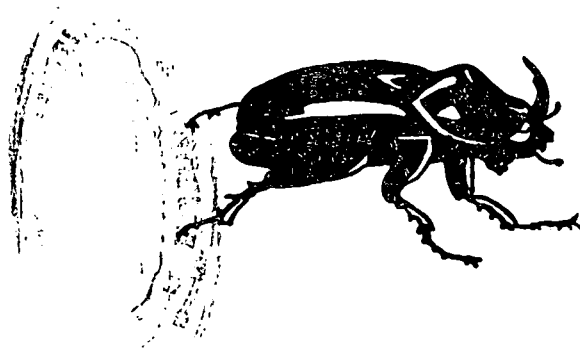


PROJECT FOR RESEARCH ON THE CONTROL  
OF THE COCONUT PALM RHINOCEROS BEETLE

# REPORT

of the

## RHINOCEROS BEETLE OPERATIONS BOARD



Apia, Western Samoa

March 1964

PEST. RHINO  
UNSF

AMJ

South Pacific Commission  
Nouméa, New Caledonia

1964

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RESTRICTED

UNSF/SPC PROJECT FOR RESEARCH ON THE CONTROL  
OF THE COCONUT PALM RHINOCEROS BEETLE

F I R S T M E E T I N G

of the

RHINOCEROS BEETLE OPERATIONS BOARD

Apia, Western Samoa  
March 1964

## MINUTES

of the

### FIRST MEETING OF THE RHINOCEROS BEETLE OPERATIONS BOARD

The Meeting opened on Tuesday, March the 3rd, at 9.15 am at the Fono House, Malinu'u, Apia, Western Samoa.

On behalf of the Secretary-General of the South Pacific Commission, Mr. W.D. Forsyth, the SPC Executive Officer for Economic Development, Dr. J. Barrau, welcomed the Members of the Board and their Advisers.

It was moved by Mr. B.E.V. Parham, seconded Mr. B. Given, that Dean K. Ryerson be elected Chairman of the Board.

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At the request of the Chairman, Dr. J. Barrau presented a summary of the past activities of the South Pacific Commission in the field of research on Oryctes control and of the origin of the present Project for which the assistance of the UN Special Fund has been obtained.

Following Dr. Barrau's summary, the SPC Finance Officer, Mr. A.J. Neil, explained the financial organization of the present UNISF-assisted project which is under the supervision of the Food and Agriculture Organization of the United Nations (FAO) as Executing Agency while the South Pacific Commission retains operational control as Sub-Contractor.

There followed questions from some Members of the Board related to territorial financial contributions to the cost of the Project. The SPC Finance Officer elaborated on these points.

The Chairman emphasized the requirement for flexibility within the broad frame of the approved programme; he considered this flexibility a basic necessity for a scientific project of this nature. This view was shared by the Members of the Board.

He continued the discussion by pointing out that the function of this Meeting was to finalize a General Plan of Work covering the five year period and a Detailed Plan of Work for the next twelve months.

Reference was then made to the PL 480 Project in India on the control of the coconut rhinoceros beetle at the Central Coconut Research Station, Kerala State. The Chairman stated that he would obtain details of this project from Washington and forward these to the South Pacific Commission for the information of the Members of the Board and of the Project Manager.

At the request of the Chairman, the Project Manager, Dr. C.P. Hoyt, then presented an outline of previous work which had been carried out on Oryctes in the Pacific, Africa and South-East Asia. The general opinion of Members was that a brief summary of present knowledge should be embodied in the Draft Plan of Work as an introductory section.

Dr. Hoyt then indicated the current staff situation and explained how authorization by the Special Fund for advance recruitment had enabled the appointment of the Project Manager, the Insect Ecologist (Project Area), Dr. A.D. Hinckley, and the Insect Pathologist (Project Area), Mr. K.J. Marschall.

Dr. Barrau also explained how under section 38 of the Draft Plan of Operation the South Pacific Commission had been able to designate as its Project Liaison Officer, Mr. K. Newton, SPC Tropical Agriculturist.

