

**TASK FORCE
APPOINTED TO MAKE
RECOMMENDATIONS ON THE
FUTURE DEVELOPMENT OF
GRADUATE TRAINING
AT THE ICIPÉ**

FINAL REPORT

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The first part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as $t \rightarrow \infty$. It is shown that the solutions of the system (1) are bounded and tend to zero as $t \rightarrow \infty$. The second part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as $t \rightarrow 0$. It is shown that the solutions of the system (1) are bounded and tend to zero as $t \rightarrow 0$.

The third part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as $t \rightarrow \infty$. It is shown that the solutions of the system (1) are bounded and tend to zero as $t \rightarrow \infty$.

The fourth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as $t \rightarrow 0$. It is shown that the solutions of the system (1) are bounded and tend to zero as $t \rightarrow 0$.

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The sixth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1) as $t \rightarrow 0$. It is shown that the solutions of the system (1) are bounded and tend to zero as $t \rightarrow 0$.

CONTENTS

- Introduction 3
- Review of present ICIPE training activities 4
- Report on graduate training at other similar institutions 10
- Recommendations for the future development of graduate training at the ICIPE 14
- The future contribution of the ARPPIS Network and the development of sub-regional centres for graduate training 20
- Implication of the recommendations for manpower requirements, physical facilities and funding 24
- Summary of the report 28
- Annex 1. Terms of reference 32
- Annex 2. Members of the Task Force 33
- Annex 3. Schedule of meetings and visits 34
- Annex 4. Analysis of training activities at the ICIPE during 1988 35
- Annex 5. Status of students following graduation from ARPPIS 36



INTRODUCTION

1. The Task Force was appointed in May 1987 to make recommendations on the future development of graduate training at the ICIPE, based on the existing graduate training activities of the Centre and other similar institutions, and on the growing urgency of the need to improve and expand the manpower available in tropical developing countries for insect pest management research and application. The Terms of Reference of the Task Force are set out in Annex 1.

2. Professor L.K.H. Goma, Minister of Higher Education, Science and Technology, Republic of Zambia, was appointed Chairman of the Task Force. The full membership of the Task Force is given in Annex 2.

repetitive! 3. The Task Force met on four occasions and members of the Task Force visited six institutions with graduate training programmes in four countries, ^{in the 4 countries} and two ARPPIS Participating Universities ^{or as a university?} and one funding agency. The Task Force discussed its interim findings and recommendations with the Academic Board of the African Regional Postgraduate Programme in Insect Science (ARPPIS). The various meetings of the Task Force are set out in Annex 3.

4. This ~~Final~~ Report of the Task Force comprises six sections, namely:

- A. Review of present ICIPE training activities.
- B. Report on graduate training at other similar institutions.
- C. Recommendations for the future development of graduate training at the ICIPE.
- D. The future contribution of the ARPPIS network and the development of sub-regional centres for graduate training.
- E. Implications of the recommendations for manpower requirements, physical facilities and funding.
- F. Summary of the Report.

Lower Case = Sub-heading?

A. REVIEW OF PRESENT ICIPE TRAINING ACTIVITIES

5. One of the major mandates of the ICIPE is to strengthen the scientific and technological capacities of developing countries in the insect sciences through training. Furthermore, the new perspective given by the ICIPE Charter has given a fresh impetus to the commitment of training a pan-tropical community of indigenous scientists capable of leading and directing the search for new knowledge and new technologies for insect pest management.

6. The Task Force reviewed in-depth the training activities of the ICIPE. As part of the review, meetings were held with all the ICIPE programme leaders and unit heads to discuss the involvement of their programmes and units in training, and particularly graduate training, and the consequences of that involvement. The Task Force also met with a cross section of graduate students at the ICIPE.

7. The range and quality of the ICIPE educational and training activities is impressive. They are:

- (a) Graduate training, particularly ARPPIS;
- (b) Short courses;
- (c) In-service training;
- (d) Postdoctoral research fellowships;
- (e) Research Associates.

The postdoctoral fellows and research associates are coordinated by the Training Department, but are regarded more as research workers and resource people than as trainees.

8. It became clear that graduate training, the short courses and in-service training are the major mechanisms for education and training at the ICIPE. An analysis of the total number of student weeks at the ICIPE during 1988 showed that 24% was spent in formal teaching (the ARPPIS teaching semester and short courses), 5% in on-the-job training for inservice trainees and 71% on supervised research by graduate students (Annex 4).

9. The Task Force recognized that the resources of equipment and scientists' time in ICIPE are limited and that, in consequence, decisions must be made to define the most cost and time effective mixture of training programmes that will ensure the impact that ICIPE seeks to achieve. These decisions will involve determining the balance between graduate training and short courses, and the most appropriate organizational mechanisms to be utilized.

10. The Task Force considered ARPPIS in depth and commended the unique structure of the network combining, as it does, the strengths and ambitions of both an international research centre and of African universities. It considered it a model for the development of other educational degree networks in Africa for other disciplines. It was reported that the Association of African Universities is reviewing regional post-graduate programmes in Africa, and that ARPPIS was one of the most successful.

11. The innovative approach to graduate education expressed through ARPPIS by the ICIPE was noted, in particular:

- (a) the creation of ARPPIS in the first place and the seminal role played by ICIPE;
- (b) the incorporation of a semester of coursework within the Ph.D. programme. This was not a component of any Ph.D. programme in an ARPPIS participating university at the inception of ARPPIS and only recently has Addis Ababa University established its Ph.D. programme with coursework;
- (c) the creation of insect science as a subject area for graduate training has broken the university traditional approach to "classical entomology". Already an organic chemist, two biostatisticians and several veterinary scientists have studied at ICIPE and ARPPIS continues to seek people outside the usual confines of entomology who want to focus their careers on insects;

- (d) the development of a joint Ph.D. degree with Addis Ababa University. The University has accepted the coursework taught at the ICIPE as a part of its own Ph.D. in insect science. The teaching and marking will continue at the ICIPE and each student research project will be undertaken partly in ICIPE and partly in Ethiopia.

