness" or the staff would continue to fund ICIPE's deficit was, to say the least, injudicious. In fact, severe cuts in the Centre's operating budget had to be made. The Team notes that there were clear signals in 1979 that donor funding for international research was headed for tough times and that recipients should have at least prepared contingency budgets based on smaller funding allocations. It is in this context that the ICIPE Board decision to increase the budget and incur deficit financing must be viewed.

44. A second internal contributing factor was the lack of adequate financial information. The funding crisis was exacerbated by the fact that the Director could not get adequate information on commitments and forecast cash flows on a weekly or even monthly basis that were sufficiently accurate or timely. After long and detailed discussions with the staff, the Team has concluded that some of the financial data on operations, capital expenditures and inventory levels is not of a

standard that, even if provided quickly, would enable key management decisions to be made with certainty. Indeed, the data provided in the latest budget documents to be reviewed by the Board in April 1983 on items such as costs to finish stage I of the Mbita Point Field Station (para. 269) and the real effects of inflation on the likely amounts of "work" available from the budgeted funds are not reliable.

45. Figures provided to the Board on some issues have an unrealistic sense of numerical exactitude. The Team believes, for example, that the cost of completing the Mbita Point Field Station will be significantly higher than the figures suggested in the documents. A serious lack of data on the disposition of materials and equipment charged to MPFS, but not accounted for and the reliance by ICIPE staff on an outdated Bill of Quantities raise questions as to the value of work actually done at site (Chapter 8).

46. A third factor was the ineffectiveness of the Board in fulfilling its executive functions at a time when its support was really needed by the management.

47. These considerations make it clear that a substantial change in the management processes is required at ICIPE to ensure its sound financial condition and the future extension of its research.

48. The impact on morale of many staff during the crisis has been, predictably, severe. Staff who wished to remain at ICIPE had no option but to relinquish their rights (temporarily) to home leave and gratuity payments. Since all staff are paid in local currency, substantial devaluations of the Kenyan shilling, coupled with an ICIPE policy of no increases in salaries from 1 January 1979 to 1 January 1983 (although annual salary awards were continued), has seriously eroded salaries. A number of senior scientific staff showed the Team calculations indicating that, in current dollar terms, their basic salary had decreased by close to 30% since 1979. In constant dollar terms, the decrease would be closer to 45% - a very substantial drop indeed. At the Team's request the staff has conservatively calculated that the 55 most senior staff at ICIPE have, collectively, foregone more than US$2.5 million in salaries, benefits and income on these funds since 1979 that should rightfully have been awarded them if ICIPE had followed personnel policies which allowed for payment in overseas currencies, regular reviews of salary scales and reasonable protection against inflation.

49. Discussions with a sample of the staff suggest that the processes and procedures for performance evaluation, staff development, review of emoluments and grievance handling are inadequate and occasionally poorly executed, although recent improvement is noted. Given the sacrifices made by the staff, the Team believes that, de minimus, personnel evaluation procedures should be above reproach (para. 69).

50. In spite of the difficulties outlined above the Team was pleased to note the degree of loyalty to ICIPE and its overall objectives by the

majority of the staff. The Team was told on many occasions that staff morale had improved considerably since the appointment of the Deputy Director. There have been "costs" however, and the impact of the crisis on ICIPE's research, though varied, has been substantial, both in the short and the longer term. Impacts are discussed in detail in Chapters 3 - 8.

51. Decision-making and the Role of the Director: As agent of the Governing Board of ICIPE, the Director's role is of paramount importance to the successful running of the institute. Professor Odhiambo is the founding Director of ICIPE - indeed he has almost single-handedly brought ICIPE from an idea to its important place in the scientific community today. The necessary ingredients in such a success story include a degree of dedication, singleness of purpose, optimism and commitment to excellence. Professor Odhiambo shows all of these qualities and more, and enjoys the respect of the scientific community around the world. A concomitant feature of these qualities is the natural tendency to a very centralized decision-making management style. Typically, however, as organizations grow in size and complexity of purpose, there needs to be a gradual delegation of authority for decision-making and of responsibility for results away from the Founder-Director position into the hands of his staff. Throughout history this necessary shift in the managerial style of the key entrepreneual figure in the organization has proved extremely difficult and costly. Many organizations fail at this critical phase. The Team believes that ICIPE and its Director are in this transition phase but are firmly convinced that the outcome will be positive - a stronger ICIPE will emerge with a clearly defined mandate, structure, and definitive roles for each level of the organization.

52. The Team has observed occasions where the Board has not had adequate financial and other background information. For example, the documents now (April 1983) being prepared for the April 1983 Board meeting should include detailed discussion on the following items:

(a) the substantial shift in core-restricted funding which now represents, for the first time, more than half of the Centre's total operating grants. The discussions should focus inter alia on how much core support funding is included in the restricted core grants (USAID, for example, does not contribute to the core support) and what is the effect on the research support budgets.

(b) an explanation of the relative shifts in funding of the components of the operating budget: the very substantial increase in Communication and Training (49% in 1983 and a further 7% in 1984) while the core research programme remains at the 1981 level; some explanation of the 170% increase in costs at Mbita Point - since many costs are simply transferred from Nairobi; an explanation of the 37% increase in the costs of the Board and Director's Office and 108% increase for the Board in 1983 and the added 9% increase in 1984.

(c) alternative budget scenarios that recognize different (lower) levels of funding along with a discussion of priorities so that the Board can guide the Director in selecting the areas to be cut, if that becomes necessary, and

(d) how the special projects fit into ICIPE's mandate, the costs and expected revenues.

53. Nevertheless, some encouraging developments were noted; for example, PDU staff are preparing papers on the effects of a highly likely US$500,000 decrease in UNDP Restricted Core funding for 1983. This will be helpful, though it does not meet the needs outlined in (c) above, since this is an almost-certain-to-be-reduced grant. Further analysis and sensitivity studies are required beyond what is already almost certain.

54. The lack of adequate strategic planning in the past has meant that the institute's mandate, programme decisions and budgets have been largely formulated in terms of what is desirable rather than on what is financially likely. Strategic planning has been inward looking, focused on what the Centre should do or become at a time when the really central issues were external, e.g. how much support would donors provide.

## SECTION 4: RECOMMENDATIONS FOR CHANGE

### Introduction

55. The Team believes that ICIPE's performance can be improved by making changes in each of the following areas - strategic planning, policy formulation and review, management control processes and capital budgeting. The changes, discussed in order, will require some slight changes in the organizational structure as outlined in paragraph 74 below. Three distinct themes have emerged in the earlier parts of this chapter, which can be summarized as:

(a) a necessity for the Board to have a greater capacity for and role in reviewing key decisions;

(b) a shift in the Director's centralized management style - with a concomitant upgrading of the capabilities of some key staff and improvement of control systems;

(c) much greater participation of senior scientists in planning so that there is a strong element of "bottom-up" as well as "top-down" planning in the whole process.

56. The Team is confident that the recommendations that follow can be effected with a minimum dislocation to ICIPE's operations and with little, if any, adverse effect on existing staff - a potentially divisive problem in many cases of management restructuring.

Strategic Planning

57. Planning has already been identified as a key factor for the continued success of ICIPE. The Team recommends that the Board should receive and review, every year, a document that discusses ICIPE's research programme in the light of an agreed strategic plan. It should review and assess the institute's comparative advantage in research, its strengths and weaknesses in both terms of scientific disciplines and physical/financial constraints. It should discuss alternative funding scenarios and the priorities for expansion or contraction of the research programme. It should assess the risk (or likelihood) of various funding levels and analyse and discuss trends in donor support. The ICIPE Strategic Plan should be the key Board document in the planning cycle and, the Team suggests that the relevant sections of this first Triennial Review Report be used as a framework for the next planning cycle. In the intervening two annual cycles between Triennial Reviews, this report could serve as a model for the types of analyses to be undertaken. In order to ensure that the strategic plan remains central to ICIPE's operations, the Team recommends that the Board should adopt a policy that no diversion from it will be permitted without either the permission of the full Governing Board at its Annual Meeting or by the unanimous approval of the Executive Committee. The strategic plan should also cover all special projects and the same approval/revision policy be applied. The Director will translate the approved strategic plan into a programme and budget document that embodies the decisions taken by the Board. The Team has commented on the deficiencies of the present programme and budget papers (including supporting documentation) but has concluded that ICIPE can upgrade its papers to a level that will enable the Board adequately to assess the Programme and Budget. Given the central importance of the strategic plan the Board may want to consider a planning cycle that involves the full Board adopting the strategic plan in April of the year prior to the plan year, and the Executive Committee reviewing and approving the Programme and Budget in October of the same prior year (i.e. 2 months before the start of the plan year).

Policy Formulation and Review

58. The Governing Board, as well as taking an active role in the development of the strategic plan, must also retain control over shifts in financial, budgetary and staff policies suggested by the Director. The Board should now review and substantially amend the Financial Regulations and Rules and, to a lesser extent, the Staff Regulations and Rules so that the Board, the Executive Committee or a quorum thereof (depending on the substance of the rules), would approve changes in the Regulations and Rules. The Team recommends that at least half the Board members be required to constitute a quorum.

59. The placing of authority for changes with the Board is necessary for a fully functioning, actively involved Board. There will be little need to change the Staff Regulations and Rules except in respect of Regulation

03.1 as noted earlier; the papers have been well prepared and follow normally accepted practice. In order that the Board can provide the Director with experienced financial and managerial guidance the Team recommends that the composition of the Board members be modified to include, within the same 16 members, additional professional skills in finance and management. As with all Boards, having one or two specialists in these fields is not sufficient. There needs to be a "critical mass" of these skills which typically is about one third to one quarter of the total membership. The Director and the Board have already started moves in this direction in response to the needs that they too have identified. The Team commends this, and recommends that as Board retirements occur each year the Nominating Committee set, as its goal, a target of 4 or 5 members with the above skills. The Team recommends that the Nominating Committee should consist of 3 members of the Board, as at present, but should not include the Director, who, inter alia, is charged with the responsibility for suggesting names to the Committee. In the light of the more extensive involvement recommended for the Board, it may wish to convene an Executive Committee more regularly than twice per year as at present. The Team recommends that the Programme and Executive Committee be constituted as at present.

60. The role of the ICIPE Company needs to be clarified. In extremis the Company could theoretically over-ride any decisions of the Governing Board, and the Team recommends that ICIPE's legal advisers and Company Secretary prepare amendments to the Articles that would provide for Governing Board members to be Company members (as was the case originally), and to increase the Company quorum from 3, to "ten of whom at least eight must be members of the Governing Board, excluding ICIPE employees or designees thereof".

61. The ICIPE Foundation was established under Swedish Law in December 1976. The Foundation was expected to be a fund-raising body but was not in a position to do this as the Centre grew. The Foundation has supported ICIPE in another way, namely by providing strong intellectual help. Now that SCI has been established to help in funding the Centre, the role of the Foundation can be focused even more effectively on the area for which it is admirably fitted. The Board should review whether, in the light of these facts, the Foundation should still control 4 Board seats, a proportion that seems out of line with its role. The Team recommends a phased reduction to 2 Board seats.

62. The Director will continue to propose to the Board new policies in response to the needs of the Centre. As a full voting member of the Governing Board, he will continue to have the key role in the development of policy.

Management Control

63. The Governing Board has delegated the implementation of its policies to the Director. In doing so, it should stipulate the type and frequency of information that it requires to be assured that its policies are being

carried out appropriately. The Team recommends that this information be provided to the Executive Committee of the Board on a quarterly basis and should consist inter alia of a summary of key budget vs actual indicators such as income, total operating expenses, capital expenditures and senior staff movement. Given the geographic dispersal of Board members, this information should be telexed to recipients.

64. The Director has primary responsibility for implementing the Board's mandate. As such he will require a set of management information reports on a regular basis varying from weekly (for cash flow forecasts) to monthly (budget-vs-actual performance by major budget category, etc. The new Financial Manager has the necessary improvements already in train, and the Team believes these reports will be adequate.

65. The Team recommends the purchase of a minicomputer, not for the Centre's accounts, which can be adequately handled manually at present, but for accurate analysis of cash flows and financial planning (para. 209 etc.).

66. A key role for the Director is donor relations, and in 1982, this and other overseas commitments kept him away from the office a total of 80 out of 220 working days. It is essential therefore that adequate provision be made for the continued smooth running of ICIPE during the Director's absence. There are a number of pressures that a national Director of an international organization inevitably faces and in similar situations in other institutes, it has often been found useful to employ non-national deputies - as has been done in the case of the Financial Manager and the Deputy Director.

67. The Team recommends the appointment of Assistant Director - Administration to fill that vacant post now occupied by the Acting Administrative Manager. ICIPE will need to review its salary scales carefully so that it can recruit a suitably qualified person. It is likely that such candidates will only be attracted by a salary competitive in international terms. Good administrative and finance managers typically save the institute more money through elimination of waste, fraud, irregularities, non-essential expenditures, etc. than the cost of their salaries and benefits every year. With the appointment of a high-calibre Assistant Director - Administration, the Team recommends that the Director delegate the hiring and termination of all staff, up to the P4 level (Executive Professional Staff) to the Assistant Director - Administration, and review other areas that could be delegated.

68. The Deputy Director is the next in line to the Director (Figure 3) and acts, as at present, for the Director in his absence. He has overall responsibility for the quality of ICIPE's research. The Team recommends that the Manager of the Mbita Point Field Station, the Head of Communication and Training and the Head of Computer Services and Biostatistics report to the Deputy Director. The Mbita Point Field Station Manager will also be responsible to the Assistant Director - Administration for following the institute's policies with respect to personnel and administrative matters, and to the Manager - Finance for following the appropriate financial procedures.

69. The series of management papers prepared by ICIPE, some 21 in all, dating from July 1975 to the latest, on Patent Policies, issued March 23, 1983, are of good quality and form an essential part of defining ICIPE's operating policies. The Team recommends reviewing and revising them as necessary in the light of recommendations in this report. The Team recommends that ICIPE refine its personnel policies and prepare additional papers in such areas as Staff Hiring Policies, Staff Performance Review Procedures, Staff Grievance Handling Procedures, Staff Records/Security Policy (i.e. who is entitled to add information to a staff member's file, who has access to the file, and/or which parts of it, the staff member's right of access and appeal, etc.) that could expand on the Staff Regulations and Rules document and help clarify much of the staff confusion and concern about ICIPE's personnel administration practices. Promotional and other personnel procedures must not only be fair but must be seen to be fair.

Capital Budgeting

70. At ICIPE capital budgeting has proved to be a difficult problem as noted earlier. Accurate cost estimates for construction in developing countries has always proved difficult and a concentrated effort by ICIPE will be required to get realistic data for Board decisions. The Team recommends that the new Assistant Director - Administration and the Manager/Assistant Director - Finance together institute a series of control procedures over stores in headquarters and field locations, goods in transit, work in progress and building materials unit price quotations on a current basis. The Team also recommends that PDU carefully review all cost estimates to satisfy itself that inflationary factors have been fully taken into account in developing cost estimates for future years' budgets. Budgets at ICIPE are presented in neither constant nor current dollar terms - but in a mixture of both - which makes year-to-year analysis and comparison somewhat difficult. The Team recommends that ICIPE's budgeting presentational formats should be modelled after those of the CGIAR-sponsored centres. Donors, many of whom are also donors to ICIPE, are accustomed to the CGIAR formats, and familiarity, in this instance, can instil confidence in the members. This recommendation applies equally to the presentation of operating budgets.

## Role of the Programme Committee

71. The Programme Committee consists of members of the Board but when the changes in Board structure recommended in para. 59 are instituted, the choice of members with scientific expertise may be limited. Consequently, the Team recommends that the Programme Committee be supplemented by inviting scientists with special expertise in particular parts of the ICIPE research programme. This may necessitate a reduction in the number of Board members on the committee.

## Role of Senior Scientists

72. In any scientific organization, management exists to support the scientific staff. However, the Team has noted a tendency in the Centre for the administration to have assumed too much control over the policy and programme in areas where the input from senior scientists should be paramount. The Team recommends that the Heads of Research Programmes, Research Units and Technical and support units together with the Heads of Administration and Finance meet regularly (say monthly) under the chairmanship of the Deputy Director, for discussions on the research policy and programmes and for making recommendations to the Director. The Team recommends that the minutes of these discussions be accessible to all staff.

## Role of the SGI

73. The Team concurs with the statement of the ICIPE Governing Board in relation to SGI.

"The establishment of the SGI provides an opportunity for donor members collectively:

(a) to review, advise, and concur in ICIPE policies, programmes, and goals;

(b) to review and approve the proposed ICIPE annual budget, and to ensure that the scale of ICIPE's proposals is in line with the anticipated SGI support;

(c) to monitor the ICIPE programme and budget performance."

## A Recommended Structure for ICIPE

The Team's recommendations for an organizational structure for ICIPE are set out in Figure 4.

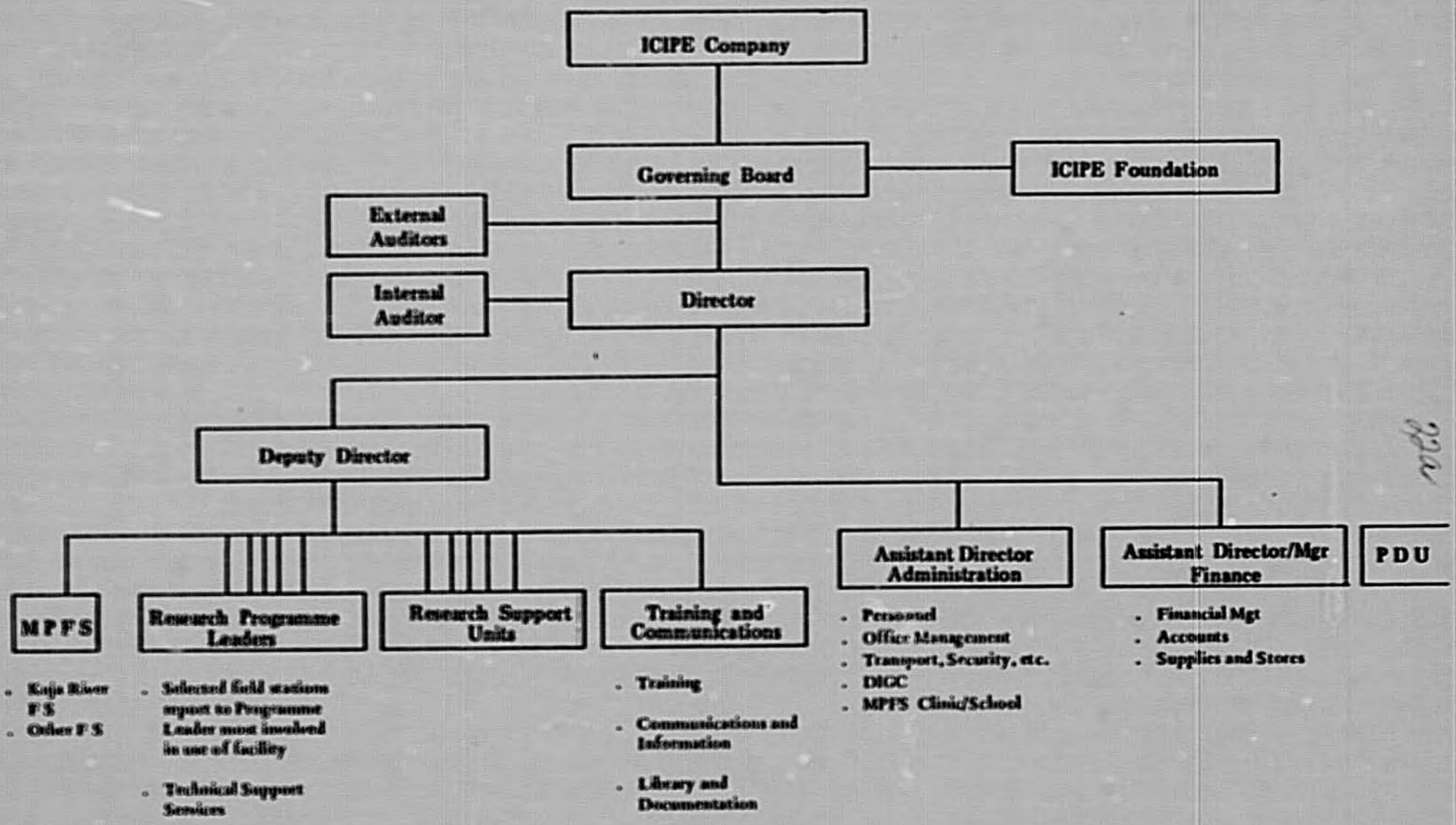



Figure 4: Proposed Organizational Structure for ICIPE

# CHAPTER 3:

## RESEARCH PROGRAMMES

### SECTION 1: CROP BORERS

#### Background and Objectives

74. The Crop Borers Research Programme at Mbita Point Field Station (MPFS) was established in late 1979, the primary objective being to develop environmentally safe and economically feasible integrated pest management (IPM) practices for crop borers of major food crops in Africa. The 1983 budget is US$427,700 (Annex 4). Target species of borers being investigated are:

(a) sorghum shootfly, *Atherigona soccata*;
(b) maize and sorghum stem borers, *Chilo partellus*, *Busseola fusca*, *Sesamia calamistis*, *Eldana saccharina*;
(c) rice stem borer, *Maliarpha separatella*;
(d) cowpea pod borer, *Maruca testulalis*.

In addition, information is being collected on the aphid, *Aphis craccivora* on cowpeas.

#### Description of Current Work

75. Research is being conducted in the following areas:
(a) biological and ecological studies on the target pests;
(b) physiology and behaviour of the target pests;
(c) biological control agents;
(c) crop loss assessment for sorghum, maize, cowpeas and rice to determine economic thresholds;
(d) intercropping effects on pest population and crop yields;
(e) screening for resistance in local varieties and confirmation of resistance levels in lines from international agricultural centres and national programmes; and
(f) genetics of crop resistance to insect pests.

76. Given the difficulties encountered, isolation and lack of adequate material and physical resources, good progress has been made in the stem-borer programme at MPTS since 1979. The strengths are reflected in the progress made on finding moderate levels of resistance to the maize and sorghum stem borers (the major crop pests of Africa), and intercropping studies. Both of these areas may have far-reaching benefits to the small farmer systems of Africa. The output of the programme is summarized in paragraphs 78 -82.

77 Sorghum shootfly population levels reach a peak at the end of the rainy season. Various alternative host plants have been recorded. A number of shootfly-resistant lines, mainly from ICRISAT, have been identified and confirmed. The line IS2146 possesses strong antibiosis for sorghum shootfly. The local variety Serena was found to be susceptible to shootfly attack but still yields well. Crosses have been made and the resistance recovered. An oviposition-deterrent pheromone, which deters repeated oviposition by the shootfly, has been detected and cooperative studies are under-way with the Chemistry and Bioassay Research Unit to identify and synthesize this material.

78. Studies on sorghum and maize stem borers have confirmed that of the four stem borer species attacking maize and sorghum in Kenya (Chilo partellus, Busseola fusca, Sesamia calamistis, and Eldana saccharina), C. partellus is the most abundant (80%) species infesting maize and sorghum, especially in the lower-altitude regions of Kenya. In the cooler and higher altitudes, B. fusca is found to be more important and C. partellus and C. orichalcociliellus in the low humid coastal areas. A large number of alternative host plants have been found. Many of these are new records, i.e. Cenchrus ciliaris and Sporobolus marginatus for C. partellus; Leptous repens for Chilo, Busseola, Eldana, and Sesamia. Diapause studies have confirmed that larvae of C. partellus and B. fusca remained in diapause for several months in the stalks of sorghum and maize and wild hosts. Because of this, destruction of sorghum and maize stalks in the field and removal of wild hosts and volunteer cereal hosts could comprise a desirable management approach. Progress has been made on collecting and identifying major parasites and predators on the stem borer complex. Good progress is being made in the host plant resistance studies. Basic screening has found that a number of sorghum and maize lines carry some resistance to both C. partellus and B. fusca. Most of the sorghum lines are also resistant to shootfly. Maize inbred lines found resistant to stem borers are local inbred lines D and G and several CIMMYT lines. Diallel analysis of sorghum resistance to stem borers indicated that the resistance is polygenically inherited.

79. Results on rice have been obtained principally by a postdoctoral fellow who has concentrated on survey of pests, loss assessment and intercropping. Survey for two years has shown that rainfed rice sustains less damage to stem borers than irrigated rice. Species composition varied with the rice ecosystem, with M. separatella composing 80% of the borer population in irrigated rice and 25% in upland rice. Upland rice

grown in sorghum and/or maize areas was found to be heavily infested with C. partellus and S. calamistis. In flooded swamp rice only M. separatella was found. In loss studies, M. separatella did not cause lodging and principal damage was unfilled grains. Average loss was approximately 10%. The use of nitrogen fertilizer increased borer infestation which increased levels of dead heart and percentage of unfilled grains.

80. The cooperative programme with IITA on cowpeas to Maruca testulalis is making good progress. Mating behaviour studies have been made and pheromone traps with newly emerged female moths have been very effective in trapping male moths in the field. Studies are under way with the Chemistry and Bioassay Research Unit to identify and synthesize the sex pheromone. Studies on plant/host relation and yield loss assessments have shown that foliage and shoot damage can be compensated for in the cowpea. Good progress in cooperation with IITA scientists is being made to examine resistant cultivars of cowpea. Several lines have been found to have moderate levels of resistance to M. testulalis at Mbita Point Field Station. Crosses have been made and the inheritance of resistance is being studied.