During further discussion on staffing of the Project, Mr. O'Connor underlined the necessity for an efficient secretariat at Project headquarters and this view was supported by the Chairman. Several Members at the Meeting

also presented their views on the most effective manner in which specialist staff could be recruited and it was agreed that a resolution incorporating these views should be formulated (cf. Appendix I).

The Chairman then introduced the Draft General Plan of Work and in doing so pointed out that while biological control was of initial importance, it was desirable that the programme should remain flexible enough to allow emphasis to be shifted to such fields as the utilization of chemicals which might be of use in beetle control. Mr. O'Connor presented a view that early emphasis on studies related to the control of adult Oryctes was highly desirable. Detailed discussion on the Draft of the General Plan of Work then continued for the remainder of the day's Meeting.

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The Meeting resumed at 8.30 am on Wednesday, March the 4th, and discussion of the Draft of the General Plan of Work continued from the point reached on the previous day.

One of the major items under discussion during the morning was the training through fellowships within the scope of the Project and the principles of the relationship between local junior technical officers and the Project.

The views of the Board on this subject have been incorporated in the attached Draft of the General Plan of Work (cf. Appendix II).

Taking into account the limited availability of local technicians and agricultural officers, the Board felt that a reasonably flexible system should be adopted for the training of these junior technical officers through fellowships awarded within the Project's frame.

The question of research contracts was then discussed and, on this subject, the Board felt that a resolution (cf. Appendix I) was necessary

concerning the design of experimental work as well as the statistical analysis and interpretation of results from field experiments undertaken within the scheme.

This completed the discussions on the General Plan of Work and the Board then moved on to a discussion of the Detailed Plan of Work for the first year of the Project.

Points raised in these discussions have been incorporated in the Draft of this Detailed Plan of Work (cf. Appendix III).

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The Meeting resumed at 9.30 am on Thursday, March the 5th, and attention was first paid to the revised text of the General Plan of Work with particular reference to details of training fellowships and research contracts.

This was followed by a discussion on laboratory facilities presently available in Western Samoa for the Project and on the plan for building new laboratory facilities within the College of Tropical Agriculture to be created near Apia in the near future.

Mr. J.B. Wright, New Zealand High Commissioner in Western Samoa, informed his colleagues on the Board of the present plans for the proposed Regional College of Tropical Agriculture.

The Board decided to appoint a Committee composed of Mr. B.B. Given, Dr. C.P. Hoyt and Mr. B.A. O'Connor to prepare an outline of the Project laboratory requirements (cf. resolution in Appendix I).

It was also understood that plans for the new laboratory facilities were to be submitted to the Director of Agriculture, Western Samoa, who is scheduled for appointment in the near future.

Another matter which received the attention of the Board was the question of communication between the Board, the Project Manager and the South Pacific Commission.

It was felt that on all programme and policy matters communication should be through the South Pacific Commission with the exception of communication on technical or scientific subjects between one Member of the Board and the Project Manager. Communications of this nature could be direct, with copies of the correspondence to the South Pacific Commission for record.

It was noted that the Australian Commissioner wished to receive copies of all documents sent to the Board.

On the subject of a second Meeting of the Operations Board, the consensus of opinion was that while adequate provision must be made in advance for such a meeting the final decision on detailed arrangements should be deferred until the report on the Project's first year of activities was available.

Finally, on the subject of publication, the Board felt that the professional staff of the Project should be able to publish results of their work in scientific journals, provided that prior approval of their manuscript was given by the Project Manager.

The Board also wished to underline the need to obtain prior approval by the Project Manager of the text of popular articles and press releases.

R E S O L U T I O N S

1. The Operations Board

Recognizing the need to attract scientists of high calibre to the staff of the Oryctes Project,

Realizing that there is a world-wide shortage of scientists,

Recommends that the Commission explore the possibilities of publicising the needs of the Project widely by such means as statements and advertisements in scientific journals and circulation of vacancies to Members of appropriate professional associations.

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2. The Operations Board

Recognizing the importance of sound experimental design,

Recommends that the Commission obtain the services of a biometrical adviser to the Oryctes Project,

and further Recommends that the design of all Project experiments which are susceptible to statistical control be submitted for consideration and approval by the biometrical adviser prior to implementation.