12. The considerable potential for ARPPIS to strengthen national agricultural research systems and African universities was noted by the Task Force with satisfaction and it expects that over the next 5 to 10 years the returning ARPPIS students will have a significant impact on these institutions. Already by January 1989 the 1983, 1984 and 1985 ARPPIS Ph.D. Classes had completed their studies. Twelve of the 23 students had received their degrees by the time of writing. All 23 students are employed within Africa as research scientists or as junior staff members at African universities (Annex 5).

13. ARPPIS has had a limited masters degree programme for students specializing in biological control; this has involved 10 students from 6 African countries. The students have been registered at Rivers State University of Science and Technology, Nigeria, where they completed one year of coursework before coming to ICIPE for a 9 month research project. The Task Force discussed the relative advantages and disadvantages of M.Sc. and Ph.D. programmes at the ICIPE (see paragraph 36) but noted that this particular activity had closed with the 1987 Class which will finish its studies by mid 1989.

14. Twenty six M.Sc. and Ph.D. students were attached to the ICIPE between 1980 and 1988. These students are undertaking their research at the ICIPE (with no formal teaching from ICIPE scientists; this is done by their registering university) and are variously from African Universities without an ARPPIS linkage, from countries outside Africa but with whom the ICIPE has collaborative agreements and projects, from M.Sc. programmes in African universities, and from the ICIPE staff development prog-

ramme. These students form an important group of ICIPE graduate students and this adhoc programme enables the ICIPE to offer its facilities and expertise to students from special programmes and from collaborating institutions. The Task Force agreed that the development of PESTNET will increase the demand for postgraduate education and attachments.

15. The overall contribution of 30 to 35 resident ARPPIS and attached students to ICIPE research is a distinct benefit to the Centre from the graduate programme. ICIPE programme leaders and unit heads all noted the contribution ARPPIS students are making to the achievement of ICIPE's strategic research objectives, and it is expected that Ph.D. students will significantly increase the research output of individual supervisors. ARPPIS students have made particular significant contributions, for example, the demonstration of the ecological and immunological significance of vaccinating sheep and goats against the tick *Rhipicephalus appendiculatus*, and the present development of a novel computerized system for the identification of phlebotomine sandflies based on cuticular hydrocarbons.

16. The supervised research of graduate students, shown to account for 71% of the total student weeks in ICIPE during 1988, is therefore of great importance with two distinct sets of benefits. The students gain from direct contact and guidance from ICIPE scientists and go away as better educated and better prepared scientists; the ICIPE benefits considerably from a young and enthusiastic scientific community able to provoke thoughts and ideas and to spend prolonged periods entirely devoted to their research at minimal financial cost to the ICIPE.

17. The Task Force noted with concern the shortage of well trained and motivated young scientists in African national agricultural research systems including those for insect pest management. This shortage of indigenous manpower was recognized to be one of the major constraints in meeting national and regional targets in food and health security. The role of short

courses in upgrading skills and sustaining enthusiasm for research is well established but expanded opportunities for graduate training, to increase the size of the manpower pool, are urgently required.

18. The enthusiasm and commitment of ICIPE staff to graduate training, the intellectual stimulus such training gives the ICIPE and the benefits to both students and the Centre led the Task Force to conclude that the strengths and experience of ICIPE with graduate training should be further developed.

19. After careful study however, the Task Force concluded that the success of ARPPIS had been achieved with a structure that was inherently unstable. The reasons for the instability were identified as:

- a) problems experienced by some ARPPIS students in completing their registration at the participating university and with obtaining guidance and feed back from their university supervisor;
- (b) prolonged periods of continuous residency on the registering university campus required by some universities;
- (c) 12-15 month periods between thesis submission and examination at some registering universities;
- (d) the accommodation of ARPPIS requirements in university regulations being dependent on individual university officers, and which are lost or revoked on a change of university staff;
- (e) the very central element of the present ARPPIS Programme, which is that the whole 3-year programme of coursework and research supervision takes place outside the participating universities and yet requires participating universities to accept and approve the studies of a student for the degree of the university when the university supervisor(s) have had little opportunity to provide effective oversight and supervision.

20. The following examples were documented for the Task Force:

- (a) Student 1, submitted a thesis to University A and 17 months later has still not been examined;
- (b) University B agreed to modify its regulations for ARPPIS student registration and residency but then 5 years later a new Dean of Graduate Studies has cancelled the modifications and ARPPIS is having to negotiate a second time, delaying the registration of students who have already begun their 3-year study programme;
- (c) University C took 3 years to register student 2; student 3 was not registered after 2 years and the registration was moved to University D. The examination of students 4 and 5 took 9 and 15 months, respectively. The University has insisted on 6 months of campus residence to expose the students to the University and applies this to its own staff;
- (d) University E agreed to register an ARPPIS Ph.D. student in the full knowledge of the structure and requirements of ARPPIS, and then refused to discuss the necessary modifications to existing University regulations;
- (e) University F has created 5 different levels of review, decision and approval in the registration of students. It is taking a long time to register students.

21. The Task Force did note with pleasure that there are participating universities that are fully cooperating with ICIPE in ARPPIS. The Task Force also recognised that the ARPPIS Academic Board, and the participating Universities, have achieved a great deal in agreeing and implementing the present ARPPIS Ph.D. programme.

22. The difficulties in achieving, and particularly in sustaining, the concessions from the universities however must not be under rated. Further more the real academic problem of asking a university to award its degree to a student when it has not been fully involved with the student's studies has to be recognized.

