

October 14, 1987

George Balazs
National Marine Fisheries Service
Southwest Fisheries Center
2570 Dole St.
Honolulu, HI 96822-2396

Dear George,

Thanks for your letter and the information on Dr. Hirth. I am glad to hear that he still plans to conduct his study at Rose and hope have more faith that it will succeed with Stewart's support.

November is very full of trips and conflicts but I have just nailed down a fairly firm date of **November 18** for our Rose Atoll trip that is agreeable with myself, Bill Knowles, Paul, and probably Doug Forsell from the USFWS office. This will also coincide with the new moon although the tides do not look favorable for turtles. The tides look better the following week, but I have a trip to Tokelau in late November and we better get to Rose as soon as possible. Hurricane season begins in late November/December and we are near the limit.

Could you review the supplied tidal information and comment on our chances of seeing turtles during the month of November? On the other hand, a late trip to Rose has the advantage of assessing the total turtle nesting activity for the 87 season as this will be the only trip for the remainder of the year.

It would be great to have your experience and company again on this trip and I hope you can make it. The only catch is that this government has gotten extremely tight with travel and it is doubtful that we could fund your way. Bill is prepared to do the tagging but our experience is limited and your experience in evaluating turtle pits and tracks would be invaluable. Would your office be willing to pay part or all of your way here and per diem? Let me know if a letter from Ray Tulafono to Richard S. is needed.

Due to the limited time involved, do not hesitate to call me or Ray about this trip. I will be on the Mainland from Oct 30 to Nov 12 but may have some time to stop in your office on Nov 13.

Boifua,

David Itano

David Itano

*D. Itano
PO 5730
Pago Pago, AS
96249*

*do YES they
midnight to
sunrise*

11/1988

Special Conditions

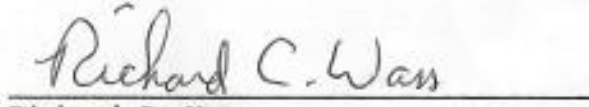
ROS-5-85

George H. Balazs

1. Logistics, including arrival and departure arrangements, shipment of gear and supplies, etc., must be coordinated with the Office of Marine and Wildlife Resources, American Samoa Government.
2. Caution must be exercised while traversing the interiors of Rose and Sand Islands to minimize disturbance to seabirds. Terrestrial and marine habitats may not be adversely affected by the permittee's activities. The camp may not be sited near concentrations of nesting or roosting seabirds.
3. Clothing, gear and supplies landed at Rose Island must be free of foreign plants, seeds, animals, and insects.
4. The taking of any animal, vegetable or mineral matter, except as authorized in writing by the Refuge Manager or this Special Use Permit is prohibited.
5. The permittee shall protect, maintain and keep in good order the premises occupied under this Permit. He is responsible for removing all trash and refuse resulting from his activities. No trash or pollutants of any kind may be dumped into lagoon waters.
6. The permittee will furnish the Refuge Manager and the Office of Marine and Wildlife Resources a written trip report by December 31, 1986. This report should include, at minimum, an itinerary of field activities, a description of the tagging effort and a summary of accomplishments.

Having read the cover page and the Special Conditions, I, the undersigned, agree to the terms of this SUP.


George H. Balazs


Richard C. Wass
Refuge Manager (Remote Islands)



UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

Rose Atoll National Wildlife Refuge

SPECIAL USE PERMIT

Permit number

ROS-5-86

Sta. No. to be credited

12510

Contract number

Date

October 1, 1986

Permittee (Name and address)

George H. Balazs
National Marine Fisheries Service
2570 Dole St.
Honolulu, HI 96822-2396

Period of use (Inclusive)

From October 6 1986
To October 12 1986

Purpose (Specify in detail privilege requested, or units of products involved)

Assess and tag sea turtles.

Description (Specify unit numbers; miles and bounds; or other recognizable designations)

Green turtle nesting activity will be monitored on Rose and Sand Islands. Turtles (including hawksbills) on the beaches and captured in the water will be tagged as possible.

Amount of fee \$ _____, if not a fixed fee payment, specify rate and unit of charge: _____

- Full payment Not Applicable
 Partial payment. Balance of payments to be made as follows:

Record of Payments

Special Conditions

See Attachment

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the undersigned, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the conditions and requirements appearing on the reverse side.

Permittee (Signature)

George H. Balazs

Issuing Office (Signature and title)

Richard C. Wass, Refuge Manager (Rem. Is.)

GENERAL CONDITIONS

1. **Payments.** All payments shall be made on or before the due date to the local representative of the U.S. Fish and Wildlife Service by a postal money order or check made payable to the U.S. Fish and Wildlife Service.

2. **Use limitations.** The permittee's use of the described premises is limited to the purposes herein specified; does not unless provided for in this permit allow him/her to restrict other authorized entry on to his/her area; and permits the Service to carry on whatever activities are necessary for (1) protection and maintenance of the premises and adjacent lands administered by the Service and (2) the management of wildlife and fish using the premises and other Service lands.

3. **Damages.** The United States shall not be responsible for any loss or damage to property including but not limited to growing crops, animals, and machinery; or injury to the permittee, or his/her relatives, or to the officers, agents, employees, or any others who are on the premises from instructions or by the sufferance of the permittee or his/her associates; or for damages or interference caused by wildlife or employees or representatives of the Government carrying out their official responsibilities. The permittee agrees to save the United States or any of its agencies harmless from any and all claims for damages or losses that may arise or be incident to the flooding of the premises resulting from any associated Government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity.

4. **Operating Rules and Laws.** The permittee shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal, county, and State laws applicable to the operations under the permit as well as all Federal laws, rules, and regulations governing National Wildlife Refuges and the area described in this permit. The permittee shall comply with all instructions applicable to this permit issued by the refuge officer in charge. The permittee shall take all reasonable precautions to prevent the escape of fires and to suppress fires and shall render all reasonable assistance in the suppression of refuge fires.

5. **Responsibility of Permittee.** The permittee, by operating on the premises, shall be considered to have accepted these premises with all the facilities, fixtures, or improvements in their existing condition as of the date of this permit. At the end of the period specified or upon earlier termination, the permittee shall give up the premises in as good order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The permittee will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his/her part, or the part of anyone of his/her associates, to use reasonable care.

6. **Revocation Policy.** This permit may be revoked by the Regional Director of the Service without notice for noncompliance with the terms hereof or for violation of general and/or specific laws or regulations governing National Wildlife Refuges or for nuisance. It is at all times subject to discretionary revocation by the Director of the Service. Upon such revocation the Service, by and

through any authorized representative, may take possession of the said premises for its own and sole use, or may enter and possess the premises as the agent of the permittee and for his/her account.

7. **Compliance.** Failure of the Service to insist upon a strict compliance with any of this permit's terms, conditions, and requirements shall not constitute a waiver or be considered as a giving up of the Service's right to thereafter enforce any of the permit's terms, conditions, or requirements.

8. **Termination Policy.** At the termination of this permit, the permittee shall immediately give up possession to the Service representative, reserving, however, the rights specified in paragraph 9. If he/she fails to do so, he/she will pay the Government, as liquidated damages, an amount double the rate specified in this permit for the entire time possession is withheld. Upon yielding possession, the permittee will still be allowed to reenter as needed to remove his/her property as stated in paragraph 9. The acceptance of any fee for liquidated damages or any other act of administration relating to the continued tenancy is not to be considered as an affirmation of the permittee's action nor shall it operate as a waiver of the Government's right to terminate or cancel the permit for the breach of any specified condition or requirement.

9. **Removal of Permittee's Property.** Upon the expiration or termination of this permit, if all rental charges and/or damage claims due to the Government have been paid, the permittee may, within a reasonable period as stated in the permit or as determined by the refuge officer in charge but not to exceed 60 days, remove all structures, machinery, and/or other equipment, etc., from the premises for which he/she is responsible. Within this period the permittee must also remove any other of his/her property including his/her acknowledged share of products or crops grown, cut, harvested, stored, or stacked on the premises. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the United States.

10. **Transfer of Privileges.** This permit is not transferable, and no privileges herein mentioned may be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue through lien or be transferred to a third party without the approval of the Regional Director of the U.S. Fish and Wildlife Service and the permit shall not be used for speculative purposes.

11. **Conditions of Permit not Fulfilled.** If the permittee fails to fulfill any of the conditions and requirements set forth herein, all money paid under this permit shall be retained by the Government to be used to satisfy as much of the permittee's obligations as possible.

12. **Officials Barred from Participating.** No Member of Congress or Resident Commissioner shall participate in any part of this contract or to any benefit that may arise from it, but this provision shall not pertain to this contract if made with a corporation for its general benefit.

13. **Nondiscrimination in Employment.** The permittee agrees to be bound by the equal opportunity clause of Executive Order 11246, as amended.



George - FYI

Darcy

David's
Rose report

AMERICAN SAMOA GOVERNMENT
PAGO PAGO, AMERICAN SAMOA 96799

In reply refer to:

OFFICE OF MARINE AND WILDLIFE RESOURCES

February 17, 1987

Darcy Hu
USFWS Remote Sanctuaries
300 Ala Moana Blvd
P. O. Box 50167
Honolulu HI 96813

Dear Darcy:

The Rose trip went off as scheduled (fortunately, for me, the ocean could not have been calmer without violating the laws of physics) and was successful. I was able to do everything, except banding, and made some qualitative assessments of the storm damage. Dick Pease, the teacher with a Masters in Botany, ran many transects and will produce a modified vegetation map, which can be compared with the aerial photos we should get on the next Coast Guard flight. I will send your office a full report when it is ready; but it will be at least month as I plan to wait for all supporting photos and Dick's map so that I can send just one report.

Typloon Tusi caused extensive wave damage to Sand Island and moderate wave and limited wind damage to Rose Island. Sand Island was washed over, there are only 3 plants with leaves left, no nesting birds, and our photo point is now under water. The wave damage to Rose mostly occurred in the Tournefortia on the North side. It appears that all ground nests and non-flying ground chicks were destroyed. I saw no sooty terns on Rose and only 5 on Sand. There were several dead boobies found. In general bird activity was very low; Paul Pedro said it was the lowest he has ever seen. I will send the details in the full report.

Of more immediate concern is the rats. As the table below shows our trapping success was higher all across the board. (Note some of the Nov. Victors were too rusty to set)

| Pisonia (62 traps) | | Tournefortin (25 traps) | |
|--------------------|-----|-------------------------|-----|
| Night 1 | 95% | | 85% |
| Night 2 | 72% | | 77% |

Although there may have been a slight population increase, I believe that the greater success was primarily due to the population being over the current carrying capacity, perhaps lowered by the storm, and the rats were less cautious due to hunger.

This is supported by: 13% of the trapped rats were entirely eaten except for the fur and long bones (a typical sign of rodent over population), several dead rats lying in the Pisonia, several rats in poor to bad condition (I was able to catch one by hand), increased boldness of camp rats, including entering occupied tents and frequent observations of rats foraging on the beach during the day and foraging in the Pisonia canopy. Thus, if it has been decided to eradicate the rats, it appears that the opportunity to take advantage of a crashing population will come soon. Because there was courtship/pairing behavior among white terns tropicbirds and all 3 boobies, I am concerned about potential ~~the~~ effect of the high rat population on the nesting that appears to be coming.

David Itano said there was little coral damage.

Thanks for the equipment and advice it was useful. I hope all is well.

Sincerely,

Bill Knowles

BILL KNOWLES

P.S. Just remembered to tell you. the big sign was blown out, the plants were pushed out, but they remained intact. Paul's crew repaired the sign, but it is rotting and needs to be replaced



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

10/30/87

Stewart - As per our telephone conversation -
As in the past, use XEROX MAPS OF ROSE/SAND
TO MARK THE DATES, TIMES AND LOCATIONS OF NESTS
AND TURTLES ENCOUNTERED. TURTLES THAT ARE
IN THE PROCESS OF LAYING EGGS, OR CLOSE TO
DOING SO, SHOULD NOT BE DISTURBED FOR TAGGING
AND MEASUREMENT. I WILL LEAVE IT TO DICK'S
DISCRETION WHETHER OR NOT TO TURN THE TURTLE
OVER TO IMMOBILIZE IT FOR TAGGING. I CAN
TAG RIGHT-SIDE-UP, BUT ITS TAKEN A LOT OF
EXPERIENCE TO GET THE "HANG" OF IT. OFTEN WITH
AN INEXPERIENCED PERSON THE TAG WILL MISAPPLY, OR
IMMEDIATELY TEAR AWAY, OR WORSE YET THE
TAGGER WILL GET HURT. FOREARM BRUSED OR BROKEN, SAND IN EYES ETC.
PUT 3 TAGS ON EACH (ADULT) TURTLE.
DICK KNOWS WHERE TO APPLY ON FLIPPERS (SEE
ATTACHED). MEASURE THE CARAPACE LENGTH ALONG
THE MIDLINE, USING A FLEXIBLE TAPE.
SEARCH CAREFULLY ON THE FLIPPERS FOR
OLD TAGS. RECORD NUMBERS OF ANY



(over)

FOUND. CARRY A SMALL PEN-KNIFE TO SCRAPE OLD TAGS CLEAN TO READ, SINCE FOULING GROWTH IS COMMON ON THEM. IF A TAG-RECOVERED TURTLE DOESN'T HAVE AT LEAST 3 TAGS ALREADY ON IT, ADD NEW ONES SO IT WILL.

THE TAG APPLICATORS ARE TRICKY TO USE UNTIL YOU BECOME MORE EXPERIENCED. YOU CAN'T START TO SQUEEZE THE HANDLES AND THEN BACK-OFF. IF YOU DO, THE TAG WILL FALL OUT AND BE LOST. SQUEEZE STEADY, RADII COMPLETE AND HARD TOGETHER -- FULL STRENGTH. IF YOU DON'T, THE TAG WON'T LOCK PROPERLY, SAVE AND RETURN TO ME ALL BENT, UNUSABLE TAGS. CARRY A SMALL PAIR OF PLIERS (ENCLOSED) WITH YOU TO USE TO BEND OVER AND FULLY LOCK THE TIP OF THE TAG, SHOULD THIS BE NEEDED. TAKE CARE NOT TO LOSE ANY OF THE TAGS. CAUTION IS NEEDED, AS THEY CAN EASILY FALL OFF THE CARDBOARD HOLDER. THAT'S WHY THEY ARE TAPED ON. CARRY ONLY WHAT YOU

THINK YOU MAY NEED FOR ONE WALK AROUND THE ISLAND. LEAVE THE OTHERS SAFE IN THE TENT. DON'T PUT THE TAG IN THE APPLICATOR UNTIL YOU ARE READY TO USE IT. OTHERWISE IT WILL SURELY FALL OUT. IF THE PLIER FEEL STIFF, LUBRICATE JOINTS WITH A DROP OF OIL. THEY WILL EASILY FREEZE-UP SOLID IF DROPPED IN SEA WATER AND NOT RINSED AND LUBRICATED SOON AFTER. THE APPLICATORS ARE NOT ESSENTIAL TO APPLY THE TAGS. IT CAN BE DONE BY POKING A SLIT THROUGH THE FLIPPER WITH A PEN KNIFE, AND LOCKING THE TAG WITH REGULAR PLIERS. OF COURSE WITH THIS METHOD THE TURTLE ALMOST CERTAINLY SHOULD BE TURNED OVER TO IMMOBILIZE, DICK'S DONE THIS BEFORE.

SEVERAL TAGS IN THE 6900-SERIES SHOULD STILL BE AT THE OMR/W OFFICE. PLEASE TAKE AND USE THOSE UP FIRST.

TAG NUMBERS - 6817 - 6825; 6826 - 6850;
6918 - 6925; 6935 - 6950.

ARE ENCLOSED (58 - TOTAL).

LEAVE ABOUT 10 AT THE OMR/W OFFICE AFTER RETURNING FROM ROSE. RETURN THE REMAINING TAGS, AND APPLICATORS, TO ME. + COPY OF DATA.
(OVER)

ON A SEPARATE BUT RELATED MATTER;

WHILE AT ROSE, PLEASE HAVE SOME
DETERMINE IN IT IS POSSIBLE TO
SAFELY WALK FROM ROSE IS. TO
SAND IS. AT LOW TIDE, IT
WAS MY IMPRESSION FROM PAST VISITS
THAT YOU COULDN'T, TOO MANY DEEP
HOLES, ETC.

ALL THE BEST -

George

cc Dick



AMERICAN SAMOA GOVERNMENT
PAGO PAGO, AMERICAN SAMOA 96799
OFFICE OF MARINE AND WILDLIFE RESOURCES

In reply refer to:

July 22, 1986

Dr. George Balazs
Marine Mammals and Endangered Species Program
National Marine Fisheries Service
P.O. Box 3830 2570 Pole St.
Honolulu, Hawaii 96812

Dear George,

I recently received a note from Harold Hirth informing us that he will not be going to Rose Atoll this year to do turtle research. Are you contemplating a trip to fill-in? Is anyone from NMFS interested in going to Rose Atoll for any reason this spring (your fall)?

We are trying to coordinate a trip with Richard Radtke (clams) and our work (fish/corals), and any other research, for September/October. Let me know ASAP. Thanks.

Sincerely

Ray Buckley
Chief Fishery Biologist

cc: Itano

July 30, 1986

F/SWC2:GHB

Dr. Ray Buckley
Chief Fishery Biologist
Office of Marine and Wildlife Resources
American Samoa Government
Pago Pago, American Samoa 96799

Dear Ray,

Many thanks for your letter of July 22d. I was very sorry to learn that Dr. Hirth cancelled his field work to tag turtles at Rose Atoll. This information comes as quite a surprise, although I know that during our last Recovery Team meeting he expressed concern over having to negotiate a vessel charter for his return passage.

I have spoken with our Program Leader Bill Gilmartin about the possibility of my going out to Rose on the forthcoming trip you mentioned. Unfortunately, our travel budget is exhausted for this fiscal year, and it is uncertain how much we will be allotted for FY 87 (starting October 1). Consequently, the only chance of my going would be in mid-to-late October. Unless, of course, you know of a very inexpensive way to travel to Pago Pago, or possibly the Fish and Wildlife Service would like to send me as their official representative.

In any event, you already have a supply of turtle tags and tagging instructions that can be used at Rose by authorized people going on the trip. However, I doubt if much work would get accomplished since the turtle monitoring is an intensive and exclusively nighttime activity. It's very difficult to stay up all night when you've been doing other work all day.

Please let me know the dates of your trip when plans becomes more formalized.

Sincerely,

George H. Balazs
Zoologist

cc: Dick Wass

bc: Balazs
HL



UNIVERSITY OF FLORIDA
GAINESVILLE, FL 32611

ROSE FILE

DEPARTMENT OF ZOOLOGY
223 BARTRAM HALL
904/392-1107

1 December 1986

Mr. George Balazs
Southwest Fisheries Cntr
Honolulu Laboratory
2570 Dole Street
Honolulu, HI 96822-2396

Dear George:

I recently got back from a month in the Amazon. Thank you for the sample of sand from Rose Atoll, packed in a most interesting container, which I found upon my return. Thank you also for the beautiful turtle stamps from Thailand! Much appreciated!!

The Rio Trombetas population of Podocnemis expansa is faring poorly again this season. Only about 300-400 animals nested this year-- out of a population which only seven years ago comprised about 7,000 nesting females. I think that general disturbance in the area (such as boat traffic, etc.) is probably responsible for the lack of nesting. Although the turtles aggregate offshore of the nesting beach, they all seem to reach a consensus of "Hell, no, we won't go!" and they just stay in the water. Very strange. Essentially no nesting has occurred at Trombetas during the past four years.

I may go back down to Brazil for a month over Xmas. I plan to go back to Seychelles at the end of February for about three months-- courtesy of WWF. During that time I will spend a month on Aldabra-- transportation to the atoll provided courtesy of the Smithsonian.

I hope all is well with you and your family.

Warm regards,

Jeanne Mortimer



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

December 5, 1986

F/SWC2:RSS

MEMORANDUM FOR: GCSW - Martin B. Hochman
FROM: F/SWC2 - *Richard S. Shomura*
SUBJECT: Turtle study in American Samoa (George Balazs' involvement)

This is to confirm our discussion regarding a request to have George Balazs undertake a turtle study in American Samoa.