81. Intercropping experiments have involved eight possible combinations of monocrops, dicrops and tricrops of maize, sorghum, and cowpea. Results show that pest colonization processes were interfered with by the cowpea/cereal (maize and sorghum) combinations, causing delayed stem-borer incidence on the maize and sorghum. Maize and sorghum dicrop is at a disadvantage in land use and productivity and contributes to stem-borer infestation. Intercropping of upland rice with millet traps the rice borers in the millet which is preferred for oviposition by moths.

Management

82. The Crop Borers Research Programme has a total of 6 scientists, 2 postdoctoral research fellows, a scientific officer and 12 technical staff. The Acting Programme Leader is a plant breeder and not an entomologist and for this reason cannot provide leadership in the ecology and bionomics of the Crop Borers Programme. The programme is organized around distinct project areas. Research overlaps with those of Bases of Plant Resistance to Insect Attack Programme and the Insect Pathology and Pest Management (IPPM) programme (para. 117).

83. Competence of technical help and career development through in-house training seems to be adequate. The programme leader interacts well with the station and field manager.

Strengths

84. In spite of difficulties at Mbita Point Field Station the overall quality of the research is good. Cooperation with IITA and ICRISAT has been good at the international level, but closer cooperation should be established with CIMMYT and special efforts made to cooperate with borer

programmes in the U.S. Cooperation with national programmes at Kitale, Kisii, and Ahero in Kenya are evident, but closer cooperative efforts should be established, especially in the plant breeding area. Cooperation with local farmers is excellent with several off-station experiments in progress.

Limitations

85. The programme has suffered from morale and financial problems among the scientists as a result of ICIPE's financial crisis, Kenya inflation and isolation of Mbita Point Field Station. It lacks strong leadership. Effort should be made to recruit a highly qualified programme leader as soon as possible. Inadequate field plot area at Mbita Point Field Station is a major limiting factor. Transportation is a major limiting factor and needs to be associated with the programme. Space is inadequate but will be resolved with completion of laboratories, as will difficulties with electricity and services. Laboratory and field equipment is inadequate, and funds for essential equipment have been severely limited.

Future Plans

86. Current plans are to continue with the existing commodity programme areas. It was indicated that cooperation would be initiated with the Kenya Ministry of Agriculture at Kakamega. The goal will continue to be to deliver environmentally safe and economically feasible pest management practices to small farmers and to enhance relationships with other international and national research centres and extension services.

Potential Users of New Technology and Knowledge

87. Small farmers of African countries, national research and extension services, and international centres will be primary users. The programme, although only four years old has produced a significant amount of basic and ecological knowledge on the African borer complex, and the intercropping and screening of local varieties for resistance has provided some technology that will help small farm systems.

Recommendations

88. (a) Appoint an effective Programme Leader as soon as possible to provide overall, dynamic leadership.

(b) Phase out rice work in this programme when the present postdoctoral fellow completes his project and concentrate resources on borers in sorghum, maize and cowpea.

(c) Because there is considerable overlap between the Bases of Plant Resistance and the screening and genetics of resistance research on crop borers, consider consolidating this effort under the broader umbrella of Plant Resistance to Insects (Figure 5: Suggested Organizational Structure).

(d) Limit plant breeding work to study of genetics of resistance. International and national programmes should concentrate on breeding work. Mbita Point Field Station Crop Borers Programme should evaluate crosses and other materials to assess local levels of resistance.

(e) Transfer parasite work to a new section on Biological Control (Figure 5).

(f) Consolidate insect rearing into a centralized unit with the present leader in charge of research on rearing and provision of insects (Figure 5).

(g) An additional land is needed adjacent to the Mbita Point Field Station to expand field plot and field insectary areas (cages) develop field plots at locations a considerable distance from MPFS but only when resources and adequate transport become available. Transport should be assigned to the programme.

(h) Give scientists in the Crop Borers Programme greater opportunity to attend international meetings to discuss results of their research and visit with colleagues. Short-term training elsewhere should be supported.

## SECTION 2: BASES OF PLANT RESISTANCE TO INSECTS

### Background

89. The Bases of Plant Resistance to Insect Attack (BPRIA) research programme was established at ICIPE in 1979. It is at Mbita Point. The budget for 1983 is US$377,000 (Annex 4).

### Objectives

90. The primary goal of this programme is to ensure that plant breeders at national and international research centres have basic information for breeding resistant cultivars. These resistant varieties will constitute the foundation upon which Integrated Pest Management (IPM) technology can be built. Overall objectives are:

(a) Develop or improve resistance screening methodology for maize, sorghum and cowpea to target insect species for international and national breeding programmes.

(b) Identify new sources of resistance to target insect species in maize, sorghum and cowpea.

(c) Classify and identify the biophysical and biochemical mechanism of maize, sorghum and cowpea resistance to insects, and where possible, identify and synthesize in cooperation with the Chemistry Unit the allelochemicals involved for potential use in controlling insect pests.

(d) Determine the genetic basis of resistance for use by plant breeders.

(e) Train African scientists in plant-resistance methodology.

(f) Expand interchange of germplasm and methodology through formal and informal cooperative relationships with national, international and the USA Cooperative Research Support research programmes (i.e. INTSORMIL).

Description of Current Work

91. One hundred local maize lines and 460 families of maize from CIMMYT and local Kenyan lines have been screened for resistance. From these, 19 tolerant and several sensitive (very susceptible) stem-borer lines were identified. Twelve lines showing medium resistance (tolerance) to Chilo partellus and good agronomic characteristics were planted, and the mechanisms of resistance were studied. These studies suggested five levels of relationships affecting plant colonization, larval survival and damage level.

92. Sorghum collections from ICRISAT sorghum lines previously identified as resistant to Chilo infestations under field conditions in India were evaluated. Four had moderate levels of resistance to stem-borer. Lines from Texas with resistance to greenbug (Schizoaphis graminum) and/or sorghum midge (Contarinia sorghicola) were found to be drought resistant. Several produced high yields even though borer infestation ranged from 18% to 45%. Tolerance appeared to be the primary resistance mechanism. Some of these lines were sent to the FAO Sorghus Improvement Programme.

93. Resistant cowpea lines of IITA origin were studied to determine the mechanism of resistance to the legume pod borer Maruca testulalis. Work is being conducted on the oviposition behaviour of moths and on the biophysical and chemical factors of resistant lines that influence Maruca testulalis behaviour and physiology.

94. Studies with the cowpea aphid, Aphis craccivora, have revealed that cowpea-resistant lines have less total sugars and more phenols and flavonoids than susceptible lines. Bioassays and sensory physiology techniques are being developed with the Chemistry and Sensory Physiology Units to study feeding deterrents/stimulants in resistant and susceptible lines. Experiments are in progress in cooperation with the Histology and Fine Structure Research Unit to determine the tissues of the cowpea plant in which aphids feed.

95. Mass-rearing techniques have been developed for three species of stem-borers attacking maize, sorghum and cowpeas. This is important to the success of the NPRIA project and to the success of the NPRIA project and to the success of the closely related crop borers programme.

96. One postdoctoral research fellow and a postgraduate scholar are receiving specialized training in the methodology.

97. Morphological and cytological differences between biotypes of the brown planthopper Nilaparvata lugens have been differentiated in cooperative studies with IRRI.

Management

98. The current BPRIA research team consists of an Acting Programme Leader, one reseach scientist and one scientific officer at Mbita Point Field Station and one senior scientist stationed at IRRI, the Philippines. There are several technical staff in this programme at MPFS.

99. The Acting Programme Leader's professional expertise lies in insect rearing. A permanent Programme Leader is currently being recruited. Currently the Programme is suffering from lack of dynamic leadership.

100. The scientific officer is involved in the Ph.D. ARPPIS programme. Technicians appear to be well trained and adequate in numbers and have periodic opportunities for in-service training at ICIPE. One student is completing training and plans to return to his country.

Strengths

101. The programme is only one of its kind in continental Africa. Cooperation has been established with IITA at Ibadan, Nigeria (cooperative cowpea programme); ICRISAT at Hyderabad, India, CIMMYT at El Batan, Mexico; the Kenya Agricultural Research Institute; the FAO/Kenya Sorghum Regional Programme; and the USAID CRSP on Sorghum (Title 12). Of special note is the outstanding cooperative programme with IRRI at Los Banos, Philippines on brown planthopper on rice. ICIPE has a senior scientist stationed at IRRI who has made major contributions on biotypes on/and chemical factors in rice and in Neem affecting the brown planthopper. These international institutions have supplied a large amount of germplasm to the project for confirmation of resistance under Kenya conditions for targeted pest species and for possible resistance against other local insects not previously studied.

102. The programme has been reasonably productive in number of published papers and manuscripts since its inception in 1979. Quality of research has been good.

103. The programme is supported by the Chemistry and Bioassay, Sensory Physiology, Histology and Fine Structure Research Units and interacts with the Crop Borers and IPM programmes.

Limitations

104. (a) Lack of dynamic Programme Leader who can provide overall direction to the total programme

(b) Overlap with the crop borers programme in the area of screening for resistance and genetic studies.

(c) Limitation in resources, space, and equipment created by recent financial difficulties.

(d) Plot land and insectary space. This problem will become greater with the potential addition of a number of students through the ARPPIS programme.

(e) Adequate transport - a major problem. Transport should be assigned to programme area rather than being highly centralized and controlled.

(f) The need of travel funds for scientists to attend international meetings and workshops.

Future Plans

105. The programme is planned to continue with current goals and objectives. Scientists and students have a well-developed work plan to 1985. Active recruiting for a Programme Leader is under way and this position should be filled this year.

Potential Users of New Knowledge and New Technology

106. International centres, national research programmes of developing and developed countries, extension services, farmers and researchers are potential users of the results. Considerable success has already been obtained from this programme since 1979. Prognosis for continued success is good.

Recommendations

107. (a) Cooperation with the International centres and programmes should continue to be strengthened, especially with IITA, ICRISAT and CIMMYT. Opportunities for exchange and visits of scientific personnel should be encouraged.

(b) Cooperation should be instituted as soon as possible with the Alb Sorghum/Millet CRSP. This programme might be willing to station a scientist at Mbita Point Field Station. Close ties should be established with related programmes in the U.S. for germplasm and information exchange.

(c) Travel funds should be made available for scientists to travel abroad periodically for short-term study, meetings, etc. The opportunity to travel to the Host Plant Resistance Workshop held every two years is extremely important as it is a very important workshop for all workers in plant resistance, especially for entomologists, plant breeders, and chemists.

(d) The rearing should be transferred to a centralized operation with its own Programme Leader covering research in mass rearing and supply of insects for all programme areas.

(e) All the research associated with breeding (involving 2 scientists) should be merged with the breeding programme of the present crop borer research programme (Figure 5).

(f) The name of the merged project should be Plant Resistance to Insect Attack (PRIA).

(g) Additional plot and insectary area should be provided at Mbita Point Field Station. Additional laboratory space and especially equipment should be made available as soon as possible in order to improve the quality of research.

## SECTION 3: INSECT PATHOLOGY AND PEST MANAGEMENT

### Background

108. The programme, started only in April 1982, comprises 2 senior staff, 3 other scientific staff and 3 technicians at Mbita Point Field Station. The budget in 1983 is US$220,000 (Annex 4).

### Objectives

109. The aim is to develop integrated control methods appropriate for the small farmer, characteristic of much of tropical Africa. The methods will be ones that involve little or no monetary inputs and will include biological controls, cultural controls, resistant or tolerant crop varieties and limited use of insecticides. The methods used will be designed to be sufficiently robust to ensure an adequate yield, even when the crop is exposed to the full pest complex.

110. Major emphasis will be placed on natural enemies, of which only some pathogens have been examined in any detail. The work is directed towards stem-borers on maize and sorghum, and the pod-borer *Maruca testulalis* on cowpea. The insect pathologists are also involved with pathogens of human and livestock pests.

111. The baseline study is on monitoring the chosen pests and their natural enemies at MPFS on experimental plots of mono-crops and mixed crops. Other studies are being made in farmers' fields. Pathogens, parasites and predators are being identified and studies on the effects of natural enemies on the pests and on yield will be conducted in field cage experiments. Such experiments will be developed further in open field monocrop and mixed crop conditions. This is a valuable approach towards developing pest management practices in small farmer mixed cropping systems. Other aspects include an examination of aestivation in the borer *Busseola fusca*, and the use of pheromones for pest monitoring.

### Management and Strengths

112. The field programme is well managed in so far as can be judged from its limited duration. However, the Programme Leader is about to leave ICIPE. There is good interaction with the Crop Borers Research Programme.

Limitations

113. As pointed out by the Programme Leader, work has been confined to certain pests, although others can be very important, notably armyworms, thrips, and aphids. These, however, can be included later in the programme. Whilst a useful start has been made in finding and identifying pathogens, MPFS is not yet equipped for the necessary laboratory studies, and we are uncertain whether sophisticated facilities could be justified at MPFS in order to undertake detailed work on pathogens. Pathogens are less likely to be of importance against borers, as distinct from their possible role against pests such as armyworms and aphids.

114. Pest management is a complex subject and it is doubtful whether the present team can accomplish very much unless their work is restructured. In this context, the Team does not understand the rationale of the title of the programme for the following reasons:

(a) It is illogical to equate one specialized (and perhaps relatively unimportant) pest control component with overall pest management, a multifaceted subject, which epitomizes the end result of research on several components and of their practical integration.

(b) The pathology component seemingly extends over all the pests, e.g. tsetse and ticks, whereas the pest management programme seems at present to be focused only on crop pests.

(c) Pest management in the form of integrated pest management (IPM) is the goal of all the pest programmes, not just the crop pest programme. Integrated pest management is already an exciting prospect in the livestock ticks programme.

(d) At present the IPM approach to crop pest control highlights crop borers, yet this subject is covered by no less than three separate programmes, namely Crop Borers, Bases of Plant Resistance to Insect Attack, and Insect Pathology and Pest Management. Aspects of host-plant resistance are already included in two of these separate programmes, and will no doubt be included in the third. The Crop Borers and IPM programmes are separately studying effects of intercropping on pest incidence and control. This structure will not facilitate the necessary coordination of effort required for IPM of crop pests.

Potential Users of New Knowledge and Technology

115. Extension workers and subsistence farmers in Africa and possibly small farm systems in other parts of the world will be the primary users.

Recommendations

116. The IPM approach to crop pests in small farmer conditions demands appropriately detailed understanding of individual components of control, probably including chemicals and their use against particular pests and pest complexes on the different crops.

a) The team recommends a re-alignment of all relevant crop-based programmes, into a consolidated Crop Pest Programme with a Crop Pest Programme Leader and 4 project leaders.

(b) Figure 5 gives the Team's proposed structure. The most important feature would be the employment of a dynamic Programme Leader for the Crop Pest Research Programme. This individual should be an expert in integrated pest management (IPM) and be able to appreciate a range of problems as well as to provide overall leadership. He would coordinate and activate the project in Plant Resistance to Insect Attack, Insect Rearing, Bionomics, Ecology and Biological Control.

117. A brief description of the proposed project areas follows:

(a) Plant Resistance to Insect Attack. This group would be responsible for all aspects of plant resistance including the screening and plant genetics work presently being conducted in the Crop Borers Research Programme.

(b) Insect Rearing: This would be a new project area. The current Acting Programme Leader for Bases of Plant Resistance to Insect Attack holds outstanding credentials for the position of Project Leader. This project conducts original research into rearing of target insects and servicing the other projects with insects. All insect rearing in Crop Borers, IPM and BPRIA would be centred in this project.

(c) Bionomics and Applied Ecology of Crop Pests: This would focus on bionomics, ecology, cultural control, chemical controls, pheromones and trapping, intercropping, etc.

(d) Biological Control: This project area would be responsible for all parasite and predator research as well as insect pathogens. A Project Leader with expertise in biological control should be recruited in the near future.

118. These four projects under the leadership of the Programme Leader would be responsible for assembling output technology from their projects

into integrated pilot research programmes at national experiment stations or cooperating farmers' fields. Extension and research professionals from the Kenya Ministry of Agriculture and possibly other neighbouring African countries should be involved with the programme at this stage so they will be knowledgeable about the opportunities to extend the information or develop it further. ICIPE's role in the development should end at this point.

119. The Team sees the proposed organization as providing a viable framework for attaining IPM goals, the importance of which cannot be overestimated in terms of contribution of insect pest control to the improvement of small farmer crop production.

Recommendations

(a) The Programme Leader should be assigned a specific budget to carry out the research objectives of his group and should be directly accountable to the Deputy Director for research for his programme.

(b) The Programme Leader should have a major role in recommendations and decisions on personnel in his programme, concerning travel, leave, promotion, merit increases, and training (para. 56).

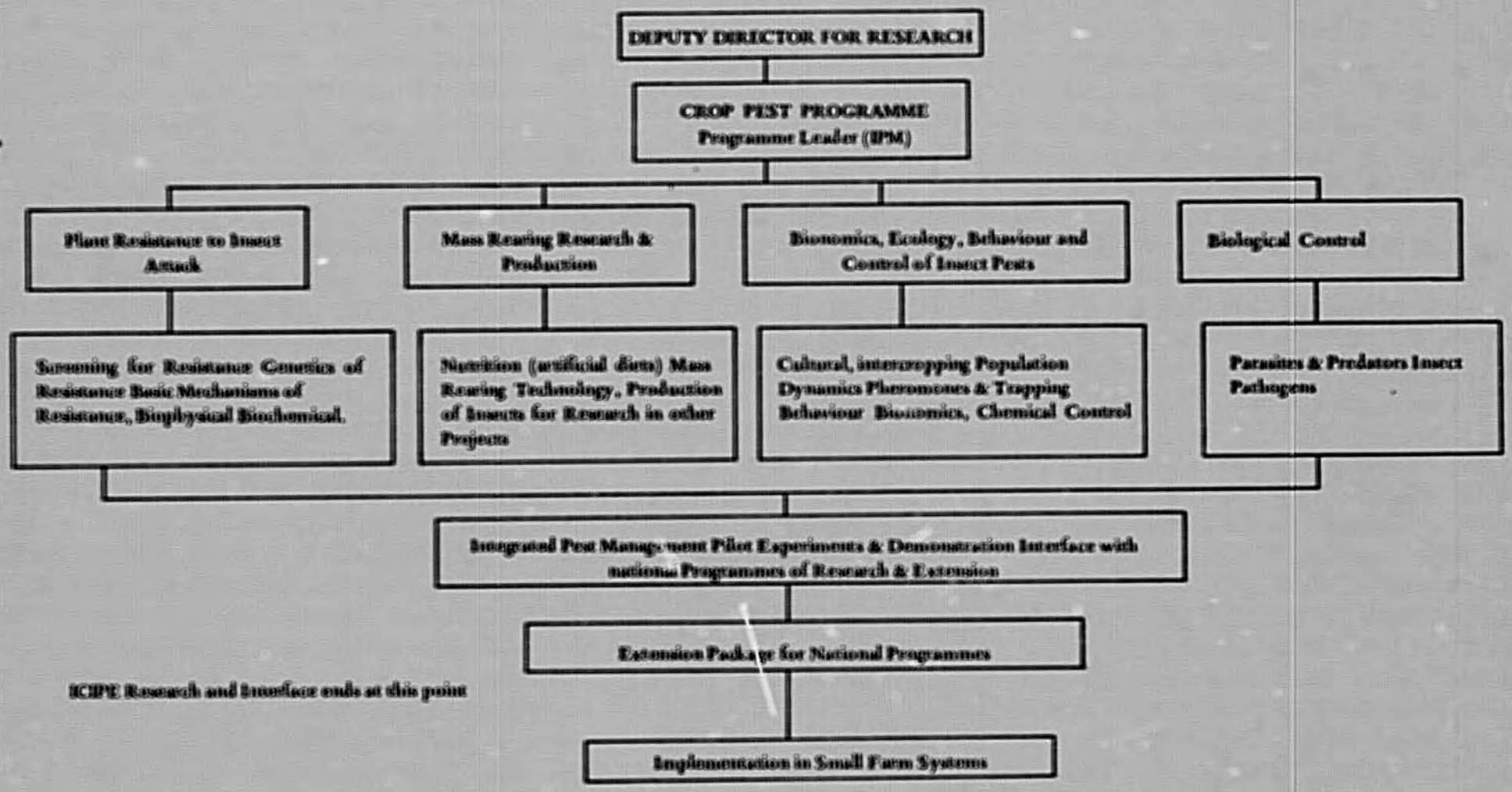



Figure 5 Recommended Research Organization Schemes for CROP PEST RESEARCH at Mbita Point Field Station

## SECTION 4: LIVESTOCK TICKS

### General Information

120. The programme was started in 1972 as a major and core programme of ICIPE, and received relatively strong financial support, especially through donors such USAID, EEC, and DDA (Switzerland). The present Programme Leader was appointed in 1977. In the current programme there are 4 senior staff, 3 other scientific staff and 7 technical staff. The total budget for 1983 amounts to U.S.$357,000. (Annex 4).

### Objectives and Background

121. The programme is entirely directed towards integrated management of ticks, which generally inhibit livestock production by sucking blood from their hosts and especially by transmitting diseases. Livestock in Africa and many other parts of the world are severely affected. Control of ticks by acaricides needs expensive and frequent applications. Interruption of treatment leads to an immediate increase in tick infestation which causes enormous losses in livestock as happened, for example, when the dipping programme broke down in Zimbabwe and about one million cattle died. Other common disadvantages of pesticide treatment are induced resistance of the pest to the pesticide, pesticide residues in meat and dairy products, and the maintenance of susceptibility to the ticks (and the diseases) because of lack of induced resistance in the host.

122. The goal of the programme is to develop alternative control mechanisms for one of the major pest ticks in Kenya and Eastern Africa, the brown ear tick (R. appendiculatus), which transmits a severe disease, the East Coast Fever (Theileriosis). The study includes work on population dynamics (survival, development and reproduction under different external factors, including tolerant and resistant hosts), host-pest relationships, physiology, and behaviour of the pest, aimed at demonstrating promising method of interfering with the pest's activities and vitality. The final goal is to develop, test and apply a method of integrated pest management. This will include vaccination against East Coast Fever (ECF), chemotherapy together with biological control of the tick, and minimal use of acaricides where necessary. Such a programme is well suited to ICIPE's mandate. One possible approach is an acquired resistance of cattle to tick infestation, combined with protection of the host animal against ECF by vaccination and/or application of curative

drugs. This would provide ecologically safe control methods less harmful to the consumer of livestock products, and less expensive pest control. The objectives of the programme were well defined when it first started and those objectives have not been changed.

Management

123. The Programme Leader and his colleagues have a strong degree of control over research projects and have had a considerable input into the budgeting process, though it was felt that there was perhaps insufficient consultation about the final decisions.

124. The programme has enjoyed strong leadership, a satisfactory flow of information between the projects, and a good interdisciplinary cooperation within and outside ICIPE. Doctoral and postdoctoral training has been satisfactory and has involved national and international contacts for training in different approaches. Opportunities for overseas visits and attendance at international conferences have been very limited. A serious gap in the programme was caused by the enforced resignation of one of its most promising scientists.

125. By using facilities at cooperating institutions, but more importantly through the strong loyalty of the staff, in spite of the severe financial problems, the programme has managed to overcome the difficult years of 1981/1982.

Strengths

126. As a result of successful biological and ecological work on the tick together with the use of other research findings on pest-generated host resistance, an efficient pest control method is in sight. African livestock appear to develop resistance to brown ear ticks during infestation, as the result of antibody formation in the host induced by antigens from tick saliva. This "type 1 resistance" leads to considerable reduction in tick vitality and results in lessened ability to transmit the disease. In pastures with resistant cattle, the tick population is significantly reduced and a new balance between host and pest is established. At present, methods are being tested to evoke antibody formation in the cattle (type 2 resistance) by means of antigens from different parts of the ticks, to isolate and characterize the antigens, to detect the target organs or processes in the tick which are affected by the antibodies, and on an increasing scale, to study the resistance of livestock in field experiments. Recently, studies have started on crossbreeds of cattle, combining high productivity and strong natural ability in developing type 1 resistance. This approach will provide quantitative data on the impact of ticks on naive and infested resistant cattle, and on the resulting tick population. Together with promising vaccines and drugs being tested by veterinarians against theileriosis, an integrated control of the tick as well as of the transmitted disease might become practicable. This multiple component

approach should make it very difficult for the pest to develop defensive strategies. It can be applied on a large scale in the field at relatively low costs. Furthermore it is ecologically sound, and could be adopted to many ecological situations.

127. The overall quality of the research in the tick projects is of a high standard; the evaluation methods are generally sound. This is the result of excellent leadership of a well-qualified and dedicated team of scientific and technical staff. The good contacts by the Programme Leader were cited as an important aspect in the programme. These include ICIPE research support units, biochemical and immunological studies on resistance in cooperation with ILRAD and the Chemistry and Bioassay Research Unit, use of field stations with resistant zebu cattle and other breeds in cooperation with veterinarians from KARI and ILRAD, and farmers. Training in immunology of ICIPE staff is done at ILRAD and overseas laboratories (Utrecht, Holland; Neuchatel, Switzerland). Cooperation with ICIPE's Sensory Physiology and Histology and Fine Structure Research Units provided valuable information on several tick sense organs, and on the structure of the relevant receptor cells. However, the significance of these results for possible tick control is limited at the moment.

128. The cooperative network is a good example of a well-coordinated programme. Considering the number of cooperative projects, the outcome in terms of publications has not been high (9 in 1980, 5 in 1981, 6 in 1982), but several staff members are preparing manuscripts, so a significant increase in the number of published papers is expected; this is to be commended.