23. Graduate students have a limited period within which to study for a Ph.D. degree. Some constraints have been identified that impinge on the progress of some students and frustrate the intention of ARPPIS to provide an excellent education and training within the 3-year period allowed.

24. The Task Force reviewed graduate training at other institutions and in the light of that review discussed structures that would give graduate training at the ICIPE greater stability but ensure the role of ARPPIS as an effective network.

B. REPORT ON GRADUATE TRAINING AT OTHER SIMILAR INSTITUTIONS

25. National and international research centres fall into 2 major groups as far as their commitment to manpower development is concerned. One group views their responsibility as largely to provide short courses to teach or refresh occupational skills to already qualified technicians and scientists. The second group has identified a need to increase the manpower pool by providing educational programmes, and usually do this through the mechanism of graduate degrees. The ICIPE is clearly amongst the second group and the Task Force therefore sent missions to other similar research centres to review their approach and experience with graduate education (Annex 3 for list of centres visited).

26. The Tata Institute of Fundamental Research, founded in 1945, began graduate training in 1966 with the specific objectives of providing good quality scientists for India by educating them in India. The students, about 80 in any one year, are registered at the Universities of Bombay and Poona.

27. The association with the University of Bombay, although over 20 years old, and a more recent linkage to Poona University, are coming under strain because the University procedures for student selection, registration and supervision are long and

restrictive and yet not sufficiently rigorous and because the development of new academic programmes at the Tata Institute are delayed and frustrated.

28. As a result of these strains there are proposals that the Tata Institute should assume its own degree awarding status.

29. The remaining 4 research centres visited by the Task Force all have a degree awarding status within the national laws but outside the national university system. The 2 Indian Institutes are "deemed universities", under the Indian University Grants Committee Act; the Feinberg Graduate School of the Weizmann Institute operates under the Council of Higher Education of Israel, and the Instituto Venezolano de Investigaciones Cientificas (IVIC) is a national research institute with a legally constituted postgraduate school outside the national university system.

30. The Feinberg Graduate School was established in 1958, and 75 Ph.D. students were enrolled in 1959. The School now registers a total of about 75 M.Sc. and 75 Ph.D. students each year into the 5 faculties of the Weizmann Institute. In the Faculties of Biology and of Biophysics and Biochemistry there are an average of 2 graduate students to every senior scientist. Both degree programmes involve coursework and M.Sc. and Ph.D. students must accumulate 12 and 24 credits respectively. The Graduate School has no full time teaching staff and the 1988 programme of 112 lecture and laboratory courses are all taught voluntarily. About one third of the Institute's scientists do teach and are paid about 950 U.S. dollars for a one semester course. The major attraction for scientists to teach is the opportunity to preview and preselect students to work in their laboratory. Much of the scientific output of the Weizmann Institute is by graduate students and there is significant competition to supervise students; there is no postdoctoral programme in the Institute.

31. The Indian Agricultural Research Institute (IARI) was founded in 1923; the status changed to that of a deemed university in 1955 after which both M.Sc. and Ph.D. programmes were introduced. There are about 500 graduate students registered at any one time. Staff at the Institute are employed to teach and carry out research, and all students must achieve a minimum grade before beginning their research.

32. The All India Institute of Medical Sciences was established in 1956 as a deemed university, with the same overall objectives and structure as the IARI.

33. IIC was founded in 1954 as an institute for neurological research. In 1959 its mandate was widened to include all the sciences and such applied areas as the oil industry and computer science. A Centre for Postgraduate Studies was established at IIC in 1971 by an Act of Parliament. The Centre was based at IIC rather than at a Venezuelan University because IIC already had the necessary staff, facilities and expertise. IIC has a graduate student population of about 100 and presents M.Sc. and Ph.D. programmes, both of which include coursework. The research staff of IIC are responsible for all teaching and supervision.

34. Three common principles were stated by all the research institutes:

- (a) They are not universities. They do not offer a full range of disciplines, but concentrate on the areas of science for which they have facilities and expertise; nor do they offer first degree courses;
- (b) They take their role to be the creation and sustainance of excellence in graduate education;
- (c) Their independence from the structures, responsibilities and constraints of full national universities allows them a far greater level of innovation in graduate education.

35. The structure and operation of the Feinberg Graduate School at the Weizmann Institute was reviewed in detail. They can be summarized as follows:

- (a) the School is administratively separate from the Institute and, as a consequence of a linkage to the University of the State of New York, U.S.A., receives funding from the U.S. Government programme for American Schools and Hospitals Abroad;
- (b) a part-time Dean and supporting office of 5 full time staff run the School;
- (c) the Institute is divided into 5 Faculties (Biology, Biophysics–Biochemistry, Chemistry, Physics, and Mathematics), each headed by a Dean. The Dean of each Faculty chairs a Board of Studies which short lists applicants, organizes Faculty teaching and the supervision of its students. In other words, the scientists of each Faculty have considerable control over the graduate training with which they are involved;
- (d) the selection of applicants is very rigorous;
- (e) Ph.D. students are on probation for up to one year during which time they complete a research proposal, attend courses and begin preliminary work in the supervisor's laboratory. It is during this first year that the abilities of individual students are assessed. High-flyers are identified and allowed the extra intellectual and scientific freedom to develop their ideas and potential;
- (f) they must have completed the 12 credits by the 30 month progress report;
- (g) after 4 years all data collection is expected to be over and there is a final 6 months to prepare and submit the thesis;
- (h) unless the nature of the project demands more, each student has only 1 supervisor. No scientist can supervise more than 5 students and supervisors must be at least senior scientists.