By way of background, I was contacted by a Charles Darby representing KRITA Ltd. based in Auckland, New Zealand, on 2 December 1986. Mr. Darby indicated that their firm was planning to submit a bid to conduct an environmental study of selected coastal waters in American Samoa. Part of the bid specification calls for a study of turtle habitats in the area. Mr. Darby mentioned that George Balazs of the Honolulu Laboratory was probably the most knowledgeable scientist engaged in the study of turtles and turtle habitats in the central Pacific. Thus, KRITA Ltd. wished to retain George Balazs' services for the turtle segment of the study.

I agreed with Mr. Darby that George Balazs was probably the most knowledgeable turtle scientist in the central Pacific region. I also indicated that the Honolulu Laboratory is interested in seeing that turtle research is carried out in the region. Further, I informed Mr. Darby that I would check with our legal advisers to determine if regulations would permit us to participate in this study.

My understanding from the telephone discussion with you on 3 December 1986 is as follows:

1. If the Laboratory is interested in the turtle studies we would be able to provide the services of George Balazs for the study.
2. We should work out travel arrangements with WASC in Seattle to provide for the payment of travel and per diem costs by KRITA Ltd.
3. Since the work is of interest to the Honolulu Laboratory and will require only several days of George Balazs' time, the Laboratory would be willing to cover George Balazs' salary during this study. The Laboratory will be able to use the information obtained during the study for a technical paper.

cc: ✓ G. Balazs



Dear George,

11/6/86

Thanks for the letter and copies of the turtle articles and publications. We had found a copy of your reply to our letter of Rose turtle observations so we were not sure how to respond. After mulling it over for a while we decided to politely become ignorant of your response owing to your advanced age and decrepit state. Ha nana! Anyway I'm glad you have the info anyway.

The Rose party is preparing to leave now and it looks like a crowded trip. Too crowded for me. We may plan another trip next quarter to finish the fish transects and hopefully continue some rat control for the island. I'm glad your office sent down Darcy to assess the situation in person.

These three pictures are all I have on Rose turtles. I hope they can be of some use to you. Ray is also sending some ~~pics~~ slides of the turtles we observed making in the lava.

All is well here and I hope the same holds for you.
Hello to Dick + Stuart.

Your friend,
Dave Howe





GOVERNMENT OF AMERICAN SAMOA
PAGO PAGO, AMERICAN SAMOA 96799
OFFICE OF MARINE RESOURCES
P.O. Box 3730

In reply refer to:

November 26, 1985

Dr. George Balazs
National Marine Fisheries Service
Honolulu Laboratory
P.O. Box 3830
Honolulu, Hawaii 96812

Dear George:

On our recent trip to Rose Island, we were able to fit in the following general turtle observations that may be of some use to your program.

- Nov. 21: Upon A.M. arrival, 3 turtles noted in the lagoon off Rose Is., two mating.
- : During daylight towing around the atoll, four turtles noted off the outer reef.
 - : Evening check of the perimeter of Rose Island, noted 126 nests/pits, four with egg pits dug but not covered, and 48 tracks still plainly visible. None of the nests appeared to be recent, that is, within the last few days as judged by overcoverage with falling leaves, etc.
- Nov. 22: 0530 check of perimeter of Rose Island found no new tracks, or pits, or turtles.
- : Afternoon check of Sand Island found 118 pits/nest and 7 tracks still visible. None of the nests appeared recent.
 - : Afternoon check of coral heads inside lagoon noted four turtles, 3 female and 1 juvenile(?); one female visually inspected close enough to determine that it was not tagged.
 - : Late afternoon, noted two mating turtles in the ava.

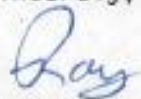
11/26/85

Page 2....

- Nov. 22: 0530 check of perimeter of Rose Island found no new tracks, or pits, or turtles.
- : Late morning check of Sand Island found no new tracks, or pits, or turtles.
 - : Late morning, noted one small turtle in lagoon.
 - : Late morning, noted four turtles in the ava (all adults), two mating ; obtained close-up photos.
 - : Morning dive on south shore of atoll, noted one adult turtle swimming along the reef slope.
 - : Afternoon dive in ava, noted one large male turtle.

I am quite certain that we will be making a trip to Rose Island next year during the spawning season. With some prior arrangements, etc., we should have time to do some tagging, if we had some tags. Lets keep it in mind.

Sincerely,



RAYMOND BUCKLEY,
Chief Biologist

cc: Ray Tulafono, Director
David Itano, Fishery Biologist IV
Richard Wass, FWS, Honolulu

6901-6908
(8 TAGS)

Again, I appreciate the notes you made at Rose. Best regards for the New Year.

December 11, 1985

F/SWC2:GHB

Mr. Raymond Buckley
Chief Biologist
Office of Marine Resources
P. O. Box 3730
Pago Pago, American Samoa 96799

George H. Malasz
Zoologist

Dear Ray:

Many thanks for your recent letter providing important basic observations on sea turtle activity at Rose Atoll for the period November 21-23, 1985. I will be permanently including this information on the enclosed historical summary sheet for Rose which I have been compiling for eventual publication. The status of nesting at Rose is not at all clear, as you will find as you read through these data. A complicating factor is surely the ability of nesting pits (and tracks?) to remain visible in the coarse substrate for many months, and even from year to year. Furthermore, the substrate makes it difficult for turtles to dig a suitable egg chamber, thereby causing many false nesting pits.

We know that large fluctuations can occur in the number of green turtles nesting at a particular site from year to year. Since the animals are very site specific and do not move from one location to another to nest, these fluctuations are almost certainly caused by annual changes in food and other conditions of the resident foraging pastures, hundreds of miles from the migratory breeding site. Even taking this important factor into consideration, it would appear that today not many turtles are left in the Rose Atoll breeding colony. This, of course, makes it all the more important to protect the area for nesting, and to learn where the turtles reside, and are likely hunted, when they are not nesting. To date, no recoveries have been made from the turtles tagged at Rose. If you ever hear of a tag recovery being made, it will be very important to trace it down and obtain full information.

Along with this letter, I am sending you a small supply of turtle tags in case you ever have the opportunity to mark an animal. I recall that some years ago a hawksbill was confiscated at the market in Pago Pago and later released alive. Turtles found like this could be easily tagged. Simple instructions with a diagram have been enclosed.

6401-6908

Again, I appreciate the notes you made while at Rose. Best regards for the New Year.

Sincerely,

December 11, 1953

J/2621:012

Mr. Raymond Fuchley
Chief Biologist
Office of Marine Resources
P. O. Box 3738

George H. Balazs
Zoologist

cc: G. Balazs ICAN 36789

HL

Many thanks for your recent letter providing important basic observations on sea turtle activity at Rose Atoll for the period November 21-23, 1953. I will be personally including this information on the enclosed historical summary sheet for Rose which I have been compiling for possible publication. The status of nesting at Rose is that of an old colony, as you will find as you read through these notes. A complicating factor is surely the ability of nesting pairs (and brackets) to remain viable in the course of years for many months, and even from year to year. Furthermore, the substrate makes it difficult for turtles to dig a suitable egg chamber, thereby causing many false nesting pits.

We know that there are fluctuations in the number of green turtles nesting at Rose Atoll from year to year. Since the animals are very site specific and do not move from one location to another to nest, these fluctuations are almost certainly caused by annual changes in food and other conditions of the resident foraging pastures, hundreds of miles from the migratory breeding site. When taking this important factor into consideration, it would appear that today not many turtles are left in the Rose Atoll breeding colony. This, of course, makes it all the more important to protect the area for nesting, and to learn where the turtles reside, and are likely hunted, when they are not nesting. Data on recoveries have been made from the turtles tagged at Rose. If you ever hear of a tag recovery being made, it will be very important to trace it down and obtain full information.

Along with this letter, I am sending you a small supply of turtle tags in case you ever have the opportunity to tag an animal. I recall that some years ago a Hawaiian monk seal confiscated at the market in Pago Pago and found to be alive. Turtles found like this could be tagged and released. Simple instructions with a diagram have been included.



AMERICAN SAMOA GOVERNMENT
PAGO PAGO, AMERICAN SAMOA 96799
OFFICE OF MARINE AND WILDLIFE RESOURCES

In reply refer to:

September 23, 1986

9/29
~~WEG~~
WEG
RFS

Dr. Richard Shomura
National Marine Fisheries Service
Southwest Fisheries Center
Honolulu Laboratory
2570 Dole Street
Honolulu, Hawaii 96822-2396

RSS

Dear Dick:

This letter is to confirm that the Office of Marine and Wildlife Resources has requested the assistance of George Balazs to conduct a turtle spawning/tagging survey on Rose Atoll during October 6-10, 1986. OMWR will cover the air fare, per diem and provision expenses connected with this work.

We appreciate being able to utilize the expertise of your staff to conduct this turtle survey. The last tagging at Rose Atoll was in 1983, and the recent recovery of a 1980 tagged female in Fiji indicates that this valuable resource should be monitored more frequently. During this trip OMWR staff will be busy doing fish/coral surveys and assisting the University of Hawaii in giant clam research.

On a related matter, would you please inform Ray Sumida that we would again like to utilize Gordon Yamasaki to help us with our biological research at Rose Atoll. One of our divers will be off-island during this trip and Gordon's assistance will enable us to complete all of our surveys. Thank you in advance.

Sincerely,


RAY TULAFONO,
Director

cc: Ray Buckley, OMWR
Chief Fishery/Wildlife Biologist

September 29, 1986 F/SWC2

Dr. Richard Wass
U.S. Fish and Wildlife Service
P. O. Box 50167
Honolulu, HI 96850

Dear Dick,

One of my staff members, George H. Balazs, has just recently been invited by the Government of American Samoa to participate in a research visit to Rose Island to assess and tag sea turtles. The dates for this trip will be approximately October 6-12, 1986. As during previous studies conducted during November 1980, and October 1982, George plans to camp on the island and tag turtles as they come ashore to nest at night. We would appreciate being issued the necessary Special Use Permit to undertake this work.

I believe that George has already informed you about the recent recovery of one of the Rose Island green turtles in Kadavu, Fiji. This is the first tag recovery that has ever been made for Rose, and it highlights the international importance of this remote breeding site.

Sincerely,

S/SWB

fn Richard S. Shomura
Director, Honolulu Laboratory

cc: Ray Buckley
Office of Marine Resources
American Samoa

Balazs ✓

DO

HL

THE
UNIVERSITY
OF UTAH

ROSE -
SAMOA FILE

DEPARTMENT OF BIOLOGY
201 BIOLOGY BUILDING
SALT LAKE CITY, UTAH 84112
801-581-6517

January 14, 1986

Mr. Raymond Buckley
Chief Biologist
Office of Marine Resources
Government of American Samoa
Pago Pago
American Samoa 96799

Dear Mr. Buckley:

I have a small research grant to study the nesting sea turtles on Rose Atoll. I am writing to you for permission to conduct research there, for help in transportation and for your advice. I will obtain the necessary federal and refuge permits. Could I get passage on your boat from Pago Pago to Rose during the first week of September and a return ride in the middle of November? Would there be a charge? Is there a seaplane in Pago or in Apia (I took a seaplane from Pago to Rose some years ago)?

My plans are to camp on Rose for 2-1/2 months. I have much experience doing this kind of work on other nesting beaches (see the enclosed vita). The purpose of the study is to assess the size of the green turtle (occasional hawksbill) nesting population. I will tag and measure adults, study their nesting repertoire and document the hatching success. No turtles of any size will be harmed. The atoll environment will be kept as natural as possible. Any help and advice you can provide will be greatly appreciated.

Sincerely yours,

Harold F. Hirth,
Professor

HFH/nc
Enc.
cc: Balazs
Wass

HISTORICAL SUMMARY OF GREEN TURTLES TAGGED NESTING AT ROSE ISLAND

by

George H. Balazs

| No. | Date | Tag Nos.* | Carapace length, cm | | Researcher** |
|-----|----------|--------------------------|---------------------|----------|--------------|
| | | | curved | straight | |
| 1 | 11-3-71 | 1080, 1080 | - | - | EK |
| 2 | 11-3-71 | 1081, 1081 | - | - | EK |
| 3 | 11-10-80 | 3502, 3503 | - | - | GB |
| 4 | 11-10-80 | 3504, 3505 | 111 | - | GB |
| 5 | 11-12-80 | 3506, 3508 | - | - | GB |
| 6 | 11-12-80 | 3509, 3510 | 104 | - | GB |
| 7 | 11-12-80 | 3511, 3512 3514 | 104 | - | GB |
| 8 | 11-18-81 | 5804, 5805 | 106 | - | GL |
| 9 | 11-19-81 | 5807-5808 | 94 | - | GL |
| 10 | 11-20-81 | 5809-5810 | 106 | - | GL |
| 11 | 10-7-82 | 5818, 5819 5820, 5821 | - | 105.1 | GB |
| 12 | 10-7-82 | 5822, 5823 5824, 5825 | - | 96.2 | GB |
| 13 | 10-9-82 | 5788, 5789 5790 | 100.2 | 95.6 | GB |
| 14 | 10-10-82 | 5791, 5792 5793 | 108 | - | GB |
| 15 | 10-12-82 | 5794 | 98 | - | GL |
| 16 | 10-13-82 | 5797, 5798 | 99 | - | GL |
| 17 | 10-13-82 | 5799 | 94 | - | GL |

*All tags applied by GB and GL are inscribed with the return address: "WRITE HIMB, UNIVERSITY, HAWAII, 96744". Tags applied by EK read: "BUREAU WILDLIFE, KAILUA, HAWAII".

**GB - George Balazs; GL - Gerald Ludwig; EK - Eugene Kridler.

FISHES OF THE PHOENIX AND SAMOAN ISLANDS
COLLECTED IN 1939 DURING THE EXPEDITION
OF THE U. S. S. "BUSHNELL"

By LEONARD P. SCHULTZ

ITINERARY

In 1939, through the courtesy of the United States Department of the Navy, I was detailed by the National Museum as naturalist on the Navy Surveying Expedition to the Phoenix and Samoan Islands. We left San Diego, Calif., on the U. S. S. *Bushnell* on April 1 and arrived in Pearl Harbor, Honolulu, on April 11 enroute to the Phoenix Islands.¹

Between San Diego and the Hawaiian Islands several attempts were made with a submarine light to attract invertebrates and fishes, but the only important capture was some small specimens of Pacific saury (*Cololabis saira* Breevoort) half and two-thirds the way to Hawaii.² Although a few specimens were taken in San Diego and at Oahu and some flyingfish enroute, serious collecting did not begin until April 23, in the lagoon of Canton Island, of the Phoenix group.

Canton Island is a coral atoll 4 or 5 miles wide and 9 miles long, with a large lagoon well supplied with coral growth. On the leeward side are two channels, a deep one near the radio stations and a wide shallow channel with exposed reef at low tide to the north. At extreme tides of 3 to 4 feet the water flows out the deep channel at the rate of several miles an hour. In the lagoon fishes and invertebrates abound, but because of the coral heads their capture with nets is difficult.

On April 30 the *Bushnell* arrived off McKean Island, latitude 3°35'S., longitude 174°6'W. This island is about 15 feet above the

¹ Several of the officers and men of the *Bushnell* aided in the collecting in various ways. Among those to whom thanks are due are Comdr. J. M. Lewis, Lt. Comdr. W. B. Coleman, Lt. H. N. Coffin, Lt. J. H. Fortune, Lt. T. D. Shriver, Lt. B. L. Talman, Lt. Comdr. (SC) L. A. Klauer, and especially Comdr. (MC) H. D. Hubbard, who assigned to me as assistants at various times Arthur Petit and Charles Rackliffe, pharmacist mates of the U. S. Navy. Without the cooperation of Dr. Hubbard it would have been impossible to collect so many specimens.

Mrs. Aime M. Awi, artist, U. S. National Museum, has drawn all the figures of the new species.

² Copola, 1910, No. 4, p. 270.

| | Page |
|--|------|
| 14. Diagram of the upper part of the head of a scorpaenid, showing names given the various cranial spines..... | 168 |
| 15. <i>Abudefduf phoenicensis</i> , new species: Holotype..... | 191 |
| 16. <i>Cheilinus undulatus</i> Rüppell: Specimen from off Canton Island..... | 199 |
| 17. <i>Thalassoma marnae</i> , new species: Holotype..... | 204 |
| 18. <i>Bathygobius fuscus swainsensis</i> , new subspecies: Holotype..... | 233 |
| 19. <i>Gnatholepis hololepis</i> , new species: Holotype..... | 236 |
| 20. <i>Makidolia pagoensis</i> , new species: Holotype..... | 240 |
| 21. <i>Oplopomus diacanthus</i> , new species: Holotype..... | 243 |
| 22. <i>Trimma eviotops</i> , new species: Holotype..... | 251 |
| 23. <i>Fagasa tutuilae</i> , new species: Holotype..... | 253 |
| 24. <i>Chalizodytes luensis</i> , new species: Holotype..... | 263 |
| 25. <i>Crystalloides cooki enderburyensis</i> , new subspecies: Holotype..... | 264 |
| 26. <i>Dermosteira dorotheae</i> , new species: Holotype..... | 267 |
| 27. <i>Cirripectes jenningsi</i> , new species: Holotype..... | 274 |

Smith. Inst.

Pac.

US Nat. Mus.

QL 636.5

Bulletin 180

P5353

sea and has practically no vegetation. There are the remains of some stone walls, perhaps abandoned huts, and a pole stands up off a mound of rocks. Birds occur there in countless numbers, flying over like swarming honeybees. Various members of the crew of the *Bushnell* caught yellowfin tuna, barracuda, a rainbow runner, carangids, and red snappers off the reef of McKean Island.

We arrived on Swains Island, latitude $11^{\circ}08'35''$ S., longitude $171^{\circ}04'24''$ W., on May 3 and left again on May 10. The reef around the island is 300 to 500 feet wide and nearly flat, but it has a little elevation at the outer margin, which is deeply channelled so that the reef is well drained at low tide. The channels are 50 to 100 feet long, and the water coming through them spreads fanwise over the reef at low tide. Between the channels the reef is elevated a foot or more and deeply pitted with small holes that are occupied by live sea-urchins, these varying from nearly white to dark purple.

According to records kept by Mr. Jennings, owner of Swains Island, the present population is 154, consisting of 44 girls, 29 boys, 44 men, and 37 women.

Much of the vegetation was introduced from the Samoan, Union, and Gilbert Islands. Because of adequate rainfall, Swains Island is a tropical paradise. The inhabitants live mostly on coconuts, breadfruit, oranges, bananas, pigs, and chickens, supplemented by fish.

Copra, the dried meat of the coconut, is the main product exported from this island. Each man on the island gathers and husks a certain number of coconuts each working day, and the women in the village cut the meat out; it takes about one and one-half minutes to remove the white meat, which is then laid out under a roof to dry. Dried copra is packed and shipped a couple of times each year to Honolulu. The women make mats from the pandanus leaves and strings of beads from the tiny corals picked up on the beach. A fresh-water lake or lagoon occupies the center of the island, around the shores of which lives a small goby.

The night of May 12 I spent on Canton Island, seining fishes in the lagoon; May 13 gave me an opportunity to collect in a small section of the widest shallow channel.

The next day I landed on Enderbury Island through a bad surf and over a rough reef. The reef of this island is 100 to 300 feet wide, and channels and coral heads occur at the outer edge where the waves break with great force. At night, with a flashlight, cowrie shells, spiny lobsters, shovel-tailed and other crabs, certain fishes, and many other species of animals can be found and captured. During the day these creatures hide in the rock crevices. Leaving the island on May 20, I was again on the *Bushnell* caring for specimens and drying plants and bird skins.

On May 23 the *Bushnell* was again off Canton Island, and I had another opportunity to collect fishes in the lagoon until the 26th, when I was back on the ship and enroute to Samon. On the afternoon of June 1 we entered Pago Pago Bay, where with the help of Frank Taiga, Polynesian, I captured specimens near Tower Rock at the entrance of the bay. There appeared in these collections several species that were not found on the coral atolls. During the next few days I visited Alofau, Pagai, Coconut Point, and Fagnasa Bay on Tutuila Island, making valuable fish collections in each place.