Limitations

129. Due to insufficient experimental animals there has been lack of quantitative data and there has been little use of biostatistics until recently. Another more basic problem is that the work on the immunology of induced resistance is really beyond the scope of ICIPE's scientific and technical resources. A major limiting factor has been the great lack of transportation.

Future Plans

130. The plans for ecological work are well defined. Results, especially on induction of type 2 resistance, will be confirmed and quantified using infested naive and resistant cattle. An increase in the field studies using resistant cattle is planned, the search for strains of livestock that are highly productive yet resistant is in its initial stage. Field trials to develop practical methods of integrated pest control will be undertaken. This requires more field facilities, cattle, probably more technical staff and transport.

131. A major study project is planned on the immunological basis of cattle resistance, on tick antigens, especially from tick eggs, and on target processes and substances (juvenile hormone-binding proteins) in ticks for host antibodies. Most of this work will be done in the Chemistry Unit of ICIPE in close cooperation with immunologists at ILRAD.

## Potential Users of New Technology and Knowledge

132. The programme is producing a range of useful results. The tick study could serve as the model study for other tick projects in Kenya and other tropical countries. If the bigger-scale field experiments are successful, there will be promise of a control technique for a major pest which affects livestock in many countries. Other scientific institutions could use the model in order to design research on tick ecology and control.

## Recommendations

133. (a) The Team strongly supports the multifaceted integrated control programme with its continuance of vaccine and drug use, host resistance to tick infestation, acaricides, and exclusion of game.

(b) The programme needs more support for field work, using larger numbers of cattle. More transport will be needed.

(c) A multifactorial model of tick population dynamics and host-pest relationships, especially with resistant, vaccinated, and drug-treated cattle should be formulated. It might well become a model for other systems as well as posing important questions and approaches for further investigations in the programme.

(d) Extension of the immunological and protein chemistry studies will present problems since such an approach will require the full range of modern biochemistry with sophisticated methods and modern instrumentation. If the plan is to be followed, a substantial section of the Chemistry and Bioassay Research Unit would have to be involved. Staff would need to be trained in the relevant techniques, and other institutions would need to be involved to provide expertise and technical assistance. The essential prerequisite will be a clear definition of research priorities of the cooperating groups, a realistic budget plan and cooperation at an international level. This should include the assistance of an experienced immunologist. It is strongly recommended that such planning be made before the full-scale programme is started.

## SECTION 5: TSETSE

### Background

134. Despite many years of research and attempts at control measures, relatively little impact has been made in controlling trypanosomiasis or its vector, the tsetse. Much valuable information has been accumulated but there are still major gaps in the knowledge of ecology and behaviour of the tsetse fly. It is also an indication that there are no striking opportunities for control as with ticks, for example, where host immunity to the pest and to its transmitted diseases together with curative chemicals provide a future prospect for integrated control. Moreover, tsetse ecosystems are vast and diverse, and tsetse adults are mobile and populations difficult to record except by adult trapping. This is no reason for despair. Indeed, it is an incentive for expanding the work, extending traditional approaches and developing new ones. Any improvements in control would have an enormous "pay-off" in view of present harm to cattle and other domestic animals, crucial limitations on use of animals for farm work, inability to use vast tracts of grazing land because of heavy trypanosomiasis challenging, and the evidence that tsetse/trypanosomiasis areas are expanding in some of the 37 countries in sub-Saharan Africa where it occurs. Furthermore, human sleeping sickness occurs in Kenya and other countries, especially Uganda.

135. There are certain dilemmas about the duration of the main thrusts in tsetse/trypanosomiasis control. In Kenya, for example, cattle production ranges from large ranching schemes to Maasai nomadic-type grazing systems. Clearly, there is a strong desire to improve conditions for the Maasai, but this presents a much more difficult problem than in organized ranches where there is no doubt that a sensible integrated control programme could greatly reduce or locally eradicate tsetse/trypanosomiasis.

136. Eradication is always being emphasized, but this is impossible in Maasai-type rangelands, expensive or impracticable in many other regions,

and only practised where the farming system is sufficiently efficient to maintain tsetse barriers combined with planned land utilization. Chemical control by itself is not adequate for eradication and, overall control usually requires expensive ground as well as aerial application; even then there is no guarantee of more than temporary reduction of the problem, as recent experience in the Lambwe Valley of Kenya amply demonstrates.

137. The tsetse programme has been a major component of ICIPE's work since 1972, and US$535,517 and US$403,600 were budgeted for the years 1982 and 1983 respectively (Annex 4).

Objectives

138. According to a recent report on the Tsetse Research Programme, their present objective is research to "develop environmentally safe tsetse control methods through studies of tsetse behaviour, vectorial capacity of tsetse populations, and thorough studies of the factors involved in the natural regulation of tsetse populations. Research towards these objectives is identified in four lines of study: ecophysiology, ecology, vector capacity and biological control."

139. In principle, emphasis is placed on the field work in ecology, epidemiology and integrated control approach, with supporting laboratory work, which help to answer field problems and provide new ideas and approaches to control.

Current Work

140. The tsetse programme covers fields and laboratory studies, the former on tsetse ecology and its role in epidemiology of the transmitted disease, and the latter on a range of topics covering reproductive and sensory physiology, growth regulation, sound production, fine structure, trypanosome/vector relations including stress, pheromones, antibody responses to the tsetse and tsetse parasites. Work on the *in vitro* propagation of the trypanosome itself has been phased out because this is the remit of other institutes such as ILRAD. The field work is solely on *G. pallidipes* and the laboratory studies on *G. morsitans*; laboratory work on *G. pallidipes* is just beginning.

141. In ecology, population studies on tsetse, following wide-scale use of pesticide in an attempt to eradicate the fly in the Lambwe Valley in Kenya, have provided very valuable and illuminating comparative data on pest dynamics in relation to chemical control in different habitats in this area, which is regarded as particularly suitable for tsetse. The population of the fly was believed to have been decreased by over 99%, yet it quickly recovered, the recovery rate depending on the nature of the habitat, and associated with movement of adult flies from one habitat to another as the population in the first reached its peak. This study is continuing because it provides important information on the behaviour, hosts and dynamics of the fly relevant to control by different methods

and in different local habitats. Another valuable study on causes of changes in tsetse populations in different habitats and the relation of tsetse to the epidemiology of trypanosomiasis has been done on the Kenya Coast, but this has been discontinued.

142. A major feature of the ecological work is a study of trapping methods. This involves studying modifications of the Challier trap aimed at improving the catch of adults, and in particular, a detailed study in which trap catches, which give only a relative measure of abundance can be translated into absolute measures of abundance of the fly.

143. In the laboratory, excellent work is being done on reproductive physiology. Studies on the pattern of ovulation involve cyclic AMP as a regulator of ovulation and precocene as a possible reproductive disruptant. A detailed examination has been made of the role of the corpus allatum and of neurosecretory pathways via the corpora allata and corpora cardiaca. Preliminary work is also being done on effects of insect growth regulators, especially their effect on abortion. The role of insecticides, notably pyrethroids, in causing abortion is being investigated. Similarly the possible effects of ecdysteroids are being examined and their significance in reproductive blocking assessed in some interesting preliminary experiments. In studies on "contract" pheromones, the sex pheromone of G. pallidipes has been identified and synthesized at ICIPE. This is a valuable development. Other useful studies include the influence of trypanosome infection on salivary glands of tsetse which enables infected G. morsitans to be really identified. Infection is associated with changes in tsetse activity and with evidence of increased sensitivity to a topically applied insecticide, the influence seemingly greatest in the male. Potentially useful studies are being undertaken as a laboratory back-up to work on variation in vectorial capacity of tsetse in the field and also a routine assessment of the incidence of trypanosomes in field populations of G. pallidipes. This work needs to be systematized and aligned more closely with the ecological studies in order that epidemiological relationships can be established. There is evidence that rabbits can develop some degree of "immunity" to tsetse. This and other studies, such as on sound production and on virus and nematode infection, should be critically examined to decide whether work should continue at any rate in the laboratory. Further work on virus characterisation would seem to be undesirable until it has shown whether the virus is pathogenic. In summary, the laboratory work include at least one major and scientifically excellent study in depth and a number of other integrated projects. Others seem to be unfruitful and in general there is inadequate coordination with and development towards field activities.

144. Almost all field projects need to be carefully examined and the programme limited to fewer projects which are individually better focused in a more clearly defined and integrated tsetse research programme.

## Management

145. The current research team consists of an Acting Programme Leader, 3 other senior scientists, 4 research scientists, 4 scientific officers and research scholars, and 14 technical support staff. The former Programme Leader was an experienced tsetse ecologist but left the programme in 1982 due to ill health. The primary interests of the Acting Programme Leader are with the pathogen rather than the vector.

### Strengths

146. The ICIPE Tsetse Research Programme contains expertise in disciplines ranging from fundamental physiology and ecology to practical control expertise. It is located near expertise in complementary tsetse/trypanosomiasis disciplines at ILRAD, FETRI, ILCA, etc. There are therefore unique opportunities for collaboration of the kind that exists nowhere else in Africa. Within reasonable distance of ICIPE's facilities there are good habitats which represent the range of ecological conditions existing throughout the tsetse belt in Africa. Furthermore, there is a valuable spectrum of methods of animal production from semi-nomadic rangeland, through small farmer to large and comparatively sophisticated ranching systems.

147. There are some excellent scientists in the Programme, the work on reproductive physiology, and effect of trypanosomes on tsetse and on ecological methodology being outstanding. Overall, with some changes of staffing and variations of work, the programme is well placed to make a useful contribution to solving major problems relevant to integrated control and its implementation.

### Limitations

148. Although much good work is being done, it lacks coherence. This seems to be a long-standing situation and is not the fault of the present Acting Programme Leader. In view of the importance of the field work, there is a serious imbalance, with too much emphasis on laboratory-based work, and only two scientific staff ecologists with relatively inadequate and inexperienced technical support. Scientists have been given very limited opportunities or encouragement to visit research workers in other countries in the last 3 years.

149. In general, the programme suffers from a lack of equipment and supplies. Field work is seriously impaired by a shortage of vehicles that are crucially important for tsetse work, especially as it is generally undertaken in difficult terrain.

### Future Plans

150. Plans include modelling the epidemiology of the disease, identifying and experimenting with the most viable components of an integrated control approach to decreasing disease, namely, factors

affecting numbers of tsetse, biting rates, and transmission of the disease to and from its animal hosts by tsetse. Further work is also planned on abortion, stress factors, animal immunity to tsetse, pheromones and pathogens of tsetse. A new study will begin on tsetse attractants. Overall, the scientific staff is sensitive to the objective of extending its laboratory findings into the field.

Potential Users of New Knowledge and Technology

151. The control of tsetse is so important for the future development of tropical Africa that any new advances or breakthroughs towards achieving this purpose will be of wide use.

Recommendations

152. (a) A Programme Leader of adequate stature and ability with ecological appreciation is a crucial requirement. Until one becomes available, use should be made of a temporary visiting programme leader who could lay the foundation for future work. A long-standing tsetse expert is not a necessity; a comparative "outsider" could be more innovative.

(b) A coherent research programme should be devised using mainly a field ecological and applied ecological approach, with the laboratory work designed to answer problems encountered in the field and to test ideas which could lead to novel control methods.

(c) ICIPE with its strengths and potentials in a range of both physiological and ecological work should take the initiative in collaboration with other major programmes in centres such as IITA, ILCA and KETRI with the objective of a truly integrated approach to vector and disease control.

(d) Without diluting its local research effort, ICIPE should seek opportunities to interest and cooperate with institutions in other parts of Africa so that the tsetse programme can be extended to other Glossina species. In this context, more provision must be made for tsetse scientists to consult colleagues in other countries.

(e) The imbalance between numbers of laboratory and field workers should be corrected.

(f) The overall programme should strike a balance between basic work and practical application. ICIPE should concentrate on good science with the goal of integrated control, although they should be cautious about direct involvement in practical control programmes. Use should,

however, be made of local control programmes and ideas for control (e.g. insecticide screens) to provide vital experimental understanding of tsetse population dynamics and hence of improved control. ICIPE workers should also be willing to advise those concerned with immediate problems of control, e.g. as has recently happened with the Covenment organizations concerned with the 1980-1982 Lambwe Valley problems.

(g) Work on laboratory rearing of G. pallidipes (in which some progress has been made) should be given priority in the breeding programme so that relevant laboratory and experimental field work can be done with this species rather than with G. morsitans.

## SECTION 6: MEDICAL VECTORS

### Objectives

153. Though there has been a programme on insect vectors of human diseases in the Centre since its inception, the topics and aims of the work have greatly changed during this period. As recently as 1982 the Annual Report described much work on mosquito vectors of malaria. Earlier there had been emphasis on the study of vectors of filariasis and yellow fever. At the moment all this work has ceased, mainly because of the lack of resources. Some of the mosquito work is in the final stages of preparation for publication, but the whole current emphasis is on the epidemiology of leishmaniasis, including the transmission of the protozoa causing it. This and related diseases are important in South America, the Middle and Far East and in a number of countries in Africa. Work on transmission, which is by sandflies, is also in progress; it is not being studied in other laboratories in Africa at present. The disease has spread widely in Kenya since 1943 and is much more prevalent than was generally recognised until recently. For example, in India over 20,000 previously unrecognized cases were found recently during a single malarial survey.

154. The leishmaniasis problem is an unusually difficult one. The vectors are very small nocturnal insects and are difficult to study in the field. At present only a few species can with difficulty be bred in the laboratory. The disease in man takes at least three forms: visceral, cutaneous and mucocutaneous. Visceral and mucocutaneous leishmaniasis are killers, but diagnosis of the visceral form is especially difficult. There is only one curative drug and treatment requires hospitalization for at least 30 days. There are many species of the genera containing the vectors. Not only is their taxonomy fiendishly difficult, but only a few species have been proven as vectors. Twelve species of Phlebotomus are known in Kenya of which two are important vectors and 2 others may be. There are 21 species of Sergentomyia of which 1 is a potential vector, and 6 species of Sintonius of which none has so far been

incriminated. Several known species of animal reservoir hosts have been discovered and to add to the complexity, a number of species of the causative organism Leishmania. Blood and lesions contain these minute parasites whose life cycle is not well understood.

Current work

155. There are 3 research scientists, 1 postgraduate scholar, and 7 technical staff on the programme. The total budget for 1983 amounts to US224,000 (Annex 4).

156. A major outbreak, particularly in the under-20 age group, population, occurred the Machakos District and almost forced large-scale emigration from the area. The timely development by ICIPE scientists of an effective sticky trap may have reduced the vector population which in turn decreased the incidence of the disease and this area is again productive. ICIPE is continuing to monitor vector populations and disease incidence in order to help in the study of epidemiology and control.

157. At Marigat in Baringo, a team is continuously monitoring sandfly populations using sticky fly traps. Flies are collected daily from around termite mounds and at the entrances of rodent holes where the flies rest during daytime. The flies are also trapped in and around houses, and preliminary attempts are being made to study direction of movement of the flies and to determine where they breed. Human and wild animal populations as well as all collected and identified flies are being examined for infection. The prime objective is in the understanding of the epidemiology of the disease in the context of the ecology of the sandfly host.

158. In the laboratory both the parasites and vectors (8 species) are now being cultured, although the initial breakthrough in this area was the joint effort with a collaborating laboratory. Studies are in progress on infection in dogs, on the cycle in the insect host, on isoenzymes of the parasites, on biochemical and immunological methods of identifying the vectors and the parasites, and on the behaviour of the parasites in immune sera. A postgraduate is working on the taxonomy of the vectors. A variety of techniques using the scanning electron microscope and enzyme electrophoresis are being brought to bear on this previously intractable problem. These laboratory studies are closely integrated with the field work and all the investigators take part in the field studies.

Strengths

159. The extensive results by this small well-knit and dedicated team illustrates that good field and laboratory work can be done when the programme has dynamic and effective leadership. The efforts being made in close cooperation with officers of the Ministry of Health are

impressive and include effective use of the Ministry's laboratories at Marigat. The researchers know that they are working on a problem of great importance and their spirit is admirable. Cooperation with other organizations, local and overseas, is good. Both the main sites are readily accessible, the one at Marigat being 3-4 hours from Nairobi on an all weather road; access within the infected area is easy and relations with local people are excellent.

Limitations

160. The programme has a single vehicle at Marigat to service several sites. This is quite inadequate. A lot of field sampling is done by bicycle. Insectary facilities are inadequate and equipment is needed for confirmatory diagnoses in the laboratory. Funds for reagents are minimal and it is to be regretted that the overall support for the programme has not been increased in recent years. There is a need for more technical staff. All except one at Marigat are temporary staff on daily rates. They work 7 days a week and deserve better conditions of employment. Laboratory space is at a bare minimum at Chiromo.

Future Plans

161. Plans involve a continuation of all current lines of work. The programme is relatively new and in the opinion of the Review Team deserves full support.

Potential users of the new knowledge

162. The importance of leishmaniasis over so much of the tropical and sub-tropical world, together with the insidious nature of the disease and the difficulty of controlling it, make it a prime target for the ICIPE. The value of the work is reinforced by WHO choice of Leishmaniasis as one of the six key disease constraints to human health. Valuable knowledge at several levels has already emerged from this project. The Review Team has no doubt that the work will be valuable, especially as the disease is prevalent amongst some of the poorest members of the community.

Recommendations

163. (a) The programme is reaching a stage where epidemiological knowledge needs to be developed into a longer-term perspective. The Team recommends that the Programme Leader consult with other authorities in the problem in order that he can advise the best possible long-term project proposals for the project. Much work has yet to be done on the ecology and physiology of the vector.

(b) The Team recommends that this programme be supported, because of the likelihood of significant increases in knowledge of transmission of the parasites, and the importance of the disease to human health.

(c) Additional vehicles should be provided.

(d) Additional laboratory space and equipment are needed in Chiromo. The equipment should include support for rearing, taxonomy, and the immunological work.

# CHAPTER 4

## RESEARCH UNITS

### SECTION 1: INTRODUCTION

164. In ICIPE's early years, basic research was directed towards insect physiology, ecology and behaviour. Units for Sensory Physiology and Fine Structure were started in 1972 and 1974 and Chemistry in 1975. Outstanding scientists from several parts of the world acted as visiting directors of research and results of high quality contributed substantially to ICIPE's reputation as a centre of scientific excellence in Africa.

165. When the Centre redirected its efforts towards applied research dealing with insects pest problems, the research units took on a role of supporting units to cooperate with the goal-oriented core programmes.

166. The units work on problems arising from core programmes, designing and performing bioassays and experiments for these programmes. They also perform a service function. Basic studies in a unit's discipline normally occupy less than 50% of staff time. In most cases such studies are closely related to the key target insects and their hosts. Thus, basic research is seen as an essential partner of applied science, especially in tackling the complex problems of pest control.

### SECTION 2: SENSORY PHYSIOLOGY

167. Sensory Physiology has replaced the former electrophysiology unit. The Head was appointed in 1981. The staff consists of 1 research scientist, 1 scientific officer, 1 senior technician, and 1 technical assistant. The budget for 1983 amounts to US$112,300, excluding support for th Unit Head (Annex 4).

Objectives

168. By knowing how pest insects use their senses and how the sense organs function, ICIPE hopes that ways can be found to impair detection of hosts, enemies, partners, or food. These objectives might be achieved by applyin, repellent stimuli, trapping by strong attractants, visual or chemical camouflage of hosts, or interference with other sensory or nervous aspects of behaviour.

Current Research

169. The unit works mainly on the chemical sense organs of tsetse flies, livestock ticks, and crop pests which are the key targets of the ICIPE programmes. One major approach is on the effects of chemicals from host plants on olfactory and gustatory receptor cells of adult and larval crop pests.

170. In the process of analysing and synthesizing the female sex pheromone of tsetse and moths, fractions of female extracts are tested using sense organ responses. Similar work is done on other pheromones such as the egg-laying deterring pheromone of the sorghum shootfly, and pheromone-like compounds in ticks. Another line of approach is to screen compounds from natural products or synthetic materials for their effects on sense organs using the electro-antennogram (EAG) which measures the electrical response of many sensory cells on the antenna. This, for example, has shown that the tsetse pheromone, originally believed to act as a contact pheromone, actually behaves as a short- or even medium-distance odour stimulus.

171. Bioacoustical work has shown that G. morsitans procedures sounds of complex frequency with maximum intensity around 2000 Hz. Sound patterns change according to age, hunger or satiation, and sexual state. They are produced during and after feeding and mating, and possibly during other interactions between flies.

Management

172. The Head of the unit has trained the staff in electro-physiological techniques, electronics and other physical methods. Many projects have been carried out in close cooperation with other units.

Strengths

173. A functional laboratory for electrophysiology with well-trained and technically competent staff has been developed. Easy-to-use EAG assays for quick screening of host- or mate-produced compounds are available as well as sophisticated apparatus for single-cell recording and refined stimulus control. Tests are available for the study of plants of different resistance or susceptibility to determine whether chemical stimuli are involved. This will be of use for screening for resistance chemicals. The unit's own research in the main project has been rather conventional, and its contributions to insect chemoreception not innovative. The standards of the methodologies are high.

Limitations

174. The Head of the unit, appointed two years ago, had to start the laboratory and spent much time setting up and operating sophisticated apparatus and training staff.

175. Space is inadequate in quantity and quality. Volatile chemicals in the laboratory interfere with experiments. Recordings from small cells are done without shockproof suspension.

176. The major limitation of the unit is in its approach to sensory functions of target insects. As long as there is only information about the sensory stimuli at the cellular and nervous system level, the programme will continue to be of academic interest. Additional careful behavioural analysis of orientation, approach, probing, feeding and mating in an ecological context can provide the necessary insight into the role of sensory stimuli and simple tests have to be developed to find out which kinds of sensory stimuli are involved. In most situations the insect will meet a complex of stimuli leading to a specific behavioural pattern. Interference with pest action involving sensory lines is unlikely to succeed until an approach of this nature is developed.

177. The Head of the unit is fully aware of this problem, but so far no behaviourist has been appointed. He will leave the unit at the end of 1983. The other staff are well trained in electrophysiology and will be able to carry on parts of the programme, but there will be no staff with the expertise and the imagination to design and to develop the necessary behavioural approaches.

Future Plans

178. The project on acoustical communication of tsetse will be terminated as soon as the scientist working on it finishes his doctoral dissertation and some field trials have been made. Morphology and physiology of chemoreceptor organs of insects and ticks will continue. Studies of host-borne olfactory and gustatory stimuli will continue on a larger scale and will include a comparison of compounds from resistant and susceptible plants. Screening and testing natural products and synthetic compounds will provide more insight into structure activity relationships. Plans for future work on the behavioural aspects of sensory functions are being formulated.

Recommendations

179. (a) There is immediate need to search for a Head of the unit with:

Interest in behavioural physiology and insight into ecological problems, and experience in electrophysiology. Core programmes, especially Crop Borers and Tsetse, would benefit from cooperation with a behavioural physiologist.

(b) Electrophysiology should remain an essential component of research on sense organs and for bioassay.

(c) The morphological work on sense organs should be more concentrated on functional rather than descriptive aspects.

## SECTION 3: CHEMISTRY AND BIOASSAY

180. In 1982 the Chemistry and Biochemistry Unit and the Bioassay Unit were combined into a Chemistry and Bioassay Research Unit. The Head of the unit was appointed in 1979. He has 3 senior research staff, 1 scientific officer, and 5 technical staff. The budget for 1983 amounts to US$249,300 (Annex 4). The IAEA Special Project in this unit has 1 senior scientist, 1 scientific officer, 1 technician and a budget of US$90,000 per year.

### A. CHEMISTRY

#### Objectives

181. The main objectives are to provide expertise, advice, support and service to ICIPE's core programmes in the fields of organic and biochemistry. Part of the work is directed to basic research on chemical and biochemical aspects of target insects and their hosts. There are four major lines of work:

(a) Physiology and biochemistry of development and reproduction,

(b) Host defence by pest antigen-induced antibody formation, and localization of the target for the action of the antigen,

(c) Screening plant chemicals which attract, repel or kill the insect or interfere with its development,

(d) Analysis and synthesis of chemical communication signals.

182. The final goal is to find out the most sensitive point of the pest to attack, to get ideas about the chemical nature of the effect of substances upon insects, and to detect the most suitable chemicals which could be applied in pest control.

183. Chemistry gives assistance to other units and the core programmes. This includes supply of compounds for field tests, analysis of animal and plant compounds which affect insects, and methods of applying such compounds in the field. Additional services are provided by supplying material synthesized for specific purposes, for example pheromones and their analogues.

Current Research and Results

184. (a) Hormone Chemistry

The members of the unit have become interested in many aspects of biological chemistry, and many projects have been undertaken. Concentration of developmental hormones (ecdysteroids) are measured during development of larvae and in gravid female tsetse and in the eggs of ticks. Interference with hormone action in the fly leads to abortion. Tick-induced antibodies of hosts may interfere with carrier proteins of the hormone and stop development in the eggs.

(b) Pheromone Chemistry

Female tsetse tissue extracts are investigated for pheromone activity by bioassay (behaviour or receptor response in male). Active fractions are purified, and the compounds synthesized. Similar work was done on tick aggregation and sexual pheromones, and on the female sexual pheromone of *Maruca testulalis*. An "egg-laying deterrent pheromone" was extracted from eggs of the sorghum shootfly.