C. RECOMMENDATIONS FOR THE FUTURE DEVELOPMENT OF GRADUATE TRAINING AT THE ICIPE

36. The Task Force investigated and debated the issue of masters degree versus doctorate degree training at the ICIPE. Senior ICIPE staff clearly identified the need for more opportunities for training at the M.Sc. level. Collaborating national research systems within PESTNET have stressed that they require scientists trained to the M.Sc. degree. Although the Task Force agreed with these opinions it firmly recommends that the ICIPE should concentrate on Ph.D. training. Ph.D. students require less supervision than M.Sc. students and can make a greater contribution to the ICIPE's research effort. Furthermore, training the limited number of graduate students that can be accommodated in the ICIPE for the Ph.D. degree will make a greater impact on the development of science than will a similar number of M.Sc. students. Opportunities should continue to be available for small numbers of M.Sc. students to work at the ICIPE on their research projects as postgraduate attachments. The major thrust of M.Sc. training within ARPPIS however should be through the proposed network of sub-regional centres. (see Section D).

37. The Task Force learnt that the ICIPE offers special opportunities for multidisciplinary training, and that this includes the interface between the social and biological sciences. The development of PESTNET will increase the opportunities and challenges for graduate training in the social sciences. The Ford Foundation strongly supported the continuation of graduate training at the ICIPE and urged that the training should continue to address the problems of small scale farmers but also encouraged ICIPE to expand graduate training into the social sciences. The Ford Foundation believes that opportunities should be provided for social and biological scientists to train together and become acquainted with both disciplines. In view of these challenges and opportunities, and the fact that the ICIPE Governing Council has accepted the social sciences as relevant to the ICIPE

mandate, the Task Force encourages the development of graduate training, at a modest level, in this field.

38. Having satisfied itself as to the progress and contribution made by the Ph.D. training programme at the ICIPE the Task Force turned its attention to the problems that had been identified and to the lessons to be learnt from other institutions involved with graduate training.

39. It is clear that the existing network of universities that comprises ARPPIS is an important resource for graduate training in the insect sciences in Africa which has benefited all the participants. These existing benefits and the future potential must not be forfeited in any re-organization that is directed towards resolving the present problems of the network (see Section D).

40. The constraints experienced by the Ph.D. training carried out at the ICIPE, within ARPPIS, reported in paragraphs 19 and 20, result from the establishment of an academic structure and administration at the ICIPE which also has to work within the academic structure and administration of all 14 ARPPIS participating Universities.

41. The ICIPE is not enmeshed in the traditions and practices of the Universities (which have in any case many more students, faculties and degree programmes to administer), and has clearly shown a desire and intention to be innovative in graduate education.

42. The present structure for graduate training at the ICIPE has operated for 6 years. Difficulties are accumulating and it is recommended that the structure should be changed to liberate all parties from the constraints.

43. The option of reducing the involvement of the ICIPE in the design and management of graduate training was rejected. To reduce the role of the ICIPE to that of an agent for universities

sending its students to the Centre for research alone would be to abandon ICIPE's already established record as an innovator and its future potential as a Centre in which students from different disciplines and experiences can meet and work together.

44. The possibility of forming a special linkage with a small sub-group of ARPPIS participating universities for the purpose of student registration and examination was also rejected. The two types of participation, passive and active, would create tensions not lessen them. It is also clear that the supervisory capacity in the selected universities would be overwhelmed and the underlying feelings of "rubber stamped" degrees would be exacerbated.

45. The Task Force discussed the academic credibility of the graduate programmes and schools that are outside the national university systems, with the following conclusions:

- (a) size is not the issue; the issue is excellence;
- (b) a Graduate School and the degree it awards gains credibility from the research of the host institute, and from the vigour and innovation of the graduate programme;
- (c) the vigour and innovation come in part from the independence of the Graduate School;
- (d) Graduate Schools have been established in developing countries outside Africa and there is no reason why they cannot be successfully created within the continent;
- (e) indeed, given the enormous need for well educated scientists in Africa, including insect scientists, there is a case for strongly supporting such imagination and innovation in the ICIPE.

46. It is therefore recommended that a Graduate School should be established at the ICIPE which would award its own degrees. The School should concentrate on Ph.D. programmes.

47. The Task Force emphasized that a Graduate School is not a university and that there are independent Graduate Schools that award their own degrees. There is no question of ICIPE offering graduate training outside its mandated areas of insect science. The ICIPE already provides an environment for the intellectual debate and investigation of problems of insect science. This environment will fuel and support a Graduate School which will in turn add vitality to the research of ICIPE, and contribute to the scientific output of the Centre.

48. The establishment of a Graduate School would provide a stable framework for the realization of the ICIPE mandate of training. The creation of a Graduate School would involve the continuation of the existing graduate student programme at the ICIPE, with the ICIPE awarding its own degree for work that ICIPE scientists have supervised. The Graduate School would become a full partner and participant of the ARPPIS network which would then be composed of universities and a Graduate School.

49. It is acknowledged that ARPPIS was established primarily to train scientists but also, through the degree training, to help strengthen African universities. The creation of a Graduate School at the ICIPE will in no way conflict with these twin objectives, nor will it be a competitor to the existing ARPPIS universities. The students of Africa need all the opportunities for higher education that can be established and fully sustained.

50. It has already been stressed that a balance must be maintained between all the educational and training activities of the ICIPE (see paragraph 9). For that reason the Task Force proposes that the present ICIPE Training activities should form the basis of the Graduate School. The School would then be responsible for the graduate educational and the skill enhancing training programmes. The integration and inter-relationships of these two must be encouraged, so that the objectives outlined in paragraph 5 can be met.

51. The manpower requirements for the establishment of the Graduate School are discussed in Section E, paragraphs 76 to 82.