Leaving Tutuila Island on June 9, the *Bushnell* arrived in the afternoon off Ofu and Tau Islands, where natives came out to the ship in their outrigger canoes to trade. When they departed, I found and preserved a lizard that was on our ship. The next day I landed on Rose Island.

During the interval from June 9 to 21 I collected specimens on Rose Atoll, chiefly in the lagoon and on the extensive reef. This atoll is the first that has had tide pools exposed at low tide on the reef, and so from them rich collections were made. It is nearly square and less than 2 miles across. On the reef at the east corner is Rose Island, only a few hundred feet in diameter, and at the north corner is Sand Island, which is smaller and lower. Rose Island is about 6 to 9 feet above the sea; the south end of it is composed of coral-shell conglomerate rock, overlaid by coral-shell gravel, and is covered with *Pisonia* trees, while the north end is barren and composed of coral-shell gravel. The island appears to be building up to the northwest end and eroding on the south end. To the east of the island for a few hundred feet are loose slabs of coral-shell conglomerate rock left on the reef, which may have at one time formed part of the island. The large coral "niggerheads" scattered over the reef, however, are not of the same composition as the coral-shell conglomerate rocks of Rose Island but are formed of corals that probably grew at the rim of the island and were broken off by storms, then rolled inward on the reef, where they have now come to rest. That these were once coral heads seems probable, since the original corals are not in the position in which they grew but rest in practically all directions, some almost upside down, others sideways.

From June 21 to 26, while the *Bushnell* mapped the ocean bottom, I had opportunity to care for my extensive collections of fishes, birds, plants, and invertebrates. But on June 27 I went ashore on Tau Island and made a large collection of fishes at Siulagi Point, where several native boys, from the village of Faleasau, helped me. The little boys, 5 to 9 years old, would dive after fish in a cave where the water surged up and down, and if a fish was too big for one to handle, more would go to his rescue, and all would come to the surface with it. On June 28 we arrived again at Pago Pago Bay but were quarantined.

tioned because of influenza at the Naval Station, until we left on July 3 for Hull Island. On July 7 I landed on Hull Island through a difficult surf and collected specimens until July 18, when I was again back on the *Bushnell*. Without the use of a small boat no collecting could be done in the lagoon of this island. Hull Island is about 7 miles long, and the north side is broken by several channels, from four of which I collected fishes. The reef, like that around most of the atolls, except Rose, is almost devoid of tide pools, because it is nearly flat, and much of it is smooth as a pavement. In other places it is well drained by channels that penetrate as far as a hundred feet.

Between July 19 and 20 we were in the vicinity of Canton and Enderbury Islands where a few fishes were taken on hook and line and presented to me by Lt. Tom Shriver. On the 21st we started for Pearl Harbor, arriving there the 27th. Until August 4 I spent most of my time at the Bishop Museum in Honolulu, when I left for Washington, D. C., arriving there on August 18.

ICHTHYOLOGICAL RESULTS OF THE EXPEDITION

Although nearly five months were spent away from the National Museum, only 65 days were actually available for collecting specimens; the remainder was used in getting from place to place and in preserving the specimens, which numbered 14,022 fishes and about 3,000 other specimens, consisting of amphibians, reptiles, birds, mammals, various kinds of invertebrates, and rocks.

Among the fishes, 30 new species and subspecies and 6 new genera are herein described, distributed among 18 families, as follows:

- DUSSUMIERIDAE:
Spatteloides atrofasciatus, new species.
- OSTEICHTHYIDAE:
Mechanocerachelys phoenicianensis, new species.
Brachycomopsis sauropsis, new species.
- ECHINIDAE:
Echidna leucosticta, new species.
Uroplexygus cantonensis, new species.
Uroplexygus reidi, new species.
- EUCERIIDAE:
Kaupichthys diodontus, new genus and species.
Muraenichthys fosteri, new species.
- SYNGNATHIDAE:
Ichthyocampus discantus, new species.
- KOHLEIDAE:
Kuhlia satoca, new species.
Kuhlia petiti, new species.
- SEBASTIIDAE:
Epiplatys urodactylus, new species.
- PSEUDOCHEILIDAE:
Aporops bilinearis, new genus and species.
Pseudochromis jamesi, new species.
Pseudopterygion roseae, new species.

- CYPRINIDAE:
Anabycirrhitus anabardi, new species.
Hypoclinichthys, new genus.
- ACANTHURIDAE:
Acantthurus rockiffi, new species.
- POMACENTRIDAE:
Abudefduf phoenicianensis, new species.
- LABRIDAE:
Tautossoma marnee, new species.
- GOMIDAE:
Bethygodius fuscus stoutsensis, new subspecies.
Graethobius hololepis, new species.
Mahidolia papuensis, new species.
Oplonomus ducantus, new species.
- ELASTOBRIDAE:
Triptera eriotops, new species.
- FAGUSA LUTULAE, new genus and species.
- ECHENIDAE:
Phthirichthys multiradiatus, new species.
- CALLIONYMIDAE:
Dermosticta dorothkeae, new genus and species.
- TACHIONOTIDAE:
Cryptotilapia cookei enderburyensis, new subspecies.
Chalcidodytes taenensis, new genus and species.
- BLENNIDAE:
Cirrhipetes jenningsi, new species.

SCOPE OF THIS REPORT

This report on the fishes of the Phoenix and Samoan Islands is based on the 14,022 specimens collected by me in 1889 and on other specimens in the National Museum in the same families. From time to time during the past century several individuals have collected fishes that have come to the National Museum. The Wilkes Exploring Expedition about 100 years ago was the first to bring back ichthyological specimens from the Samoan Islands and Hull Island of the Phoenix group. About 1874 or earlier Col. A. B. Steinberger collected numerous species of fishes among the Samoan Islands. These were entered in our catalog in 1875 and reported upon by Streets in 1877. During May and June 1883, Dr. W. H. Jones collected several fishes at Samoa, and six years later (1889) Dr. C. H. White collected a few more. In 1894, or a year or two earlier, Lord Lilford and also the Rev. S. G. Whitmee sent a few fishes to the National Museum.

A large collection received from the Samoan Islands was made by David Starr Jordan and Vernon Lyman Kellogg in 1902, mostly at Apia, Samoa, although they collected numerous specimens at Pago Pago, Samoa. These collections were reported upon by Jordan and Seal in 1906. Since that time but few fishes from the Samoan Islands have been received. Lt. Richard C. Reed collected a few on January 3, 1921, at Tutuila Island, and Capt. J. P. Ault took some in 1922.

Oxford
at the Clarendon Press

98

JACOB ROGGEVEEN

visited an island which was undoubtedly Takapoto in 1765 (see section 29), a landing party found relics of a Dutch longboat. Takapoto had, however, been discovered by Le Maire. The island to the west of Schadelijk, namely Dagenraad, was either Manihi or Ahe. It may have been discovered by Le Maire. Coming south, the expedition then saw Apataki (Avondstond), and then Arutua (Meerder Zorg), which lies 9 miles west of Apataki. The ships passed south of Arutua, and then saw Rangiroa to the north-west by west. Rangiroa had been discovered from the north by Le Maire. Then the expedition came to Makatea (Verkwikking), which is unique in those parts in being of moderate height and hilly. All these islands fit in with Roggeveen's relative locations, topographical descriptions, sailing times, and broad latitudes. The new discoveries among them were Tikai, Apataki, Arutua, and Makatea, and possibly Manihi or Ahe according to which of these was seen by Roggeveen and which before him by Le Maire.

On 6 June 1722, 3 days after leaving Makatea, two more islands were seen to the south. Bouman of the *Thienhoven*, which was nearer these islands, said that when seen at daylight, at a distance of 8 to 9 Dutch miles (about 32 to 36 geographical miles), one of these, a very high island, was to the south-east of the ship, and the other, a lower island, was to the south-west by south. According to Roggeveen, the latitude on this day was taken as 15 degrees 37 minutes south, and the two islands were 2 Dutch miles apart. He identified them with Le Maire's Cocos and Verraders (Tafahi and Niuatobutabu).

These two islands were the northern islands of the Society Islands, Borabora and Maupiti. The sailing time of 3 days from Makatea is realistic in relation to these islands. Their latitudes are about 16½ degrees south. Borabora has peaks of over 2,000 feet. Maupiti is a good deal lower, its highest point being 698 feet.¹ Tubai, also known as Motu Iki, a low atoll, lies between Borabora and Maupiti at a distance of 7 miles from Borabora and 24 miles from Maupiti. While Borabora and Tubai might appear to agree with Roggeveen's figure of 2 Dutch miles between the two islands, this does not accord with Bouman's bearings, nor with the fact that Tubai at a long distance would not be visible, nor with the

¹ *Pacific Islands Pilot*, vol. iii, pp. 180-1.

The Discovery of the Pacific Islands
by Andrew Sharp

1960

JACOB ROGGEVEEN 99

further fact that, if Tubai had been visible, Maupiti would have been more so. Roggeveen was thus the discoverer of Borabora and Maupiti.¹

On 13 June 1722 a low island estimated to be about 1 Dutch mile in circumference was seen, and was called Vuyle Eyland (Bird Island). The latitude on this day was taken as 14½ degrees south. Very soon thereafter high land was seen to the north-west, first from the *Thienhoven*. The next day the two ships stopped off this high land on its south side, the latitude near it being taken as 14 degrees 9 minutes south. It was found to consist of four islands. The easternmost was the largest; to the west of it were two islands divided by a narrow channel; and west of these was a small island. These islands were called Boumans Eylanden.

Bird Island was the modern Rose Island, a small atoll in latitude 14 degrees 33 minutes south, the easternmost of the Samoa Islands. The Bouman Islands to the north-west of Vuyle Island were the Manua Islands of the Samoa group. Of these, Tau, the easternmost, is 3,056 feet high, Olosenga, 5½ miles north-west of Tau, is 2,095 feet high, Ofu, ¼ mile west of Olosenga, is 1,589 feet high, and two islets lie close together near the west side of Ofu.

While the Dutch ships were at Tau three canoes came out to them. They were not made out of a log, but constructed of framework and planks in a workmanlike way. A ship's boat went in to the shore, where large numbers of people were gathered. There were numbers of canoes there to meet them, one of which was very large. In this sat a man who was obviously a person of authority, and with him a girl who wore a blue coral necklace. The men had spears, bows, and arrows. The people resembled the Easter Islanders in having good physiques: also in painting themselves, but not so abundantly, as the painted adornments began at the thighs and went down to the legs. Nothing else was seen that the islanders used for clothing their nakedness except a belt round their waists, to which a great number of long and wide leaves or rushes or some other plant was attached.

Early the next day, 15 June 1722, a high island was seen, first from the *Thienhoven*, being named Thienhoven accordingly. Bouman says

¹ These identifications accord with those of Mulert, in *De reis van Mr. Janh Roggeveen* (The Hague, 1911), p. 165 n.

Why didn't he ask
the natives at Toi about Rose

they sailed on a west-north-west course along it at a distance of 7 to 8 Dutch miles, and later in the day saw another high island to the west-south-west, the previous island being still in sight. They could not get much idea of the extent of the second island to the west. The second island was named Groeningen.

The first of these islands, Thienhoven, was Tutuila, which rises to 2,141 feet, and the second, Groeningen, was Upolu, which has a number of peaks of which the highest is 3,607 feet¹—both in the Samoa group. Tutuila is about 50 miles west of the Manua Islands, and Upolu is about 38 miles west-north-west of Tutuila. It is plain that the expedition did not proceed far enough before dark to appreciate the full extent of Upolu, or to see Savaii to the west of it.

No more islands were seen until Roggeveen reached New Ireland on 17 July 1722.

The contributions of Jacob Roggeveen to the discovery of the Pacific Islands were as follows: On 5 April 1722 he encountered Easter Island, a landing being made. This was a new discovery because it is not credible that Davis had seen it (see section 22). On 18 May 1722 Roggeveen discovered Tikai; on 25 May 1722 he discovered, or rediscovered after Le Maire (see section 16), either Manihi or Ahe; on 27 May 1722 he discovered Apataki; on 28 May 1722 he discovered Arutus; and on either 1 or 2 June 1722 he discovered Makatea, a landing being made; all these islands being in the Tuamotu Archipelago. On 6 June 1722 Roggeveen discovered Borabora and Maupiti in the Society Islands. On 13 June 1722 Roggeveen discovered Rose Island and the Manua Islands, and on 15 June 1722, Tutuila and Upolu, in the Samoa group, these discoveries being first seen from his second ship the *Thienhoven*.

¹ *Pacific Islands Pilot*, vol. ii, pp. 405-6, 410-11.

28. Norton Hutchinson, James Dewar, and Thomas Baddison

ON 5 March 1761 three British ships, the *Carrarvon* (Captain Norton Hutchinson), the *Warwick* (Captain James Dewar), and the *Princess Augusta* (Captain Thomas Baddison) passed Mapia, south of the western Carolines, on the way to China, and some months later came back over the same course, being on occasion separated from one another. A chart embodying the information of one Scott of the *Warwick* shows that the expedition on the way to China, after leaving Mapia, encountered an island in the western Carolines, the position shown for it being that of Pulo Anna. It would appear that another island to the south-east of this position and corresponding to that of Merir was seen by the *Carrarvon* on the way back.¹

These would appear to be the first reasonably well-established European sightings of Pulo Anna and Merir. Either or both of these islands may have been seen by the Portuguese (see section 4).

29. John Byron

IN 1765 John Byron came through Magellan Strait into the Pacific as commander of a British expedition of two ships, the *Dolphin* and the *Tamar*, sent by the British Government on a voyage of exploration. The authority for this voyage is Byron's journal as edited by Hawkesworth.²

By Byron's time the improvement in navigation had reached a stage where figures for latitude were fairly precise, although not yet for longitude. The modern abbreviations for degrees, minutes, and seconds were becoming generally adopted, being a token of the improvement. These latter are therefore used in the present and ensuing sections.

¹ Eilers, A., in *Egelnütz der Südsee-Expedition 1808-1810. II. Ethnographie B Mikronesien*, vol. ix, part 1 (Hamburg, 1935), p. 164—citing Dalrymple, A., *A Collection of Charts* (London, 1781-94).

² Hawkesworth, J., *Voyages* (London, 1773), vol. i, pp. 1-139.

72. James Cary

IN 1804 James Cary, of the American whaling vessel *Rose*, while on the way to Canton in China, discovered an inhabited island placed by him in latitude $2^{\circ} 33' S.$, longitude $176^{\circ} 9' 30'' E.$, named *Rose Island*.¹

The position given is almost precisely that of Tamana, the south-westernmost of the Gilbert Islands. Had Cary's *Rose Island* been Arorae, some 52 miles east of Tamana in latitude $2^{\circ} 40' S.$, it might be expected that he would have seen others of the Gilbert Islands on his conjectural north-west course. *Rose Island* can reasonably be regarded as Tamana, a new discovery by Cary.

73. Captain Crozer

THE French explorer Duperrey, in his geographical memoir of 1827, cited an account from the *Monsieur* of 1 February 1806, of the seeing by an American captain Crozer, commanding the *Nancy* of Boston, from a distance of 11 leagues, of a high island named Strong Island, on 20 December 1804, the position given being latitude $5^{\circ} 21' N.$, longitude $160^{\circ} 37' 40'' E.$ of Paris. Duperrey concluded from the close correspondence of this position with his own observations of 'Oualan' in the eastern Carolines, in 1824, that this was the same island.²

This was Kusaie, alternatively known as Ualan, a detached high island in the stated position. This may have been the high land shown in Arrowsmith's chart, presumably reported by Musgrave of the *Sigar Cane* (see section 55).

¹ Stackpole, E. A., *The Sea-Hunters* (Philadelphia-New York, 1953), p. 341, citing log of the *Rose*, 1803-4.

² Duperrey, L. I., *Mémoire sur les opérations géographiques* (Paris, 1827), p. 54.

74. Urey Lisianski

UREY LISIANSKI, in command of the Russian vessel *Neva*, traversed the Pacific from North America to China in 1805.¹ On the night of 15 October 1805 he grounded temporarily on a reef, and the next day found he was near a small island beset with reefs. The position given was latitude $26^{\circ} 24' N.$, longitude $173^{\circ} 42\frac{1}{2}' W.$ The island, on which Lisianski landed, was low and arid. It was named Lisianski's Island.

The position and description show that this was Lisianski island, in the northern part of the Hawaii group.

75. Juan Baptista Monteverde

IN February 1806 Juan Baptista Monteverde, of the Spanish vessel *La Pala*, while passing through the Caroline Islands on his way from Manila to Peru, encountered two islands. One of them was identified by him with Tompson's San Agostino, i.e. Oroluk (see section 36). The other, discovered on 18 February 1806, and named Dumkin by Monteverde, was placed by him in latitude $3^{\circ} 27' N.$, longitude $155^{\circ} 48' E.$ ²

Dumkin was evidently Nukuoro, a large detached atoll in latitude $3^{\circ} 50' N.$, longitude $155^{\circ} E.$ Monteverde's latitudes show a tendency to be too low. Monteverde was thus the discoverer of Nukuoro.

76. Abraham Bristow

ROSS, the Antarctic explorer, in his account of his own voyage, gives a note on the discovery of the Auckland Islands by Abraham Bristow in the British vessel *Ocean*. This was a whaler belonging to Enderby's of London. The ship's log was shown to Ross by one of the Enderbys.³

¹ Lisianski, U., *A Voyage Round the World* (London, 1814).

² Espinosa, J., *Memorias* (Madrid, 1809), vol. ii, p. 22.

³ Ross, J. C., *A Voyage of Discovery* (London, 1847), vol. i, pp. 117-8.

DEPARTMENT OF MARINE BIOLOGY
OF
THE CARNEGIE INSTITUTION OF WASHINGTON

VOLUME XX

AMERICAN SAMOA:
PART I. VEGETATION OF TUTUILA ISLAND
PART II. ETHNOBOTANY OF THE SAMOANS
PART III. VEGETATION OF ROSE ATOLL

BY
WILLIAM ALBERT SETCHELL
Professor of Botany in the University of California



PUBLISHED BY THE CARNEGIE INSTITUTION OF WASHINGTON
WASHINGTON, JUNE, 1924

For GK 473
.S3
S4

THE VEGETATION OF ROSE ATOLL.

INTRODUCTION.

The atolls of the Pacific and Indian Oceans possess a peculiarly romantic and scientific interest, and studies of their biology and geology must necessarily be carried on intensively in order that a basis may be made certain for any theory relating to their origin. Rose Atoll is one of the simplest, as well as one of the smallest, of the isolated atolls, and seems to present certain atoll characteristics which may serve as fundamental in the general discussion. I have, therefore, availed myself of the opportunity afforded by the visit, notes, photographs, and collections of Dr. Alfred Goldsborough Mayor, the most recent as well as one of the very few scientific visitors to this atoll, to scrutinize as thoroughly as possible, from the botanical standpoint, all the data made available to me through his generosity. It is, then, as a simple atoll and one of a distinctive type, that I approach the study of the vegetation of Rose Atoll.

GEOGRAPHY.

Rose Island or more properly Rose Atoll, is situated in lat. $14^{\circ} 32'$ S. and long. $168^{\circ} 11' W$. It is the southeasternmost of the islands of the Samoan Archipelago, previously called the Navigator's Islands. It is 78 miles distant from Tau Island of the Manus group, the nearest member of the Samoan Archipelago, and is several to many times that distance from any other island. Between Rose Atoll and Tau Island there are depths of over 5,000 but somewhat under 10,000 feet, and between Rose Island and those of any other archipelago the depths are over 15,000 but probably somewhat under 20,000 feet. Rose Island, therefore, represents the extreme southeastern boss of the Samoan mountain chain, which extends somewhere between 15,000 and 20,000 feet above the base level of the ocean floor and rises possibly 7,000 to 8,000 feet above its own general basal mass. The height to which Rose Island rises above the water has been found to amount to 11 feet above the high-tide limit (cf. Mayor, 1921, p. 62).

HISTORY.

"Rose Islet" was discovered and named by Freycinet in his voyage around the world in the *Uranie* and the *Physicienne*. The island was sighted and observed from a distance of 1.5 nautical miles on "October 21, 1819." It was named, as Freycinet tells us, for a lady especially dear to him (cf. Freycinet, 1829, pp. 623, 624). Freycinet also adds a somewhat extended description of Rose Islet (1826, pp. 250, 251) and a chart with a profile sketch (1828, pl. 19). These give very well

Freycinet's conception of the island, but since his vessels did not approach nearer than 1.5 miles, his description and sketches are too imperfect to serve as a basis for any definite conclusions as to changes which may have taken place in the island and atoll since its discovery. Certain characteristics, however, stand out sufficiently for comparison.