(c) Plant Product Chemistry

Plants from Kenya and other tropical countries have been screened for compounds which are active as antifeedants, growth regulators, repellents, insecticides, or which may specifically affect insect gut flora. Antifeedant terpenoid compounds isolated at ICIPE have been used as a basis for designing simple analogues which are now being synthesized. Emphasis is being placed in the synthetic work and screening with *Spodoptera*, *Maruca*, and *Chilo* on the search for systemic deterrents with which to combat crop pests.

(d) Chemical Basis of Plant Resistance

Resistant and susceptible cultivars of cowpea, maize and sorghum are being analysed for compounds which might act as antifeedants for pest insects. Neem seed oil was fractionated and compounds with insecticidal effects were extracted.

(e) Protein and Immunochemistry

Target antigens in ticks (*R. appendiculatus*) that, after injection into cattle or rabbits induce the formation of antibodies and thus a defense against the tick (type 2 resistance) were investigated.

Proteins (vitellins) which possibly act as antigens were extracted from tick eggs. In vitro, one of them appeared as a possible binding protein for the ecdysteroid hormone in tick eggs.

(f) Biomass Degradation

Recently, a project supported by International Atomic Energy Agency was added to the Chemistry Unit to work on degradation of ligno-celluloses. Cellulase from micro-organisms from termite mounds is being used in the project.

Strengths

185. The work of the unit is of generally good quality. Very small amounts of material of use in natural products chemistry can be processed. Characterization of the tick antigen in type 2 resistance would be an important step. The analysis and synthesis of insect pheromones has made progress. Research on synthetic pheromone analogues revealed one that was more potent than the natural product. The screening of plant products and their synthetic analogues revealed compounds of interest to the natural product chemist. However, further research on these may well be beyond ICIPE's resources and furthermore they are the subject of much research in large research organizations. The unit has a good record of publication.

Limitations

186. The unit has become involved in too many problems. The enthusiasm of a group of skilled organic chemists to become involved in a host of fascinating natural products is understandable, but such dispersion of effort is likely to be counterproductive.

187. The unit is tackling a major problem in immunology and protein chemistry. It is optimistic but perhaps underestimates the sophisticated methods and expertise together with high-powered equipment that will be needed.

188. The Team has some doubts about the lines which are being developed on biomass degradation. It is of the opinion that the aerobic micro-organisms that have been isolated may be less effective in digesting ligno-cellulose than the anaerobic flora of the termite gut.

189. The unit has limited sophisticated analytical equipment. The mass spectrometer is outdated and needs much service to keep functioning. Space is a major problem.

Future Plans

190. A major study is planned on the biochemical basis of type 2 resistance of cattle and rabbits against tick infestation (para. 185). Analysis and synthesis of insect pheromones will continue as well as synthesis of pheromone analogues. The screening of plant material for

compounds which affect insects will be pursued. Resistant and susceptible host plants will be investigated for antifeedants and other substances. Studies on structure-activity relationships with synthetic and naturally occurring compounds will be continued.

Potential Users of the New Knowledge

191. The chemical and biochemical work of the unit is of interest to other groups in the Centre. The natural product chemist provides pheromones which can be used in the field for trapping and population control. Methods and substances for field testing may in the future emerge from the research.

Recommendations

192. (a) The unit should re-examine the objectives and the focus of the work in progress. A group with such limited resources has to concentrate on a few major projects which can be followed through and studied in depth. Decisions on priorities become vital and the criteria for making such decisions should be spelt out clearly.

(b) The natural products chemistry programme is too diverse and should be confined to a few areas where it is not competing with organizations that have far greater resources.

(c) Because of the complexity of the research, the study of type 2 resistance in cattle should be carefully planned. The Team recommends that an expert from another institution be consulted in the planning process.

(d) The laboratory facilities are quite inadequate and present some health hazards. Action to improve this situation is needed soon.

(e) Some major instruments such as the NMR and the mass spectrometer need replacing.

## B. BIOASSAY

### Background and Objectives

193. The Bioassay Section provides services for other programmes and units, particularly for Livestock Ticks, Tsetse, Crop Borers, Bases of Plant Resistance and the unit of which it is a part.

194. Simple but effective techniques have been adapted and devised for assaying of hormones and ecdysteroids using ticks and tsetse. A biting test for tsetse has been developed for testing repellants and simple and effective methods are being used with borers for examining antifeedant, repellant or toxic action of phytochemicals and repellant or antifeedant action of resistant crop cultivars. Other tests involve Dysdercus as a possible indicator of brown planthopper sensitivity to novel chemicals, a choice chamber for examining attractants for certain stored products pests, a "climbing" test for tick repellants and, in prospect, tests for assaying animal odours as attractants for tsetse.
Assays of molluscicides, fungicides and bacteriostatic compounds not relevant to the ICIPE's core programmes are planned or have been undertaken.

### Strengths

195. The staff seem to be enthusiastic and competent and to interact well with those for whom they provide a good service. This group provides a useful service and will be increasingly needed in work on animal odours, feeding deterrents and host-plant resistance.

### Limitations

196. The laboratory designated for the work is small and poorly equipped. There is no temperature control and notable temperature increases are said to occur during the day. This is unsuitable for work in which temperature could significantly affect insect responses and cause difficulties in obtaining reproducible results. However, some of the assays are undertaken in the laboratories of the programmes concerned where facilities are better.

### Recommendations

197. Whilst much can be done in the existing simple conditions, rooms or cabinets with temperature control are needed and provision should be made for handling insecticidal or acaricidal compounds in conditions where they will not contaminate other experiments.

## SECTION 4: HISTOLOGY AND FINE STRUCTURE

### Introduction

198. A Fine Structure Research Unit was started at ICIPE in 1971; it became the Histology and Fine Structure Research Unit in 1977. The present acting Head joined the former unit in 1975 as a scientific officer and was appointed to the present position in 1977 and to a research scientist position in 1978. The other staff members of this unit are 1 research scientist and 5 technical staff. The budget for 1983 amounts to US$131,400 (Annex 4).

### Objectives

199. The Histology and Fine Structure Research Unit provides services in light microscopy, scanning and transmission electron microscopy, and also in the related histological and photographic methods. This involves all stages of research, from supervision and alignment of the instrument and processing of the specimen to the provision of the final photographs. Because of the wide variety of the experimental material of interest to ICIPE research projects, a large range of different materials including plants, insects, mammals, protozoa, bacteria and viruses is processed. Research problems range from taxonomy of different biotypes or species of insects, protozoa and viruses to morphology of sense and reproductive organs, and histochemistry of endocrine organs. Accordingly, the staff of such a research unit have to be flexible, need to be trained in a variety of techniques and their application, and be able to develop an imaginative approach to methodology.

200. Apart from providing such services and working in cooperative projects, the unit carries out its own basic research, although this is related to other research programmes of the Centre.

Current Research

201. There are four major projects:

(a) Investigation of the histochemistry and fine structure of trypanosome-infected tsetse salivary gland epithelia. Alterations in the epithelial cells in "virus-infected" and trypanosome-infected flies are of special interest. The taxonomy of the virus-like particles is being studied. The presence of virus-like particles in other tsetse organs is also being investigated.

(b) Sense organs on antennae, ovipositors, mouthparts and legs of a variety of target insects and ticks are being studied in detail, in cooperation with the Sensory Physiology Research Unit and Medical Vectors Programme. The function of several types of sensilla are under investigation, together with fine structural details of hair, walls and nerve endings of receptor cells.

(c) Sperm production, spermatophore production, epithelia of gonoducts and accessory glands of the male, and ovarian development spermatheca and uterus of the female in G. morsitans are being investigated. A study on the functions of different states of the "milk gland" is being done in cooperation with the developmental physiologists.

(d) The neuroendocrine system of G. morsitans is being studied in detail. Special emphasis is placed on innervation of the corpora allata and corpora cardiaca and the transport of neurosecretory material.

Management

202. The Head of the unit decides on priorities of the projects from ICIPE core programmes and allocates them to staff in the unit; those within the unit are decided upon by the Director and the staff concerned, those from outside ICIPE are decided upon by the Director and the Deputy Director on the recommendations of the Head of the unit. The staff in the unit undertake all histological, histochemical and fine structural processing for the Centre and provide photographic services. Technical help is also provided to collaborating scientists from other units.

Strengths

203. The unit provides a service for many research projects at the Centre. A well-functioning photographic service is available for macrophotography and microphotography. The staff of the unit have shared in the publications of some of the results. Basic scientific research in the unit has contributed to the knowledge of micro-histology of several sense organs, and of endocrine and reproductive organs on a comparative level.

Limitations

204. The electron microscopes are now old, and while they can be kept operating, this requires skilful service which is not readily available at ICIPE. As a result, the microscopes are often out of commission.

205. The scientific and technical capacity of the unit is limited and it can only operate really effectively when it has help and close cooperation from other scientists. The capacity of the unit to follow useful lines of research on its own and to work as a service unit is limited.

Future Plans

206. The unit plans to continue the work on insect sensory organs and to extend this to more species. Investigation of epithelia of salivary glands and of reproductive organs and endocrine organs will continue. In cooperation with the Medical Vectors Research Programme, studies are planned on taxonomy of sandflies and on different morphological types of leishmania. Installation of equipment for the freeze-fracturing method is planned.

Recommendations

207. (a) The Centre has to take a major decision about the future role and functions of the unit. The Team suggests that these alternatives be considered:

(i) A service for Fine Structure be organized using technically well-trained staff. The scientists in the Unit will then have available properly aligned and functioning equipment but all the scientific work, including special methodology and interpretation, would be left to them. To run the unit an experienced technical officer or engineer or a scientist with good technical expertise would be required.

or (ii) The unit should function as a research unit at the same level as the other research units in the Centre. To do this a leader with flexibility, imagination, and expertise in terms of methodology and scientific approach would be needed.

(b) The existing electron microscopes have to be replaced or repaired. This has major financial implications but they are at the technical heart of the unit, and work is severely delayed if the instruments are available only 50% of the time.

(c) Radioautography would make a major contribution to the array of available methods and should be considered as and when funds become available.

(d) Since so many ICIPE projects depend on the reliable functioning of the unit, the skills of the scientific and technical staff need to be upgraded.

# CHAPTER 5

## TECHNICAL AND SUPPORT UNITS

### SECTION 1: COMPUTER SERVICES AND BIOSTATISTICS

208. The Team noted the views of, for example, the TAC Mission in 1980 on the needs for a computing and biometrical service for ICIPE. The Team was therefore gratified to see that a service to meet these needs had been established, and that a competent biometrician was providing essential service to many ICIPE scientists.

209. The installation of a main frame VS80 256K Wang and a Wang minicomputer with plotter and printer at Duduville in mid 1982 filled a long felt need at ICIPE. The capacity is adequate for likely future needs but Mbita Point Field Station will require its own minicomputer as it will be impractical to use the terminal already purchased. The main research campus at Chiromo will also need its own minicomputer(s) for specific purposes.

210. The scientist who is at present acting as Head of the Unit has been in the post for only two months but has made good progress in organizing the unit and in providing ICIPE scientists with biostatistical help and advice. He is a member of the tsetse research team and splits his time about 60:40 between the two programmes. The only other senior staff member is a Senior Systems Analyst.

#### Objectives

211. The acting Head responded to our requests for his views on the organization of the unit by stating that it should have three specific functions:

1. Provide a comprehensive service to scientific staff in experimental design, analyses, interpretation and presentation of data;

2. Collaborate with scientists on development of population, epidemiology and pest management models;

3. Computerize the major management functions of the Centre financial information as a priority; staff files and library service should also be included.

Management and Staffing

212. A data systems manager has been appointed and will be in post by June 1983. His appointment would appear to make the post of senior systems analyst redundant. No final decisions have been made by management as yet on how the unit should be structured or managed. The present policy of zero growth in international scientific staff means that the unit cannot be staffed in an optimal manner and that the best possible use will have to be made of existing staff and perhaps postdoctoral fellows for the time being at least.

213. It was originally intended to install terminals at several locations, e.g. Mbita Point Field Station, but this appears to be impractical in the present telecommunication systems so the installation of minicomputers in strategic locations would be the best solution under present circumstances.

Recommendations

214. (a) The Team recommends that ICIPE management should, in consultation with the major users, prepare a staffing plan for the unit. The Team considers that a biostatistician should be Head of the Unit.

(b) Some investment in minicomputers at strategic locations should be made as soon as possible.

SECTION 2: INSECT AND ANIMAL BREEDING UNIT AT CHIROMO

Background and Objectives

215. The primary objectives of this unit is to centralize and improve the techniques and produce ample supplies of the target insects and laboratory animals needed by project leaders at the ICIPE. It is located in several temporary buildings at Chiromo. There are also rearing laboratory facilities at Mbita Point Field Station to produce crop insects for the Bases of Plant Resistance to Insect Attack (BPRIA), Crop Borers, and Insect Pathology and Pest Management Research Programmes. Rearing of tsetse (G. pallidipes) is also being attempted at MPFS. $F_1$ flies have been produced and the technique may be successful. This species has not been successfully reared in captivity to date.

Current Activities

216. The unit is currently rearing the following species of insects and animals in support of on-going research programmes:

(a) Tsetse: (i) Glossina morsitans morsitans, Chiromo
(ii) Glossina pallidipes, Mbita Point Field Station (MPFS)
(b) Stem-borers: (i) Chilo partellus, Chiromo, MPFS
(ii) Maruca testulalis, MPFS
(c) Wax moth, Galleria mellonella
(d) Meal worm, Tenebrio molitor
(e) Housefly, Musca domestica
(f) Mosquito, Aedes aegypti
(g) Cotton stainer, Dysdercus fasciatus
(h) African grasshopper, Gastromargus africanus
(i) African armyworm, Spodoptera exempta
(j) Rabbits. In support of Livestock Ticks, and Tsetse Research Programmes
(k) Rats. In support of Tsetse and Medical Vectors Research Programmes
(l) Mice. In support of Tsetse and Medical Vectors Research Programmes
(m) Hamsters. In support of Tsetse and Medical Vectors Research Programmes.

Management

217. The unit comprises a principal technician, 1 senior technician, 4 junior technicians and 6 technical assistants, a total staff of 12. The principal technician answers directly to the Deputy Director for Research. Personnel involved in rearing at MPFS were not included in the technical staff described above. Rearing of insects resides in the various research programmes at MPFS.

218. Technical staff were well trained with the principal technician having graduated from schools offering specific training in animal and insect rearing. In-house as well as external training opportunities exist.

Strengths

219. Personnel are adequate in numbers, obviously well trained, are proud of their contribution and were doing an outstanding job given conditions, resources and space available. They were meeting needs of the research programmes without great difficulty. The unit has been cooperating well with ILRAD, IITA, KARI, and other groups involved with rearing.

Limitations

220. This unit, in order to meet expanding needs of research, will require:

. . .

(a) Additional support for supplies and needed equipment

(b) An incinerator. High priority for disposing of animals and other waste that pose health hazards to animals and humans

(c) Vehicle to meet needs of the unit, especially for moving and disposing of animals, supplies, etc., and for communication with MPFS

(d) Equipment, especially food mixers, steam sterilizer and haemolyser

(e) Adequate high-quality space with environmental controls and adequate ventilation systems. These are needed for sanitation and health of workers

(f) Genetically controlled strains of rabbits, rats and mice for immunology and biochemistry

(g) Centralization of rearing, which now occurs in each of the research programmes. The Team recommends that rearing be centralized to provide a more efficient and effective system of supplying insects for research purposes.

Future Plans and Recommendations

221. Plans are for this unit to continue to service ICIPE research programmes and units as required. The Team recommends that the facilities be upgraded when resources become available.

# CHAPTER 6

## TRAINING, COMMUNICATIONS AND LIBRARY

### TRAINING

#### Objectives

222. ICIPE has set itself a very wide mandate for its training programme, which covers two broad areas: training and upgrading the quality of ICIPE staff, and increasing the pool of well-trained insect scientists, particularly in Africa. Both are extremely important objectives and, properly focused, can make an important contribution to the improvement of crop and animal production in the continent. The training objectives are in keeping with the overall objectives of ICIPE's founders and have always been given a high priority in the financing of the Centre, its budget for 1983 being US$479,400, the largest of any programme (Annex 4).

#### Training Programme

223. The programme covers three broad areas: Staff development training, which is designed to cover research training, technical training for support staff, research management training and training in communication skills; pest management training, which covers postdoctoral research fellowships, the African Regional Postgraduate Programme in Insect Science (ARPPIS) and research associateships; training for practitioners, which covers two courses - the International Group Training Course in Pest and Vector Management Systems and the International Group Training Course on Insect Growth, Development and Behaviour.

224. In the years 1972 through 1982 the Centre provided about 360 man-years of training, of which about 130 man-years (36%) was for ICIPE staff; half of the latter was on the technical training of support staff. Over the years, a substantial number of ICIPE staff have received

M.Sc. and Ph.D. degrees at Nairobi, other African and Asian universities, and universities in Europe and North America. More than 30 staff members went on short courses (less than 12 months) to overseas laboratories for specialized training. Collectively these students have had training in many of the most distinguished laboratories in the world. About 70% of the remaining man-years of training was on postdoctoral research fellowships (55 man-years) and postgraduate research training (108 man-years). The latter figure does not include the ARPPIS programme which started only in March 1983 with 10 students. The group training courses and others for practitioners last only about 3 weeks, so the 24 man-years represent a substantial number of trainees.

Strengths of the Programme

225. ICIPE has succeeded in attracting considerable financial support from the international donor community for its training programmes. This is understandable for there is a unanimous belief that lack of trained manpower is indeed one of the factors most seriously limiting the improvement of agricultural research in the developing world. The Centre has developed a register of insect scientists in Africa of whom there are more than 2000, but these are very unevenly distributed, and with very uneven but generally poor facilities and lack of opportunities for contact with good research institutions.

226. ICIPE is to be commended for the manner in which it has pursued the training and career development of its African staff. This is self-evident in the quality of both the research and support staff and in the enthusiasm for their work. There are no national programmes that can match the Centre's record in this respect.

227. The Team is not in a position to judge the strengths of the programme for training scientists from other organizations, but its impression from brief meetings with students is that they feel that they are offered a worthwhile and useful opportunity. The Team would deduce from the discussion of the research programmes that students at the Centre receive a good professional training and a lesson in motivation, in the areas where ICIPE is specializing.

228. It is also important that the accommodation and facilities at Duduville International Guest Centre, completed in 1980, provide an excellent resource for the training programme.

Limitations

229. As noted in para. 223, training is an important feature of an international centre. Nevertheless, there are two important questions that must govern the training programme of any institute - training for whom, and training for what. The former is important for the Centre's own staff. Programme leaders should have a strong say in who is to be trained as they have the best opportunity to recognize individuals who can most benefit. The latter is important in connection with such

programmes as the ARPPIS programme. Although all students are sponsored by their countries or organization, it is not always clear whether the type of training is related to the needs and facilities to which the graduate will return. (The training is in general more relevant, however, than training outside Africa.) It should also be emphasized that while ICIPE has the staff and the skills to take a leadership role in the areas in which it specializes, it does not and never will have the resources to cover more than a small proportion of the overall needs. This is particularly true at the moment of course, because of its limited library and laboratory resources (para. 249).

230. It is against this background that the Team voices concern about two programmes, one already started, the other proposed. The former, the African Regional Postgraduate Programme in Insect Science (ARPPIS), has many attractive features. It brings together a group of universities with a common interest, it allows students from these universities to interact and work together, and it provides an opportunity to work in an atmosphere of strong dedication to research. Nevertheless, even at the present numbers, the Centre will have 30 students in residence by 1985, with about 35 research scientists with very heavy research programmes scattered over Kenya and beyond to supervise their work. The Team does not question the value of the programme, only its potential size.

231. The second programme of which the Team is critical is the proposed Financial and Administrative Management in Eastern and Southern Africa (FAMESA) programme which is presently in an exploratory phase. Although the Team agrees that there is need to sensitize research policy-makers to the needs of research and to improve the capacity of research managers at all levels, it has serious doubts about ICIPE's competence in a subject which moreover is not relevant to its mandate. Moreover, the Team has serious doubts about ICIPE's capacity and its comparative advantages in this broad field. The Centre could participate in certain aspects of such programmes, such as providing some of the lecturers or perhaps with case studies, but in the view of the Team, it would be a serious misuse of ICIPE's limited resources, particularly of its management, to organize and run such courses.

232. The Team was also concerned that the burden of training may fall unevenly on the research staff. Some contact with students is stimulating, but too heavy a responsibility would affect the research programmes.

233. An area in which the Centre has not yet been able to make an impact is in the francophone territories of Africa although the proposed cooperative programme in the Ivory Coast is a useful first step. The Team recognizes the problems brought about by the limited French-language capacity at the institute and the extra costs of language training and translation into French. The possibilities of organizing English-language courses at the University of Nairobi and the French Cultural Centre in Nairobi for trainees from francophone countries have been under exploration for some time.

Future Plans

234. The Centre will continue to have an important role in training scientists. Indeed one of its problems will be to resist the multitude of demands that are being put on its limited resources, partly as a result of its successes in attracting funding and trainees.

Recommendations

235. (a) The Centre should develop a 5-year plan for its training programmes that would capitalize on its unique advantages without, at the same time, overstretching its capacities of staff and space. Such a plan should be thoroughly costed and its demands on research staff time and on facilities should be worked out in detail.

(b) No further planning work on the FAMESA programme should take place beyond the present exploratory phase, but that ICIPE should encourage other institutions to develop such a programme and offer limited help in areas where it has expertise.

(c) The 1984 and 1985 intakes for the ARPPIS programme should be determined after the plan for training has been developed.

(d) Selection of trainees from ICIPE's own staff should be done with concurrence of Programme Leaders.

(e) There should be a sustained follow-up of external trainees in order to assess the strengths and weaknesses of the training programme. UNEP appears to have some such plans in mind.

(f) Closer collaboration should be developed with the University of Nairobi in the training programme.

COMMUNICATIONS

Objectives

236. From the outset ICIPE has stressed the need to communicate its aims and results of its work to different audiences, and to provide a forum for discussing relevant topics with fellow scientists. Examples of the efforts are:

(a) Workshops: Numerous workshops have been held and have been listed up to 1978 in the report of the TAC group. Details of those arranged recently are given in Table 3. The subjects are carefully selected and it is the aim to hold about two each year. Those scheduled for 1984 will be on Bases of Plant Resistance and on Leishmaniasis.

TABLE 3: Workshops 1980-1982

| Year | Conference /Workshop | Location | attended | countries represented | Sponsor |
|---|---|---|---|---|---|
| 1980 | UNDP/World Bank/WHO Special Programme for Research & Training in Tropical Diseases: Second Workshop for Training Internal Evaluators | Nairobi | 15 | 7 | UNDP/ World Bank/ WHO |
| 1980 | Scientific Working Group on Tsetse Ecology & Its Application to Control | Nairobi | 20 | 7 | ICIPE/DITH |
| 1980 | Scientific Working Group on the Use of Naturally Occurring Plant Products in Pest Control | Nairobi | 28 | 12 | UNDP/ICIPE |
| 1980 | International Study Workshop on Sorghum Shootfly | Nairobi | 24 | 8 | ICIPE/IFAD |
| 1980 | The International Scientific Working Group on Cereal Stem-Borers and Legume Pod-Borers | MPFS/NBI. | 26 | 7 | ICIPE/IFAD |
| 1980 | Study Workshop on the Promotion of Teaching Insect Science in Africa | Lusaka, Zambia | 15 | 9 | ICIPE/AAIS/ Gov. of Zambia |
| 1981 | International Training Course on Insect Growth and Development | Nairobi | 23 | 16 | ICIPE/ICRO/ IDBS/ABN/ UNESCO |
| 1981 | Planning Conference for the International Postgraduate Training Course in Insect Science | Villa Serbelloni | 23 | 15 | ICIPE/ Rockefeller Foundation |

| Year | Conference /Workshop | Location | attended | countries represented | Sponsor |
|---|---|---|---|---|---|
| 1982 | International Study Workshop on Crop Borers and Emerging Strategies for Their Control | MPFS | 32 | 8 | ICIPE/IFAD |
| 1982 | International Study Workshop on Termite Caste Differentiation | NBI. | 24 | 14 | ICIPE |

237. The Review Team was impressed by these efforts and recognized that they required considerable time and effort of the Communication staff and the research workers. In some cases this was thought to inhibit research capability, and although the results mostly warrant the effort, this is a problem which needs to be kept under review.

(a) Seminars and Conferences: Regular seminars are held in the Centre, and the titles and names of speakers have been listed in successive Annual Reports. Well-attended Annual Research Conferences are held with objective of reviewing and assessing results and collaborative work. Each year a few programmes are discussed in depth.

(b) Mass Media: Judicious use is made of the mass media and efforts have been made to issue press releases when appropriate.

(c) Field Days and Exhibits: On one occasion the Centre prepared an exhibit for the Annual Agricultural Show. It was much appreciated by over 33,000 visitors and received 2nd Prize for the best private exhibit. However, it was an expensive exercise and has not been repeated. Open days and field days are held to publicize particular facets of the programme.

(d) Visitors: Between 500 and 800 visitors per annum have been received by the Centre in recent years. They range from eminent scientists to children. Our impression was that all are made welcome and receive a favourable impression of the Centre.

Publications

238. In line with the mandate of the Centre to fill gaps in scientific understanding of tropical insect pests, there has been a policy to

publish the results of research in scientific journals and books. The output of journal papers including joint papers with outside authors is summarized in Figure 6. In the early years authors were encouraged to publish in existing international journals, but in 1980 the Director organized with Pergamon Press the publication of the journal Insect Science and Its Application. This is now in its third volume and has, as is illustrated in Table 4, published much of the output of the ICIPE. The policy of the journal calls for review of all submitted papers by international peers, which is standard practice in all reputable journals. A considerable number of publications by the ICIPE staff continue to appear in other international journals.