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3. The Operations Board

Recognizing the necessity of providing the Project with well equipped laboratories and insectaries,

Recommends that:

- (a) the following buildings be provided at the proposed College of Tropical Agriculture:
    - (i) an office and laboratory building of 2280 square feet of floor space,
    - (ii) an insectary and quarantine chamber of 1000 square feet of floor space,
    - (iii) a store-room for inflammable and poisonous material of 180 square feet of floor space;
  - (b) library space for the proposed Regional College of Tropical Agriculture should not at this stage be included in the Project buildings;
  - (c) construction of the Project buildings should not be commenced until the plans and specifications have been approved by the Project Manager.
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RESEARCH ON THE CONTROL OF THE COCONUT PALM RHINOCEROS BEETLE

( 1964 - 1969 )

GENERAL PLAN OF WORK

INTRODUCTION

In 1953, the coconut palm rhinoceros beetle, Oryctes rhinoceros L., was found to have established itself in Fiji; as a consequence, the Government of Fiji requested the South Pacific Commission to undertake research into the methods of control of the pest.

Investigations began in 1954 and, during ten years, have covered fields such as ecological studies, biological control by parasites, predators and pathogenic agents, experimentation with attractants and pesticides. This work which was largely concerned with the elimination of breeding sites and the destruction of Oryctes at the larval stage will be continued.

Control at the apparently vulnerable adult stage which has received little attention in the past will be examined more closely; but the aims of the Project should be to investigate all possible means of control which are economical and applicable under the conditions prevailing in the South Pacific area.

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OVERALL SCHEDULE FOR PROJECT OPERATIONS

SECTION A - TITLES, MAN MONTHS ALLOCATED FOR WORK AND DUTIES

I. MANAGEMENT

1. Project Manager Man months of service .... 60

Duties

He shall

- (a) be responsible for the detailed planning, administration and execution of the Project, the timing and budgeting of the various elements, the preparation of the technical reports and detailed plans of work and the organization and supervision of the training programmes;
- (b) assist in the selection of Project personnel, auxiliary staff and recipients of Special Fund fellowships;
- (c) supervise the personnel assigned to the Project;
- (d) be responsible to the Executing Agency for all material and equipment supplied by the Special Fund;
- (e) control the use of land, buildings, equipment and materials, supplies and other property made available by the Governments or provided out of the Special Fund allocation;
- (f) coordinate, as judgement indicates desirable, the efforts of Project personnel with that of UN and other Agencies and projects mutually interested in achieving the purpose of the Project;
- (g) be responsible for obtaining prior approval for the introduction of biological control agents into the various island groups from their Governments;
- (h) nominate the Deputy Project Manager to be appointed by the South Pacific Commission.

2. Secretary-Typist Man months of service..... 60

Duties

A Secretary-Typist will be assigned to the Office of the Project Manager.

II. PROJECT AREA

The headquarters of the Project and the centre of research for the Project Area will be located in Western Samoa where Oryctes rhinoceros is prevalent and where the size of plantations is sufficiently large to allow satisfactory experimentation and field work. From the base in Western Samoa the Project Area experts will cover other territories in the South Pacific region affected by O. rhinoceros or where other dynastids related to the rhinoceros beetle are serious pests of the coconut palm. Research and experiment in the Project Area will be under the direct supervision of the Project Manager.

Staff based in the Project Area will be as follows:

SCIENTIFIC STAFF:

1. Insect Ecologist (Project Area) Man months allocated  
for work ..... 46

Duties

The Insect Ecologist will carry out the following programme of research with the object of studying Oryctes rhinoceros, its behaviour and its relationships to environmental factors in actual and potential habitats. This research will include:

(a) The following measurements and observations:

I. Physical-Chemical Measurements

A. Physical

1. Macro-climate
2. Micro-climate

B. Chemical

1. Larval food
2. Adult food

II. Community and Population Studies

A. Adult population and behaviour studies

B. Succession in larval media

1. Precursors
2. Commensals and Symbionts
3. Successors

C. Other Coconut Insects

D. Competition

1. Inter-specific
2. Intra-specific

III. Evaluation of Natural Mortality (with special reference to the adult beetle)

A. Parasitization

B. Predation

C. Disease

D. Survival

Parallel studies by the Ecologist (S.E. Asia) will provide useful comparisons.





various lures suggested. Also in co-operation with such organizations as are concerned, information will be sought and investigations made in regard to the use of chemical sterilants as a possible means of control of Oryctes. As a part of these investigations, as well as for information needed to complete the ecological studies, the reproductive cycle and sexual habits of Oryctes will be worked out in detail.