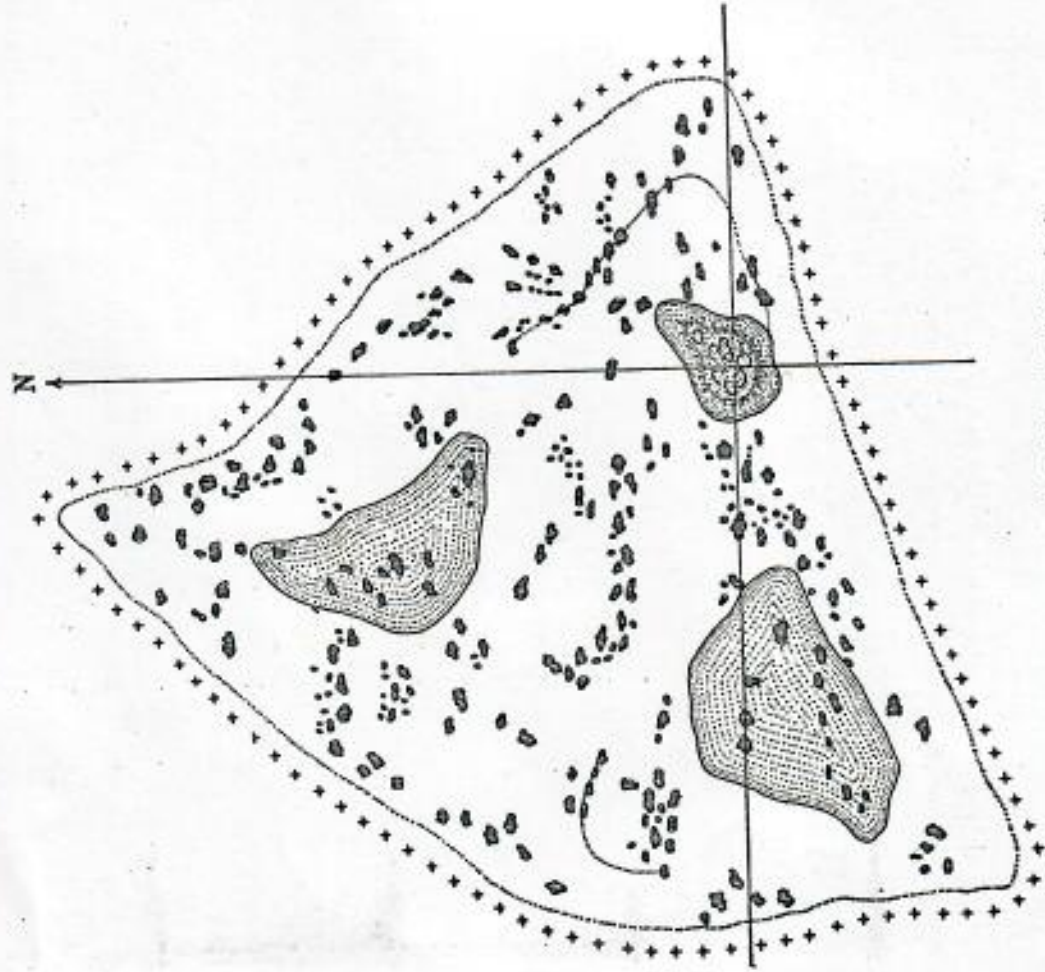


FIG. 47.—Chart of Rose Atoll after Freycinet (1828, pl. 19).

Freycinet remarks that in sailing past the islet 1.5 miles, no bottom could be perceived under his ships; that the islet was low and well wooded, and that its height was greater toward the southeast. The general shape of the islet was triangular (cf. fig. 47) and it appeared to be inhabited only by seabirds of several species, which he details. The trees on the island were not distinguishable, as he

says, as to whether they may have been coconuts or some other species of palm. In his sketch (cf. fig. 48), Freycinet very definitely represents the trees as being in two adjacent but separated clumps, the higher being to the south of the lower. He represents, as I interpret his chart, the presence of two additional sandy, or at least naked, islets, and does not recognize the presence of a lagoon. He emphasizes the presence of numerous small black rocks of about the same size on the beach portion (cf. figs. 47 and 48), but at the northeastern corner he mentions the existence of a small black rock, conical in shape, dominating the other rocks. Freycinet noticed that the heaviest surge commenced to be evident about one or two cable-lengths distance from the islet.

Kotzebue (1830, p. 256) states that on April 2 (O. S.) in 1824 his expedition "passed a little uninhabited island, something higher than the coral islands usually are." Unaware of Freycinet's discoveries, since that voyager's account had not been published when Kotzebue left Russia, he named it Kordinkoff Island, in honor of his first lieutenant, but discovered its identity with Freycinet's Rose Islet on his return to Europe. In Kotzebue's chart (1830) it is incorrectly labeled "I. Kordiu-coff," and is represented as a completely inclosed atoll with one larger islet and several smaller islets, or possibly larger "negro heads" (cf. fig. 49, 3). So far as I may determine, Kotzebue did not land on Rose Atoll.

Rose Atoll was observed at a distance of less than a mile on September 23, 1838, by Dumont D'Urville, who describes the atoll as being a circle of 6 to 7 miles in circumference. Rose Islet he describes as a heap of sand about 200 meters in diameter covered with a "bouquet" of green, very fresh and pleasing. In passing about 600 meters to the north of the breakers, he perceived a cut, or channel,

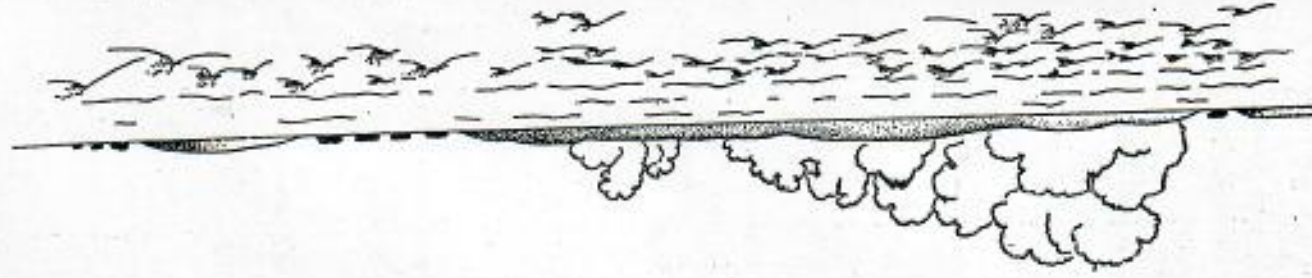


FIG. 48.—Landscape of Rose Atoll after Freycinet (1828, pl. 19).

in the reef, about 100 meters across, which gives access to the lagoon whose water appears reasonably deep and which seemed to promise an anchorage for ships as small as his (cf. Dumont D'Urville, Voyage au Pol. Sud., etc., sur les corvettes *l'Astrolabe* et la *Zélée*, Relation du voyage, vol. 4, pp. 91, 92, no date).

The first recorded landing on Rose Atoll is that of the U. S. Exploring Expedition under Wilkes on "October 7, 1839," when a portion of the day was spent in making surveys and observations on its geol-

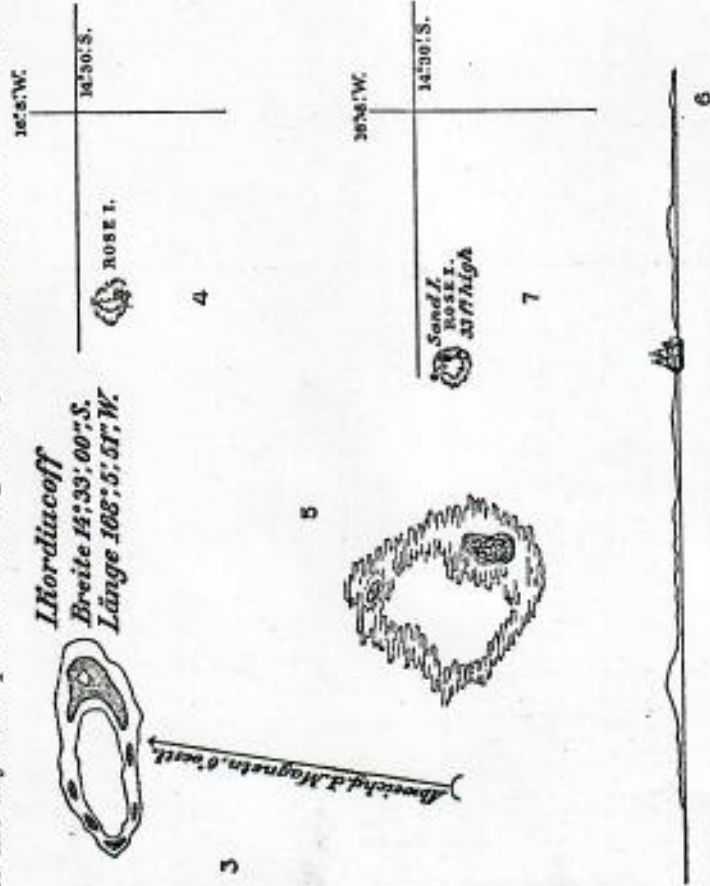


FIG. 49.

3. Chart of Rose Atoll ("L. Nordiucoff," property I. Kordiucoff) after Kotzebue (1830).
4. Chart (smaller) of Rose Atoll after Wilkes (1850, pl. 19).
5. Chart (larger) of Rose Atoll after Wilkes (1850, pl. 23).
6. Landfall of Rose Atoll after Wilkes (1850, pl. 23).
7. Chart of Rose Atoll after U. S. Hydr. Office, based on Wilkes's chart with additions from German Surveys (issue of 1912).

ogy and natural history. As a result of this visit there were published brief accounts both by Wilkes (1845, vol. 2, p. 64) and by Dana (1849, pp. 78 and 308), as well as a chart of the atoll and its islets (cf. Wilkes, 1850, plates 19 and 22). The two sketches of Rose Island, with a landfall sketch, have been reproduced on figures 49, 4, 5, and 6, and were for many years the standard for the charts of the U. S. Hydrographic Office.

Wilkes says of Rose Atoll:

"It appears, at first, like a round knoll of land, but on a nearer approach, this is found to arise from a large clump of *Pisonia* trees, similar to those found growing

in the low archipelago. * * * It is a low annular coral island, of small dimensions, inundated at high water, with the exception of two small banks, one of which is entirely covered by the clump of trees. * * * The other is formed of dead coral, without any vegetation. * * * The lagoon has from 6 to 12 fathoms depth of it. * * * There is an entrance into the lagoon, having 4 fathoms depth of water through it. * * * A remarkable coral formation, like a submerged tree, 30 feet in diameter over its top, was found in the center of the lagoon, rising to the level of low water, and having all around it a depth of 8 fathoms. * * *

Some boulders of vesicular lava were seen on the coral reef; they were from 20 to 200 pounds weight, and were found among blocks of coral conglomerate. * * * The frigate birds and boobies (sula), whose nests had before been observed on low bushes, were here found on the tops of trees 50 feet high. * * * Several small turtles were observed here. * * * They feed upon a species of fucus that grows upon the reefs."

Dana (1849, p. 78 and p. 308) says:

"On Rose Island, Dr. Pickering found only a *Pisonia* and a *Portulacca*. * * * Rose Island is a low coral atoll; masses of basalt were observed in one or two places on its reefs, which had probably been carried there by floating logs, or as the ballast of some canoe."

Couthouy (1842, pp. 137, 138) gives a seemingly fanciful account of Rose Island, differing in essential details from that of Wilkes, of whose expedition he was a member. Couthouy says: "Not a particle of vegetation had yet made its appearance elsewhere than on the most elevated portions of one sandy knoll, which a solitary shrub (a *Pisonia* if I recollect right) had begun to clothe with verdure."

Charles Darwin, in his "Structure and Distribution of Coral Reefs," speaks of Rose Island as not being an atoll. This was in 1874. But a footnote to the last edition (1914, p. 218) corrects this statement, as Alexander Agassiz had already done in his Fiji report.

As will be shown later, both the *Portulacca* and the *Pisonia* were omitted from special reference by Ass. Gray (1854), although (loc. cit., p. 139) he probably refers to the former. We must remember, however, that only portions of the Botany of the Wilkes Expedition were ever published. The species of *Fucus* referred to by Wilkes is probably the *Caulerpa mammillosa* in Bailey and Harvey's account of the Alge of the Expedition (1862, p. 171).

In 1873, Graeffe published a sketch of the "Topographie von Samoa" and included some very interesting data concerning Rose Atoll (1873, p. 32, plate 1). Graeffe owed this information and sketch of the chart of Rose Atoll presented with his paper to "Captain Ranzau" or "Rantau," who had visited this isolated islet repeatedly in connection with his service under the German exploitations in these waters, and had passed through the hazardous entrance in his small schooner and anchored in the lagoon. The Rantau chart (cf. fig. 50), whether original or based on surveys unknown to me, is a very definite advance on the charts of Wilkes. It is the same in all essential respects as that of Chart 1073 of the British

Hydrographic Office (issue of May 1889, but not of October 1866) and seems to be the same which was very nearly exactly reproduced on U. S. Hydrographic Chart 90 (cf. fig. 51). The representation of this last chart is said to be based on the survey of the U. S. Exploring Expedition under Wilkes and on a "British survey." The close correspondence between Rantzau's sketch and Chart 90 is shown in the representation of a house on Rose Islet, which will be referred to later in the discussion of the coconut trees on Rose Islet. It is noticeable, too, in the sketch of Rantzau and the later charts, both British and American, that the grove of trees on Rose Island is repre-

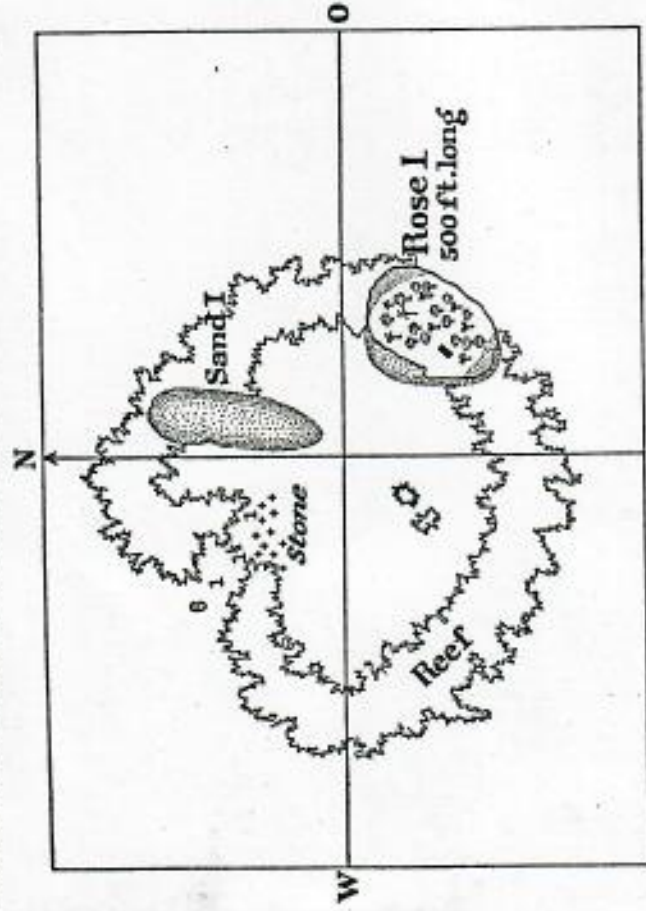


FIG. 50.—Chart of Rose Atoll after Rantzau (vide Graeffe, 1873, pl. 1, with labeling changed from German into English).

mented as mixed palms (coconuts) and non-palms. The latest issue of Chart 90 (revised to October 4, 1921) shows Rose Islet much reduced in size, with height given as 11 feet, and height of trees as 90 feet (cf. fig. 52).

The above statements of Freycinet, Kotzebue, Wilkes, Dana, and Graeffe represent all that has been heretofore known with any definiteness about Rose Atoll, although it has been fairly frequently visited by small trading-vessels for the sake of the fishing. Governor B. F. Tilley visited the island about 1902 and planted coconuts, one of which possibly still survives.

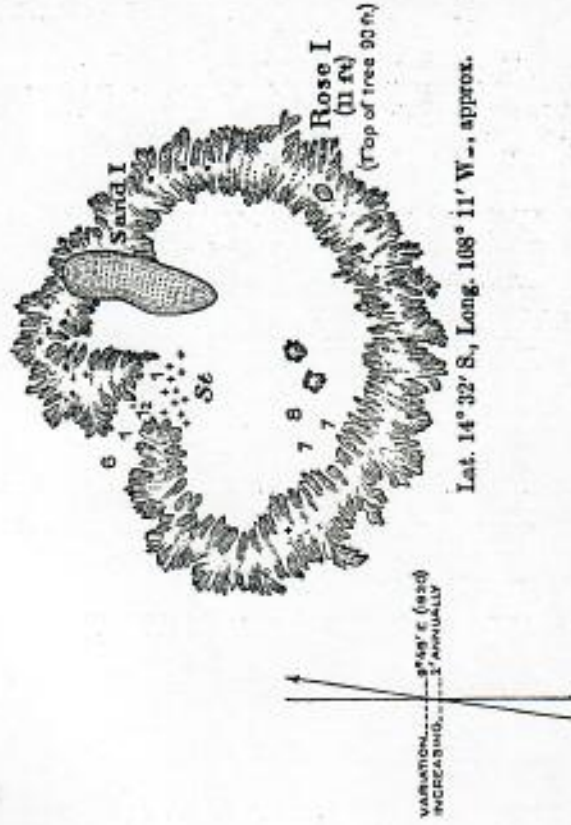
In January 1920, Governor Warren Jay Terhune visited Rose Atoll and in June 1920 decided to revisit it. He invited Alfred

Goldborough Mayor, at that time in Pago Pago conducting observations on various projects appertaining to the marine biology of the



Lat. $14^{\circ} 32' S.$, Long. $168^{\circ} 11' W.$, approx.

FIG. 51.—Chart of Rose Atoll after U. S. Hydr. Office, issue of Sept. 25, 1919).



Lat. $14^{\circ} 32' S.$, Long. $168^{\circ} 11' W.$, approx.

FIG. 52.—Later chart of Rose Atoll after U. S. Hydr. Office, No. 90 (issue of Oct. 4, 1921).

Samoa Islands, to accompany him on this second visit. Doctor Mayor spent about 24 hours at Rose Atoll on June 5 and 6 and made such observations and collections, as well as photographs, as his brief

stay and multiplicity of interests allowed. This is the first scientific survey of the atoll since 1839. Doctor Mayor has detailed his observations in other places (1920, 1921, 1921a), but certain of them, taken from notes kindly supplied by him for the purpose and which are pertinent to an inquiry into the nature and surroundings of the vegetation, are noted here.