Table 4 Contributors to Insect Science and Its Application

| Vol. | No. | Total Papers | ICIPE Contributors | Non-ICIPE Contributors |
|---|---|---|---|---|
| *1 | 1 | 20 | 5 | 15 |
| 1 | 2 | 15 | 4 | 11 |
| 1 | 3 | 14 | 6 | 8 |
| 1 | 4 | 27 | 6 | 21 |
| *2 | 1&2 | 20 | 6 | 14 |
| 2 | 3 | 12 | 8 | 4 |
| 2 | 4 | 12 | 5 | 7 |
| 3 | 1 | 12 | 6 | 6 |
| 3 | 2&3 | 19 | 8 | 11 |

* Vol. 1 No. 1 Special Issue: Epidemiology of African Trypanosomiasis

* Vol. 2 No. 1/2 Special Issue: The Biology, Ecology and Control of the Sorghum Shootfly, *Atherigona soccata*

239. The Review Team considers that the publication rate, given the constraints imposed on some ICIPE staff by the needs to provide training, and other commitments, is reasonable. However some scientists have been slow to publish and need to be encouraged. The quality of the papers is generally good and has added to the reputation of staff. Several have been invited to participate in international conferences and to contribute to books.

240. To ensure that the results of ICIPE workshops benefit the scientific community, ICIPE publishes full or abridged proceedings. For example, the International Study Workshop on the Epidemiology of African Trypanosomiasis, 1979 (Nairobi) and the International Study Workshop on the Sorghum Shootfly, 1980 (Nairobi) have been published as special issues of the journal of Insect Science and Its Application. More recently, ICIPE has published books based on its workshop presentations under a new book series, Current Themes in Tropical Science, using Pergamon Press. Physiology of Ticks has been published and Natural Products for Innovative Pest Management is in the final stages of preparation. The next book planned will be based on the International Study Workshop on Termite Caste Differentiation, 1982 (Nairobi).

241. The Centre has produced a number of other publications. For example, a Directory of Insect Scientists in Africa is now in its 3rd edition. The Annual Report has been regularly published, the 10th in 1982. This is now standardized in a format which is thought to be satisfactory at this stage in the development of the Centre. However, the quality of the 1982 report is not up to the standards of previous reports in scientific content, perhaps because an attempt was made to use more informal, non-technical language.

242. A Dudu Newsletter has been produced quarterly and is now in number 24. There has been many brochures and occasional publications - altogether a formidable publication task for the small staff involved.

Conclusions

243. Communication is a very important function of the Centre in fulfilling its mandate. ICIPE is to be congratulated for the scientific journal it has initiated (although the Team would warn against it becoming too much of a house journal) and major textbooks that are the outcome of some of their workshops. The other activities also seem to be of undoubted value.

Recommendations

244. (a) Emphasis should be placed on maintaining high international standards in the journal based on authoritative refereeing and publishing the textbooks with minimal delay.

(b) There are differences of opinion on whether the research conferences are structured in order to derive maximum benefit for the staff and the Governing Board. A working group of scientists should be set up to recommend possible improvements.

(c) Open days and field days for the general public and for farmers should continue to be organized since these are especially important for maintaining awareness of ICIPE's valuable role.

(d) Restraint must be maintained on activities such as communication which might unduly direct the scientists, many of whom are already committed to training and other non-research activities.

LIBRARY AND DOCUMENTATION

245. At present the library is housed at ICIPE House near the University of Nairobi campus at Chiromo. In the near future, an extension library will be installed at Mbita Point Field Station. A temporary holding library is being operated at the school. A Chief Librarian joined the staff in 1981. The other staff comprises a documentalist, a library assistant, and a library clerical assistant. A librarian is to be appointed for MPFS.

Objectives

246. The library provides such services as loans, acquisitions of library material, and literature for ICIPE staff. A stock of 3000 volumes of monographs and textbooks is available, together with 140 periodicals, and a series of reprints, mainly of ICIPE's publications.

Management and Policy

247. The Chief Librarian and his staff are well trained and experienced. Considering the restrictions in space and funds, they run the library very efficiently. The library follows a sensible policy. Because resources are limited, they decided to specialize in fields of interest for ICIPE such as entomology and pest research. Other fields are well covered by good libraries at the University of Nairobi and the Kenya Agricultural Research Institute (KARI). The ICIPE library is connected to an interlibrary loan system and ICIPE staff can use this system.

Limitations

248. The budget of the library (US$31,646, excluding staff salaries) is tiny. Subscription to several periodicals had to be cancelled recently. Space is very limited at Chiromo. The reading room is small, and staff have to work in a few small rooms. Costs required to establish a library service at MPFS will exceed the present annual budget for the whole library. There are plans to expand the documentation in the Centre, and this would require considerable resources.

Recommendations

248. (a) There should be a policy decision on organizing the library for MPFS.

(b) Even though the ICIPE library is part of the library network in Nairobi, additional funds are needed.

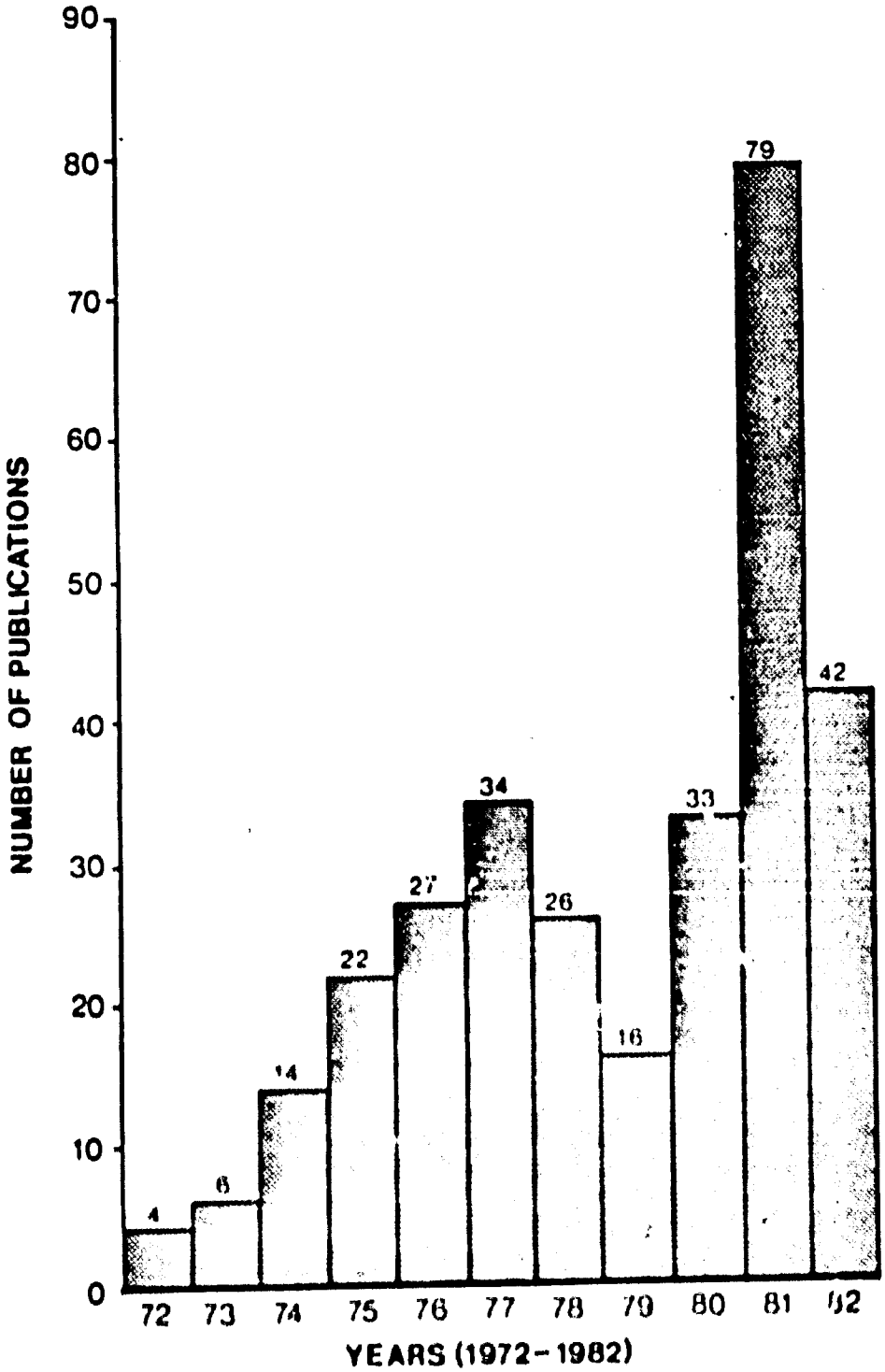



Figure 6 : Number of Staff Publications 1972-1982

# CHAPTER 7

## COOPERATION

250. It will be apparent from the description of the work in each research programme in Chapters 3 and 4 that cooperation between workers at ICIPE and those at other institutions is very widespread. There is, for example, interaction between the Centre and Kenyan Government instrumentalities, international agencies, university departments around the world, indeed with research workers in an extremely wide range of activities and employment. This collaboration is to be commended. Indeed, in to-day's scientific world it is indispensable to any effective science-based international centre.

251. Collaboration in research can be encouraged by administrative direction, but it can never be forced. It occurs when there is: (a) mutual respect between research workers and (b) a realization that there is mutual benefit to the work and to the workers. In the absence of either of these, no cooperation can be fruitful. Of course, there is a further element in these interactions, namely the possibility of personal animosity between workers. But where there is animosity there is rarely respect.

252. Given these considerations, the extent of interaction between the ICIPE scientists and others around the world speaks well for the Centre. Although the Team saw much that was good in this, there were instances when members of the Team were able to suggest additional contacts which it hopes will prove helpful. In a number of instances these were discussed with the research scientists and a few of them are mentioned elsewhere in this report. One such area needing special attention is in the projects dealing with integrated pest management. ICIPE should make an effort to link to other national integrated pest management programmes, especially the large FAO-sponsored programme in the Sahel area of Africa, and the USAID-sponsored Plant Protection Programme in Tanzania. ICIPE could serve as a valuable resource to these programmes as well as benefiting from results.

253. There is little active collaboration between ICIPE and ILRAD on tsetse fly, because the ICIPE programme has dealt mainly with the ecology and physiology of the fly whereas the ILRAD programme has been concerned mainly with immunological aspects. There have, however, been interchanges between the two organizations of tsetse flies for breeding programmes.

254. The position is very different with work on livestock ticks. In this, the criteria for collaboration outlined above are fully met and a productive relationship between the scientists is very evident. Recently at the top levels of management some strains in relationships have occurred, but at the time of the Team's visit a Memorandum of Understanding between the two organizations had been signed and good working relationships had been re-established.

255. Generally speaking, collaboration with IARCs is active. For work on resistance, germplasm of improved plants is obtained from IRRI, ICRISAT, IITA and CIMMYT. In the case of tsetse and livestock ticks, there is collaboration with ILCA, OAU/IBAR and national programmes; and for those institutions located in Nairobi, a formal Agreement for the "Nairobi Cluster" defines the research area of each institution within the concerted effort of developing integrated control of trypanosomiasis and East coast fever.

256. Cooperation between ICIPE and IRRI is proceeding very well. It has been and continues to be productive, both of scientific contributions and of results which can be incorporated into pest control systems. The ICIPE team interacts well with the staff of IRRI and has a number of collaborative activities which well complement those of IRRI. The brown planthopper (BPH)remains one of the most serious pests of rice in spite of production of resistant varieties by the IRRI plant breeders, which have greatly reduced hopper burn and the severity of the infestations of the virus disease which is transmitted by the planthopper. The research leadership is innovative and productive, and the research work on rice pests could not be done as effectively anywhere else as at IRRI. There are some disadvantages, but the compensations are greater, and the output has benefited from the very good esprit de corps that is a marked feature of the IRRI environment.

257. There is currently some cooperation between ICIPE and IITA, but it needs to be improved. Increased travel between members of the 2 centres would be very desirable.

258. ICIPE can contribute to the development of the new screening techniques and in testing varieties for resistance against local pest species. A start has been made with cowpeas, but much more should be done with cowpea and with maize.

259. Close relations and interaction between the University of Nairobi and ICIPE was foreseen from the very inception of the Centre. These ideas were translated into an actual Memorandum of Understanding signed by the two organizations in November 1970, which included provision for ICIPE staff to teach in the University as honorary lecturers, academic staff undertaking joint research in ICIPE as research associates, the sub-leasing of land for ICIPE to construct its headquarters, the sharing of selected facilities, and the establishment of a Liaison Committee under the chairmanship of the Vice-Chancellor. In discussions with the Vice-Chancellor of the University and the Chairman of the Department of Zoology, Team members were told that personal links on sharing facilities

were mostly satisfactory. In particular, the arrangements for joint supervision of Ph.D. students worked well, and was one reason why the University did not feel that it was necessary to be involved in the ARPPIS programme. The other reason was that they already had a strong M.Sc. programme.

260. A major question, which is taking some time to resolve, is the process of issuing a legal sub-lease to ICIPE for the plot it occupies in Chiromo on University land. The Memorandum of Understanding specified a sub-lease period of 40 years, with possibilities of extension by mutual agreement, and with provision for a 5-year notice for either party to terminate the sub-lease. The legal processes need to be speeded up, in order to give the ICIPE stability of occupation and development for some time to come.

Recommendations

261. It is essential that the University of Nairobi and ICIPE move closer, both at the personal and the institutional levels, by more frequent dialogue and by activating the Liaison Committee. In this respect:

(a) ICIPE should provide the University with some of its 5-year plan for training (para. 235) so that areas of mutual interest can be discerned.

(b) ICIPE should continue with its collaborative arrangements in research.

(c) ICIPE should continue to make a major effort to persuade the University to complete the sub-lease formalities.

262. The Team saw opportunities for more of the field work of ICIPE to be undertaken on field stations of Kenya Government departments e.g. agriculture.

# CHAPTER 8

## PHYSICAL FACILITIES

263. Previous chapters have discussed the management and scientific resources of the ICIPE; this chapter presents the Team's assessment of the physical facilities - laboratories, library, student accommodation, field stations, workshops and transport.

### Chiromo

264. ICIPE's main buildings at Chiromo were completed in 1974 on land belonging to the University of Nairobi on the outskirts of the city. As these facilities became more crowded, the Centre constructed some temporary buildings close by and also acquired a nearby house as an office and the library. The layout of the site is such that any further permanent building would be difficult and furthermore the University of Nairobi plans to re-acquire the site eventually.

265. By international centre standards, few of the facilities are satisfactory for the present activities. Most inadequate are the library (para. 245) and the insect-rearing facilities (para. 215). The laboratories provide scarcely adequate space for the research staff, but inclusion of research students in the teams leads to overcrowding (para. 229). Moreover safety and health facilities are inadequate, especially in the chemical laboratories.

### Duduville International Guest Centre

266. In 1976 and 1980 the Centre acquired 26.1 acres of land at Duduville, about 15 km from Nairobi city centre, as a site for new headquarters for the Centre. Phase 1, the construction of 30 units of accommodation for students and visiting scientists, was completed in 1980. In 1980 also the Centre requested architects to evaluate its capital development needs and to cost them. After discussion in the

Board the programme for Duduville Phase II was reduced, giving a new estimate of US$4.7 million. This would include laboratories, insectaries, library, training and conference, and administrative facilities. This estimate is probably a conservative one as there is rapid inflation in Kenya, offset of course to a considerable degree by the devaluation of the Kenya shilling against the US dollar. Phase I provides excellent accommodation though somewhat isolated from the headquarters at Chiromo.

Outreach Sites

267. ICIPE has acquired outreach sites at Kajiado in the savannah area (80 km from Nairobi), Muhaka Forest at the Kenya coast and most recently, Kuja River, consisting of 4 blocks of land, totalling nearly 1000 acres, 90 km (2 hours drive) from Mbita Point (Table 5). The Team was not able to visit any of these sites except Mbita Point.

Table 5: Lands Leased by ICIPE

| | | Leased/owned |
|---|---|---|
| 1. | Ruaraka (DIGC)-L/R 12334<br>Two plots (i) 19.2 acres<br>(ii) 6.9 acres | Leased |
| 2. | Muhaka - 320 acres | Leased |
| 3. | Mbita Point - 50 acres | Leased |
| 4. | Nairobi (Riverside Drive)<br>- 1.038 acres | House owned on leased land |
| 5. | Langata (Nairobi) - L/R 12181 | Leased |
| 6. | Kajiado - 10.1 acres | Leased |
| 7. | Kuja River (near Mbita Point)<br>- 988 acres (Four discrete pieces) | Lease being negotiated |

Note All leases are with the Covenment of Kenya.
Item 4 above contains ICIPE House, a residential unit converted to office and library use, owned by ICIPE

Mbita Point Field Station (MPFS)

268. In 1976 the Government of Kenya made 50 acres of land available to ICIPE on a lease. ICIPE chose this site for a number of reasons, including the fact that it is an area of resource-poor farmers and that the target insects in the Centre's research programme exist there in abundance.

269. The station is situated on the shores of Lake Victoria. It is in an isolated area, 500 km from Nairobi, and more than 40 km on a poor road from the nearest all-weather road at Homa Bay, the district headquarters. Consequently, it may be cut off for several days at a time during the wet season: Homa Bay itself does not have regular air service, so the station is a full day's drive from Nairobi. The Centre has other disadvantages. Several diseases, trypanosomiasis, malaria, and bilharzia, are endemic (drug-resistant malaria in particular being a serious problem); cropping in the area is atypical of the important agricultural areas of Kenya and indeed of Africa generally. Although the rainfall pattern is bimodal, the short rains are insufficient for a crop and even the long rains are unreliable. The black cotton soils are not a large component of major agricultural areas of Kenya or of Africa (except Sudan). The 10 acres of land available for experiments are not sufficient for the major research programme. The Centre is conducting

some experiments on farmers' fields in the better farming areas, but some of these are as much as 2 hours drive away; some farmer field experiments are also done near Mbita Point.

270. The reaction of scientists already working at the station is mixed, but some are unhappy about the isolation and worried by the health situation, especially for children. Their reaction is understandable for the station is the most isolated of any of the major research stations in the international agricultural research scene.

271. As a consequence of its isolation, the Station has had to plan to be self-contained for all services and had to build its own school, medical clinic, electricity, water and sewerage services. The impact of this on the overall costs of running the station will be high, thus raising the unit cost per scientist. In discussions with the scientists there, the Team formed the opinion that it may be difficult to retain first-class scientists at the station and that the ICIPE may well face a high turnover of scientists at the site.

Construction at Mbita Point

272. The master planning for the research facilities was completed in 1978 and ICIPE's architects then proceeded with detailed plans. Following pre-tender qualifications and international competitive bidding, the lowest bid of Ksh22.8 million (about US$3 million at prevailing exchange rates) was accepted. Construction started in April 1979 and was due for completion in April 1981, but the contractor went bankrupt and the contract was terminated in December 1980 with less than a third of the work complete. ICIPE decided that re-tendering would be too expensive and consequently set up its own in-house construction unit. The shortage of funds has led to long delays and at the time of the Team's visit (2 years after the projected completion date) they were informed that the construction was 60% completed. Some staff housing, school building, clinic and farm buildings are nearing completion but the administrative block and laboratories are less than 50% complete and housing for research support staff (stage 2 of the project) has not yet started. At the end of 1982, the ICIPE had spent Ksh20.88 million (including directly purchased items) and the Centre estimates that a further Ksh11 million (approx. US$1 million) will be required to complete the work. At present ICIPE estimates that the laboratories will not be completed until May 1984, an optimistic assessment in the Team's view.

273. The problem of construction has been exacerbated by ICIPE's own financial problems (para. 42), so the delays have been even further extended by lack of funds and their release on a rather unpredictable basis for the construction.

274. Apart from the laboratory and field equipment valued at pound sterling 250,000, provided by ODA for Mbita Point Field Station, no budget has been provided for laboratory and field equipment for the station. At the moment the programmes are expected to provide these out

of their own meagre capital budgets but these are completely inadequate to equip the station properly even though it is planned that some equipment will be moved from Chiromo. Because of the shortage of land at Mbita Point, it is proposed to develop land at the distant Kuja River site.

275. The history of the development of Mbita Point is an unfortunate one that has undoubtedly affected the morale of the non-Kenyan scientists and the quality of their work. However, it is to their great credit that they have managed to accomplish so much under living and working conditions that are below the standards expected for international scientists.

Workshops

276. At the workshops, staff are trained in glass blowing, electronics, metal and wood fabrication and vehicle maintenance. However, the unit sorely lacks equipment; in 1980, for example, two glass blowers returned from a 9-month training course overseas, but there is no glass-blowing workshop or equipment. Electronic test equipment is out of date, and there is not the right kind of testing equipment for the newest types of apparatus. The workshops are dispersed and are cramped for space. In a period of financial stringency the workshops are at the end of the queue. This is demonstrated by the fact that the budget for the vehicle workshops for 1983 does not include equipment, even though the demands are increasing for travel, e.g. to Mbita Point Field Station.

Transport

277. The Centre has 54 vehicles on its books, but 16 of these were out of action during the Team's visit. Many of the vehicles are old and need replacement. Vehicles are a vital part of ICIPE's operating facilities, because of its scattered field stations and a large amount of field work, often in difficult areas. There is a central pool of vehicles, and serious problems have arisen in their allocation to the scientists.

Conclusion

278. The Team has presented the capital development plan at some length since it considers that it presents serious problems for both the Centre's management and SCI. As indicated in para. 269, a considerable sum of money is needed to complete Mbita Point Field Station. While the completion of the physical facilities will certainly improve the quality of life for the scientists posted there, the isolation, the shortage of station land, and the distance from the more important farming areas of Kenya will continue to impose limitations on the crop research programmes.

279. The Team is also concerned that MPFS will continue as a drain on the capital resources of ICIPE and even its completion will not deal with the space problem at Chiromo. These can only be dealt with by developments at Duduville.

Recommendations

280. (a) ICIPE should obtain an independent estimate of the funds needed to complete Mbita Point Field Station (stages 1 and 2). In doing so, it should consider lower specifications for those parts not yet started, i.e. the housing for middle and lower grade staff (stage 2), though it recognizes that some housing for junior and middle grade staff will be essential.

(b) The Centre should develop, as a matter of urgency, a budget for scientific and farm equipment at Mbita Point.

(c) That as capital funds for even the modified capital plan for Duduville are not in sight, the Centre should develop an alternative strategy for operating in the next five years. While the Team supports the need for buildings there, the assumption must be made that little further capital development may take place at this site in the short term though it might be possible to provide space for some of the most hard-pressed sections, e.g. insect and animal rearing and workshops.

(d) That no further investment should take place at any of the other stations including Kuja River until the Board has received a detailed report on the potential usefulness of these sites to the ICIPE programme. Before a site is taken over for a station, there should be an approved plan and budget for its development.

(e) That in the longer term the Centre solicit suggestions and ideas for the sharing of the site (and the costs) of Mbita Point by national or international organizations interested in the animal and human disease vectors.

(f) That each programme leader should have a permanent allocation of suitable vehicles, over which he has full control. In the Team's experiences, vehicle pools do not work.

(g) The Centre has many diverse capital needs for buildings, vehicles, and equipment. The Team recommends that some additional funds for capital development be included in each annual budget provided to ICIPE, but that the Centre must prepare a detailed study of priorities for the use of such funds.

# CHAPTER 9

## ANSWERS TO QUESTIONS IN THE TERMS OF REFERENCE

281. In order to ensure that the Review Team would provide answers to the terms of reference, the Team paraphrased the terms into a series of questions. The questions may be used as a guide to the report. Each answer is followed by a reference to the numbered paragraphs or chapters where the matter is dealt with in greater detail.

The questions and the Team's answers are as follows:

1. How relevant is the present mandate to the future work of ICIPE, and particularly in relation to its work in Africa and to its role in research on crop animal and human pests and diseases?

   In general terms, the mandate is satisfactory, but the Team has outlined certain problems with it, and has suggested action which would tidy up the position (para. 15).

2. Is the present management structure of ICIPE appropriate for an institute with commitments to basic and applied research dealing with crops, animals and human?

   The Team has answered no to this question, and has recommended a number of changes in the structure and operation of the ICIPE management. The Team has confidence that these changes will overcome the problems that it has identified (Chapter 2).

3. What is the efficiency and the quality of the present system of management?

   The answer to these points are implicit in (2) above.

4. What are the staffing procedures and how efficient are they?

Many staff have a perception that the procedures for appointments, renewals, terminations and promotion are not being applied in a satisfactory manner. The Team has made recommendations which should improve the situation (paras. 58, 67, 69, etc.).

5. What is the role of the ICIPE Foundation?

   The Team understands that the ICIPE Foundation is currently reassessing its own views on this, and we have made some suggestions on the matter (paras. 29, 62).

6. Should SGI be represented on the ICIPE Governing Board, and if so, how should this be arranged?

   Yes, by having the power to nominate at least 2 members of the Board. This will imply that other organizations may have to be asked to relinquish part of their responsibility in this respect, if, as we recommend, the membership of the Governing Board remain at 16 (paras. 33, 56, 60).

7. Are the objectives of the research programmes relevant to the problems of the small farmer?

   Generally speaking, yes. This is especially true of the Crop Pests and of the Vectors of Diseases of Man and Animals (Chapter 3).