- (c) The Entomologist will be responsible for the reception, breeding, distribution, release and evaluation of the insect parasites and predators of Oryctes and related dynastids in the Project Area. This will necessarily include the training of technicians in these phases of biological control methods. It may also include follow-up surveys to determine if establishment of the various parasites and predators released has taken place.
- (d) Observations will be made whenever possible to determine the direct beneficial effect and the rôle of the introduced predators and parasites in their new environment and of any factors, such as native insects, which might be adversely affecting them. In this, co-operation with the Insect Ecologist and Insect Pathologist will be necessary.

NON-PROFESSIONAL PERSONNEL:

1. Laboratory Technician Man months of service ..... 60

Duties

- (a) The Laboratory Technician will help in setting up the laboratories in Western Samoa. Afterwards he will be engaged in tasks such as the preparation of solutions and media for

breeding purposes, preservation of specimens and care of collections. He will be responsible for the insectary and will assist the three resident scientists as his services are required.

- (b) He will be responsible for seeing that the laboratory and insectary equipment is clean and in good order. He will report all breakages and losses and will notify the Officer concerned of all shortages in supplies of expendable goods.

2. Laboratory Assistant Man months of service ..... 60

Duties

The Laboratory Assistant will assist the Technician in his duties and will in addition give assistance to the three resident scientists when needed. He will be required to accompany these scientists in the field to help them with the organization and set up of their field experiments.

3. Field Assistants/Drivers (2 men) Man months of service .... 120

Duties

- (a) One Field Assistant/Driver will be assigned to the Office of the Project Manager. After the initial work of establishing the laboratory and settling in the Project Officers, his services will be at the disposal of the Insect Pathologist.
- (b) One Field Assistant/Driver will be assigned to the Insect Ecologist (Project Area).

4. Labourers Man months allocated  
for work ..... 120

Duties

Labourers will be assigned to the Office of the Project Manager. They will be given work on a day-to-day basis.

### III. SOUTH-EAST ASIA

A laboratory will be established in South-East Asia, probably in Malaysia, as near as possible to areas where O. rhinoceros is prevalent.

One member of the scientific staff stationed in South-East Asia will be designated Officer-in-Charge. He will be responsible to the Project Manager for all material and equipment and will control the use of land, buildings, equipment, materials, supplies and other property provided under the Project for this base. In this connection he will prepare inventories and lists of equipment and supplies needed for submission to the Project Manager at regular intervals. Logistic support will be provided from this base for the other specialists working in the area.

Scientific staff based in South-East Asia will be as follows:

- |  |  |    |
|--|--|----|
| 1. <u>Insect Ecologist</u> (S.E. Asia) | Man months allocated<br>for work ..... | 34 |
|--|--|----|

#### Duties

- (a) As far as possible measurements and observations parallel to those made by the Insect Ecologist (Project Area) will be carried out. In this regard it will probably be necessary for this Officer to visit Western Samoa before taking up his post in South-East Asia.
- (b) Particular attention will be given to the roles played by indigenous parasites and predators of Oryctes and the related dynastids in palm crowns and in the breeding sites, the main object of this being to aid in the selection of those predators and parasites best suited for introduction into the Pacific area as biological control agents.
- (c) The Insect Ecologist will co-operate with the Entomologist and Insect Pathologist and will provide assistance for them as needed.