52. The Head of the Graduate School will chair a Board of Studies, composed of the Heads of all ICIPE programmes and units. The Board will:

- (a) establish student selection procedures, and select the students each year;
- (b) organize and approve the teaching semester and the course lecturers;
- (c) appoint student supervisors;
- (d) appoint student review committees;
- (e) nominate each examination committee;
- (f) review and advise on all academic and student matters;
- (g) report to the Academic Council.

53. It is recommended that an ICIPE Academic Council be established with the following membership:

- (a) Representative of the ICIPE Governing Council;
- (b) The Director of the ICIPE;
- (c) Head, Graduate School;
- (d) Representative of the Board of Studies;
- (e) Representative of the ARPPIS participating universities;
- (f) Eminent insect scientists from Africa not represented by (a) to (e) above.

The Academic Council will function as a Senate, including the responsibility of approving the award of degrees.

54. Given the size of the ICIPE it is recommended that an ICIPE graduate programme should retain a single student intake. During the establishment of the Graduate School the annual student intake should remain at its present level. Once the Board of Studies and Academic Council are established then the student intake will be determined and set by those bodies.

55. Coursework should continue to be a mandatory and integral part of the Ph.D. degree. A minimum number of credits to be achieved during the year should be established.

56. So far the ARPPIS coursework has been taught by ICIPE scientists and by visiting faculty members from the participating universities. The programme of visiting lecturers should be continued.

57. The Task Force noted a debate over the length of the existing ARPPIS Ph.D. degree; at present 3-years are allowed but there are arguments for this to be extended to 4-years. It will be for the Academic Council to agree the minimum and maximum study period for the Graduate School Ph.D.

58. The Task Force strongly urges that the student research projects must continue to fall within the strategic plans and objectives for each ICIPE programme and unit.

59. The Task Force has made the recommendation for the establishment of an ICIPE Graduate School after having fully considered the likely credibility and acceptability of future ICIPE degrees. The Task Force does not accept the view that degree granting is the exclusive right of established universities and it is fully confident that the Graduate School will quickly achieve widespread international recognition and acceptance. It does so for the following reasons:

- (a) because it will be part of the ICIPE which already has a worldwide reputation for its research and training, especially its graduate training;
- (b) the quality of the research facilities now available at ICIPE will attract high calibre students;
- (c) the quality of the graduate students that leave the School will set and maintain the reputation of the School;
- (d) the proposed new Academic Council of eminent insect scientists from Africa and the rest of the world will give weight and credibility;

- (e) the legal status of the Graduate School will be clear and unambiguous.

60. The legal requirements for the establishment of a Graduate School in Kenya have been gazetted under Legal Notice Number 56, of 3rd March 1989; "The Universities (Establishment of Universities) (Standardization, Accreditation, and Supervision) Rules, 1989".

D. THE FUTURE CONTRIBUTION OF THE ARPPIS NETWORK AND THE DEVELOPMENT OF SUB-REGIONAL CENTRES FOR GRADUATE TRAINING

61. As already stated, the Task Force accepts the urgent need to increase the opportunities for M.Sc. degree training in the insect sciences, and that the ICIPE cannot meet this need. The Task Force considered and accepted the proposal by the ARPPIS Academic Board to develop sub-regional centres to teach M.Sc. degrees, provided that the M.Sc. degree is complete in itself and will enable the graduate to undertake research, and is not merely a preparatory course for subsequent entry into a Ph.D. programme.

62. The Task Force considers the development of the sub-regional centres to be another major experiment in higher education within ARPPIS. It sees the centres as models for networks in other disciplines. The Task Force recommends that each sub-regional centre should be strengthened to deliver the coursework and much of the research, but that linkages also be formed with other universities in the sub-region and that these universities receive strengthening for particular research areas. Students could then travel to collaborating universities to pursue research in their specialized areas. This approach will result in the strengthening of a whole sub-region and not just one university. Teaching staff should be drawn from all sub-regional universities.

63. The development of the sub-regional centres will create sub-networks within the overall graduate training network. This will alter the nature of the network and new mechanisms of communication and of responsibilities will have to be established. The Task Force does however urge again that the ARPPIS network with its consortium of training centres should be maintained, even though consideration will have to be given to widening its nature and objectives.

64. The sub-regional centres must be sensitive to the needs of French and Portuguese speaking students. The idea of separate centres catering for non-English speaking students was rejected. The sub-regional centres must therefore be able to accept qualifications from non-anglophone universities and may have to consider offering courses in remedial English.

65. It was noted that many previous sub-regional training programmes have collapsed when the external source of funds has closed. Such programmes have often lacked a commitment from the host university to embrace them as part of the university's own programme. Frequently the only sub-regional content has been the request for students from neighbouring countries.

66. The ARPPIS Academic Board has proposed the establishment of four sub-regional centres;

Southern Africa

Eastern and North East Africa

West Africa

Central Africa.

Each centre will be hosted by an ARPPIS participating university, and the Task Force understands that the centres will be introduced in a phased manner.

67. The Task Force has been informed that each sub-regional centre will have the following objectives:

- (a) to present a 2-year M.Sc. programme in insect science with coursework and research;
- (b) to draw upon the strengths of the host university and the other participating universities of the sub-region;
- (c) to present coursework that has been specifically designed to meet the needs of the national research systems of the sub-region.

68. The Task Force endorsed the proposed structures which will offer M.Sc. students the opportunity to study in their own sub-region, and would enable ARPPIS to embrace all areas of insect science and not just those covered by the ICIPE mandate.

69. The University of Zimbabwe has agreed to host the sub-regional centre for southern Africa. The Senate has approved the principle of the programme and is urging the Department of Biological Sciences to formulate the full details of the M.Sc. degree. The other universities of the sub-region have accepted the University of Zimbabwe as host and joint discussions are being held to reach agreement on the content and structure of the degree programme. The admission of the first ARPPIS students is planned for the 1990 academic year.