8. What is the basis for determining priorities?

   There is a formal procedure for this (Figure 3), and in principle it should be effective. In practice, the Team considers that there is inadequate "bottom-up" planning, and recommends enhanced input by the scientific staff of the Centre (para. 72). However, we note that there have been substantial changes in the research programmes in recent years (Table 1) and comment these. The Team is of the view that there still remain too many small projects and has commented on these in Chapters 3 and 4.

9. What is the basis for determining the balance between programme and between applied and basic research?

   This balance has been changing significantly with time towards an increase in the amount of effort in the applied area. The Team has commented at length on this matter in Chapters 3 and 4.

10. What is the quality of the research as measured by performance, and as measured by reference to the advancing state of knowledge and technology?

The quality of research is a direct reflection of the ability of the project leader. Not surprisingly, the quality varies. Some of the work is very good by any standards. Lack of funds available for overseas travel has prevented some scientists from keeping as well up to date as they, and the Team, would wish. It is to be hoped that more scientists will be able to attend more conferences and visit more laboratories overseas that are relevant to their work. Lack of travel funds could have long-term deleterious effects on scientists, and the Team strongly recommends that increased opportunities be provided to encourage scientists to keep up to date in their fields of work (Chapters 3, 4 and 6).

11. How adequate is the funding of ICIPE?

The Centre has operated with a substantial deficit but this is being effectively reduced. Better use of monies is possible, but the Team makes a strong case for additional funds, although we wish no increase in the numbers of research scientists (Chapter 2 and para. 288).

12. How does the lack of stability in funding affect:
(a) the research programme of ICIPE
(b) the support staff
(c) the building programme
(d) the equipment in ICIPE

The impact of lack of stability has been discussed at length in each of the programmes and support areas covered by this report (Chapters 3 and 4 and para. 280).

13. What relationship is there between core and non-core support?

The Team has recommended that the proportion of core support be increased as opportunity offers, because funding for too many special projects can distort the priorities of the Centre (par. 286).

14. What is the level of cooperation between national and international programmes and ICIPE? What is the level of cooperation between ICIPE and scientific institutions and the developing and the developed countries? What are the present methods of cooperating with ILRAD and with other organizations?

These questions are dealt with in Chapter 7 of the report.

15. What is the degree to which the Centre is in contact with and utilizing the intellectual resources of basic research institutes?

The Centre initially had extremely close contacts with many of the major world centres of research in entomology. The Team has recommended in 10 above that more frequent overseas visits be one of the means of maintaining contacts. The Team believes that the extent of the contacts may have been somewhat eroded although there is abundant evidence that many of the ties with other laboratories are very close (Chapters 3 and 4).

16. What is the degree to which the Centre is in contact with and utilizing the resources of FAO, UNEP, WHO, and other relevant specialized agencies?

There are close ties between ICIPE and a number of specialized agencies. Members of the Team were able to visit each of those specifically referred to in the question and they found relations to be generally very close (Chapter 7 and Annex 1). However, there are some exceptions to this statement, and these instances need attention.

17. In what ways can the Centre help national programmes in Africa, and what is the potential usefulness of the work of the Centre in:

(a) training at all levels
(b) its new technology
(c) the efficiency and value of the Integrated Pest Management training courses?

The work of the Centre will continue to assist the national programmes in many ways. The training programmes are well attended and, so far as we have been able to judge, effective. They are certainly appreciated. Several developments in the technology of pest control are having an impact. These matters are discussed in greater detail in Chapter 6 and in the discussion of the research programmes (Chapter 3).

The efforts to provide opportunities for African entomologists to improve their knowledge and understanding are commendable (Chapter 6).

# CHAPTER 10

## CONCLUDING OBSERVATIONS

282. Although ICIPE shares some common objectives with the international centres in the CGIAR system, it faces problems that are unique. Not least of these is the instability of funding which SGI has not yet overcome. The objectives of the Centre must, by their very nature, take time to accomplish and there are few opportunities for the "quick" impact type of results that can be achieved through plant breeding in irrigated agriculture, for example. The work of ICIPE must be seen in a mainly African context where 95% of all agricultural production is rainfed. In such conditions opportunities for large increases in production are less than in irrigated agriculture. Thus the need to increase production by reducing crop losses is perhaps even more important. Compared to an international institute with a crop mandate it is much more difficult to set priorities amongst the vast range of insect problems that beset tropical agriculture. The Team therefore continuously asked itself these questions: How can an international centre, devoted to the study of insect pests, (a) deploy its limited resources in such a way that it can make worthwhile advances in the relevant basic and applied sciences, and in the development of technologies that can improve farming in the tropics and more particularly in Africa, and (b) how can it accomplish these objectives in a reasonably short time span?

283. The Team has no ready answer to these questions but it can list some of the essential prerequisites. These include:

(a) The need for stable year-to-year funding so that the Centre can concentrate on an agreed set of problems and not deviate from these because of short-term financial pressures or inducements.

(b) The need to concentrate its resources in a few areas, cancel unfruitful programmes in a timely fashion and hand over lines of work to other institutions when their further pursuit would be beyond ICIPE's resources or mandate.

(c) The need to use resources effectively through efficient management and efficient forward planning.

(d) The need to set realistic objectives in terms of financial and manpower resources, and in terms of achievability in a realistic time frame.

(e) The need to make full use of the resources of other institutions: Kenyan national, African national, developed country national, international and industrial research organizations.

(f) The need to identify opportunities for useful topics in the basic sciences where the Centre will not be competing with far better funded and equipped organizations elsewhere in the world.

(g) The need to have a cadre of top class scientists kept up to date by reasonably frequent opportunities to work in, and collaborate with, fellow scientists in advanced institutes elsewhere.

(h) The need to ensure that it maintains its international character and that its work in Kenya is not distorted by the need to concentrate on the solution of primarily local problems, though it can use such local problems as models for research and application elsewhere.

284. Given these prerequisites the Team believes that the Centre can achieve its objectives by capitalizing on its unique advantages. The most important of these, in the Team's view, is ICIPE's capacity to investigate all the important aspects of a pest problem by breaking down such a problem into a series of insect and host projects, investigating each aspect of these, and then to put together the results in a coherent fashion. The tick programme provides a model as to how this can be done successfully. Furthermore, the Centre can do this in a developing country setting where the parameters set by the conditions of small farmers can be properly defined and where the results can be tested in a very wide variety of tropical conditions.

285. The Centre has some other important advantages. Amongst these is the opportunity to interest the world scientific community to help in some fascinating problems of insect science in developing countries. Another is the ready availability of easily trainable support staff. Yet another is the availability of a series of diverse environments (also a problem of course in that these make choice more difficult).

286. What should be expected from such research? In the Team's view, even if revolutionary breakthroughs in control of pests did not

eventuate, it would be reasonable to expect a few major successes. What should be expected is that, by developing a multidisciplinary approach, ICIPE can pioneer a way that is uniquely suited to solving the problems of small farmers. Many institutes, particularly in the developed world can train scientists in the various disciplines of ICIPE's research programme, but none can train them in such a multidisciplinary setting in a tropical environment. In such a setting they will learn to work in and eventually lead similar groups in their own countries. If ICIPE is successful in this, then the Team foresees the development of first-class groups of pest management scientists in Africa and elsewhere over the next two decades. These in turn could contribute to the development of improved systems for small farmers in a continent where per capita production is falling.

287. The Team believes that ICIPE should continue to undertake much of its work in the broad field of what is often called strategic research, namely in-depth studies relevant to and leading to understanding of pest management and its application. This does not mean that ICIPE should not be involved in developing control models or in practical control. Indeed the Centre should be encouraged to do so when results justify technology transfer, as in the tick programme, or where practical control programmes provide valuable data that could lead to relevant understanding of population ecology or insect behaviour and physiology, and hence to improve control as in the recent studies on tsetse in the Lambwe Valley.

288. The Team's Terms of Reference covered all aspects of the Centre's activities. It formulated these terms into a series of questions (Chapter 9) which it then attempted to answer through its discussions and recommendations. Some of the questions could be answered in specific terms; many are matters of judgement. The Team gave considerable attention to the management of the Centre because many of the questions raised by the terms of reference have particular reference to this. ICIPE's capital development confronted the Team with difficult questions because of the way in which this development has occurred in the past, resulting in the Centre having two major but partially completed sites. The errors of the past can only be rectified partially, and the Team in suggesting least-cost solutions is fully aware that there can be no fully satisfactory solution, but rather compromises, and that the Centre will have to live with these in the future.

289. The Team has been made fully aware of the problems posed by the way in which the Centre is financed, particularly its dependence on restricted core funding. The objective might be about 75% of unrestricted core funding but the team recognises that it will not be possible to achieve this for the next few years, at least. It can only urge the donors to work collectively towards this goal.

290. In making its recommendations for future work the Team has not attempted to provide a blueprint for the next three years. It has commented on forward plans where these have been available but it did not

regard it as within the Team's role to set out a strategic plan for the future. Rather it intends that its discussion and recommendations will provide the framework within which the management of the Centre, including the Board, can develop such a plan, which should be done as a matter of urgency.

291. In its discussions of the research programmes of ICIPE, the Team has described their strengths and weaknesses, recognizing that no research institute can achieve top-class quality in every aspect. In making its recommendations for change, it has tried to do so in the context of the philosophy expounded in this short chapter. The Team hopes that the Centre's supporters will also see the Centre in a similar context, and give it the stable financial support needed to achieve its objectives. The Centre has learnt a great deal from its successes and failures during its short life. These lessons will surely stand it in good stead in the next decade.

292. The Team strongly recommends to SGI that stable funding for ICIPE be given high priority.

## ITINERARY

Annex 1

**Dr. M. Way**

| | |
|---|---|
| Before March 20 | Brief discussions with Dr. F.T. Haskell, Member of the Governing Board, and Dr. Davies, recently Deputy Director of ICRISAT |
| March 21 | Discussions at World Health Organization (WHO), Geneva. |
| | Dr. J. Hamon, Assistant Director General |
| | Dr. R. LeBerre, Division of Vector Biology and Control |
| | Dr. A.O. Lucas, Director for the Special Programme for Research and Training in Tropical Diseases |
| March 22 & 23 | Discussions at the Food and Agricultural Organization (FAO) Rome |
| | Dr. D.F.R. Bommer, Assistant Director General |
| | Dr. R.B. Griffiths, Director, Division of Animal Production and Health |
| | Dr. J. LeRoux, Director, Division of Animal Production and Health |
| | Dr. McCosler, Director, Division of Animal Production and Health |
| | Dr. G. Taylor-Lewis, Division of Animal Production and Health |
| | Dr. L. Chirappa, Head of Plant Protection Service |
| March 24 & 25 | Discussions at the International Atomic Energy Authority, Vienna (FAO/IAEA programme) |
| | Dr. D.A. Lindquist, Head, Insect and Pest Control Section |
| | Dr. J.R. Plimmer, of the Section |
| | Dr. L. Vollmer, of the Section |

| | |
|---|---|
| | Dr. E.T.B. Buyckx, Chief Entomologist, Plant Protection and Production Service (FAO, Rome) |
| | Dr. A. Micke, Head, Plant Breeding and Genetics Section |
| March 26 | Arrive in Nairobi |
| **Dr. M.F. Day** | |
| March 22 | Arrive in IRRI, Philippines |
| March 23 | Discussions with Dr. M.S. Swaminathan, Director General |
| | Dr. R.C. Saxena, Programme Leader IRRI/ICIPE Joint Programme |
| | Dr. A.A. Barrion |
| | Dr. H.D. Justo, Jr. |
| | Programme staff |
| March 24 | Discussion with Dr. R.C. Saxena continued |
| March 24 | Leave Manila for Nairobi |
| March 25 | Arrive Nairobi |
| March 26 | Team assembled in Nairobi |
| March 27 | Team discussions on mission |
| March 28 a.m. | Overview of ICIPE; discussion on finance, budgeting and capital development programme. |
| p.m. | Discussion on establishment, communication, library and documentation |
| March 29 a.m. | Presentation and discussions on training, livestock ticks. Travel to Kenya Agricultural Research Institute (KARI) Muguga. Discussions with Dr. W. Masiga, Director, Veterinary Research Department, and staff |

| | |
|---|---|
| p.m. | International Laboratories for Research on Animal Diseases (ILRAD). Dr. R. Gray, Director General, Dr. J.J. Doyle, Director of Research |
| March 30 a.m. | Presentations and discussions on Tsetse Research Programme |
| p.m. | Continue discussions, visit to Insect and Animal Rearing Unit |
| March 31 a.m. | Depart by chartered aircraft to Murumbi Ranch. Discussions on Tick Programme. |
| p.m. | Continue to Homa Bay and the Lambwe Valley; discussion on tsetse ecology |
| April, 1 a.m. | Homa Bay - Mbita Point Field Station. Visit to facilities. Presentation and discussion on Crop Borers Research Programme |
| p.m. | Visit to experiments in farmers' fields |
| April 2 a.m. | Mbita Point Field Station. Visit to school and clinic. Presentation and discussion, Insect Pathology and Pest Management Programme and Research Programme on Bases of Plant Resistance to Insect Attack |
| p.m. | Return to Nairobi by air |
| April 3 | Team discussions |
| April 4 a.m. | Presentation and discussion of the Chemistry and Bioassay Unit, Histology and Fine Structure Unit |
| p.m. | Presentation and discussion of the Sensory Physiology Unit, Computer and Biostatistics Services Unit |

| | | |
|---|---|---|
| April 5 | a.m. | Presentation of Leishmaniasis Research Programme |
| | a.m. | By air to Baringo (except Prof. Boeckh). Visit to leishmaniasis field experiments |
| | p.m. | Discussions in field and laboratory. Return by air to Nairobi. (Prof. J. Boeckh discussions with staff of research units) |
| April 6 | a.m. | Discussions with scientific staff; discussions with Director Dr. Maxwell and Dr. Coulter visit UNEP (Dr. Waiyaki, Programme Officer, Environmental Management Service). Dr. Day and Dr. Way visit to University of Nairobi (Dr. J.F. Mungai, Vice Chancellor) |
| | | Dr. Atang and Prof. Boeckh, visit Prof. P. Cacii, Ministry of Regional Development, Science and Technology |
| | p.m. | Team meeting with Dr. Munyua Waiyaki, Minister for Agriculture, Dr. J. Gitau, Director of Research |
| April 7 | a.m. | Dr. Maxwell and Dr. Atang visit USAID (Mr. J.W. Koehring, Director, East Africa Regional Economics Development Services Office) |
| | p.m. | Dr. Day meeting with Professor Kinuti, University of Nairobi |
| April 8 | p.m. | Visit with Mr. Skoog, Swedish Embassy, Dr. Way departs |
| April 9 | a.m. | Presentation of highlights of report to ICIPE staff by Chairman of Team |
| | p.m. | Dr. Maxwell departs for IITA |
| April 11 | a.m. | Dr. Day and Dr. Coulter visit UNDP Resident Representative (Mr. Pennacchio) |
| | p.m. | Dr. Day and Dr. Coulter visit UNESCO Regional Director (Chief Ibekun) |
| April 13 | | Dr. J.E. Coulter departs |

<u>Dr. F. Maxwell</u>

| | | |
|---|---|---|
| April 9 | p.m. | Depart Lagos |
| April 10 | a.m. | Arrive IITA |
| April 14 | | Depart Lagos |

Annex 2

## LIST OF DOCUMENTATION SUPPLIED BY ICIPE

1. General information for the Triennial Review Team
2. Review Team members and detailed programme
3. Report of the UNDP Evaluation Mission, December 1980
4. Report of the visiting Group on Administration and Finance, September 1978
5. Report on the TAC Review
6. List of publications. Annual, 1971-1972 to 1982
7. General Introduction to ICIPE, 20 March 1983
8. ICIPE Capital Development Programme, 22 March 1983
9. Financial Report by Mr. E. English, March 1983
10. Research Training at ICIPE, 20 March 1983
11. Collaborative Research and Training, 20 March1983
12. Study Workshops and Scientific Working Groups, 20 March 1983
13. ICIPE Planning and Budgeting Procedures, 22 March 1983
14. Annual Report and Accounts for the year ending December 1982, Annex 1
15. Structures, Programmes and Resources of ICIPE (Policy Statement by ICIPE Governing Board)
16. Ninth Annual Report, October 1982
17. Tenth Annual Report, March 1983
18. Report of the Scientific Working Group on Tsetse Ecology and Its Application to Trypanosomiasis Control
19. Joint project on biology and biochemistry of microbes for biomass degradation, IAEA
20. Record of the discussions held during the inhouse IPPM workshop outlining research activities and links with other ICIPE programmes, March 1982 (M.W.)

21. Minutes of the 7th Meeting of the Programme Committee, 21 April and 26 April 1982

22. IITA Cooperative Project on Maruca, 1981

23. ICIPE-IITA Cooperative Research Project on Cowpea Pests (Phase II) grant support, 23 June 1981

24. Official visits to IITA, Ibadan, 1[illegible] - 16 May 1981, Z.T. Dabrowski, May 1981

25. ICIPE-IITA Cooperative Research Project on Cowpea Pests (Phase II), 2 February 1983

26. ICIPE-IITA Cooperative Programme for 1978, Revised Budget February 27, 1978

27. Proposal for collaborative research between ICIPE and IITA, 20 December1977

28. Memorandum of Agreement between ICIPE and IITA, June 1976

29. Twenty-fourth meeting of the Technical Advisory Committee Report of meeting (see para. 171-182 for discussions of ICIPE's application to join CGIAR), July 1980

30. Extract Minutes, 11th meet[illegible] of the Executive Committee (Financial Regulations), [illegible] March 1981

31. I[illegible] PE-II[illegible] operative project on Maruca, 16 October 1980

32. ICIPE-IITA cooperative project on cowpea pests: Report, October 1982

33. ICIPE-IITA cooperative research project on cowpea pests (Phase II). Revised workplan (mid-October 1982 to mid-April 1983).

34. Thomas R. Odhiambo, An African Perspective of Faith and Science in an Unjust World (M.D.)

35. R.C. Saxena, complete set of reprints on insect pests of rice

36. Details of management papers

37. Current organization chart

38. Estimate of editorial services provided by ICIPE to Professor Odhiambo on Insect Science and Its Application

39. Calculation of ICIPE's dollar/DM/other foreign currency costs

40. ICIPE financial summary 1979-1984

41. ICIPE's operating expenditure by category 1980-1984

42. Analysis of ICIPE Income - budget vs actual

43. An estimate of costs to complete Mbita Point Field Station Stage I

44. Analysis of staff benefits foregone 1979-1983

45. List of various committees and membership

46. Staff turnover analysis 1981-1982

47. External Auditor's Report for 1983

48. ICIPE's new Patent Policy of 23 March 1983

49. Staff clinic at Mbita Point Field Station

50. Vehicle-aging analysis

51. Financial Regulations and Rules

52. Agreement with Pergamon Press Ltd (2)

53. April 1982 Board Minutes for Programme budget

54. November 1982 Board Minutes for Programme budget

55. Staff salary scales 1979-1983

56. An example of how capital budget is changed by Board

57. ICIPE commentary on USAID Evaluation Mission Report on Bases of Plant Resistance to Insect Attack Research Programme dated 25 November 1982, USAID

58. Bases of Plant Resistance to Insect Attack Project Paper, June 1982, USAID

59. Tick Resistant Cattle in the Ecological Management of Ticks, 1983-1987, Project Paper, USAID

60. ICIPE-IITA Cooperative Research Project on Cowpea Pests (Phase I) and Phase II. Two documents dated 1981 and 1982

61. Sensitivity of T. vivax and T. congolense infected G. morsitans to Endosulfan. UNDP-ICIPE Regional Project on Pest Control for Increase of Livestock Production in Africa 1983-1986

62. Protocol d'etude et de recherche en microscopie electronique ICIPE

63. Research and Training in Animal Trypanosomiasis and other Livestock Pests.

Annex 3

"East Africa: Science for Development"

Thomas R. Odhiambo, Senior Lecturer in Zoology, University College of Nairobi, in Science, Washington D.C., 158:876 - 10 March, 1970

"It seems to me that Africa's best long-term solution to the problems of conducting effective research is to concentrate research effort in 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, taxonomy, physiology, 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 ensuring 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 INTERNATIONAL CENTRE OF INSECT PHYSIOLOGY AND ECOLOGY

PROGRAMME EXPENDITURE FOR THE YEARS 1980, 1981, 1982 AND PROJECTIONS FOR 1983 AND 1984

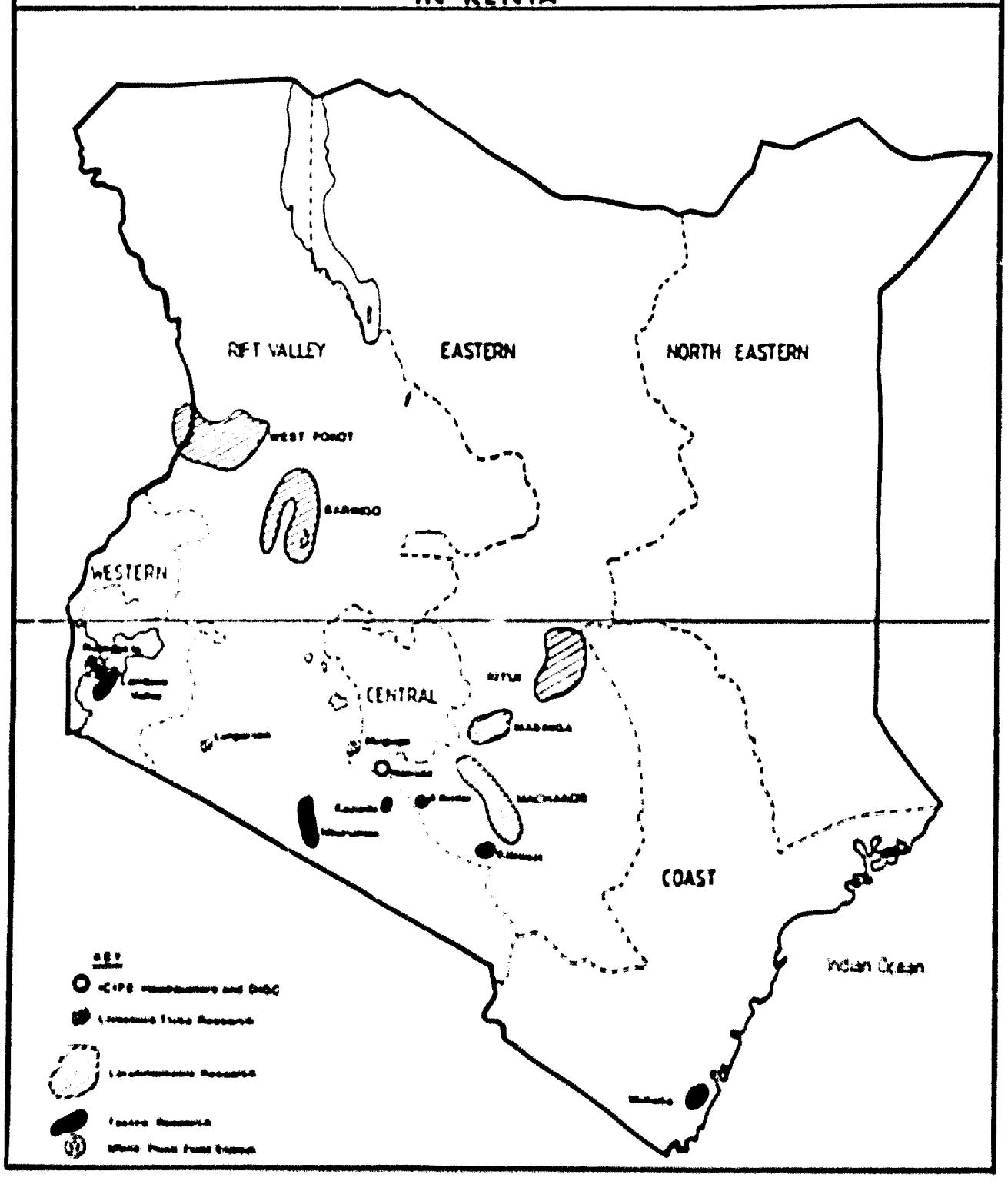
(IN U.S. $)

| PROGRAMME/SERVICE/UNIT | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|
| **CORE RESEARCH PROGRAMME** | | | | | |
| Sense of Plant Resistance | 371,838 | 388,288 | 313,681 | 377,600 | 300,100 |
| Crop Borers | 363,108 | 474,304 | 303,387 | 427,700 | 463,300 |
| Grassland Termites | 201,081 | 217,030 | 50,546 | - | - |
| Livestock Ticks | 249,158 | 300,030 | 168,033 | 387,000 | 351,700 |
| Tsetse | 490,908 | 481,083 | 330,217 | 403,000 | 401,000 |
| Medical Vectors | 234,400 | 320,008 | 109,711 | 334,000 | 320,600 |
| African Armyworm | 98,374 | 14,763 | - | - | - |
| Insect Pathology and Pest Management | - | - | 133,410 | 320,000 | 346,300 |
| | 2,101,701 | 2,079,547 | 1,409,064 | 2,011,400 | 2,000,000 |
| **RESEARCH UNITS** | | | | | |
| Chemistry and Bioassay | 283,970 | 242,710 | 141,938 | 247,400 | 244,000 |
| Histology and Fine Structure | 90,388 | 87,027 | 60,745 | 131,400 | 130,600 |
| Sensory Physiology | 101,527 | 119,308 | 90,308 | 113,300 | 111,300 |
| Biostatistics and Computer Services | - | - | 202,540 | 100,000 | 126,000 |
| | 438,300 | 449,133 | 504,511 | 590,100 | 611,900 |
| **RESEARCH SUPPORT SERVICES** | | | | | |
| Insect and Animal Breeding | 113,147 | 117,430 | 101,300 | 103,300 | 117,000 |
| White Point Field Station | 160,411 | 161,170 | 157,470 | 430,400 | 474,900 |
| Mubuku Field Station | 83,430 | 90,000 | 60,378 | - | - |
| Sajiado Field Station | 4,313 | 8,000 | 3,400 | - | - |
| Workshop and Laboratory Management | 150,710 | 157,915 | 121,913 | 103,000 | 100,000 |
| Outreach Management | 70,203 | 41,300 | - | - | - |
| Transport Unit | 107,304 | 73,010 | 73,200 | 134,100 | 131,300 |
| | 711,507 | 647,103 | 522,065 | 814,700 | [illegible] |
| **COMMUNICATION AND TRAINING** | | | | | |
| Training | 300,000 | 373,100 | 310,047 | 470,400 | 540,000 |
| Conferences and Study Workshops | 134,458 | 87,000 | 30,000 | 52,700 | 90,600 |
| Library and Documentation | 70,404 | 70,547 | 70,758 | 91,000 | 97,500 |
| Communication and Information | 340,000 | 104,008 | 130,050 | 341,000 | 322,900 |
| | 850,500 | 611,404 | 501,330 | 904,700 | 950,000 |
| **MANAGEMENT AND GENERAL OPERATIONS** | | | | | |
| Board and Committees | 90,502 | 30,100 | 51,330 | 100,000 | 71,600 |
| Director's Office | 300,910 | 334,113 | 300,758 | 327,700 | 413,200 |
| Finance - Accounts | 300,931 | 303,134 | 150,400 | 102,700 | 107,100 |
| Finance - Supplies | 34,700 | 30,123 | 30,200 | 40,700 | 47,300 |
| Personnel and Office Management | 330,303 | 300,130 | 143,017 | 100,700 | 313,100 |
| Security and Janitorial Services (inc. Utilities) | 332,010 | 100,503 | 63,127 | 130,300 | 300,300 |
| SUB-TOTAL | 1,970,301 | 1,001,230 | 750,002 | 973,000 | 1,104,300 |
| | 5,343,900 | 4,701,503 | 3,010,028 | 5,201,000 | 6,501,600 |
| **SELF-FINANCING UNITS** | | | | | |
| Dudeville International Guest Centre | 83,330 | 94,004 | 141,143 | 103,500 | 107,700 |
| White Point International School | 17,030 | 67,430 | 54,113 | 70,400 | 97,700 |
| | 100,170 | 143,004 | 100,300 | 171,900 | 300,000 |
| **INTEREST ON OVERDRAFT** | 14,000 | 51,001 | 71,040 | 50,000 | - |
| **CAPITAL DEVELOPMENT PROGRAMME** | 1,403,101 | 930,740 | 501,340 | 504,000 | 510,000 |
| **SPECIAL PROJECTS** | - | - | 174,013 | 143,000 | 143,000 |
| GRAND-TOTAL | 6,903,700 | 6,723,100 | 4,000,324 | 6,340,000 | 7,[illegible] |
| DATE USED (U.S.$0.70 US $ 1.00) | 0.13 | 0.24 | 11.30 | ACTUAL ESTIMATE | ACTUAL ESTIMATE |