2. <u>Insect Pathologist</u> (S.E. Asia)	Man months allocated for work .....	34
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Duties

- (a) This Officer will make a survey of the populations of Oryctes and related dynastids in South-East Asia and perhaps parts of Africa for the purpose of discovering organisms pathogenic to these beetles. He will collect and send the diseased material to the Institut für Biologische Schädlingsbekämpfung where isolations, determinations and cultures of the pathogenic organisms can be made.
- (b) If it is not desired to appoint this Officer, the work outlined under (a) will be undertaken by the Insect Pathologist (Project Area) [see above].

3. <u>Entomologist</u> (S.E. Asia)	Man months allocated for work .....	48
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Duties

- (a) The primary duty of this Entomologist will be to discover, collect and ship to the Pacific area parasites and predators found to attack Oryctes and related dynastids.
- (b) To accomplish the object of (a), studies of the life histories, host relationships, and other biological details of the parasites and predators found will be made.
- (c) As far as possible the relationships between these parasites and predators, and their hosts and other inhabitants of their environments with special regard to their suitability for introduction into the Pacific islands will be determined. Prior approval must be obtained from the Project Manager before any shipments are attempted.

- (d) This Officer will co-operate with the Insect Ecologist and Insect Pathologist by supplying them information and material.

#### IV. AFRICA (including MADAGASCAR)

Investigations will be undertaken initially in Madagascar and later in the humid tropical belt of West Africa.

The main object of these investigations will be the search for predators and parasites of the adult beetles of Oryctes spp. However, predators, parasites and suspected pathogenic agents of Oryctes spp. at all stages will also receive attention.

Scientific staff for this task will be limited to:

<u>Entomologist</u> (Africa)	Man months allocated for work .....	36
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#### Duties

- (a) The primary duty of this Entomologist will be to discover, collect and ship to the Pacific area parasites and predators found to attack Oryctes and related dynastids.
- (b) To accomplish the object of (a), studies of the life histories, host relationships, and other biological details of the parasites and predators found will be made.
- (c) As far as possible the relationships between these parasites and predators, and their hosts and other inhabitants of their environments with special regard to their suitability for introduction into the Pacific islands will be determined. Prior approval must be obtained from the Project Manager before any shipments are attempted.

- (d) This Officer will co-operate with the Insect Ecologist (South-East Asia) and Insect Pathologist by supplying them information and material.

## V. TRAINING FELLOWSHIPS

Junior Technical Officers (9)      Man months allocated for  
study and training ..... 540

- (a) In-service training of local personnel will be an integral part of the Project. Nine Junior Technical Officers from administrations or research institutions within the Project Area will be associated with the Project for the whole of its duration.
- (b) This association may take the form of either:
- attachment to the Project on a full-time or temporary basis,
  - employment within existing Oryctes control teams, or crop protection or plant quarantine units,
  - employment by an entomology laboratory within the Project Area...
- (c) Each Junior Technical Officer will be under the general supervision of one of the Project Specialists.
- (d) In the course of the Project, the Junior Technical Officers will be given fellowships for study abroad. These fellowships will vary in duration (from a few months to two years), in nature (technical or professional training), and in subject matter (economic entomology, pest control, etc...).

- (e) One Junior Technical Officer with appropriate basic training will be given a fellowship to study abroad in the field of microbiology and insect pathology.
- (f) The purpose of the fellowships and the training these Officers will receive during their connection with the work of the Project, will be to prepare them to work in their territories in the field of economic entomology, particularly in such capacities as Officers-in-Charge of programmes to control Oryctes and related dynastid pests, Quarantine Officers and Pest Control Officers.
- (g) To accomplish fully this aim, it will probably be necessary for all of these Officers to attend a specialized training course which will be held in Western Samoa towards the end of the Project (1967-1969).

SECTION B - RESEARCH CONTRACTS WITH SPECIALIZED INSTITUTIONS OUTSIDE  
THE PROJECT AREA

Total Allocations ... 4 years  
(\$50,000)

I. INSTITUT FUR BIOLOGISCHE SCHADLINGSBEKAMPFUNG,  
DARMSTADT, GERMANY

Research to be undertaken:

- (a) The Institut will receive from the Project's Insect Pathologist material of Oryctes and related dynastids which is suspected to be infected by disease-producing micro-organisms. From this and other material, the Institut will attempt to isolate the causative agents, determine and culture them and conduct preliminary

experiments to assess their mode of action and virulence' under laboratory conditions.