"The island is an atoll, the lagoon being surrounded by a narrow ring of limestone composed chiefly of lithothamnium, which is everywhere nearly awash at low tide, excepting on the northeast side, where there is a narrow entrance about 9 feet in

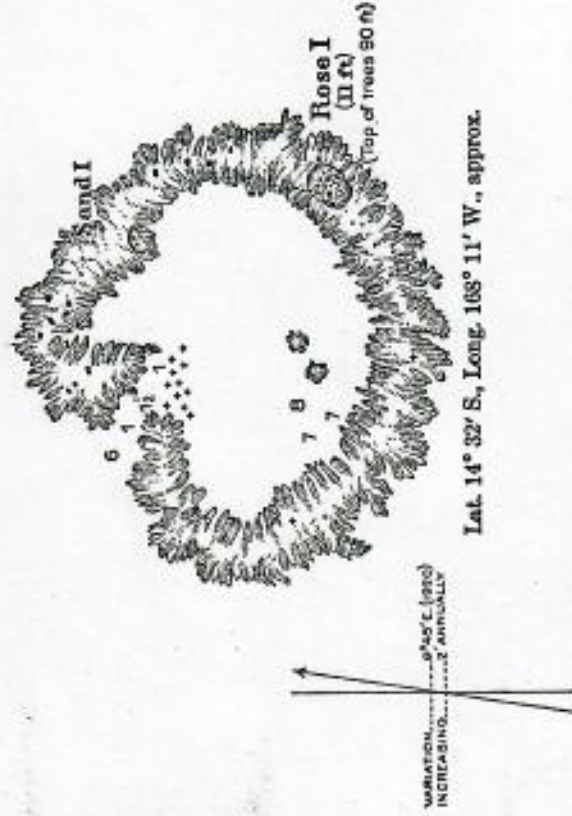


FIG. 53.—Chart of Rose Atoll corrected to June, 1920, by Alfred G. Mayor, to represent a close approximation of the relative dimensions of the reef and each of the two islets. On Rose Islet, the single dot in the *Pisonia* Grove is an older coconut tree, while the five dots in a row are the coconut trees planted by Governor Terhune in January, 1920, while the two dots on Sand Islet represent those he planted in June, 1920.

depth, out of which a current constantly flows. * * * The ring of limestone which surrounds the lagoon is quite uniformly 500 yards in width, while the central lagoon is about 2 miles wide and appears to have a maximum depth of not more than 8 fathoms. * * * There are only two small islets upon the atoll rim, Sand Islet and Rose Islet."

Besides the general description of the atoll, Mayor describes the islets in some detail and brings forward various matters of interest to an account of the flora, which will be referred to later. He also collected all the plants he was able to find and collected or made notes on such land animals as were observed in his limited stay. He has provided sufficient material to give a fairly thoroughgoing description of this very interesting, isolated atoll of such a very small size. On figure 53 is given a sketch of Rose Atoll, corrected by Doctor Mayor

to show the present relations in size and position of Rose Islet and Sand Islet to the rest of the atoll.

GEOLOGY.

The geology of the atoll, as given by Mayor in the article just quoted, seems now to be fairly well established. The atoll-rim is, for the most part, a hard, smooth surface, veneered with a pink crustaceous coralline. The rock of the rim supports hundreds of large blocks of limestone (negro heads) about 5.5 feet high. Most of these boulders are loose, or at least not continuous with the substance of the rim, while a few still remain attached to the rim and are mushroom-shaped, with a slender or stouter pedicel. These boulders indicate that the atoll-rim at one time stood 6 to 8 feet above its present level. The solid rock (cf. pl. 36, fig. 5) of the atoll-rim, as well as that of the negro heads, consists chiefly of lithothamnium compacted into a mass of chalky whiteness superficially resembling dolomite. It is remarkable that these rocks contain a large amount of magnesium, as do also the living pink lithothamnium which veneer the surface of the atoll-rim. The tree-covered rocky center of Rose Islet is composed of a coquina (cf. pl. 36, figs. 3, 4) consisting chiefly of wave-worn fragments of lithothamnium and *Hatimeda* and also fragments of broken coral, such as *Favites*, *Porites*, *Symphylia*, *Pocillopora*, and still more rarely *Acropora*. Some portions of shells and part of a skull of a small cetacean were also found embedded; all forms now living on or about the reef. A large amount of organic matter, dark brown in color, and derived from the decomposed roots of the *Pisonia* trees, permeated this coquina to a depth of several feet. On the wave-washed southeastern shore of Rose Islet, some modern beach-rock (cf. pl. 36, fig. 6) has been formed and projects a few inches above high-tide level; but this is more recent than the rocky matrix of the islet itself, which is now elevated about 11 feet above high-tide level. Sand Islet is a mere accumulation of fragments of lithothamnium, shells, and broken coral, is devoid of vegetation, and is only about 5 feet above high-tide level. The sea must wash completely over it in times of storm.

SOIL.

As may be seen from the above statements, taken immediately from Mayor's account, the land flora is confined to Rose Islet. It is of interest, therefore, to consider what may be determined as to the nature of the soil on which the scanty flora is growing. Professor C. B. Lipman has kindly supplied me with as full notes as the material available permits. The sample of soil obtained from the collections of Doctor Mayor was not gathered for sampling according to soil methods and was both scanty and taken without precautions against

bacterial contamination. Rose Islet consists of an upper layer of soil, which is organic and which is rich in particles of undecomposed lithothamnium. It is black when wet, dark brown when dry, and is much like a peat of calcareous origin. Underlying the soil layer are partially decomposed lithothamnium masses, a very light material because of the very large percentage of pore spaces. Finally, below the layer just mentioned is a fine-grained limestone. Analyses of these three layers, as supplied by Professor Lipman, are appended.

Rose Islet Rock and Soil (Analyses by C. B. Lipman).

| | Total composition. | | Water-soluble constituents. | |
|--------------------------------|--------------------|------------------------|-----------------------------|------------------|
| | Rose Islet soil. | Inter-mediate product. | Litho. rock. | Rose Islet soil. |
| H ₂ O at 100°C. | p. ct. 5.12 | p. ct. 2.49 | p. ct. 0.4 | p. p. m. 26,400 |
| Loss on ignition | 22.84 | 31.09 | 46.22 | |
| SiO ₂ | 0.18 | 0.2 | 0.16 | 1,837 |
| Al ₂ O ₃ | 16.717 | 9.2 | 0.465 | 4,414 |
| Fe ₂ O ₃ | 0.4 | 0.48 | ..... | 14,391 |
| P ₂ O ₅ | 20.94 | 14.599 | 0.575 | 5,976 |
| CaO | 29.26 | 35.776 | 44.008 | |
| MgO | 1.745 | 3.338 | 7.457 | |
| SO ₃ | 1.144 | 0.871 | 0.011 | |
| Na ₂ O | 1.38 | 1.389 | 0.348 | |
| K ₂ O | 0.228 | 0.229 | 0.155 | |
| Total | 99.966 | 99.06 | 100.40 | |

p. p. m. stands for parts per million.

The bacterial population of the soil (contamination not guarded against) is very interesting. The total bacterial numbers on soil extract agar are 300,000 per gram of soil. The ammonia-producing bacteria are very active among the flora. The nitrifying bacteria are also very active. There is one form of *Azotobacter* resembling much *A. vivandii* (Lipman, J. G.), but probably distinct from it. An unusually large number of coccus forms were found, many of them probably new. No more definite conclusions on the bacterial flora are possible, inasmuch as no precautions were taken in sampling and the sample itself was too meager. These notes are also based on the investigations of Professor Lipman and furnished through his kindness.

CLIMATE.

While we have no definite data on the climate of Rose Atoll, it is certainly decidedly tropical, i. e., warm and moist. One may draw certain inferences about it from the data available from the other Samoan islands, but it must be definitely borne in mind that all the

other islands of the Samoan group are "high islands" and their cliffs and mountains modify at least the rainfall to a greater or less extent. The temperature must be that of the open ocean and therefore slightly lower than that of the more extensive islands. The temperature probably varies from about 70° F. at the very lowest to about 88° F. at the very highest, and may average somewhere in the neighborhood of 80° F. The southeast trades blow vigorously from April to November, but during the other months of the year the winds are variable, coming frequently from the west and northwest, with occasional gales. There are probably few hurricanes, as will be indicated later in discussing the trees on Rose Islet. The rainfall probably varies according to the season of the year. The midwinter season (July and August) is probably the drier and the midsummer season (January and February) is probably the wetter. Torrential storms may probably blow in from the southeast at any time. Hurricanes probably visit Rose Atoll, but, judging from the continued existence of the *Pisonia* grove and the persistence of the numerous negro heads, are probably neither frequent nor severe. In this, Rose Atoll probably shares the general climatic condition of the Samoan Archipelago, rather than that of the Tonga Islands lying somewhere about 350 or more nautical miles to the southwest of it.

FAUNA.

There are few animals on Rose Islet, and these are largely sea-birds. Both Wilkes and Mayor mention noddies (*Anous*) and terns (sooty), and boobies (*Sula*) as nesting on the islet, and Mayor adds boatswain birds as also nesting. Frigate birds were present, but not nesting. Mayor observed an abundance of the small brown-gray rat of Polynesia and a small, brown, short-tailed lizard, *Lepidodactylus lugubris*, also common in Polynesia, both of which seem to have been widely distributed over Polynesia through the agency of Polynesians. Wilkes noticed several small turtles and one was taken, but its flesh proved coarse and was drier than that of the green turtle. The turtles feed upon a species of seaweed, probably the *Codium* (mentioned later), which grows upon the reefs. Of insects, Wilkes makes no mention, but Mayor found the larva of a sphynx-moth (*Celerio Oken*) feeding on *Portulaca*, a few gnats, and an occasional fly which may have come with the visitors. The presence of the birds and the rats may have considerable to do with the character of the vegetation. Graeffe (1873, p. 32) mentions two species of turtles as breeding on Rose Islet in August and September. The more common was the green sea-turtle, *Chelonia mydas* L., and in much less numbers was *Chelonia imbricata* L. The fish have long been an object for visits to Rose Atoll by smaller vessels, and at one time, probably in the late sixties according to Graeffe (loc. cit.), Th. Weber, superintendent of

the German agency, with the view to establishing a fisheries station, bought the islet from the chiefs of Manua, to whose fishing-grounds it belonged, and placed an Englishman and some natives on the islet. The industry, however, was found to be unprofitable for various reasons and was abandoned. A house was built under the trees on Rose Islet and some coconut trees were planted, which did well and bore fruit. A native and his family continued to live there, even after the giving up of the fishing station. The house is represented on the sketch map of Rose Atoll made by Captain Rantzau and is reproduced on Chart 90, U. S. Hydrographic Office (cf. figs. 50 and 51).

VEGETATION.

The vegetation of this small atoll is naturally of few species, which, together with its isolation, makes all details of especial interest. The native spermatophyte flora is limited to three species, viz, *Pisonia grandis* R. Br., *Boerhaavia tetrandra* Forst., and *Portulaca lutea* Soland. The introduced spermatophyte flora consists of a single species, viz, *Cocos nucifera* L., plants of which have been put out on Rose Islet by the Germans, by Governor Tilly, and by Governor Terhune. The algal flora includes, so far as known to us, two large and several small species. The most important of these is the lithothamnium, *Porolithon craspedium* var. *mayorii* M. A. Howe, which is the builder of the reef, and *Caulerpa cupressoides* (Vahl) Ag. var. *mammillosa* (Mont.) Weber-v. Bosse. There are several smaller algae in Doctor Mayor's collection, some from the reef and some from the shell and coralline material of Rose Islet, which will be mentioned in the list of plants below. Of fungi and lichens, there are no indications in the collections, although a few inconspicuous forms of these groups might be expected. Likewise, there are no indications of either mosses (or bryophytes in general) or of ferns or their allies (pteridophytes in general) and the entire lack of these does seem significant.

ECOLOGY.

As might naturally be expected, there is only one zone represented, and that is, very strictly, the tropical. The elevation even of Rose Islet allows, also, of the representation of only one exposed belt, viz, the strand belt. The strand belt seems to have two very distinct associations, the *Pisonia* association and the *Boerhaavia-Portulaca* association.

The *Pisonia* association occupies the more elevated portion of Rose Islet, which Mayor estimates as being about 11 feet above the high-tide level, where there is a scanty soil, as described above. The trees of *Pisonia grandis* R. Br. cover the southern and southeastern half of

the islet (the whole islet being about 240 yards south southwest-north northeast and about 200 yards wide) with a dense forest growth "casting so complete a shade that no other plants grow beneath them (cf. plate 32, fig. A), save only a single coconut palm." The trees in the *Pisonia* association reach a height of about 80 feet and a girth (3 feet above the ground) of 25 feet and 7 inches. Mayor says:

"On the south side of Rose Islet the sand beach is reduced to from 1 to 5 feet in width at low tide, cliffs of coquina from 5 to 8 feet high front the sea. A few feet inland this rocky ledge rises to a height of about 11 feet above high-tide level. The *Pisonia* grove appears to be confined to this region of coquina rock and does not appreciably extend out over the loose calcareous breccia which has been washed in upon the islet in time of storm. The ground under these trees is covered with rich chocolate-colored humus, which is of considerable depth near the southern end of the grove."

The grove forms a nearly symmetrical dome, the leaves and branches on its borders extending quite to the ground (cf. plate 32, fig. B). The largest trees are near the southern end of the grove. Boobies construct their nests among the branches of the *Pisonia* trees.

The *Boerhaavia-Portulaca* association of the strand belt occupies the coral breccia and calcareous sand which surrounds the *Pisonia* grove on Rose Islet (cf. plate 32, fig. B). There are no plants of this association to be found in the shade of the *Pisonia* trees, but they grow in the open, fully exposed to the rays of the sun. The associates in this area are *Boerhaavia tetrandra* Forst. and *Portulaca lutea* Soland. The former has trailing stems up to about 3 feet long, seldom longer, a thick, woody root, and rather thick, coriaceous, ovate-orbicular leaves. The flowers are small and pink. *Portulaca lutea*, on the other hand, is suffrutescent, a foot or a little more than that high, has thick, cuneate, but distinctly petioled leaves and moderate-sized yellow flowers. It has been passed over by most authors, being confused with the cosmopolitan garden-weed, *P. oleracea* L. Later the statements as to the differences between these two species of *Portulaca* will be given in fair detail. Contrasting the two associations of the strand flora of Rose Islet, it may be inferred that the *Pisonia* aggregate finds the more solid lithothamnium-coquina with the soil accumulated on it and in its interstices a favorable medium for its roots, while the *Boerhaavia-Portulaca* complex is able to thrive on the loose sand and coarser calcareous fragments, as well as to endure the direct exposure to the sun.

The introduced flora of Rose Islet is limited to a few coconuts. At the time it was proposed to establish a German fishing station there, Græffe (loc. cit., p. 32) tells us that coconuts were planted and were bearing fruit at the time of abandonment of the station (about 1872). Governor Tilly, of American Samoa, planted a few

The littoral belt, so far as explored, consists only of the venerated top of the reef-rim, which is, at least, awash at the time of high water. The outer slopes of the reef toward the ocean, as well as the inner slopes of the reef toward the lagoon, were not noticed as being different in their inhabitants from the "flat upper surface." The littoral belt of Rose Atoll shows only one formation, viz, that determined by the surf or surge of the water, which sweeps it at all times except at fairly low-tide intervals. Such formations have been designated as "wave beat formations" by Svedelius (1906a, p. 85), translating thus the "Böljlags formationer" of Gran (1897, p. 9). These are constituted of the surf plants of most writers or of what may be called "cumatophytes," to bring the designation into line with other terms intended to indicate nature of habitat. The single formation of the littoral zone of Rose Atoll is a "cumatophyte" formation. The plants of the different associations of a cumatophyte formation differ particular in their method of resisting the stresses and strains of the backward and forward movements of the waves. They are all firmly attached to the substratum by holdfast structures of various kinds. They all seem to require intensely aerated water and all are able to endure considerable exposure on emersion at the times of the lower tides. They differ most characteristically, however, in the matter of the various ways of minimizing the stresses and strains of wave attack. Each of the three associations enumerated later on does this in a characteristic fashion of its own.

The flat upper surface of the atoll-rim, or the annular reef, "is in most places planed off nearly to low-tide level, but it is venerated with a vigorous growth of a beautiful pink lithothamnium." Besides the patches of lithothamnium (*Porolithon*), there was a green alga, *Caulerpa*, growing here and there between them. There are, therefore, two macrophyte associations of surge plants, or cumatophytes, in the littoral belt. There are as well two microphyte associations, one of a very dwarf red alga and admixtures, traces of which are found on the bases of the negro heads collected by Doctor Mayor for examination and analysis. The most characteristic plant in this microphyte association is a species of *Gelidium*. The other microphyte association is made up of microscopic boring species invisible to the naked eye.

The *Porolithon* association is an almost pure association of *Porolithon craspedium* f. *mayori* Howe. Mayor describes the occurrence of this species on the reef surface as follows:

"In most places this lithothamnium forms irregular, more or less connected, patches growing on the smooth hard-floor of the flat. West of the main entrance to the lagoon it grows in long, nearly parallel, flat-topped over-reaching ridges, all parallel with the line of the wave fronts of the breakers as they surge over the reef. These ridges are about 6 inches high and from 6 inches to several feet in width and with channels of similar width between them."

about 1902, and Governor Terhune others in 1920. Mayor (loc. cit.) mentions half a dozen, and speaks of one in particular as growing in the shade of the *Pisonia* grove. The lack of any number, save possibly one, of the coconuts set out by the Germans seems to indicate that they do not thrive on Rose Islet, even when planted. This is probably due to the lack of a finely divided sand, or soil of any kind other than that under the *Pisonias*. The rats, also, may prevent the germinating coconuts, either from the planted trees or those washed ashore, from surviving the germinating period. On figure 53 the coconuts are indicated by round dots; one in the *Pisonia* grove may be either a survival of German planting in the seventies or one of those planted by Governor Tilly about 1902. The other five on Rose Islet and the two on Sand Islet were planted by Governor Terhune in 1920. That the latter will not survive seems certain, and it is doubtful whether those on Rose Islet will maintain themselves.

Besides Rose Islet, the strand belt shows a second islet, called Sand Islet. Mayor says:

"Sand Islet, which lies north of Rose Islet, is a mere accumulation of fragments of lithothamnium, shells, and broken coral, and is devoid of vegetation and only about 5 feet above high-tide level. The sea must wash completely over it in time of storm."

Wilkes (1845, p. 64) says that it "is formed of dead coral, without any vegetation." Captain Rantau, quoted by Græffe (1873, p. 32) simply mentions Sand Islet as a low sand-bank. The reasons for the absolute lack of vegetation on Sand Islet are not altogether clear, but might appear if the opportunity were given for more extended observation with this point clearly in mind. It may be of interest in this connection, however, to add that Captain Rantau observed that great numbers of sea turtles, as mentioned above, resort to Sand Islet in August and September to lay their eggs and that the young turtles feed in the lagoon. Wilkes (loc. cit.) mentions that "several small turtles, similar to those seen at Horden Island, were observed" in September 1839, when he visited the atoll. Mayor, visiting the atoll in early June of 1920, did not observe any turtles.

Of the strand belt, there remain only to be mentioned the hundreds of large blocks of limestone, of the sort called negro heads on the barrier reef of Australia. These lie scattered over the flat wave-washed rim of the atoll, and are uniformly about 5.5 feet high. Most of these are loose boulders, but a few are still attached to the reef of which they are a part. Since these limestone blocks are largely above the high-water level, they may have some scanty flora of algae or lichens, but there are no data available as to its presence or possible nature. The fact that they are blackened, and thus resemble basaltic blocks when seen from a distance, may possibly indicate the presence of microscopic algae or lichens with scanty thalli.

Mayor also says:

"Lithothamnium grows in greater profusion over the reef rim of Rose Atoll than in any other Pacific reef I have seen; but apart from the single species of pink lithothamnium there are remarkably few organisms growing in the shallows of the reef flat; * * * apart from the pink lithothamnium all other organisms were a negligible factor on the upper surface of the atoll rim."

Porolithon, like other members of the tribe *Melobesiaceae* of the family *Corallinaceae*, is closely adherent to its base of attachment by a broad, tightly adhering crustaceous and stony layer. From this base arise thick, branching, cylindrical or slightly compressed and closely arranged erect portions forming rosettes of greater or less diameters. These resist the onslaught of the waves through their rigid and stony consistency. It seems proper to call such plants lithakophytes, or stony plants. The *Porolithon* association may be described as a macrophytic lithakophyte association of the cumatophyte formation.

The *Porolithon* association is by far the most important association or aggregation of plants on Rose Atoll, since the atoll itself is almost, or in reality entirely, built up of *Porolithon craspedium* f. *mayorii*. The atoll-rim is a solid white limestone and consists of little else than this *Porolithon*, either whole pieces or intermixed with fragments of larger or smaller size, firmly compacted together. There are, to be sure, certain admixtures of corals, shells, sea-urchin spines, portions of skeletons of sea animals, etc., but all of these together represent only a very small fraction of the total bulk in comparison with that furnished by the *Porolithon*. Of the same composition as the reef are the limestone blocks above it, they being the remnants of higher portions of the reef, now more or less disintegrated as a result of the supposed subsidence of the ocean or emergence of the reef (cf. Mayor, 1921a, p. 68). Rose Islet and Sand Islet are composed of debris, largely of the *Porolithon*, which is more or less aggregated, or even compacted together.