Best Available Document

**Annex 5**

# ICIPE'S RESEARCH SITES IN KENYA



# BOARD RESPONSE TO REPORT OF REVIEW TEAM

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ANNEX III CORRECTION OF FACTS RELATING TO TRT DESCRIPTION OF MANAGEMENT PRACTICES

## PREAMBLE

The ICIPE Governing Board expresses its deep appreciation to the First Triennial Review Team for its timely and thorough review of the ICIPE. In endorsing all of the major recommendations and a high proportion of the detailed recommendations, the Board acknowledges the importance of the Report to its own management and planning responsibilities. The Board believes that the Report will lead to the strengthening of mission and programme of ICIPE, for which it is grateful.

In this preamble the Board draws attention of the SGI to four considerations:

I. The Board has fully accepted the main arguments of the Report's recommendations regarding (a) reorganization of the scientific programme, (b) decentralization of ICIPE's management style, and (c) responsibility of the Board for tighter financial and personnel review. Some of the changes implied are minor; others are substantial. Many accelerate management and program changes already endorsed by the Board. None of the recommendations are contrary to our plans and hopes for ICIPE.

At its next meeting (November, 1983), the Executive Committee of the Board will consider a detailed Calendar of Implementation of the Report's recommendations. It is expected that many of the recommendations will be implemented immediately, or in the very near-term. Other changes require Board deliberation and approval, and thus will be implemented within twelve months. A few of the more complicated programme changes should be phased carefully, in accord with the availability of senior staff and the development of the scientific programme. All of the recommendations will be implemented within the triennial review cycle. A report on the progress of implementation will be presented to the SGI on the occasion of the 1984 "Chairman's Annual Report to the SGI."

II. To help ICIPE meet the programme recommendations of the Triennial Review Team, the Board has revised its early policy with respect to optimum size for ICIPE. As noted below (para 57), ICIPE will operate with 40 professional staff-years in 1983 onwards. This is a reduction of 4 professional staff-years from the level identified in the policy paper submitted to SGI in 1982.

III. The recommendations have onsequences not only for ICIPE, but also for the SGI. The recommendations assume that ICIPE's funding is stable and predictable. Guaranteeing such a funding pattern is beyond the control of ICIPE's Board. Even as we write this promised cooperation with the Report's recommendations, we note that the timing of pledged grants received in 1983 threatens our ability to do so in good faith. Further, the recommendations of the TRT have consequences for the levels of expected expenditure. Management has prepared a paper (see Annex I) costing out the Team's recommendations at approximately US $2.4 million. The Board notes that it can be fully responsive to the Report only if these additional funds are available.

IV. For reasons not necessarily the fault of the TRT Team, errors of fact have crept into its account of ICIPE's history and into its description of current management and financial practices as well as into its analysis of general policies of governance. These errors can partly be traced to inadequate or out-of-date documentation provided by ICIPE, for which we apologize and will correct. The errors can also be traced to a schedule which prevented the full Team from meeting with the Board or its Executive Committee. We also regret that the Team's schedule limited the amount of time spent with the Director. Where the Board believes these errors of fact are material to understanding its response to recommendations, it has attempted to set straight the historical record (Annex II, on lessons learned from the financial crises, and in the commentaries on the Mbita Point Field Station). We have also clarified actual management practice (see Annex III, Corrections of facts relating to the TRT Description of Management Practices).

## RESPONSE OF THE BOARD TO RECOMMENDATIONS FOR CHANGE IN MANAGEMENT

55. This paragraph incorporates three general recommendations, all of which have been endorsed by the Board. Specific responses to the particulars implied in these three general recommendations appear in comments on detailed recommendations. Here we comment at the same level of overview adopted in paragraph 55.

(a) a necessity for the Board to have a greater capacity for, and role in reviewing key decisions.

The Board feels it has already initiated and begun fully to implement necessary changes with respect to closer monitoring of finances and expenditure. It needs to consider improvements in its responsibility of review of key personnel decisions, including promotions and termination. In light of these responsibilities, the Chairman of the Board and the Chairman of the Programme Committee will make more frequent trips to ICIPE. In addition, the Executive and the Programme Committees are assessing the pros and cons of an additional meeting each year. With respect to both financial and personnel management, new quarterly reporting is being initiated. Additional details appear in subsequent paragraphs.

(b) a shift in the Director's centralized management style -- with a concomitant upgrading of the capabilities of some key staff and improvement of control systems.

As will be evident in Board agreement with many specific recommendations, the Board fully endorses this important recommendation. Establishing a research institute and guiding it through financial crises inevitably leads to centralized management as noted in para 37 by the TRT. The successful establishment of ICIPE and the resolution of the financial difficulties permits the Board to implement a much more decentralized management style, at least if we can assume stable financing.

Although the Board felt it could not endorse a particular organizational chart (see para 74) in the time it had available to respond to the TRT Report, it does wish to indicate its agreement with the spirit of the TRT recommendation. Consequently, as indicated below, the Board has requested further revisions in the Staff Regulations and Rules and in the Financial Regulations and Rules. These revisions will prescribe and strengthen deputization of authority. Additional organizational changes will implement and reflect the general recommendations to decentralize authority, upgrade the capabilities and responsibilities of key staff, and improve control systems. Where appropriate, these changes will be codified in a revised organization chart to be reviewed at the next Annual Board Meeting.

(c) much greater participation of senior scientists in planning so that there is a strong element of "bottom-up" as well as "top-down" planning in the whole process.

The Board shares with the TRT Report the basic principle of scientific management that planning should remain as close as possible to the level of the working scientists. This Board policy is reflected throughout our response to the TRT Report, not only in the sections on management but also, and especially, in the sections on the scientific program.

56. If the Board did not agree with the confidence expressed in this paragraph, it would be acting irresponsibly to agree to so many of the TRT Report's recommendation. In those few instances where the Board believes that adopting a recommended change could have adverse consequences, we do not endorse a change at this time.

57. The Board accepts the recommendations to formulate an ICIPE Strategic Plan, important components of which already exist and have been shared with the SGI. The Strategic Plan will rest upon a Board policy adopted at its 44th Annual Meeting, which alters previous policy regarding the number of professional staff-years. The policy paper submitted to the SGI last year, as cited in para.25 of the TRT Report, should now be revised to read as follows: "That the ICIPE will operate with 39.5 professional staff-years in 1982, and not more than 40 professional staff-years in 1983 onwards. Future reduction and/or modest growth will be evaluated in the light of the strategic plan".

It should be noted that in this important respect, the Board has varied its prior policy statement which was endorsed by TRT (para.26) regarding the number of professional staff-years.

58. The Board is pleased that the TRT Review shared its view of the importance of two recently developed tools of ICIPE management - the Financial Regulations and Rules and the draft Staff Regulations and Rules. The Financial Regulations were approved by the Board with effect from July 1981 in the knowledge that they were susceptible of considerable refinement which would follow a test of time. The TRT Review has identified certain Financial Regulations and Rules which clearly need revision. At the same time the Board would point out that the Regulations are intended to represent codification of Board policy decisions relating to financial administration, i.e. they are issued, revised and interpreted by the Board. The Rules on the other hand are promulgated by the Director, and represent his arrangements for implementing Board policies as enshrined in the Regulations. Article I ("Introduction") of the Regulations and Rules attempts to explain this conceptual framework. It will be clear that the Regulations, when prescribing actions to be taken by the ICIPE, are uniformly addressed to the Director, as its Chief Executive Officer. Important delegations of authority by the Director are intented to be codified in the Rules issued by him. The Board takes the point made by the Review that the Rules reflect an insufficiency of delegated authority by the Director.

The conceptual framework described above also applies in the case of the draft Staff Regulations and Rules, which are currently under Board consideration and the observations of the TRT Review will be of value in that connection.

The Board is increasing its quorum to eight, one-half of its membership. (See Annex III, Para. 37)

59. Agreed. The Board shares the TRT's view of the importance of professional skills in management and finance being adequately represented in its membership As constituted for 1983/84, the Executive Committee will be comprised of seven (out of 16) Board members, including the Director. The Board expects to maintain this ratio and counts on the SGI for nominations appropriate for Executive Committee assignments.

The Board accepts the TRT suggestions that the Director should not serve as a member of the Nominating Committee. In future he will serve as Secretary of that Committee, which will be a sub-committee of the Executive Committee.

60. Agreed. The Memorandum and Articles of Association of the ICIPE are badly out of date and need to be revised and up-dated. In that process the questions of quorum and of Company membership for Board members will be reviewed. The Board expects that the concerns expressed by the TRT will be satisfied as a result.

61. Agreed. The ICIPE Foundation representation on the Board will be reduced in consequence of decisions expected to be taken at the next meeting of the Foundation's General Assembly, scheduled for September 1983.

62. Agreed. The Board confirms that the Director is a full voting member of the Board.

63-69: Observations: The Board understands and agrees with the Team's concern for increasing the degree of "bottom-up" planning in respect to management policies and decisions which affect the quality and effectiveness of the scientific programmes. As the Team itself observed in para. 37, in the formative years of the Institute and through its later financial crises induced by funding uncertainty and instability, the management had to exercise unusually tight controls. This led to a highly centralized mode of decision-making. The Board takes the point that both staff regulations and financial regulations should be under continual re-examination by the Board and the Management in order to identify and implement opportunities for greater delegation of authority and responsibility, especially to the scientific Programme Leaders and senior scientific staff. While the Board fully agrees with the general thrust of administrative recommendations made in para. 67-69 we are not persuaded of the workability of some of the detailed delegations suggested. In particular, in connection with the recommendation for greater delegation of appointment power up to the PQ level, we would insist that such delegation be in accord with the general Board policy expressed in (Min.255/79 (a) that "the principle of evaluation by peers should be followed, i.e. scientist candidates should perceive that they are being judged by scientific peers capable of assessing the value of their scientific accomplishments."

To implement this policy of the Board the Director has established a system of consultation with appropriate Programme Leaders, Senior Scientists, and Administrative Officers in connection with all new appointments, performance evaluation and contract terminations. We would agree that this system needs to be monitored by the Board and the Director to make certain that it is working as intended in accordance with the spirit of peers judging peers, and with the primacy of the agreed scientific goals of the Institution constantly in mind. At the same time it must be recognized that realization of these objectives will depend strongly on the absence of recurrent financial crises leading to the necessity of hasty and seemingly arbitrary centralized decisions on personnel and expenditures.

In the following paragraphs we comment in somewhat more detail on the suggestions made by the Team in Para. 63-69. The quotations are from the minutes of the 35th Meeting of the CB , 19th February 1979, recording the decisions of the Board leading to present organization and practices.

63. Agreed. The Board agrees that quarterly information is required for the Board to exercise its responsibility for monitoring the implementation of its budgetary decisions and other policies. Reports should emphasize variances and exceptions. The form of communication chosen should be at the discretion of the Director. The Chairman should be kept fully and currently informed of important changes or problems between quarterly reports.

64-65. Computer capacity is needed now at both Chiromo and Mbita Point. Provision of this capacity should not await the provision of adequate phone lines from Nairobi.

Before any new computers are purchased a plan of computing needs for the next 2 or 3 years at each site should be made.

Provision should be made in this plan for accommodating all accounting including expenditure control, management information, inventory control, staff records, payroll etc.

66-67. Agreed. The Board agrees with priority given by the team to the appointment of an Administrative Manager at Assistant Director level. With respect to the recommendations regarding the delegation of hiring and termination authority, the Board feels that any such delegation must be consistent with the Board's policies regarding peer review, i.e. that scientists should be judged by scientists, and with the system established by the Director for consultation with appropriate Programme leaders and Senior Scientists regarding personnel decisions that affect the conduct and effectiveness of the scientific programs for which they are responsible.

68. The Board regards the Directorate as a single entity, and feels that the reporting structure to the Director should be decided by agreement between the Director and the Deputy Director.

69. Agreed. As noted by the Team in para. 35, the Staff Regulations and Rules has not yet been approved by the Board. The Board notes and agrees with the specific list of topics that should be covered in a complete personnel policy, and also agrees with the urgency of clarifying some of these matters in order to relieve staff confusion and concern about ICIPE's personnel administration practices. We also feel that such a comprehensive policy document will require, at least at first, frequent updating in the light of experience and of suggestions from staff.

70. Agreed. This must include control of orders, checking of goods received, safe storage, inventory control, including physical verification, re-order planning etc. as well as the factors listed. Protection against theft and fraud on construction jobs is especially important. An attempt must be made to include both inflation and currency fluctuations. The assumptions made should be clearly stated in each case. The CGIAR Secretariat is not satisfied with its present portrayal of budgets and is likely to make changes. ICIPE will keep in touch with the Secretariat and follow their lead where appropriate.

71. Agreed. It has been the practice of the Programme Committee to call upon expert ad-hoc review teams to assess projects for which the expertise did not exist in the Committee.

72. Agreed. The policy of the programme was handled by the Research Committee which was composed of the Programme and Unit Leaders and chaired by the Deputy Director of Research. The Committee used to meet on a regular basis, and when it found it necessary invited the financial or administrative officers to participate in their meeting. The Minutes were circulated to all the Scientists.

The 5 year strategic research plans were prepared and updated by the Research Committee and circulated to the Programme Committee for comments.

73. We welcome the Team's endorsement of Board policy with respect to the SGI.

74. For reasons noted, the Board is reviewing the existing organizational chart but felt it premature to adopt a specific revision in the time it had available for response to the TMT Report.

# RESPONSE OF THE ICIPE PROGRAMME COMMITTEE TO THE FIRST TRIENNIAL REVIEW APRIL, 1983

## Crop Borer Programme

**89(a)** Agreed (see 89c).

**89(b)** Although the Committee agreed with this recommendation to phase out rice work in the present programme, it however recognised the need to carry out work on upland rice in Africa in collaboration with IRRI, WARDA and IITA and recommended that the ICIPE Management review this requirement with the Institutes.

**89(c)** The restructuring of the 3 crop oriented programmes into one crop pest programme is considered necessary. It should be implemented now, as all programme leader positions for these programmes are at present filled by acting programme leaders. A new leader for the combined programmes must be appointed soon.

The substructure into four projects as recommended by the Review Team is accepted in principle. Its implementation requires relocation of personnel and resources. The Committee therefore recommends, that this be implemented during 1983 in consultation with the new programme leader.

**89(d)** The Committee agrees, with the stipulation that 'limit plant breeding' should not be interpreted to mean 'no plant breeder' since there is the urgent need for ICIPE to have a competent plant breeder as a resource person. However, the plant breeding activities should be limited to genetics of plant resistance.

**89(e)** Agreed

**89(f)** Agreed

**89(g)** The Committee agrees that the crop pest programme will need additional land near Mbita Point for its field experiments. It is recommended to negotiate with land owners near Mbita Point Field Station for suitable arrangement.

**89(h)** Agreed

Bases of Plant Resistance to Insect Attack Programme

108 The Committee agrees in general with the 7 points under this recommendation.

Insect Pathology and Pest Management Programme

117) 118) 119) The Committee agrees with recommendations 117 to 119, with possible alterations in the specific names for the programmes

120(a) 120(b) The Committee agrees in principle

Livestock Ticks Research Programme

134(a) Agreed

134(b) All field oriented programmes have transport problems. It is recommended that a minimum of one vehicle is assigned to each field oriented programme. Additional vehicles should reinforce these programmes. Vehicles retained in the motor pool should serve as additional transport for programmes and handle administrative needs.

134(c) The Committee agrees that modelling systems would be useful and recommends that the Senior Research Scientist go to Australia for training in this area.

135(d) It is agreed that it would be difficult for present ICIPE staff to carry out these experiments. The Swiss Government assistance has generously offered to train ICIPE personnel in some of the relevant techniques. It was also pointed out that this project is an ideal one on which collaboration with ILRAD would very much facilitate the progress of the work, and the programme was urged to initiate joint planning between the two institutes.

Tsetse Research Programme

153(a) The Committee agreed and discussed possible solutions to this problem.

153(b) It was agreed that the future focus of attention based on the need to develop an integrated control approach, should be on field problems with maximum linkage to and support from laboratory based studies.

153(c) and(d) It is obvious that ICIPE cannot cover all aspects of tsetse research itself and therefore it is essential for it to develop collaboration with international institutes such as ILRAD and ILCA and national organisations such as KETRI and the Ministry of Livestock Development. Thus the Committee strongly endorses Recommendation 153 (c) of the Review Team.

An essential form of the development of such collaboration would be arrangements for ICIPE scientists to visit other organisations and scientists to discuss complementary research and therefore the Committee supports that proposal in Review Team Recommendation 153 (d).

However, the Committee disagrees with the first part of this recommendation, which proposes that the ICIPE tsetse programme be extended to other "Glossina species". This proposal is at variance with other Review Team recommendations criticising lack of coherence in the present ICIPE programme, because including more species of Glossina with different ecology and behaviour would clearly tend to dilute and diffuse the present effort, the coherence of which should be augmented by concentrating on G. pallidipes as proposed in para 153 (g).

153(e) and(f) The question of balance between basic and applied research is a difficult one but the concensus view was that a general programme of basic and field oriented ecological work should form the foundation of the whole programme. It was agreed that ICIPE should not get involved in practical control operations, but should carry out research related to the development of new approaches to control. To obtain the best balance for the overall programme the Committee recommended that more frequent meetings of the scientists be held to discuss programme development and execution.

153(g) The Committee agrees that in future all work should concentrate mainly on G. pallidipes so as to make the most efficient use of the limited resources of expertise and finance and in this connection priority should be given to establishment of a breeding colony of this species.

## Medical Vectors Research Programme

164(a) The Committee was impressed by the performance of this small team, which seems to make maximal use of their limited resources.

It is recommended that ICIPE invite some outside expertise (e.g. British Museum) to strengthen further the work on sandfly taxonomy.

164(b) The unit deserves all possible support from core funds especially for its field work and its insect rearing project.

It is recommended to apply for extra funding for this programme in view of the promising field work, directly relevant to the rural population in agricultural development projects.

164(c) This problem, and the Committee's response, has been dealt with in para. 134(b).

164(d) All programmes are deficient in research equipment. The Committee recommends that an adequate proportion of the annual budget is used to improve the situation.

## Sensory Physiology Research Unit

178 The Unit Head informed the Committee that he had indeed prepared and advanced the plans referred to by the Team.

180(a) and(b) The need for a behaviourist has previously been discussed in the Programme Committee. It may be possible to send a recent Ph.D. for training in this area.

180(c) Agreed

180(d) The scientists argued that their emphasis has been primarily on function, rather than structure. It was also noted that many of the pest insects studied at ICIPE (e.g. sorghum shootfly) are not commonly used in sensory physiology studies, and a description of their sense organs may be a necessary first step.

Chemistry and Bioassay Research Unit

187 The Committee felt that some misunderstanding had developed in the Review Team because of the absence of a chemist on the Team. Attempts to resolve these will be covered below.

189 The IAEA Biomass project was discussed at some length. It was suggested that ICIPE consult with IAEA to clarify which unit would investigate degradation by anaerobic organisms. If it is agreed that ICIPE should do this, then further material assistance from IAEA should be sought, or, alternatively, ICIPE staff members should be seconded to the laboratories in Vienna for such work, since ICIPE lacks appropriate facilities.

It was suggested that ICIPE should not expand this project to systems outside the termite area in order not to exceed resource limits.

193(b) The Scientists did not entirely agree with this recommendation, dealing with natural products chemistry and felt that the work has been misinterpreted. It was noted that the scientists should be free to follow some projects of a basic nature in accord with ICIPE's interests, provided that this does not interfere with the service function of the unit. Examples are projects on the structural elucidation of natural products and their synthesis. The screening methods are inexpensive and take little time. The indigenous tropical flora of the region is diverse, and information from folk medicine sources make ICIPE well suited for such screening efforts. It is highly unlikely that any major corporation would undertake such a screening effort. Should ICIPE's work lead to promising compounds, ICIPE should then make provision for handing them over to others for development.

The following programme oriented plans for natural products research were reviewed:

(1) The Programme Committee hopes that the project on egg-laying deterrent of the sorghum shootfly can be successfully completed, so that it can be exploited by the biological control group.

(2) The project on identification of the Maruca sex pheromone was considered a good one, but similar work on Chilo and Eldana should not be considered, as it is being done elsewhere.

(3) Work on the resistance of maize and sorghum to borers appears to be a productive line of research.

193(c) This matter is dealt with in para. 134(d).

193(d) Agreed and noted. Solution of this problem must await further capital development.

193(e) This recommendation was considered to be crucial by both scientists and the Committee. It is clear that the NMR and mass spectrometer are worn out and outmoded. The present sensitivity of these instrument will never permit completion of the projects noted under 193(b). Unless these essential instruments can be replaced soon, personnel may be lost through discouragement. This matter should receive top priority in the 1984-85 budgets.

198 The Programme Committee noted the need for isolation and temperature control in the bioassay unit.

Histology and Fine Structure Research Unit

208(a) The Committee endorsed a service and research function lying between the two proposals.

208(b) The Committee was informed that the transmission electron microscope was non-functional during much of 1982 and the scanning electron microscope was repaired at the end of the year. A new microscope is desirable when funding is available, and added staff are needed. The Committee discussed the situation and noted the needs.

208(c) Radioautography was discussed. The Committee felt that this could be added to ICIPE's programme with little difficulty.

The Committee reminded the scientists that Prof. Fawcett at ILRAD could be a valuable resource person and that they should consult him about new techniques, e.g. radioautography. ILRAD management has expressed a willingness to aid in training of ICIPE personnel in specialized techniques. This might also be a suitable vehicle for achieving recommendation 208(d).

208(d) Agreed

Biostatistics and Computer Service Unit

214(a) The staffing needs of this unit were explained and discussed. The Committee recommended that the budgeted staff be employed with the understanding that programming is part of their responsibility.

214(b) It was explained, that computer services at Mbita Point Field Station can be offered by a terminal or a minicomputer compatible with the computer at Duduville. The Committee recommends that the decision be deferred, until facilities at Mbita Point allow the installation, and a better judgement on the technical provisions required becomes available.

Insect and Animal Breeding Service Unit

221 Noted and agreed.

Training Programme

232 Questions of ICIPE staff involvement in teaching and/or supervision in training programmes at ICIPE was discussed at length. A document showing individuals scope of involvement was discussed. While the Committee recommended that the Training department should ensure that research staff were not overburdened with a heavy load of teaching, it was agreed that teaching experience for ICIPE staff was advantageous for later careers, possibly in teaching institutions.