- (b) From this collected material and from cultures of pathogenic agents obtained from other sources, they will provide the Insect Pathologist (Project Area) with pathogenic micro-organisms to be tested on Oryctes in the Project Area.
- (c) They will continue to conduct studies of known pathogenic agents to determine their possibilities for use against Oryctes and other scarabaeid species and to provide a preliminary screening of all pathogenic micro-organisms before supplying them for tests in the laboratory and field in the Project Area.

The type and starting date of this contract will be determined at a later date.

## II. OTHER INSTITUTIONS SUCH AS:

1. The Research Service of the US Department of Agriculture, with regard to research on and testing of attractants, sterilants and other chemicals of possible use in Oryctes control.
2. The Commonwealth Institute of Biological Control or other specialized institutes of the Commonwealth Agricultural Bureaux, with regard to a search for predators and parasites in areas not covered by the Project specialists or specialized investigations into other aspects of biological control.
3. The C.S.I.R.O. Division of Mathematical Statistics, with regard to the design of experiments and the statistical interpretation of their results.

DETAILED PLAN OF WORK  
FOR THE FIRST YEAR OF THE PROJECT (\*)

A. STAFF

I. Staff appointed in advance of signature of Plan of Operation :

1. Project Manager  
Appointed 1 January, 1964  
Arrived Project Headquarters 18 January, 1964
2. Insect Ecologist (Project Area)  
Appointed 1 March, 1964  
Arrived Project Headquarters 1 March, 1964
3. Insect Pathologist (Project Area)  
Appointed 10 February, 1964  
Arrived Project Headquarters 8 March, 1964

II. Staff to be appointed after signature of Plan of Operation :

1. Entomologist (Project Area)  
To be appointed April, 1964
2. Insect Ecologist (S.E. Asia)  
To be appointed April/May, 1964
3. Insect Pathologist (S.E. Asia)  
The decision concerning the appointment of this Officer will depend on future findings in this field.
4. Entomologist (S.E. Asia)  
To be appointed April/May, 1964
5. Entomologist (Africa)  
To be appointed April/July, 1964
6. Secretary-Typist (Project Area)  
To be appointed April, 1964

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(\*) All dates given in this Detailed Plan of Work are subject to alteration depending on the date of signature of the Plan of Operations.

7. Drivers/Field Assistants (2)  
    To be appointed April, 1964
8. Laboratory Technician  
    To be appointed April, 1964
9. Laboratory/Field Assistant  
    To be appointed April, 1964
10. Labourers  
    To be hired.

B. PROJECT WORK YEAR

The Project work year will, for convenience, be divided into four three-months intervals.

Specific activities to be initiated during these periods will be listed. These may be of such nature that they can be completed during the three months, or they may carry on throughout the year, or extend over several years.

In each case, the probable duration of each activity will be noted either by repetition, or by initial statement.

C. ACTIVITIES TO BE UNDERTAKEN DURING THE FIRST PROJECT WORK YEAR - 1964/1965

I. MANAGEMENT

Project Manager

1st quarter

- (a) Submission of General Plan of Work and Detailed Plan of Work, including lists of equipment and supplies needed (to be completed during period 7 March to 31 March, 1964).
- (b) Recruitment of Specialist Staff.
- (c) Recruitment of Local Staff.

- (d) Finalization of establishment of Project Headquarters office and laboratory buildings and construction.
- (e) Finalization of financial arrangements.

2nd quarter

- (a) Completion of arrangements for appointment of Junior Technical Officers.
- (b) Visit to South-East Asia (Malaya) to supervise establishment of laboratory and to make arrangements for equipment and supplies and finances. A stop-over will be made on return at the SPC Headquarters in Noumea.

3rd quarter

- (a) Submit report on first six months activities of Project.
- (b) Arrangements for supplies and equipment for Entomologist (Africa). This may be done prior to South-East Asia visit if this position is filled earlier.
- (c) Visit to Entomologist (Africa) and to Research Service of the USDA on return from Africa.