Mayor calls attention to the fact that both the compact limestone of the reef-rim and the negro heads lying on or attached to it have a comparatively high percentage of magnesium carbonate relative to the amount of calcium carbonate, and in this respect the reef rock in general approaches a dolomite, without, however, having either the composition or the specific gravity of a true dolomite. A high content of magnesium carbonate is also found in the various species of lithothamnium which have been analyzed, much higher than is to be found in any of the skeletons of corals thus far examined. A résumé of the relation of these two carbonates in the skeletons of various animals is given by J. W. Judd in the Funafuti report (1904, pp. 373-378), with tables of the percentages of each as determined by various authorities. Mayor (1921a, p. 66) has given analyses of the *Porolithon* of Rose

Atoll, as well as of the reef rock and of the boulders lying upon it. Professor C. B. Lipman has communicated to me his results on the various rock and soil constituents of the reef rock and the rock and soil constituents of Rose Islet as given above, and has also allowed me to add a series of complete analyses of a number of *Corallinaceae* selected by me, including specimens from Rose Atoll, Tutuila Island, and the California coast. These will be given below in the discussion of *Porolithon craspedium* f. *mayorii*.

The *Porolithon* association may be looked upon as the reef-builder in Rose Atoll. The entire reef, so far as visible, is formed so largely of the *Porolithon* that the small admixture of other calcareous organisms contributes very little to its bulk. So far as may be seen, then, the reef of the atoll is made up of *Porolithon craspedium* f. *mayorii* and of very little else. The same species is said to have built up the reef of the island of Onoatua (Clark Island) of the Gilbert Group (cf. Finckh, 1904, p. 147, and Foslie, 1900, p. 26, 1900a, p. 462, 1907, p. 197, etc.) and is also an important member of the reef-building associations in Funafuti, Tahiti, and Palmyra Island in the Pacific Ocean, as well as of the Maldives, Chagos Islands, and Coetivi in the Indian Ocean (cf. Foslie, loc. cit., in particular). In my exploration of the reefs of Tutuila Island I did not detect *Porolithon craspedium* in any of its forms.

The importance and relative proportions of the work of the corallines and particularly of the non-jointed corallines (often called nullipores) in the work of reef-building is becoming more and more recognized. In some cases, like that of the reef at Rose Atoll, the entire reef is made up of a single species with no perceptible admixture of either other species of the non-jointed corallines or lithothamnium, while many reefs are mixtures of corals, crustaceous lithothamnium, and branched erect lithothamnium. In the latter types of reefs, the proportional amount of the lithothamnium constituents varies. In the case of the Pacific reefs most studied, however, the lithothamnium play such important part in making reef-formation possible that they are being looked upon as the conspicuous element. Stanley Gardiner (1898, pp. 474-478, 1905, pp. 571, 572) and Foslie (1903 and 1907) have emphasized this point and M. A. Howe (1912) has summarized the facts and added from his own knowledge.

The *Caulerpa* association, as I have thought fit to designate it, occurs in the littoral zone and is not a considerable association, according to the description of Doctor Mayor. He says: "The bright-green seaweed *Caulerpa* was here and there found in the troughs between the ridges of lithothamnium." The specimen brought back by Doctor Mayor is a fair-sized plant of *Caulerpa cupressoides* var. *mammillosa* (Mont.) Weber-van Bosse. It is one of the larger species of the genus. Apparently it grows on the comparatively bare spaces be-

very small and shallow pits that the small tufts of the minute *Gelidium* and its associates find the possibility of growth (cf. plate 36, fig. 5). The general color of the *Gelidium* complex is a light red, and the rock appears to the unaided vision to be freckled with the small spots of this association. The two chief constituents are the dwarf *Gelidium* and two equally dwarf species of *Lophosiphonia*, not as yet seen in fruit. Associated with them is a depauperate *Microdictyon*, all of these species being only a millimeter, or slightly over, high. All three species have very pronounced organs of attachment, similar to all true cumatophytes. The particular form of habitat, i. e., the snuggling into the shallow or mostly into the proportionally deeper pits, a characteristic of many associations, both of macrophytes and microphytes, on the coral reefs, or even elsewhere, is probably due largely to the need of escaping too intense illumination. I have advanced definite proofs of this in my paper on "The Vegetation of Tutuila Island." Such a habitat is also protected from the sweeping force of the waves; and in the littoral belt the hollows retain water and consequently protect the plants occupying them from too rapid desiccation. It seems proper to propose pholadophytes as a designation of such plants. The *Gelidium* association may then be described as a microphytic pholadophyte association of the cumatophyte formation of the littoral belt.

In sectioning the rock of the reef to determine the extent of the *Porolithon* as the reef-former, and in decalcifying portions of the surface to obtain a better knowledge of the pholadophyte association, I found that the surface layer of the reef-rock was everywhere bored through and through with boring organisms, especially by algae and worms. The depth penetrated by the boring algae is not more than 1 or 2 mm., but within that depth the species doing the boring were everywhere present. The largest and most conspicuous borer seemed to be a species of *Gomontia*, one of the green algae, or Chlorophyceae, but in no case did I find any reproductive bodies, and consequently the species is not certain. Associated with it, I found portions of a species of *Hyella*, one of the blue-green algae, or Myxophyceae. There were also a few other Chlorophyceae and Myxophyceae in the various preparations of decalcified material examined, giving evidence of a considerable and very much mixed boring association. This may be called, from the most conspicuous member, the *Gomontia* association. A similar boring association is to be found in most portions of the fringing reef of Tutuila Island. The plants which bore into the lime rock in this fashion may be designated as tranophytes or boring plants, and the same term may be used to designate the associations of which they are the characteristic members. The *Gomontia* association, then, is a microphytic tranophyte association of the cumatophyte formation of the littoral belt of Rose Atoll. The tranophyte

tween the closer packed masses of *Porolithon*, but its root-like attaching organs have clung so tightly to pieces of the *Porolithon* base as to bring them away with it when pulled from its habitat. Wilkes, as stated above, describes the sea turtles as feeding "upon the species of *fucus* that grows upon the reefs." If the observation is correct, it is probably this *Caulerpa* upon which they feed.

The long, stout, and branched rhizomes of *Caulerpa cupressoides* var. *mammillosa*, together with the frequent, stout, attaching root-like structures which cling so tightly to small projections that they tear these projections with them when the plant is removed from the reef, point to such an adaptation to the comparatively smooth, wave-washed surface of the reef as to enable the *Caulerpa* to occupy it on nearly equal footing with the *Porolithon*. The assimilatory filaments also are just such as might be expected from a cumatophyte. They are slender, relatively long as compared with their diameters, and dichotomously branched to form tufts, which collapse together like cords and make little resistance to the force of the waves. They are not flattened, but have the very slender axis of each cylindrical, with the projecting teeth arranged in three, or, as in the case of the Rose Atoll plants, in more than three vertical ranks. The stress of the waves, therefore, meets very little resistance and has little opportunity for tearing the plants from their anchorage. *Caulerpa cupressoides* var. *mammillosa* compares well with *C. lactevirens* of Ceylon, cited by Svedelius as an example of the surf-inhabiting *Caulerpa*s in its adaptation to its environment.

The assimilatory filaments of the *Caulerpa cupressoides* var. *mammillosa* are only one example of the erect or unattached portions of many cumatophytes. The bases of such plants are tightly attached to the substratum, as are those of all cumatophytes or surf plants. The unattached portions, whether cylindrical or flattened, are flexible, so that under the stress of the forward and backward movement of the surf they collapse together like a bunch of string or coarse cord, or even tapes, so that there is little purchase possible to tear them away. Such plants may be designated as chordophytes. The *Caulerpa* association may then be described as a macrophytic chordophyte association of the cumatophyte formation.

The two remaining littoral associations inhabiting the wave-swept rim of the reef are microphyte associations. The only visible one may be called the *Gelidium* association, since its most striking member is a minute species of *Gelidium*. The only material available is that growing on a small piece of rock, labeled by Doctor Mayor as having been taken from an "elevated flat-topped ridge fronting the sea on the east side of the entrance to Rose Atoll. * * * This ledge is about 1 foot above low-tide level and is submerged at high tide." The exposed surface of this sample of rock is finely pitted, and it is in these

associations, together with the similar associations of boring animals (worms, mollusks, etc.), are undoubted factors of very considerable importance in producing changes of more or less wide-reaching effect in the reef-surface and in the materials of which the reef is composed.

The sublittoral belt could not be explored, either on the side of the ocean or the lagoon, and consequently no description of its associations or formations may be even hinted at. Wilkes says: "A remarkable coral formation, like a submerged tree, 30 feet in diameter over its top, was found in the center of the lagoon, rising to the level of low water, and having all around it a depth of 6 fathoms" (Wilkes, 1845, p. 64). Wilkes does not show this reef-patch on his chart, but two small reef-patches are indicated in the lagoon on Rantzau's sketch (cf. Graeffe, 1873, plate 1) and on the present Chart No. 90 of the U. S. Hydrographic Office. They are also mentioned by Graeffe (*loc. cit.*, p. 32) in the text of his article.

ORIGIN OF THE LAND FLORA.

The origin of the land flora of Rose Islet does not seem to be very complicated. The *Pisonia* has a viscid fruit which clings to the feathers of sea-birds which roost and nest among the branches. The carriage of this species by this means, even over considerable stretches of ocean, is a possibility, and even under present conditions of bird wanderings is a very reasonable probability. *Pisonia* exists on the neighboring islands and probably in the form of the same species as on Rose Islet, although that point is not as yet so completely proven as is desirable. The *Boerhaavia* probably also has a viscid fruit, although none is present on the specimens from Rose Islet. The *Portulaca* has circumscissile capsules, with small and only slightly roughened seeds. The latter might readily be carried, in the same sticky mass with the fruits of the *Boerhaavia* and *Pisonia*, on the plumage of the sea-birds so abundant in both associations of the strand of Rose Islet. The *Portulaca* plants might readily be carried by the waves also, and so might those of the *Boerhaavia* and the *Pisonia*, but this seems less likely than the probable distribution by birds. Of the marine alga, both the *Porolithon* and the *Caulerpa* are widely distributed in the Pacific and Indian Oceans. The microphyte association is too little known either here or elsewhere to permit of discussion as to its relationships of origin or of source of supply.

LIST OF PLANTS OF ROSE ATOLL.

Class I. SPERMATOPHYTA.

Family 1. Palmae.

Cocos nucifera L. Spec. Pl., p. 1188, 1753.

The coconut palm exists on Rose Islet only as it has been planted. So far as may be determined, plantings were made about or somewhat before 1870 by the German promoters of a fishing station on the island, and these thrived sufficiently to produce fruit and in sufficient abundance to induce one of the natives employed in this work to remain after the project had been abandoned and to keep his family with him (cf. Graeffe, 1873, p. 32). It is inconceivable that a native family would remain in such an isolated and desolate island as Rose Islet unless there were at least a few coconut trees. According to the observations of Doctor Mayor, which he has so very kindly placed at my disposal, there were only 6 coconuts growing on Rose Islet when he landed there in June 1920; 5 of these had been planted in January 1920, on Governor Terhune's first visit to the island, and were still surviving. They were planted on the sandy breccia in front of the *Pisonia* grove on Rose Islet. The sixth coconut was a tree about 40 feet high, within the *Pisonia* grove and towards the lagoon. This may be a survival of the German planting, or possibly, but not so probably, one of those planted in 1902 by Governor Tilly. In June 1920, Governor Terhune planted 2 coconuts on Sandy Islet, although it seemed to those accompanying him that the chances of their persisting on the hot and coarse accumulations of wave-worn rubbish were decidedly negative. It is to be hoped that there may be some opportunity for following the fate of these plantings.

Family 2. Nyctaginaceae.

Pisonia grandis R. Br., Prodr. Fl. Nov. Holl, vol. 1, p. 422, 1810.

The *Pisonia* of Rose Islet is a tree reaching a height of about 80 feet and with a circumference of 25 feet and 7 inches at 3 feet above the ground. It has a smooth grayish bark, more or less blotched with darker color, and stout branches. The leaves are opposite even to the very tip, but do not occur in whorls even at the tips of the flowering branches. The mature leaves are large, up to 37 cm. in length and 15 cm. in width, are thin, soft in texture, smooth on both sides, and of only slightly different shades of green on the two surfaces. They are broadly ovate-lanceolate, narrowed at the tip and subcordate at the bases. The specimen collected was in full anthesis, with the stamens protruding. The panicle is short and broad and two of them (in the specimen brought back) are situated at the tip of the flowering branch. The peduncle is 3 to 4 cm. long, with several stout branches, nearly equal, at the top. The panicle is nearly semiglobular, about 4 cm. high and 6 cm. in diameter. The pedicels of the flowers are short, 2 to 3 mm. long, and the flowers are crowded. The peduncle, its branches, and the pedicels are all hairy, but the ultimate branches are more so, being decidedly densely short villose. The flowers are narrowly turbinate as to the perigone, about 7 mm. high, and slightly contracted just below the apex. The perigone is slightly furrowed with rows of minute projecting black glands (?) on the obtuse longitudinal ribs. The limb of the perigone is entire as to its margin, with about 5 points, and is shallow-funnel shaped. It is viscoso villose, with dark, stout glandular hairs. The stamens number 6, are very nearly equal, are hypogynous, and not connected at the base by any perceptible membrane. The pistil exists as a mere residual structure and has no appearance of being functional. The limb of the perigone had the appearance

while fresh of being honey-yellow in a very narrow and irregular ring. Our species certainly has the appearance of being dioecious and, consequently, comes nearest to the Australian species, *Pisonia grandis* R. Br., as to the description of Bentham (1870, p. 280), as well as to the illustrations of the same species by Endlicher (1838, plate 30). The differences between the plant of Rose Islet and the Australian are slight, but possibly important.

The synonymy of *Pisonia grandis* is very much entangled. In the Flora Vitensis (p. 195), Seemann places it as a synonym under *P. inermis* Forst. and states that the Australian and the Tahitian plants are identical. Seemann, however, cites the *Pisonia procera* Bertero, as illustrated on plate 87 of Delessert's Icones. This plant is certainly not the Australian plant illustrated by Endlicher under *P. grandis*. The Hawaiian plant illustrated and described by Rock (1913, p. 147, plate 52), under which *P. grandis* R. Br. appears as a synonym, is certainly not the *P. grandis* of Endlicher's Icones. In his account of Palmyra Island (1916, p. 59), Rock uses the name *Pisonia grandis* as an independent name and cites the figure of Endlicher in support of his reference. Otherwise, Rock does not append the accustomed synonymy, but refers under his *P. grandis* only two East Indian species, *P. alba* Span. and *P. sylvestris* T. B. The second is unknown to me, but the first can not be the species as Endlicher figured it, since it is described as having the calyx reflexed. Through the kindness of A. B. Rendle, I have been able to obtain a photograph of the type of *Pisonia grandis* in the herbarium of the British Museum of Natural History, and although the type is a pistillate plant it seems to me to show the same essential characters as the Rose Islet species (cf. plate 33, fig. A, and plate 35, fig. a).

The *Pisonia* trees must have existed on Rose Islet long before its discovery by Freycinet (1819), since he observed that the island was well wooded and has given, in his sketch of the island from a distance, a picture of two separate masses of trees where only one is now to be seen. Owing to the fact that Freycinet did not land on Rose Islet and that the sketch represents only a distant view, it is impossible to discuss with any certainty the changes which may have taken place in the *Pisonia* grove in the last century. Mayor found only a single continuous grove, but one which was highest at its southern end. If there were two groves, they have become united, or possibly one may have been destroyed by a hurricane, leaving only the more southern one surviving. At any rate, Wilkes found but one and there was most certainly only one grove, and that a very dense one, at the time of Mayor's visit in June 1920. On the Palmyra Islands, Rock (1916) found *Pisonia grandis* an abundant tree and of large size, reaching a height of 80 feet and a circumference of 18 feet (Rock, 1916, p. 50, plates ix and xix). On Eastern Islet of the Palmyra Group it was not mixed with coconuts or with any other tree except a few of *Tournefortia argentea*, but on the other islets it was more or less common and mixed with other trees.

Pisonia grandis forms a pure association, as has already been described, occupying the southern portion of Rose Islet. The association is so dense that there is nothing growing under the trees, with the exception of a solitary coconut tree. As to whether these are the same trees, or some of them, that were seen by Freycinet in 1819 is a question not answerable with any certainty at the present time. Presumably, the trees are very old, for some of them were estimated by Mayor to be about 80 feet high and were 25 feet and 7 inches at a height of 3 feet above the ground. Wilkes says that they were 50 feet high in 1839 and his figures may be taken as accurate, although his reference is simply incidental. On Chart 90 of the U. S. Hydrographic Office the height of Rose Island, however, is given as 33 feet. The wood of this *Pisonia* is very brittle and large branches may readily be broken across. The Nyctaginaceae, including such species of *Pisonia* as have been investigated, show anomalous secondary thickening of the stem (cf. De Bary, 1884, p. 590, Solleder, 1908, pp. 645-649, and later works), since they

develop an extrafascicular ring of cambium which remains permanently active. This may have to do with the lack of toughness of the wood in *Pisonia grandis*. It is interesting to note that Rock (1916, p. 50) says that the tallest tree of the *Pisonia grandis* of the Palmyra Islands measured 80 feet in height and 18 feet in circumference.

Rock (1913), speaking of *Pisonia umbellifera* of the Hawaiian Islands, says that logs collected for wood specimens shriveled to such an extent that it was impossible to recognize them afterwards, resembling the stems of shriveled banana plants. * * * Trunks of a foot in diameter can be felled with one stroke of the axe." Again, speaking of the Hawaiian *P. inermis*, Rock says (loc. cit., p. 149): "The fruits of this, as well as other species, were used by the natives for catching birds." The catching of birds is also a habit of the New Zealand species and is probably true of all the species with viscous fruits. Associated with this character is the possibility of dispersal through bird agency and with the fruits of the *Pisonias*, other seeds, such as those of the *Boerhaavia* and the *Portulaca* of Rose Islet; for, while the sea birds nest in the trees of *Pisonia grandis*, both on Rose Islet and the islets of Palmyra Island, they also rest on the ground among the *Boerhaavia tetrandra* and what other species may grow there, and may readily add the small seeds of the ground species to the viscous fruits of *Pisonia* already attached to their plumage, to be shed possibly after a flight of more or less extended radius.

Boerhaavia tetrandra Forst., Prodr., p. 2, 1786. Plate 33, fig. B.

This plant, as represented by two specimens, is a prostrate, somewhat woody herb with a stout, rather thick, descending woody root. Several stems arise from the root and creep over the ground. They are 3 to 4 mm. thick at the point of origin, reddish-purple in color, pubescent in the younger portions, and swollen at the nodes. They may reach a length of upwards of a meter. The leaves are opposite, thick, coriaceous, from nearly orbicular to broadly ovate in shape, with the tip truncate or slightly reflexed and with the base varying from rounded or ovate to slightly subcordate. The under surface is lighter colored than the upper and both are smooth. The petiole is slender and about 0.5 to 1 cm. in length. The veins are obscure above, but below they are well marked as to a few of the main divisions. The panicles are always axillary and loose. There is a peduncle, slender and at least very nearly smooth, 5 to 6 cm. long, bearing up to 3, possibly more, branches at its summit. The branches of the peduncle bear, in turn, 1 to 3 flowers with slender pedicels, up to 5 mm. long (about 3 to 4 mm. long in the unopened bud). The perigone is distinctly swollen below and constricted below the limb, which, according to Doctor Mayor, is reddish-purple. There were no expanded flowers on the specimen as I received it, nor the fruits. The stamens number 4, or occasionally 5. The pistil is slender in the unopened bud and equals the stamens. The stigma is capitate.