70. The Task Force was pleased to learn that the University of Zimbabwe is able and willing to register students from Mozambique.

71. The Task Force recommends that there must be a commitment from the host and participating universities to adopt the ARPPIS programme and help sustain it either directly or indirectly. Furthermore there must be an intellectual involvement by as many as possible of the appropriate scientists of the sub-region in planning, teaching and supervision.

72. The Task Force proposes that each subregional centre should have an advisory committee which will emphasize and plan for the regionality of the subregional centre. These commit-

tees must not be in conflict with the acknowledged responsibility of the Senate of the host university to approve and sanction the degree programme, but by involving insect scientists from the sub-region (from the host university, other universities of the sub-region and from national programmes) it will ensure an involvement for all beyond merely sending students.

73. It was agreed that the role of ICIPE in the subregional centres should be as a:

- (a) member of the advisory committee;
- (b) possible source of resource persons for teaching and supervision;
- (c) collaborator in fund raising initiatives.

74. The Task Force has already noted that the establishment of an ICIPE Graduate School will change the character of the present ARPPIS Academic Board. It strongly recommends , however, that the ARPPIS network be retained with a new mandate and set of responsibilities. The network, as a meeting of universities with an interest in the insect sciences, will have a unique opportunity to address issues confronting insect pest management in Africa, to continue setting internationally recognized standards for the graduate teaching of the insect sciences, and to take initiatives for graduate training.

75. The Task Force envisages ARPPIS as being a network of institutions all involved with degree programmes in insect science, and which will have the following specific objectives:

- (a) to encourage and facilitate the teaching of insect science in first degree courses within the universities of the network;
- (b) to coordinate the M.Sc. programmes in insect science being presented at the sub-regional centres;
- (c) to encourage the introduction of Ph.D. programmes, with coursework, at participating universities
- (d) to develop and encourage coordinated staff development programmes in insect science for faculty members;

- (e) to identify and where possible establish opportunities for short course training and for sabbatical leave of existing faculty members throughout the network.

E. IMPLICATION OF THE RECOMMENDATIONS FOR MANPOWER REQUIREMENTS, PHYSICAL FACILITIES AND FUNDING

76. The Task Force has recommended the strengthening of the continuing programme of graduate training at the ICIPE. The implications of these recommendations are set out in this section.

Manpower requirements

77. The manpower of the existing ICIPE Training activities are as follows:

- ARPPIS Academic Coordinator
- Senior Training Officer
- Senior Secretary (2)
- Secretary (1)
- Driver (2)

The budget provides for one technician.

The ARPPIS Academic Coordinator and the Senior Training Officer report to the Head of the Institutional Building and Interactive Research Unit.

78. The manpower requirements beyond those already available and described in paragraph 77, are:

- Head, Graduate School
- Training Officer (for MPFS)
- Administrative Officer
- Secretary (MPFS)
- Technician (1 for MPFS)

The position of ARPPIS Academic Coordinator will be replaced as a result of the reorganization.

79. It is proposed that the Head of the Graduate School should report to the Director of the ICIPE and be responsible for the full activities of the School (graduate and nongraduate training) but with particular responsibility for the degree programmes.

80. The Training Officer at MPFS would be responsible for all students, graduate and non graduate, based at MPFS and would organize the graduate and short courses located at MPFS. This position will facilitate the full utilization of MPFS as a resource and base for training activities. The secretary at MPFS will assist the training officer.

81. The administrative officer will be responsible for those day to day activities of the School delegated by the Head of the School.

82. The two technicians will provide laboratory support for courses in MPFS and Nairobi, and keep the laboratory stores of the School.

Physical facilities

83. At the present time the ICIPE Training activities have the following space in the new Duduville Laboratory complex:

(a) Offices – 3

1 each for the ARPPIS Academic Coordinator and the Senior Training Officer, and 1 general office for the secretariat

(b) Teaching rooms – 2

1 for lectures and 1 for microcomputers

(c) Teaching laboratory – 1.

84. This space is only temporarily occupied until purpose built accommodation for the whole of IBIRU is designed and constructed.

85. The new buildings should include adequate provision for the Graduate School. The Task Force suggests that the follow-

ing outline requirements are considered during the design of the new building:

- (a) adequate office space for the administrative staff of the School;
- (b) offices for visiting lecturers;
- (c) at least two teaching laboratories with associated storage and preparation facilities;
- (d) lecture and seminar rooms;
- (e) microcomputer room;
- (f) study and writing space for students.

These facilities will be used by both the graduate and non-graduate training activities.

86. The Task Force noted that the new ICIPE library is being designed with the likely future needs of ICIPE training activities in mind.

87. The Task Force considered the problems faced by existing students renting accommodation in Nairobi and travelling daily to Duduville. The commitment of the students to their work was noted but the Task Force urges that attention be given to the development of suitable hostel accommodation on the Duduville campus. This would relieve some of the domestic pressures on the students and would further encourage and support their commitment to their study and research.

88. The identification of funds for the start of a purpose built student hostel at MPFS was welcomed.

89. The Legal Notice number 56 concerning the establishment of new universities in Kenya clearly sets out the physical spaces and their fixtures expected in new establishments and the Task Force urges that these should be carefully and fully consulted during the design of any new facilities for training at the ICIPE.

Funding

90. The creation of new staff positions and the physical development described in paragraphs 77 to 89 to strengthen the graduate training obviously have implications for recurrent and capital development budgets, but they are very modest. The Task Force again noted that the new manpower and physical facilities will develop and strengthen the existing graduate and nongraduate training activities of the ICIPE, and will be of advantage to the proposed Graduate School.