The Programme Committee considered that 10% total teaching load, including preparation time, was an upper limit. Advanced planning between the scientific staff and the Training Department is necessary in order to minimize interference with the scientific activity.

233 Efforts to intensify cooperation in training with African francophone regions was discussed. The Programme Committee was informed of the participation by a number of french-speaking individuals in a number of training programmes of the ICIPE as a beginning of a proposed larger interaction with French speaking Communities.

235(a) The Committee noted this recommendation for a 5-year plan which is at present being prepared by the Training Programme.

235(b) The Principal Training Officer at the ICIPE gave an account of the origins of this programme and pointed out that the initial concern was to explore ways of upgrading ICIPE staff management skills. However, in the course of negotiations with donors it became apparent that this was a much larger concern in the region and IDRC was ready to assist the ICIPE but only in the context of formulating programmes that would cater for a larger region. This region finally encompassed Eastern and Southern Africa. In the course of two meetings an action plan for FAMESA was formulated and an Advisory Committee appointed to undertake its implementation. In this context, ICIPE was charged with the compilation of a portofolio on information on research institutions in the sub-region, a task that should be completed by the end of the year.

The Programme Committee felt that the objectives of FAMESA were not fully in line with the mandate of ICIPE, and agreed with the spirit of the recommendation, that ICIPE should complete the exploratory phase and within this period, in consultation with IDRC, identify an institution that is competent to undertake such a programme.

235(c) The Programme Committee discussed the ARPPIS Programme and agreed to plan student intakes for 1984 and 1985 in balance with the training staff available.

235(d) The Programme Committee endorsed this recommendation.

235(e) Agreed

235(f) The Training Programme will continue to strengthen the collaboration with the University of Nairobi and report on these activities annually.

Communications

244(a) Agreed

244(b) The Committee felt that the 1983 Annual Research Conference was a very good one. Further improvements through appropriate action of ICIPE's scientific community are welcome.

244(c) Agreed

245(d) See comments to para 232.

Library

249(a) These plans are in preparation and will be implemented when facilities at Mbita Point Field Station are available.

249(b) Agreed

Cooperation

259(a) see 235 (f)

259(b) Agreed

259(c) Agreed

Mbita Point Field Station Programme

277(a) The slow development of the Mbita Point Field Station was noted. The Committee recommends to quickly activate water supply, sewerage, electricity and staff housing, followed by laboratory facilities within Phase I. Additional capital development is not recommended until the Programme Committee has completed its current study on the utilization of the ICIPE facilities. The potential to construct adequate housing for technical staff, fully equipped with water and electricity should be explored. Serious consideration must be given to provision of minimal social amenities for staff at Mbita Point Field Station.

COMMENTARY ON MBITA POINT FIELD STATION

The development of field stations linked to central laboratory facilities is essential to the work of ICIPE. Mbita Point is an area where research on disease vectors and agricultural pests can be carried out in circumstances which, although hard, nevertheless focus the applied research programmes on the development of control systems viable under the the difficult conditions which are widespread in all developing countries; because this is consonant with ICIPE's objectives the Board re-affirms its belief that the Mbita Point Field Station is an important and relevant facility for the Institute.

However, the Board agrees to faults in the building strategy employed and in the premature deployment of scientists at the Station before adequate facilities were available; these errors are the root cause of most of the problems commented on by the TRT, and explains why the Board has endorsed the Programme Committee's proposal for a re-examination of the factors related to the employment of staff, both at work and leisure, at the Station.

The Board repudiates the criticism in the TRT report that a basic error was made in choosing the site. The Board notes that Mbita Point is a field station and the location of any such station must involve a compromise between what is desirable and possible. There are problems but they are not site specific. Thus the TRT report claims that the soil, rainfall and cropping patterns are "atypical of Africa" - but what is typical for Africa? The soil is not of the best, but with the abundant water, irrigation poses no problem, which minimises the rainfall problem. The area is certainly poor and agriculture difficult for the local farmers; yet they survive and have developed a viable cropping system. The district has been designated as a development area by the Kenya Government. This was one of the main reasons for the choice of site, because ICIPE's objectives are to advance insect science and apply it so as to assist the development process in African agriculture.

Given this situation, experimental crops can be easily grown and, as the TRT report points out, Mbita is a site where a number of ICIPE target pests can be found in abundance. Furthermore, the TRT Report notes that the site "offers many opportunities for research on vectors of animal diseases." This was another important factor in the Board's choice of site. The Lambwe Valley, about 15 miles from Mbita, is a prototype habitat of tsetse and trypanosomiasis and has a focus of tsetse research for some forty years. Already the ICIPE tsetse programme has carried out important work on the population dynamics of the fly in that valley which could form the basis for development of viable strategies of control therein. The Tick programme also regards Mbita as an area which offers a variety of ecological situations necessary for the further development of its work; one of these sites is an island in the Lake which allows work on the disease ecology of an isolated population of cattle.

The problems with the construction of Mbita Point Field Station (Para.269-271) are noted, and we are pleased to report that they will be largely resolved by September 1983. The problems of endemic disease and isolation have certainly made life and work difficult for the ICIPE staff concerned, but they are not worse than those in other research institutes in Africa (e.g.sites on the Kenya Coastal strip)

The TRT evaluation of Mbita Point Field Station appears to rest in part on comparison with CGIAR institutes. This is misleading because those institutes are deliberately sited to achieve maximal conditions for the crops with which they deal. However, it is significant that when those institutes have embarked on application research they have had to develop outreach programmes in farmers fields and have to adapt their findings to deal with a variety of adverse factors. The position at Mbita Point Field Station is that research in the "on the site" plots has gone hand in hand with comparative trials in farmers fields and even in the short time which has elapsed this has already resulted in improvement in the returns from the experimental farm sites.

Thus it is clear that ICIPE can play an important part in plant protection and vector control development through the use of Mbita Point Field Station. It is also of relevance to the future of the Institute that it has already played an indirect role in the overall development process in the area in respect of employment, medical services, schooling and increased demand for services and goals.

For all these reasons therefore the Board feels that the TRT Report is unduly pessimistic, and that the Mbita Point Field Station has an essential role to play in the overall ICIPE programme, particularly in relation to the important linkage of science to development in Africa.

This commentary is the basis for the Board's agreement with the specific recommendations of the TRT Report.

ANNEX II

## Section 3 - Management Problems and Lessons Learned from the 1979-1981 Crisis

The Review Team made a valiant attempt to find causes and to discern lessons in this harrowing series of events. The main thrust of their observations is clear and correct but we believe that, through lack of information and possibly of historic perspective they may have learned some wrong lessons and missed some important ones.

The ICIPE began life with impeccable scientific goals but inadequate and insecure financial backing.

In its early years the Board formed the habit of approving "budgets" both capital and operating that were catalogues of aspirations rather than expectations. Each year the Director gave a donor forecast of possible revenue. The Board then authorized him to get on with the programme for the year as far as he could without incurring an overdraft. In many years revenue was only a fraction of the budgeted expenditure but the Director managed to avoid deficits. This was often achieved by arbitrary and sometimes inefficient but essential cuts in expenditure. Better management information and monthly expenditure control reports (as was later urged by the Board) would have facilitated better control but would not have dealt with the great uncertainties in revenue.

(The figures that follow are mainly taken from a paper dated March 1983 which was prepared by Mr. E.J. English for the Triennial Review).

In the years prior to 1978 small surpluses were accumulated. The year 1979 began with surplus in the capital account of $1,309 (figures in thousands of dollars) operating costs of $5,163 and capital costs of $1,512 leaving a deficit of $1687 for the year. Thus the cumulative deficit at the start of 1980 was $378 and ICIPE had started down a slippery slope from which it did not escape till the end of 1982.

In 1980 actual revenue was $6,802 and total expenditure $7,587 including $1,614 on Capital. The resulting deficit was $785 and the starting position for 1981 was a deficit of $1,163.

In May 1980 the Board approved another visionary budgets looking forward to the Biennium 1981-1982. The forecast revenue for 1981 was $8,367 with an equal expenditure. The results for 1980 were sufficiently discouraging that at the November 1980 meeting of the Executive Committee of the Board warned the Director to watch expenditure carefully and to prepare a revised budget for the April 1981 Board meeting. At that meeting a new budget of $4.71 million for both revenue and expense was approved.

The final result for 1981 was revenue $4,736 plus a currency gain of $304 for a total of $5,040. The efforts to reduce expenditure without widespread dismissal of staff and in the absence of adequate financial management information were successful in reducing total expenditure to $5,483 (operating $4,616 Capital $867) for a deficit of $443. There was a small surplus on operations. The deficit could be attributed entirely to capital spending in excess of capital grants. The deficit carried forward into 1982 therefore totalled $1,554. (The Balance Sheet figure converted into U.S. dollars at the January, 1st 1982 rate of 10.3 K.Shs. ($US).

The Board had not, as stated in Para. 43 of the Review Report, "agreed to a programme and budget for 1981 that included deficit financing of some US$1.1 million". The Board had, as it and all the Boards of the IARCs in the CGIAR do every year, made an estimate, or educated guess concerning the dependability of the revenue forecast. In this case it felt that, because of past deficits it had to be especially conservative.

The crucial problem was a promised grant of $2.5 m from OPEC that had been negotiated in 1979. This was from counterpart funds lodged with the Government of Kenya. In 1980 the Government authorized payments of about $1.5 m of this total. The remainder of the grant was expected in 1981 but because of its own financial problems the government did not approve the payment.

During 1981, as hope for the OPEC grant dwindled, an arrangements was made to have UNDP pay about $800,000 from their 1982 pledge in 1981. Even with this help the year ended badly.

By the November 1981 meeting of the Executive Committee it had become clear that the Government of Kenya would not approve the payment of the OPEC Grant. A huge deficit was clearly inevitable and plans for further drastic cuts in expenditure were made. These cuts added a further burden to an already over-burdened scientific and administrative staff and resulted in some controversial staff terminations.

The cause of the deficit and the steps being taken to eliminate it were explained to the donors at the meeting of the SGI in Paris in May 1982. Their response was excellent. With their continuing support and further sacrifices by the staff the deficit has been almost eliminated in 1982 ($1,554 down to $224) instead of taking two or three years as had been expected.

The main reason for this unexpectedly fast retirement of the deficit was that revenue for 1982 was $6,685 or $600 more than the forecast, while expenditure was held to $5,370 giving a positive balance for the year of $1,366 (including $50 exchange gain).

The Review Team has repeatedly used the IARCs supported by the CGIAR for comparison with ICIPE. The IARCs that are roughly comparable to ICIPE - and this includes the majority - have a staff of 30 to 90 international staff and a gross expenditure per staff member from US$200 to US$300 thousand dollars per capita.

Staff classifications are quite uneven throughout the IARCs but are sufficiently uniform that this rough measure of level of expenditure is often used for comparative purposes. As in ICIPE the senior administrative staff are included with the scientists. The use of this measure for rough comparison between ICIPE and the IARC seems to be valid. For ICIPE the comparable figures are:

1981 actual $100
1982 actual $117
1983 Budget $123
1984 Actual $132

The TRT have repeatedly and correctly recommended more and better scientific equipment, more travel, more support staff, more transport, all things that would raise this figure.

ICIPE began operation in a very frugal style suitable to the environment in which it works. This frugality has continued but has been exaggerated by shortage of revenue. Because of this tradition ICIPE does not need US$200,000 per international professional staff member to operate comfortably. A level of US$175,000 would probably prove to be adequate.

The ultimate cause of the financial crisis of 1979-82 was the reluctance of the Board to force the Director to terminate competent scientific staff.

The Director presented to the Board extensive plans for a large and useful research programme. The Board enthusiastically joined in helping to plan and guide the programme and authorized the Director to proceed as fast as revenue permitted. Where forecast increases in revenue failed to materialize ICIPE found itself overstaffed. The peak reached in 1979-80 was 54. The Director felt sure that the shortage of funds was only temporary and was very reluctant to terminate good scientific staff. After careful discussion the Board supported him. His plan to weather the storm without throwing anyone over board was approved and draconian measures for expenditure control were instituted. As the TRT has pointed out this was done with a blunt instrument and was not successful. Beginning too late in 1981 staff ceilings were rigidly enforced. The reduction of staff combined with the continuing expenditure controls produced the essential financial result seen in 1982.

The revenue forecast for 1983 and 1984 aim at a balanced budget while providing money to finish essential construction at Mbita Point Field Station and supply the reasonable needs of an international professional staff of 39-40 at a slightly less austere level than in 1982. Devaluation and inflation will almost certainly continue so the planned salary increases will probably be regarded as inadequate. If world economic recovery occurs ICIPE will not be competitive in the race for good scientists.

All of this has been said to try to convince the SGI that the Board and Management of ICIPE do learn from experience, are in effective control of operations and are capable of continuing to run a very good research Centre at remarkably low cost. If extra money can be found for reducing the accumulated deficiencies in salaries and equipment, while other revenue is maintained in constant dollars the present staff level can probably be maintained. If this money cannot be found then staff must be reduced and programmes terminated in order to maintain quality. It is not reasonable to try to operate on an expenditure as low as US$100,000 per international professional staff member.

ANNEX III: Corrections of facts relating to the TRT Description of Management Practices

Chapter 2, Section 2, is a description of existing management practices. In certain particulars it is incorrect, a situation caused in part by the out-of-date nature of a few ICIPE documents. These documents are being revised at present. In the meantime, the following notes correct inaccuracies in paragraphs 33-38.

33. With regard to the Programme and Budget, the Executive Committee acts as "the financial over-sight and review Committee of the Board. This responsibility includes monitoring and development of the budget to ensure that actual disbursements and the filling of positions is in accord with the budget". Regarding modifications, "authority to approve modifications to the Budget between annual meetings is delegated by the Governing Board to the Executive Committee" (MIN. 256/79 (a). It is, therefore, not correct, as implied by paragraph 33, that the Director can approve increased expenditures with only the Chairman's approval. Such action cannot occur unless the Executive Committee has considered and authorized the increase beforehand subject to availability of funds. In such a case, the Director would be delegated the authority to carry out the decision with the Chairman's approval. This procedure is necessitated by the large uncertainties that often exist with respect to availability of funds at the time of the GB or Executive Committee meeting. Thus the Executive Committee is frequently forced to approve in advance a number of contingency plans, with the final decision on execution delegated to the Director in consultation with the Chairman based on the actual financial picture at the time.

34. Due to financial uncertainties, as mentioned above, and the fact that due to travel costs, the Board meets only once and the Executive Committee only twice a year, a high degree of delegation to the Director is necessary if decisions are to be made in a timely manner with respect to a financial outlook that frequently changes very rapidly. The Executive Committee, in consultation with the Director attempts to foresee likely contingencies and to authorize appropriate actions should these contingencies come to pass. However, in many cases not everything is foreseen and quick decisions have to be made.

35. The Board agrees that the articles for the Board and Company need updating. In practice the Company is a creature of the Board and only meets when called by the Board, and when the majority of members present are also Board members. This is not to deny that the Company could theoretically take actions contrary to the intent of the Board, and such a theoretical possibility may call for some reconsideration of the present Memorandum and Articles of Association.

36. The last sentence of this paragraph does not correspond to the actual situation. The smallest number of individuals that can form a quorum for decision-making is a quorum of the Executive Committee. Min. 251/79(d) (i) of the Governing Board stipulates that "The Executive Committee shall consist of the Chairman or Vice-Chairman of the Board, the Director, and (at least) three elected members of the Governing Board. The quorum of the Executive Committee shall be four members, including the Director, and either the Chairman and Vice Chairman". It is to be noted that this quorum of four applies only to decisions delegated to the Executive Committee by the Board. The quorum of the whole Board is presently seven and must include the Chairman or Vice Chairman. The suggestion of the team would raise the quorum to eight, which would be half the full board, a number which has been discussed by the Board, and is agreeable to them. The Board recognizes that the record of Board decisions and policies is presently recorded in Minutes and other documents which does not allow for easy access to these decisions and policies. It is intended to codify a set of approved Board policies and decisions in the near future.

# ANNUAL REPORT OF THE CHAIRMAN OF THE ICIPE GOVERNING BOARD FOR THE YEAR ENDING APRIL 26, 1982

TO THE SPONSORING GROUP FOR THE ICIPE

5TH MEETING

PARIS - MAY 24, 1983

BY

DR OMOND SOLANDT

OF DR O.M. FOLANDT

At the meeting of the SGI in Paris in May 1982 you were told that at the end of 1981 the ICIPE had an accumulated deficit of $1.56 million U.S. The Board presented to you a financial plan which promised to eliminate this deficit within two or three years. The audited accounts for 1982 show that by the end of the year the deficit had been reduced to U.S. $224,000.

Grants totalling $640,000 had not been received at the end of the year and appear in the audited statement as accounts receivable. At the time of writing this report all but $196,000 of this amount had been received and even that is in the pipeline. Forecast revenue for 1982 had been calculated at a rate of 10.3 K.Shs. to $1 U.S. It has been received at rates ranging up to almost 13 to the dollar. Throughout the year this resulted in significant currency gains. Therefore the rapid reduction in the deficit can be mainly attributed to three factors:

1. Remarkably effective expenditure control by management and staff at all levels. This included holding the international staff total to 39.5 man-years instead of the 45.7 that had been approved by the Board at its 1982 meeting.

2. Unexpected grants totalling $412,000

3. Gains due to devaluation of the Kenya Shilling of approximately $190,000.

In approving the revised budget for 1982 the Board had instructed the Director not to attempt to retire the deficit in one year but rather to start easing the expenditure controls as soon as the target reduction of $600 to $700 was in sight. Because of the already noted delays in receiving the final grants, the Director could not do this. However the expenditures for both operations and capital in 1982 were in fact significantly above budget so the excellent result was due to increased revenue and not to excessive reductions in expenditure.

The year 1982 was we hope, the last of a series of years in which the ICIPE Programme has been underfunded or was too large for the revenue actually received. This has resulted in what the Board describes, for want of a more glamorous term, as accumulated internal deficiencies. These include salaries that have not been increased fast enough to keep pace with competition, inflation and devaluation, new instrument and equipment needed, instrument and equipment unrepaired, a serious shortage of vehicles, and a host of other less visible factors.

Now that the external financial deficit is under control the Board at its April 1983 meeting turned its attention to these accumulated deficiencies. The first step was to provide for 39.5 man years in 1983 and 40 in 1984 instead of 44 as had been previously planned. At these staff levels, and using carefully considered values for anticipated revenue it appears that ICIPE can, with present plans for operations and providing a total of $1.1 million to complete presently planned buildings at Mbita Point Field Station achieve a surplus of $400 to $600,000 in each of these years. In order to have a fall-back position these surpluses have been reserved for use as an uncommitted contingency reserve (UCR) to cover unexpected shortfalls in revenue or increases in expenditure. Should neither of these eventuate the Director has authority to spend the surplus as it becomes certain, on an agreed list of priorities for reducing accumulated deficiencies (mainly by the purchase of equipment as recommended by the Triennial Review Team (TRT). The aim is to reach a break-even position as the financial result in each of the two years.

The uncommitted contigency reserve (UCR) is not the only way in which the internal deficiency is being attacked. Rather than try to identify each item it is easier to look at global figures

| Year | Core Operating Costs | International Staff man-years | Gross Expenditure per man-year |
|---|---|---|---|
| 1981 Actual | 4616 | 46.25 | US$ 100,000 |
| 1982 Actual | 4567 | 39.5 | 117,000 |
| 1983 Budget | 4877 | 39.5 | 123,000 |
| 1984 Budget | 5284 | 40 | 132,000 |

(The figures for 1983 and 1984 are taken from the budgets as revised by the Board at its April 1983 meeting)

This shows quite clearly how the detailed expenditure controls are being relaxed. In case members of the SCI think that these figures are high it should be pointed out that the corresponding figure for the Centres financed through the CGIAR is typically from $200 to 300,000 dollars or more per capita.

Specific measures to attack the salary problem include increases on January 1, 1983 having an annual cost of about US$270,000, and another slightly larger but more selective increase that had been budgeted for July 1984. The Board decided that the second increase should be advanced to January 1984, and should be announced to the staff within a short time. The funds for meeting the July date are mainly in the present 1984 budget. The additional funds needed to advance to January are planned as the first charge against the UCR in 1983 and if necessary in 1984.

I have dealt first with the financial results of 1982 because of your interest in how your donations are being spent. However, of even greater importance is the quality of the research that your money has supported. This topic is dealt with at length in the Report of the Triennial Review Team (TRT) and in the comments on it by the ICIPE. Since these will be fully discussed later in this meeting, I will only make a few comments on the TRT views of the ICIPE research program.

The TRT did a very complete study of the ICIPE research programme and had the opportunity of reacting effectively with both the management and staff and some members of the Board. Their report on the Programme is very reassuring. They found much to praise but also offered many useful criticisms and recommendations which are discussed in detail later.

The TRT repo[illegible] commented on the accumulated deficiences within the Centre. They attached great importance to improving morale by salary increases and other measures. The specific recommendations for additional expenditures on equipment, transport and other facilities that they considered essential to the programme has been costed at approximately $2.5 million (not including salary increases).

Another event of the year that is a part of the scientific programme and that should not pass unnoticed is the admission of the first students to enter the doctoral program of ARPPIS (The African Regional Postgraduate Programme in Insect Science). This is an important milestone in the evolution of the ICIPE training programme which is an essential derivative from the ICIPE's primary tasks in entomological research.

The Cha[illegible] of the Triennial Review Te[illegible], [illegible]r Max I. Ray was very anxious to [illegible] the Governing Board before starting work. This did not prove to be possible. In addition only one member of the team (Mr. J.Griffith) devoted his full time to management matters. As a result the interaction with the Board and Staff on management problems was much less extensive than on the research program.

The Board considers that the management chapters of the TRT report contains much that will prove of value to it in its future deliberations. A detailed discussion of the Board's reaction is contained in a later report. Here it is only necessary to record the thanks of the Board for the excellent work done by the TRT, its own regret that it was not able to meet Dr Ray earlier and an assurance that it will not lightly set aside any of the many suggestions for change.

In conclusion let me summarize - ICIPE has successfully weathered a serious financial crisis - it is in the process of digesting the generally positive and useful results of its first Triennial Review done for the SGI. The future looks bright.

In thanking the SGI for generous support in the past we have four specific requests for the future. First, continue and where possible increase your support of ICIPE, especially the Core Programme. Second, try to make extra, one-time grants to purchase desperately needed equipment. Third, try to transmit grants early in the year. In spite of the good financial results in 1982, April 1983 finds ICIPE with the Bank line-of-credit fully used and work being held up for lack of cash. Fourth - come and visit ICIPE whenever you can. You will be most welcome and I am sure that you will find it inspiring experience.

ANNEX 1

## LONG-TERM IMPLICATIONS OF THE RECOMMENDATIONS OF THE TRIENNIAL REVIEW (IN B.EHS.) [1]

| PROGRAMME/ UNIT | PERSONNEL COSTS: ADDITIONAL STAFF ENTITLEMENTS | PERSONNEL COSTS: STAFF DEVELOPMENT TRAINING | PROFESSIONAL TRAVEL | MATERIALS SERVICES & EXPENDABLES | EQUIPMENT/ TOOLS | MOTOR VEHICLES | SPACE/ SCREEN HOUSES | TOTAL |
|---|---|---|---|---|---|---|---|---|
| Rust of Plant Resistance | - | - | 160,000 | - | 1,791,400 | 340,000 | 611,000 | 2,902,40[illegible] |
| Crop Pests | - | - | 240,000 | - | 800,000 | 340,000 | - | 1,380,00[illegible] |
| Virus | - | - | 200,000 | 660,000 | 273,000 | 340,000 | 30,000 | 1,503,00[illegible] |
| Economic Ticks | 330,200 | 208,000 | 200,000 | 169,000 | 1,578,100 | 340,000 | - | 2,825,30[illegible] |
| [illegible] | - | - | 160,000 | 139,000 | 250,000 | - | - | 549,00[illegible] |
| Soil and Tsetse (Entomologists) | 261,300 | - | 120,000 | 469,000 | 743,600 | 340,000 | 120,000 | 2,053,90[illegible] |
| Soil Microbiology | - | - | 80,000 | 52,000 | 634,000 | 170,000 | - | 936,00[illegible] |
| Immunology and Biometry | - | - | 160,000 | - | 6,897,000 | 170,000 | - | 7,227,00[illegible] |
| Virology and Plant Pathology | 310,000 | 50,000 | 80,000 | 180,000 | 1,950,000 | 170,000 | - | 2,740,00[illegible] |
| Statistics and Biostatistics | 310,000 | - | 40,000 | 150,000 | 975,000 | - | - | 1,475,00[illegible] |
| Chemistry and Animal Breeding | 109,200 | - | - | - | 840,000 | 150,000 | 50,000 | 1,149,20[illegible] |
| Maintenance and Laboratory Equipment | - | - | - | - | 740,000 | - | 640,000 | 1,380,00[illegible] |
| Others | - | - | - | 945,800 | 2,757,300 | - | 900,000 | 4,603,10[illegible] |
| Training | - | - | 300,000 | 100,000 | 100,000 | 340,000 | 500,000 | 1,400,00[illegible] |
| TOTAL | 1,310,700 | 258,000 | 1,740,000 | 2,864,800 | 20,329,400 | 2,700,000 | 2,911,000 | 32,123,90[illegible] |

US$ 2,471,10[illegible]

[1] Included in the total cost amounting to US $ 2,471,100 is annual recurrent cost of $ 475,700.
Conversion Rate K.Shs.13.00 US $1.00