It seems perfectly safe to refer this plant to the species of Forster, since in all its details it corresponds well with the description in the manuscript notes of Forster as given by Guillemain (1837, p. 190). It also corresponds to the fragmentary type in the Herbarium of British Museum (cf. plate 34, fig. A) and Forster's drawing of the species preserved at the same institution (cf. plate 34, fig. B), for photographs of which I am again indebted to the friendly services of A. B. Rendle. It is a species inhabiting rocky soil in maritime regions, enduring the most unfavorable conditions possible, both as to scantiness of soil, lack of water, and extreme heat. It ranges from the Gambier Group to the Marshall and the Hawaiian Islands. The type locality is Huanbeine of the Society Group. The only specimen I have been able to examine is one collected at the Palmyra Islands by Rock (1916, p. 50, under No. 10275) and preserved in the Gray Herbarium. It is perfectly matched by the Rose Islet specimen. It is likely that the fruiting perigone possess adhesive structure, adapting it to bird carriage.

Family 3. Portulacaceae.

Portulaca lutea Soland., in Forster, De Pl. Esc., p. 72, 1786. Pl. 34, fig. c; pl. 35, fig. A, and fig. 54.

Stem stout, up to 50 or 60 cm. high, purplish, succulent, but of firmer texture than those of *P. oleracea*, erect or ascending, up to nearly 2 cm. in diameter at the base, very much branched, branches alternate; leaves alternate (cf. fig. 54, 1), the terminal in fours, distinctly petiolate, cuneate-obovate, rounded at the apex, thick and fleshy (cf. fig. 54, 2), with short and inconspicuous clusters of dark hairs in the axils. The flowers are terminal (cf. fig. 54, 4), and are single or 2 or 3 together, with 4 leaves at their bases, 2 of which are short, thick, mucronate, and closely applied to the calyx. Calyx, at first, uncipitate (cf. fig. 54, 3), of two sepals, each obtusely carinate and with membranaceous margins. Corolla yellow; petals 5, ovate oblong, attenuate at the base, deeply emarginate at the tip and up

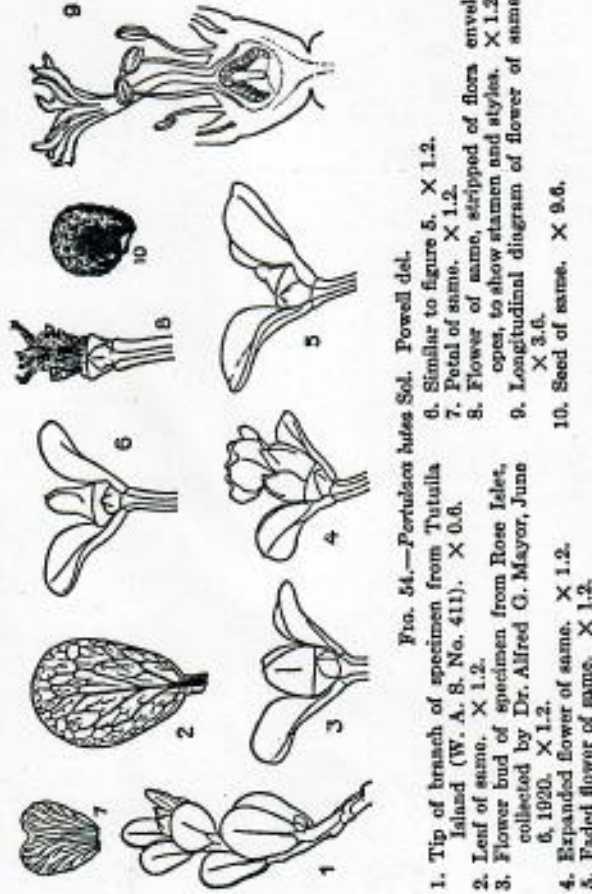


FIG. 54.—*Portulaca lutea* Sol. Powell del.

1. Tip of branch of specimen from Tutuila Island (W. A. S. No. 411). X 0.6.
2. Leaf of same. X 1.2.
3. Flower bud of specimen from Rose Islet, collected by Dr. Alfred G. Mayor, June 6, 1920. X 1.2.
4. Expanded flower of same. X 1.2.
5. Padded flower of same. X 1.2.
6. Flower of same, scrippled of floras envelopes, to show stamen and styles. X 1.2.
7. Petal of same. X 1.2.
8. Flower of same, scrippled of floras envelopes, to show stamen and styles. X 1.2.
9. Longitudinal diagram of flower of same. X 3.6.
10. Seed of same. X 9.6.

to twice as long as the sepals (cf. fig. 54, 7); stamens numerous (cf. fig. 54, 8); styles about 6 or 7 (cf. figs. 54, 8, 9); seeds black, minutely stellately rugulose (cf. fig. 54, 10). While this plant has its nearest relative in *Portulaca oleracea* L., so common and so widespread as a weed in both temperate and in tropical countries, yet in its aspect and in several morphological details it is so different as to demand recognition as a distinct species. It has, however, seldom been collected, or, rather, been seldom prepared for the herbarium, probably on account of its fleshy character rendering the preparation of dried specimens difficult and most unsatisfactory (cf. plate 35, fig. A). Its claims to distinctness from *P. oleracea* rest on the following particular characters: the erect, almost suffrutescent habit; the distinct petioled leaves; the short, dark-colored hairs in the axils of the leaves; the heavy, mucronate pair of bracts inclosing the lower part of the calyx; the much longer and deeply emarginate petals; the numerous (35 and more in number) stamens; and the stellately rugulose seeds. Most of these characters are emphasized by Solander for his species in his manuscript (as transcribed by Seemann, in the Flora Vitiensis, p. 9), but not given in full by Forster, either in "De plantis esculentis" (1786c) or in the "Prodromus" (1786).

Portulaca lutea has been generally misunderstood. The species is described in full by Solander in his manuscript and was made the subject of a highly finished drawing by Parkinson (cf. plate 34, fig. c), both of which are preserved in the British Museum, but no specimen seems to have been saved. This is given on the authority of Seemann (1865, p. 9), who transcribes the description of Solander and argues for the recognition of the independence of the species. He did not find it in the Fiji Islands. In 1831, Chamisso (p. 566) gives a description of an erect, shrubby, yellow-flowered species of *Portulaca* from the island of Oahu which seems most likely to be this species. De Candolle (1826, p. 355) cites the species as "*P. flava* Forst.," evidently a mistake in transliteration, and appends the statement that it is, perhaps, not distinct from *P. oleracea*.

Gray, in the Botany of the Wilkes Expedition (1854, p. 133), lists a number of specimens from different archipelagos under this species which he places as a synonym of *P. oleracea*, although he says that Pickering, the botanist accompanying the expedition, assigned them to *P. lutea*. Among the archipelagos of its habitat, he gives the "Navigator Islands," and this reference is probably to the "Portulacae" which Dana, as mentioned previously, states that Pickering observed at Rose Islet. In the herbarium of the New York Botanical Garden there is a specimen agreeing with the Mayor specimen from Rose Islet, labeled "*lutea* Forst.," and as coming from "Navigator Islands." This is probably one of Pickering's specimens from Rose Islet. There is a specimen of the same plant in the Gray Herbarium, collected by "Capt. Davis" on Jarvis Island, which is clearly *P. lutea*. Hillebrand, in his "Flora of the Hawaiian Islands" (1888, p. 39), says: "In dry, rocky situations near the sea (Kaikua and Kaena, Oahu) a very similar plant [i. e., to *Portulaca oleracea*] is found with a thick lignescens stem, evidently a perennial, of which no plant has been preserved in my herbarium, but I suspect that it is the *P. lutea* Sol., spoken of in the Flora Vitiensis, p. 9." I have collected the same plant on a dry lava-flow on Tutuila Island. From these and from the reported occurrence by Gray, it seems that *Portulaca lutea* is widely distributed among the Pacific archipelagos, from the Paumotu in the south, through the Society, Samoan, and Phoenix Groups, to the Hawaiian and the Marshall Islands to the north. Drake del Castillo (1893, p. 9) places "*Portulaca lutea* Forst., Prodr., n. 520" as a synonym under *Talinum patens*. This reference must certainly be an oversight of some sort.

Class 2. PHYCOPHYTA.

Subclass 1. RHODOPHYCEAE.

Family 4. Corallinaceae.

Porolithon craspedium f. *mayorii* M. A. Howe. Forma nova. Plate 36, figs. 1, 2.

Thallus confluentibus in sericeis latis longisque ad undas promoventis aggregatis parallelis, singulo pulvinatis 15-20 cm. latis et 8-10 cm. altis; ramis e centro radiantibus, complanatis (2:1 aut 1.5:1) sut subteretibus, plus minusve libere anastomosantibus, erecto-patentibus, apicibus rotundo-obtusis aut trifurcatione depresso-concavis molariformibusque, plerumque in diametro longiori 3-9 mm.; hypothallo medullari aliquando stratis cellulis longioribus brevioribusque alternantibus compositis, cellulis plerumque 10-25 μ x 5-13 μ ; cellulis pericriballicis plerumque 12-16 μ x 5-12 μ ; sectionibus longitudinalibus radio-verticalibusve plerumque series numerosas cellulis dilatatis 4-7 compositas ostendentibus, his plerumque 28-38 μ x 13-20 μ ; conceptaculis (infrequentis vacuisque 150-180 μ diam., ultimo obductis et forma *Mayorii* a forma typica species ramis minus erectis, minus confertis et plus divergentibus, etiam apicibus plus concavis molariformibusque praecipue differens.

The type specimens are divided between the herbaria of the New York Botanical Garden and the University of California (W. A. S., No. 1050 I).

The specimens brought back from the Rose Atoll trip by Doctor Alfred G. Mayor lack the prostrate base which probably exists in the earlier periods of the life of the plant and which is described by Foslie (1899, p. 28) as seen in the type specimen of the species from Onoatua, one of the Gilbert Archipelago, where it is said to be the sole reef-forming organism. The clumps collected at Rose Atoll are made up of radiately arranged, stout branch-systems, closely placed together in a pulvinate, yet stony, mass which resembles in all except texture some of the more remarkable and well-developed cushion plants of the genera *Raoulia*, *Azorella*, and the like. The individual branches are terete, or nearly so, and are from 3 to 9 mm. in diameter. They fork at about every centimeter of their height clear to their tips, which are crowded together so that the spaces between their almost level tops are very small. Through the radiate branching the clumps of this species tend to form curved surfaces, but by the crowding together of the individual plants this is largely prevented on the reef-rim of Rose Atoll. The angle of the dichotomous branching is closely approximate to 45°. The color of the living plant is a lively rose pink, but it fades more or less after drying.

The first description of the type of the species was by Foslie in 1900 (p. 26), under the name of *Lithophyllum craspedium*. The type was collected at Onoatua or Clark Island, an atoll of the Gilbert Group, and is Finckh, No. A 27 in the British Museum of Natural History. In 1900 (cf. 1900 a, pp. 7, 8), Foslie described this type as *f. compressa* and referred to the same form and to what he describes as *f. abbreviata*, several specimens from Funafuti of the Ellice Group, which were collected by the Funafuti Expeditions which made the famous borings through the reef of this island in 1896-1898. These forms of *L. craspedium* are credited by Finck and his fellow workers with being important reef-formers both in the Ellice and in the Gilbert Groups. Foslie, later, referred his *Lithophyllum craspedium* and its forms variously. In 1901 (cf. Foslie, 1901, p. 10), he added a new form, *f. subtilis*, from the lagoon side of one of the islands of the Funafuti Atoll, to be distinguished from the other forms by its slender branches. In 1903, he (pp. 462, 468, 467) noted the occurrence of *f. abbreviata* and *compressa* at the Maldives and the Laccadives in the Indian Ocean, figured them (loc. cit., plate xxv, fig. 1, 2), and added information as to their work as reef-builders. In some atolls of the Maldives this species seems to be predominant. In 1906 (pp. 24, 25) he proposed a new subgenus, *Porolithon*, under *Lithophyllum*, and assigned *Lithophyllum (Porolithon) craspedium* as a species to it. In 1907 (pp. 178, 179, 181, 182, 189, 190), he extended the distribution of this species to the Chagos Islands and to Coetivy, both in the Indian Ocean. In both, *L. craspedium* is said to be an important reef-builder. Finally, in 1909 (p. 57), Foslie erected *Porolithon* into an independent genus and created the binomial *Porolithon craspedium*. Lemoine (1911, pp. 163-166, fig. 92-94, plate 4, fig. 2) has also fully described this species and particularly a form of it, from "Makaros" in Tahiti, which had been determined by Foslie (I suspect that this locality is in the Paumotu Islands and is an atoll).

The microscopic structure of *Porolithon craspedium f. mayorii* (cf. plate 37, figs. A, B) agrees with that described for the species. The curved rows of cells shown in longitudinal section are alternately longer and shorter with considerable regularity, although at times there may be 2 or 3 rows of long cells alternating with a single row of short cells. The short cells are about 7 μ to 14 μ high by 7 μ to 11 μ wide and the long cells about 10 μ to 35 μ high by 5 μ to 13 μ wide. Scattered regularly through the tissues are groups of cells of a larger size and somewhat different shape from the regular longer or shorter cells of the bulk of the frond. These groups are characteristic of the species of the genus *Porolithon*. In longitudinal section these groups of cells are transverse rows of from 4 to 9 in number and with their long axes parallel to the long axis of the branch. In transverse

section, the groups form clusters of 12 to 30 subquadrate or slightly polygonal cells, arranged usually in oblongs of about 3 cells deep in the shorter diameter of the group. These large cells vary from 26 μ to 38 μ in height and from 13 μ to 20 μ in width. Their function does not seem to have been at all clearly surmised as yet. We have seen few sporangial conceptacles in the Rose Atoll specimens, but Foslie describes them in the species as "shown on the surfaces as minute convex knobs about 150 μ in diameter which soon become decorticated." The cavity of the sporangial conceptacle is described as 150 to 180 μ in diameter. No sporangia have been seen and no cystocarpic or antherial conceptacles have been found in any of the forms of the species.

Porolithon craspedium f. mayorii occurs, as has been described above, as an extensive, massive lithakophyte (stony) association of the cumatophyte, or surf, formation of the littoral belt of the reef-rim of Rose Atoll and has been almost the sole agent in forming the solid and compact reef of this atoll. As has been detailed above, the species, of which this is one of the forms, makes up the sole, or the principal, member of similar associations in the similar formations in atolls of the Ellice (Funafuti Island) and Gilbert Groups of the western Pacific Ocean at Makaros, Tahiti (?), in the Central Pacific, and the atolls of the Maldives, Laccadive, and Chagos Groups, as well as of Coetivy Island, of the northwestern Indian Ocean. I did not find a trace of this species on any of the fringing reefs of Tutuila, and Stanley Gardner, as quoted by Foslie (1907, p. 180), states that none of the *Lithothamnium* enters into the composition of the fringing reefs found about the granite islands of the Seychelles Archipelago. An examination of ground sections of the solid reef-rock of the atoll-rim of Rose Atoll shows very clearly the well-nigh complete monopoly of its substance by the *Porolithon*. As has been mentioned previously, the living *Porolithon* forms a sort of veneer on the surface of the reef-rim and in certain portions, at least, occurs in the form of windrows parallel to the wave-fronts. These windrows are about 6 inches high, 6 inches to several feet wide, and alternate with spaces bare of the *Porolithon* or on which it grows only sparsely, the spaces being of the same general width and length as the windrows.

The following analyses of *Porolithon* and, for comparison, also of other Corallinaceae, made by C. B. Lipman, are given here with Professor Lipman's consent:

1. *Lithothamnium proboscideum* Foslie, dredged off Monterey, California.
2. *Porolithon craspedium f. mayorii* M. A. Howe, from Rose Atoll.
3. *Lithophyllum kaiserii* (Heydr.) Heydr., from Aua Reef, Tutuila.
4. The same species from the same locality.
5. *Gemolithon frutescens* Foslie, from Nuuli Reef, Tutuila.
6. *Amphiroa foliacea*, from Aua Reef, Tutuila.
7. *Porolithon onkodes* (Heydr.) Foslie, from the reef rim at Fagnala, Tutuila.
8. *Lithophyllum kaiserii* (Heydr.) Heydr., from Fagsala reef, Tutuila.

Analyses of *Lithothamnium*.

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|--------------------------------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|
| H ₂ O at 100° C. | p. d. 1.038 | p. d. 1.102 | p. d. 1.226 | p. d. 0.760 | p. d. 0.94 | p. d. 1.50 | p. d. 1.21 | p. d. 1.07 |
| Loss on ignition. | 41.27 | 45.848 | 48.574 | 47.92 | 47.91 | 49.37 | 46.08 | 48.02 |
| SiO ₂ | 8.38 | 0.28 | 0.18 | 0.16 | 0.22 | 0.32 | 0.06 | 0.02 |
| Fe ₂ O ₃ | 0.64 | ..... | ..... | ..... | ..... | 0.54 | ..... | ..... |
| Al ₂ O ₃ | 0.905 | ..... | 0.296 | ..... | ..... | ..... | 0.22 | ..... |
| P ₂ O ₅ | 0.305 | 0.383 | 0.383 | 0.485 | 0.46 | 0.35 | 0.25 | 0.46 |
| CaO..... | 40.31 | 42.22 | 40.28 | 41.708 | 41.70 | 39.02 | 43.78 | 40.76 |
| MgO..... | 3.888 | 8.0 | 7.848 | 7.288 | 7.28 | 7.53 | 6.55 | 7.09 |
| SO ₃ | 0.974 | 0.816 | 0.943 | 0.905 | 0.91 | 1.08 | 0.87 | 0.78 |
| Na ₂ O..... | 2.78 | 2.06 | 2.936 | 1.918 | 1.57 | ..... | 1.42 | 1.1 |
| K ₂ O..... | 0.349 | 0.25 | 0.498 | 0.871 | 0.38 | ..... | 0.45 | 0.24 |
| | 100.829 | 100.969 | 102.164 | 102.114 | 101.42 | 99.817 | 100.99 | 100.14 |

*Not enough sample for analysis.

Family 5. Rhodomelaceae.

Lophosiphonia sp. 1.

In the smaller hollows of the reef-rim there are certain minute species constituting a microphyte association of what it has seemed best to distinguish, as I have above, as a "snuggling," or pholadophyte, association. Among the microphytes, which are probably mostly depauperate forms of larger species better developed under more favorable conditions, is a species of *Lophosiphonia* of which I have found no fruiting plants of any sort. Like all cumatophytes, or surf plants, it has a very effective manner of attachment. The primary filament is prostrate, cylindrical, and attached at intervals to the substratum by closely placed and very short, unicellular rhizoidal filaments. The primary filament has 4 pericentral cells and is not corticated. The erect filaments are short, unbranched, less than a millimeter high, with 4 pericentral cells, and gradually tapering toward the apex. While good tips are rare, they seem to be piliferous. It seems to be a species of *Lophosiphonia*, more or less nearly related to, but not at all certainly identical with, *L. prostrata* (Harv.) Falk. from western Australia. It is impossible, however, to be certain as to the species of the Rose Atoll plant until better developed and fruiting plants are available for study.

Lophosiphonia sp. 2.

While the species just mentioned and the *Gelidium* to be mentioned later form the bulk of the pholadophyte flora visible to the unaided vision, or even to the vision as reinforced with the hand lens, there are scanty traces of another species of *Lophosiphonia* in the preparations studied. This is a somewhat stouter species, with 5 to 6 pericentral cells in surface view. It probably comes near to *L. calothrix* (Harv.) De Toni, but is probably not the *Polyisiphonia calothrix* credited to the Polynesian Islands by different writers. The specimens are sterile and too fragmentary to confirm any conclusions as to exact identity upon them.

Laurencia sp.

One or two very small plants of *Laurencia* were found among the pholadophyte flora, but the species are not to be surmised.

Family 6. Gelidiaceae.

Gelidium sp.

One of the most abundant plants in the intertangled mass of pholadophytes on the reef-rim of Rose Atoll is a small species of *Gelidium*. It is either a dwarf or a depauperate species, scarcely over a millimeter in height and with a strong creeping cylindrical or slightly flattened rhizome. The erect branches are terete, never flattened nor branched, mostly tapering gradually to an almost pointed tip, but some are less tapering and more robust. The erect branches show the stress and strain of their cumatophyte habitat in that they all show several places, more or less, where the tips have been whipped off and regeneration has taken place. I have seen only one tip-bearing tetrasporangia and that was soon lost. The tetrasporangia, in that case, were borne in a short and broadly ovoid terminal and abruptly swollen portion of the erect branches. The species appears to be very near to *Acrocarpus capitatus* Kuetzing (Tab. Phycol., vol. 18, p. 12, plate 35 a, b, c, 1868), whose type locality is New Caledonia. The shape of the fruiting portion, however, is more like that represented for *A. ramellosus* Kuetzing (loc. cit., p. 12, plate 34 d to g), but the filaments in the Rose Atoll plant show no branching. It is not identical with *Gelidium acrocarpum* Harv. from Tonga.