4th quarter

- (a) Discussions with Project Staff and preparation of first year's report.
- (b) Visit to SPC Headquarters in Noumea.

∟ Note: In addition to above mentioned work, financial statements will be prepared and submitted monthly to the SPC. Inventories of supplies, equipment, vehicles, buildings etc. held or on order, will be included in each 6 months report initially, and yearly after the first year. ∟

II. PROJECT AREA

1. Insect Ecologist (Project Area)

1st quarter

- (a) Lists of supplies and equipment needed for work to be completed during period 7 March to 31 March.
- (b) Survey of sites for long and short-term ecological observations.
- (c) Visit to Tokelau Islands.
- (d) Commencement of observations to determine percentages of adult beetles by age found in breeding sites.

2nd quarter

- (a) Completion of observations on age of beetles in breeding sites.
- (b) Commencement of micro- and macro-climatological recordings as equipment becomes available.
- (c) Commencement of detailed Community and Population Studies and studies of larval food as equipment becomes available.
- (d) Commencement of flight studies.
- (e) Preparation of first 6 months report which will include statement of equipment position as of 31 September.

3rd quarter

- (a) Observations on the fauna of palm crowns and continuation or initiation of climatological and Community and Population Studies (the situation depending on availability of equipment).
- (b) Extension of observations to other sites as desirable.

4rd quarter

- (a) Preparation of report on year's activities and observations.
- (b) Continuation of observations started, but not completed in past months.

2. Insect Pathologist (Project Area)

1st quarter

- (a) Preparation of lists of supplies and equipment needed for insect pathology work and for general laboratory work to be done in Project Area and in South-East Asia.
- (b) Conducts a general survey of plantations and groves to obtain ideas of the Oryctes problem in Western Samoa and to choose sites for future field experimental work.
- (c) Visit to Tokelau Islands to become acquainted with the Oryctes problem and the possibilities for eradication of it from a small atoll.

2nd quarter

- (a) Set-up of laboratory equipment and facilities for breeding and holding large numbers of Oryctes and other scarabaeids.
- (b) Start of survey to determine if any diseases affect Oryctes or related beetles in the Project Area. This will start in Western Samoa and will then extend to American Samoa.
- (c) Submit a report on observations made during the first six months and on the equipment and breeding facilities situation.

3rd quarter

- (a) Continuation of diseases survey probably extending the work to Tonga. The rate of progress will depend on the equipment available and on the difficulties encountered with holding and breeding arrangements.

4th quarter

- (a) Continuation of diseases survey. By this date, if no further difficulties are encountered in the breeding arrangements, the survey should be extended to Fiji.
- (b) Submit report which includes outline for next 12 months work, on findings and activities for the past 12 months.
- (c) Leave for Darmstadt, Germany for consultations and leave of absence.

3. Entomologist (Project Area)

1st quarter

- (a) Arrive Project Headquarters.
- (b) Fumigation and pesticides trials in relation to plant quarantine.
- (c) Visit to Tokelau Islands.
- (d) Visit to Tonga.

2nd quarter

- (a) Based on observations made in Tokelau Islands and Tonga, design and set-up experiments needed for small area eradication work.
- (b) Organize laboratory equipment etc. for future work.

3rd quarter

- (a) Submit report on equipment situation and on observations made during Tokelau and Tonga visits.
- (b) Start predator and parasite establishment and evaluation survey of Project Area.
- (c) As needed, arrange for equipment and facilities for receiving, breeding and releasing predators and parasites from S.E. Asia and/or Africa.

4th quarter

- (a) Continue predator and parasite establishment survey.
- (b) Continue experiments or conclude those started with regard to Tokelaus situation.
- (c) Implementation of eradication measures for Tokelaus.
- (d) Reception of predators and parasites from S.E. Asia and Africa.
- (e) Preparation of report of first year's work and recommendations for future work.

III. SOUTH-EAST ASIA1. Insect Ecologist (S.E. Asia)1st quarter

- (a) Arrive in Malaya.
- (b) Visits and consultations with local authorities and also personnel of Chemara Research Station (Oil Palms) and selection of a suitable site for work.
- (c) Arrangements to rent housing and laboratory building.