91. It is also reported that three existing donors have expressed their complete satisfaction with the work that ICIPE is already doing for graduate training and have indicated their understanding and support for the principle of future consolidation and re-organization of graduate studies in the Centre.

92. The Task Force believes that an ICIPE Graduate School could also generate its own financial resources through the charging of fees to certain students, although external fellowship support will need to continue for students from specified projects and institutions (including the ARPPIS Universities).

93. The 1989 budget for ARPPIS activities at the ICIPE is \$420,000. This represents approximately \$14,000 per Ph.D. student at the ICIPE; which includes:

- (a) student stipend, health insurance and book allowance;
- (b) student travel;
- (c) university fees;
- (d) exchange visits between the ICIPE and the registering university by student and university supervisors;
- (e) a contribution to student research costs;
- (f) thesis preparation and submission;
- (g) administrative costs of ARPPIS.

The additional costs for the institutional support and for the time contribution of ICIPE scientists are estimated to be \$6,000 for each ARPPIS student. The total annual cost for each ARPPIS student is therefore \$20,000.

94. The Task Force strongly believes that the proposed Graduate School will deliver a first rate graduate education to African scientists in Africa at rates more favourable when compared to the alternative sources of education in Europe or North America.

F. SUMMARY OF THE REPORT

95. The ICIPE educational and training activities were reviewed; short courses, in-service training and graduate education were found to be the major activities.

96. ICIPE has a record of innovation and achievement in graduate education and the ARPPIS programme is already making a significant impact on teaching and research for insect science in Africa.

97. Graduate students at the ICIPE are also making a major contribution to the Centre's strategic research objectives and are expected to significantly increase the research output of individual supervisors and research programmes. They do this at a minimal financial cost to the ICIPE.

98. The need to increase the indigenous manpower resources of Africa for insect pest management; the existing record of the ICIPE with graduate education; and the intellectual stimulus such educational programmes give to the Centre led the Task Force to conclude that graduate education at the ICIPE should be further strengthened.

99. The ICIPE and the participating universities have achieved a great deal in advancing the ARPPIS programme but difficulties and constraints were identified which will affect the long term stability of ARPPIS.

100. Reports were received on graduate training at other research institutions. It was clear that the institutions had the facilities and the confidence to be fully responsible for graduate

education within those areas of science for which they have competence and expertise. They take this role to be the creation and sustenance of excellence in graduate education and achieve this through independent but legally established degree awarding graduate schools.

101. The Task Force considered the constraints being experienced in ARPPIS; the capabilities and record of the ICIPE in graduate education; and the lessons learnt from other research institutions. In consequence, it is recommended that a degree awarding Graduate School be established at the ICIPE.

102. The Graduate School will provide a stable framework for the realization of the ICIPE mandate for training.

103. The School should concentrate on Ph.D. programmes. Consideration may be given to extending these programmes to include the social sciences as they relate to the ICIPE's established Social Science Interface Research Unit.

104. The ICIPE will award its own degree for work that ICIPE scientists have supervised, which must remain within the strategic research plans of the Centre.

105. The establishment of a Board of Studies and an Academic Council is recommended. The latter will have representatives from the ICIPE, the ICIPE Governing Council, the ARPPIS universities and include other eminent insect scientists.

106. The Task Force is emphasizing that the Graduate School will not be a university and there is no question of the ICIPE offering graduate training outside its mandated areas of insect science.

107. The Task Force is fully confident that the Graduate School and its degrees will quickly achieve widespread interna-

tional recognition and acceptance strengthened by ICIPE's own international acclaim.

108. The Government of Kenya has provided clear and detailed guidelines for the legal recognition of higher education establishments in Kenya outside the national system and therefore there will be no legal problems.

109. The Graduate School should become a full partner and participant in the ARPPIS network which the Task Force strongly recommends be retained and given a new mandate and set of objectives.

110. The ARPPIS Academic Board has already proposed the establishment of four subregional centres to be hosted by participating universities to teach two-year M.Sc. programmes in insect science that are relevant to the needs of each sub-region. The Task Force endorses the proposal and notes that it will provide opportunities for masters level education within ARPPIS but outside the ICIPE.

111. The first subregional centre will be hosted by the University of Zimbabwe.

112. The sub-regional centres will accept qualifications from non-anglophone universities. The possibility of a separate centre for non-English speaking students was rejected.

113. The ARPPIS network will have the responsibility to set and maintain standards for the teaching of insect science in Africa and to continue taking initiatives to further develop graduate training.

114. The modest additional resources required will strengthen both graduate and non-graduate training at the ICIPE which use common facilities.

115. The Task Force noted that training at the ICIPE is presently occupying temporary space within the laboratory complex. The new buildings for training activities should make adequate provision for teaching and administration in the graduate programme. The requirements of Kenya law will easily be met.

116. The development of a student hostel at Duduville is strongly recommended.

117. The Task Force strongly believes that the ICIPE graduate programme will be strengthened and given a firm base for the future by the recommendation to develop an independent degree awarding Graduate School. It will deliver a high quality education in a first rate research environment at a financial cost that is competitive to any other establishment.

TASK FORCE APPOINTED TO MAKE RECOMMENDATIONS ON THE FUTURE DEVELOPMENT OF GRADUATE TRAINING AT THE ICIPE

Terms of Reference

- (i) to review the structure and objectives of existing graduate training at the ICIPE
- (ii) to review the graduate training programme in similar institutions
- (iii) to make recommendations for the future development of graduate training at the ICIPE, taking account of the following:
 - (a) the urgent need to develop effective training at the masters degree level for African national systems;
 - (b) the need to develop modalities for extending effective graduate training to French and Portuguese-speaking African countries;
 - (c) the possibility of extending ICIPE graduate training to disciplines impinging onto, and affecting the effective utilization of the insect sciences;
 - (d) the desirability of extending the opportunities of graduate training at the ICIPE to the whole tropical developing world;
 - (e) the need to develop graduate training at the ICIPE sensitive to, and in the context of higher education in Africa.
- (iv) to relate the recommendations to the existing ICIPE graduate training programmes
- (v) to assess the implications of the recommendations for manpower requirements, physical facilities and funding.

**TASK FORCE APPOINTED TO MAKE
RECOMMENDATIONS ON THE FUTURE DEVELOPMENT
OF GRADUATE TRAINING AT THE ICIPE**

Members of the Task Force

Professor L.K.H. Goma,
Chairman of the Task Force
Minister of Higher Education, Science and Technology,
Republic of Zambia, and a former member of the ICIPE
Governing Council.

Professor D.E.U. Ekong,
Secretary-General, Association of African Universities,
Member of the ICIPE Governing Council and Chairman of its
Programme Committee.

Dr. J.M. Gopo,
Chairman, Department of Biological Sciences, University of
Zimbabwe. Representing the ARPPIS Academic Board.

Dr. J.O. Nyabundi,
Lecturer, University of Nairobi.

Mrs. R.A. Odingo,
Chief Planning Officer, ICIPE

Dr. M.E. Smalley,
Secretary to the Task Force,
ARPPIS Academic Coordinator, ICIPE.

**TASK FORCE APPOINTED TO MAKE
RECOMMENDATION ON THE FUTURE DEVELOPMENT OF
GRADUATE TRAINING AT THE ICIPE**

Schedule of Meetings and Visits

- A. Task Force Meetings.
- 30th September to 2nd October 1987
 - 30th and 31st May 1988
 - 3rd June 1988
 - 18th March 1989.
- B. Visits to other Institutions.
- Weizmann Institute of Science; Feinberg Graduate School, Israel,
 - Tata Institute of Fundamental Research, India
 - Indian Agricultural Institute, India
 - All India Institute of Medical Sciences, India
 - Instituto Venezolano de Investigaciones Cientificas, Venezuela
 - International Laboratory for Research on Animal Diseases, Kenya
 - Ford Foundation, Regional Office for Eastern and Southern Africa.
- C. Task Force Meetings with the ARPPIS Academic Board
- 17th December 1987
 - 2nd June 1988
 - 1st December 1988.
- D. Visits to ARPPIS participating universities
- Addis Ababa University
 - University of Zimbabwe

**TASK FORCE APPOINTED TO MAKE
RECOMMENDATIONS ON THE FUTURE DEVELOPMENT
OF GRADUATE TRAINING AT THE ICIPE**

Analysis of Training Activities at the ICIPE during 1988

Activity	Total No. of students	Total No. student weeks	% Total student
ARPPIS			
– teaching semester	10	216	13
– supervised research (M.Phil and Ph.D. Students)	40+	992	61
Postgraduate attachments			
– supervised research	5	160	10
Short Courses	83	179	11
In-service training	3	76	5
	131*	1,623	100

- * the 1988 Class of 10 students completed the teaching semester before starting their research and are not therefore counted twice.
- + includes students from the 1985 and 1988 Ph.D. Classes who concluded and began their research respectively during 1988; and 4 M.Phil students.

**TASK FORCE APPOINTED TO MAKE
RECOMMENDATIONS ON THE FUTURE DEVELOPMENT
OF GRADUATE TRAINING AT THE ICIPE**

Status of Students Following Graduation from ARPPIS

Name of student	Date thesis examined/status of thesis	Present position
1983 CLASS		
Mr. R.K. Bagine	January 1988	Head, Department of Entomology, National Museums of Kenya
Miss W.S. Forawi	April 1987	Lecturer, Omdurman University, Sudan
Mr. A.L. Ibrahim	April 1986	Scientist, ICIPE
Mr. S. Kyamanywa	December 1988	Lecturer, Makerere University
Mr. B.C. Njau	July 1987	Postdoctoral Fellow, International Livestock Centre for Africa
Mr. J.H.P. Nyeko	March 1987	Research Officer, Tsetse Control Department, Ministry of Animal Industry and Fisheries, Uganda
Mr. S.H. Okech	March 1987	Scientist, ICIPE

Mr. J. Okeyo-Owuor February 1988 Scientist, ICIPE

1984 CLASS

Miss D.A. Adabie submitted Entomologist, Ghana
October 1987 Atomic Energy
Commission

Mr. J.W. Bahana submitted Research Scientist,
January 1989 International Red
Locust Control
Organization for Central
and Southern Africa,
Zambia

Mrs. U.M. Elneima in preparation Entomologist, Ministry
of Livestock, Sudan

Mr. L. Kantiki October 1987 Lecturer, University
of Malawi

Mr. C. Maranga submitted Lecturer, Kenyatta
June 1988 University

Mr. J.H. Nderitu submitted Entomologist, Ministry
November 1988 of Agriculture, Kenya

Mr. M. Ogenga-
Latigo submitted Lecturer, Makerere
December 1988 University

Mr. J.F. Omollo in preparation Lecturer, Kenyatta
University

1985 CLASS

Mr. G. Tikubet in preparation Lecturer, Addis Ababa
University

Mr. B. Torto	January 1989	Lecturer, Egerton University, Kenya
Mr. I. Aniedu	August 1988	Lecturer, Anambra State University of Technology
Mr. C. Kyorku	submitted March 1989	Lecturer, University of Ghana
Mr. M. Basimike	July 1988	Postdoctoral Fellow, ICIPE
Mrs. R. Sang	in preparation	Research Officer, Virus Research Centre, Kenya
Mr. B. Wishitemi	submitted December 1988	Lecturer, Kenyatta University.