2nd quarter

- (a) Finalization of accommodation with help of Project Manager and Entomologist (S.E. Asia).
- (b) Arrangements for supplies and equipment.
- (c) Arrangements for use of suitable sites for field experimentation.

3rd quarter

- (a) Report on progress in setting up laboratory in Malaya.
- (b) Commencement of observations parallel to those being made in Western Samoa, the first being to determine the percentage by age of adult beetles found in breeding sites.
- (c) Commencement of micro- and macro-climatological observations and measurements parallel to those made in Western Samoa.
- (d) Planning and set up of community and population studies also to parallel those being conducted in Western Samoa.

4th quarter

- (a) Preparation of report on first year's work including inventories of buildings, equipment, supplies, vehicles etc. and recommendations for future work.
- (b) Continuation of studies and observations started in past three months period.

2. Insect Pathologist (S.E. Asia)

[refer to General Plan of Work]

3. Entomologist (S.E. Asia)

1st quarter

- (a) Arrives in Malaya.
- (b) Establishes headquarters (including facilities for breeding beetles and parasites) taking into consideration the requirements of the Insect Ecologist.

2nd quarter

- (a) Completes establishment arrangements including transport.
- (b) Surveys local and other areas in Malaya with regard to the incidence of Oryctes and related dynastids, and the possibilities for future field work.
- (c) Submits general report on the situation, both in regard to Oryctes and the buildings, equipment and transport available.

3rd quarter

- (a) Start of study of adult Oryctes populations and the fauna of the crowns of coconut and oil palms. This study will continue for the next nine months.
- (b) Starts studies of host relationships of Scolia spp. suspected to parasitize Oryctes larvae.
- (c) Arranges for the collection of Scolia procer and other Scolia spp. and of diseased Oryctes larvae for shipment to the overseas stations.

4th quarter

- (a) Continuation of entomological exploration and studies.
- (b) Continuation of collection of parasites.

IV. AFRICA (Including MADAGASCAR)

Entomologist (Africa)

1st quarter

- (a) Recruitment finalized.

- (b) Visits Project Headquarters in Western Samoa to become acquainted with Oryctes problem in the Pacific area.

2nd quarter

- (a) Receives and packs equipment needed for field work.
- (b) Arrives Madagascar and makes arrangements for accommodation at Nossy Be and later at Ambanja.
- (c) Makes arrangements for transport in areas of future work.
- (d) Reports on conclusion of arrangements for accommodation and transport to be included in Project's 6 months report.

3rd quarter

- (a) Commences study of crown fauna and of parasites and predators of adult Oryctes spp.
- (b) Meets and confers with Project Manager on work in progress, problems encountered and future work.

4th quarter

- (a) Continuation of Oryctes studies. The emphasis will depend on findings, as will the decision to extend the areas of exploration.

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SOUTH PACIFIC COMMISSION

RHINOCEROS BEETLE OPERATIONS BOARD

MEMBERS :

(i) Representing the participating Governments:

- Australia: Mr. A.W. CHARLES, Chief of the Division of Plant Industry, Department of Agriculture, Stock and Fisheries, Territory of Papua & New Guinea.
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- Western Samoa: Mr. B.E.V. PARHAM, Director of Agriculture, Western Samoa.

(ii) Representing the South Pacific Commission:

Dr. J. BARRAU, SPC Executive Officer for Economic Development.

(iii) Representing the UNSF/SPC Rhinoceros Beetle Project:

Dr. C.P. HOYT, Project Manager (ex officio Executive Secretary to the Board).

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Mr. B.B. GIVEN, Senior Principal Scientific Officer (Biological Control) of the Department of Scientific and Industrial Research, New Zealand,

and

Mr. M. WATT, Entomologist of the Department of Agriculture of Western Samoa, attended the Meeting as Advisers nominated by their respective Governments.

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Mr. K. NEWTON, SPC Tropical Agriculturist and the Project's SPC Liaison Officer designate, and Mr. A.J. NEIL, SPC Finance Officer, also attended the Meeting.

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