Subclass 2. CHLOROPHYCEAE.

Family 7. Caulerpaceae.

Caulerpa cupressoides (Vahl) Ag. var. *mammillosa* (Mont.) Weber-van Bosse, Monogr. Caulerp., p. 332, pl. 28, figs. 2-7, 1898.

The specimens collected on the reef-rim at Rose Atoll by Doctor Mayor are extremely well developed plants, seemingly having grown under circumstances very favorable to their existence. The rhizomes in the specimens are about 2 to 3 mm.

thick, smooth, and repeat on the smoother portion of the reef-rim, between the denser growths of *Porolithon*. The rhizomes are 30 cm. long and probably even much more than that, branching occasionally and vaguely. They are attached by frequent stout rhizoidal branches, which branch repeatedly and with decreasing coarseness, until the final rhizoidal fibers actually penetrate the rock, or in reality the *Porolithon* composing it, and attach the plant so firmly that fragments of *Porolithon*, often of fair size, come away with the attachments when the *Caulerpa* is pulled from its growing place. The erect branches occur along the upper surface of the rhizome at intervals of from 1 to 4 cm., as a rule, and are 3 to 5 cm. high. The erect branches are at first simple and cylindrical, but a short way from the base they give off branchlets and continue to do so in a corymbiform manner until their full growth is accomplished. The branchlets are beset with pyramidal, sharp teeth, arranged in fours and with adjacent whorls alternating, making a very distinctly polystichous arrangement. The color is noted as "bright green."

I am indebted to Madame Weber-van Bosse for the name of the *Caulerpa* of Rose Atoll,

and this form, as well as the other forms, of the species are abundant over the Pacific and Indian Oceans. The plant itself belongs to the rock-inhabiting, cumatophyte group of the *Caulerpa* species (cf. Swedelius, 1906, p. 194, 1906a, p. 85, and Boergesen, 1907, p. 346), its strong rhizomes with their effective attachment to the stony *Porolithon* components of the reef-rim and the branches of branchlets of the erect portions collapsing like a tuft of strings, making it a true chordophyte, capable of resisting strenuous stresses and strains of the advancing and receding waves.

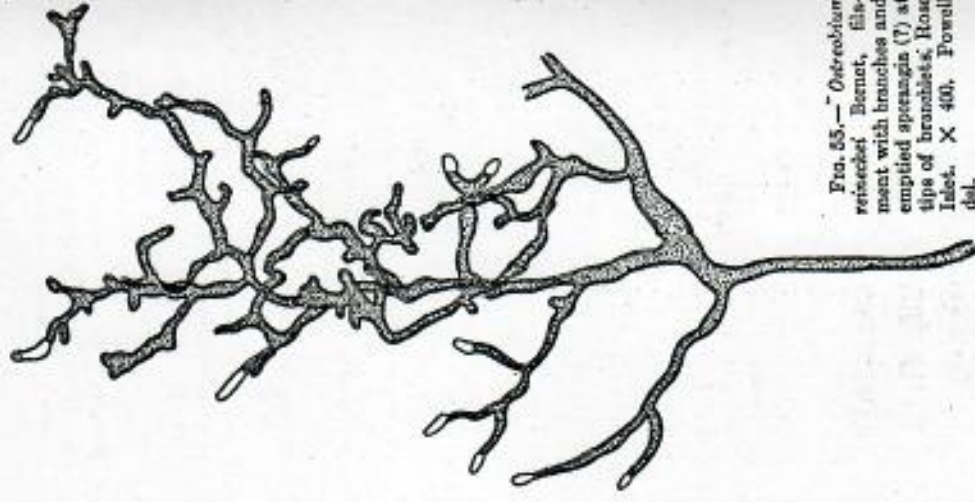


FIG. 55.—*Ostreobium* *reischetii* Bernot, filament with branches and emptied sporangia (?) at tips of branchlets, Rose Atoll. X 400. Powell del.

Family 8. Phyllosiphonaceae.

Ostreobium reinckeii Bornet, Engler's Jahrb., vol. 23, p. 269, 1896.
Fig. 55.

This species is one of the common tranophytes, or boring algae, found just below the surface in old *Porolithon* and in a similar situation in the rock of the reef-rim. It is a very readily recognizable plant in the decalcified material. The main filament is about 4 to 8 μ , even to 16 μ in diameter in swollen places, its primary branches about 4 μ in diameter, and the curious and very distinctive "network" terminating each secondary branch, all in one plane, is made up of very slender branchlets indeed (about 2 μ in diameter). The "network" in this species, however, is not a true network, since the recurved ultimate branchlets do not unite but form a flattened design similar to a network, but without any anastomoses. This is the chief distinction between *Ostreobium reinckeii* Bornet and the type species of the genus *O. quekettii* Bornet et Flahault. The cell membrane is thick in *O. reinckeii*, thicker than in *O. quekettii*, and the two species agree in that there are no transverse partitions in the vegetative filaments. I have been able to find "sporangia" in the Rose Atoll specimens (cf. fig. 55). The type of *Ostreobium reinckeii* is Samoan, probably from the island of Upolu, where it infests corals. I have found it abundant in various constituents of the fringing reefs of Tutuila Island, as well as in the reef-rim of Rose Atoll.

Family 9. Valoniaceae.

Microdictyon umbilicatum (Velly) Zanardini?, Scelta Fic. Nuov., Dec. III, p. 461, pl. 19, 1862.

Only a couple of depauperate specimens were found as pholadophytes, i. e., snuggling in the hollows among the branches of the *Porolithon*. These fragments of plants clearly indicate the genus, and since the segments are from about 60 to 150 microns in diameter, it seems best to refer them to the common Hawaiian species with proper doubt.

Family 10. Chaetophoraceae.

Gomontia sp.?

Among the tranophytes, or boring associations, sterile filaments of a *Gomontia* are very common, but so far I have been unable to obtain any sporangia and I do not feel that it is desirable to assign the plants definitely to any species. They are always mixed with species of *Ostreobium*, *Plectonema*, and other microphytic tranophytes.

Subclass 3. MYXOPHYCEAE.

Family 11. Scytonemataceae.

Microchaete vitensis Askenasy, in Born. et Flah. Mem. Soc. Cherbourg, vol. 25, p. 214, 1885?

There occur scattered, especially in No. 1056, occasional or small groups of filaments which are puzzling, but which have basal heterocysts and none of which ends in a hair or is decidedly attenuate above. In general they agree with the descriptions of *Microchaete vitensis*, originally described from the Fiji Islands, but later credited also to various islands of the Pacific Ocean. The type of the species, collected at Matuku, one of the Fiji Archipelago, forms layers which are short, lax, and tomentose. The Rose Atoll specimens, as stated above, do not

form layers in the samples available, but the habitat is not a suitable one for such development. The cells in our plants are mostly shorter than the descriptions of *M. vitensis* demand. This is a character relating our species with *M. grisea* Thuret, which may not be very distinct from the Pacific Ocean species.

Family 12. Oscillatoriaceae.

Microcoleus tenerimus Gomont?, Monogr. Oscill., p. 93, pl. 14, figs. 9-11, 1893.

There occur in the mixtures of pholadophytes obtained from the sample of reef-rock (No. 1056) scattering filaments of a very slender *Microcoleus* which agree very well with the plants referred to *M. tenerimus* from the western coast of North America. The Rose Atoll specimens are intermingled with other algae such an extent that they do not form any distinct layer of their own, but the filaments are simple or slightly branched, with ample hyaline sheaths. The trichomes are few to many in each sheath, are about 1.5 μ in diameter, with the dissepiments obscured so as to make the determination of the length of the cells very difficult. They seem, however, to be somewhat longer than they are wide. Terminal cells of characteristic form are also difficult to find, but a few were seen which seemed to be long and acutely conical. The North American plant inhabits shallow waters in salt marshes where insolation raises the temperature of the water to tropical limits.

Plectonema terebrans Bornet et Flahault, Sur les Alg. Perf., p. 18, pl. 10, figs. 5, 6, 1889.

The filaments of this species are commonly intermingled with those of the other tranophytes in the collections of reef-rock from Rose Atoll. There seems to be little, if any, doubt of the identity of the plant. In all characters of dimensions of cells, branching, and the presence of the two refractive granules at each dissepiment, the Rose Atoll plant agrees with the descriptions and figures of Bornet and Flahault (1889, p. 18, plate x, figs. 5, 6). The best material was obtained from Nos. 1056 and from fragments of dead *Porolithon* attached to No. 1057.

Spirulina subsalsa Oersted?, Naturh. Tidskr., p. 17, pl. 7, fig. 4, 1817.

A few filaments were noticed in a mixture of microscopic algae on the fragments of *Porolithon* attached to the rooting portions of the *Caulerpa* in No. 1057. These filaments are very slender and tightly coiled and resemble most closely those usually placed under *Spirulina subsalsa* f. *oceanica* (Crouan) Gomont, but they are even more slender than the filaments of that form. In the absence of sufficient material for a thorough study, it has seemed best to call attention to their presence and to the doubt attending any positive specific determination.

Family 13. Chamaesiphonaceae.

Hyella caespitosa Bornet et Flahault?, Sur les Alg. Perf., p. 19, pl. 10, figs. 7, 8, pl. 11, 1889. Fig. 56.

This tranophyte is frequent and varied in form and condition in the *Porolithon* rock in both numbers 1056 and 1057. The plants obtained are certainly very close to the type of the species to which they are referred above, but the lack of typical, or at least matured, gonidia prevents a determination of a completely satisfactory nature. There have not been found any filaments in which there was more than one trichome in a sheath, such as are commonly found in typical forms of the species. There occur, in one specimen (from No. 1057) enlarged cells with dense contents and thick lamellose walls, arranged in a series (cf. fig. 56) which are very similar to those figured by Bornet and Flahault (loc. cit., plate XI, fig. 4)

and which are probably resting cells, but no gonidia are formed in any of them. In dimensions, the Rose Atoll plant resembles closely the type of the species. Possibly this is another case of a plant occurring in shallow warmer waters, specially influenced as to temperature by insolation, in temperature and even in frigid zones, and occurring also in tropical waters.

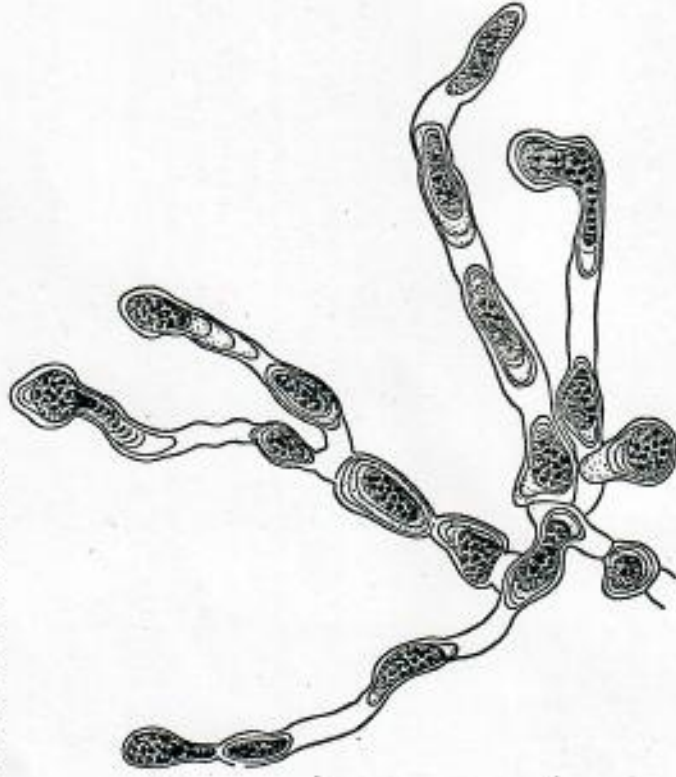


FIG. 56.—*Hyella coarctata* Bornet et Flahault?, filaments with cyst-like structures, Rose Islet. X 400. Powell del.

Pleurocapsa mayorii sp. nov. FIG. 57.

Strato tenui, effuso, pulverulento, atro-coerulescenti, irregulariter et minute granuloso, in superficie interiore conchae vestustatae *Tridacnae* insidente; cellulis singulis globosis, sine tegumentis usque ad 2 μ diam., dilute coeruleo-viridibus, cum tegumentis usque ad 4-4.5 μ diam.; tegumentis hyalinis usque ad dilute, aut raro plus minusve saturate, fuscis, homogoneis; colonis 2-4-8-16-32-64 cellulis compositis, globosis aut oblongis, cellulis regulariter in quadris aut octonis ordinatis et quibusque tegumentis propriis suis indutis; colonis ramoso botryoideo aggregatis gelina communi inclusis; gonidiangis globosis, 20 μ diam., gonidiis usque ad 1 μ diam., globosis, tegumentis propriis destitutis.

Doctor Mayor noticed that the inner surface of one of the *Tridacna* shells, embedded among the breccia on Rose Islet about 7 feet above high-tide level, was covered with a dark deep bluish growth of *Myrophycena*. On examination, it proves to be due to a *Pleurocapsa* and one closely related to the *Microcystis densa* Meneghini, which has been referred to *Gloecapsa* by Kuetzing. A comparison with the type of Meneghini's species shows that the Rose Islet plant, while closely related, is specifically distinct. The Rose Islet plant is paler in color of cells and membranes, with cells and colonies of only about half the size of Meneghini's species. It does not seem to form such definite orbicular thick crusts as those described for *Microcystis densa*. I take great pleasure in naming this new species for Doctor Alfred Goldsborough Mayor, its discoverer.

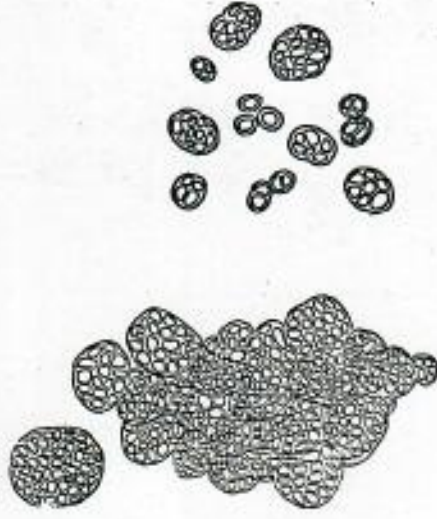
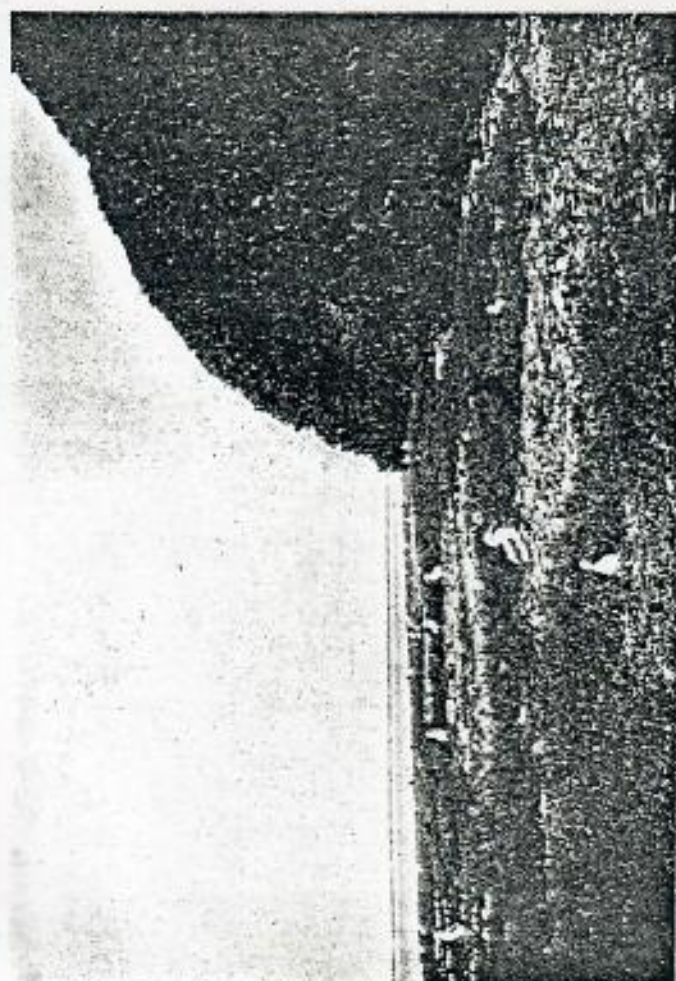


FIG. 57.—*Pleurocapsa mayorii* sp. nov., cells, colonies, and gonidiangia (uppermost figure). X 525. Powell del.

gation of Rose Atoll; Dr. M. A. Howe, of the New York Botanical Garden, has aided by the critical study of the *Porolithon*; and Doctor Alfred B. Rendle, of the British Museum of Natural History, has supplied photographs of type specimens and drawings otherwise inaccessible to me. To these colleagues, in particular, I wish to express my indebtedness and extreme gratitude.

ACKNOWLEDGMENTS.

The late Alfred Goldsborough Mayor, Director of the Department of Marine Biology of the Carnegie Institution of Washington, supplied me with materials, notes, photographs, etc., of Rose Atoll assembled by him, for the basis of this discussion; Director Elmer D. Merrill, of the Bureau of Science, assisted in determining the land plants; Professor Charles B. Lipman, of the University of California, has given notes on soils, composition of calcareous algae, etc., from his own investi-



A. Interior of *Pisonia* grove on Rose Islet. Photographed by Dr. A. G. Mayor, June 6, 1920.
B. Northern side of Rose Islet, showing edge of *Pisonia* grove and the *Boerhaavia-Peritulea* association with boobies and noddies. Photographed by Dr. A. G. Mayor, June 6, 1920.

GB-855
Animal material, many 1 mm diameter eggs, mollusk shells

GB-856
Animal material
Shells

GB-857
Ulva reticulata 99
Codium edule 1

GB-858
Codium edule
Ulva reticulata

GB-900
Microdictyon setchellianum

GB-901
Halimeda discoidea

GB-902
Porolithon gardinerii

GB-903
Porolithon sp.

GB-904
Porolithon gardinerii
Cladophoropsis luxurians

GB-905
Dictyosphaeria versluysii

GB-906
Lyngbya majuscula

GB-907
Schizothrix calcicola

GB-908
Polysiphonia (new species ?) tetrasporic
Valonia aegagropila

GB-909
(no sample)

GB-910
Caulerpa urvilliana

GB-911
Halimeda discoidea

GB-912
Laurencia majuscula

GB-913

Red patches are animal material

GB-914

Porolithon sp.

List of algae in samples GB-800 to GB-858 and GB-900 to GB-914

CHLOROPHYTA

Caulerpa sertularioides (Gmelin) Howe
Caulerpa urvilliana Montagne
Codium arabicum Kützting
Codium edule Silva
Derbesia fastigiata Taylor
Dictyosphaeria versluysii Weber van Bosse
Halimeda discoidea Decaisne
Halimeda opuntia (L) Lamouroux
Microdictyon setchellianum Howe
Ulva sp.
Ulva fasciata Delile
Ulva reticulata Forsskal
Valonia aegagropila C. Ag.

RHODOPHYTA

Acanthophora spicifera (Vahl) Boerg.
Acrochaetium sp.
Amansia glomerata C. Ag.
Callithamnion byssoides Arnott
Centroceros clavulatum (C. Ag.) Montagne
Ceramium sp.
Galaxaura cylindrica (Ellis and Solander) Lamouroux
Gelidiella adnata Dawson
Gelidiella setacea (Feldmann) Feldmann and Hamel
Hypnea sp.
Hypnea cervicornis J. Ag.
Jania sp.
Jania capillacea Harvey
Laurencia sp.
Laurencia majuscula (Harvey) Lucas
Laurencia tenera Tseng
Pterocladia sp.
Pterocladia calaglossoides
Pterocladia capillacea (Gmelin) Bornet
Polysiphonia sp.
Polysiphonia sphaerocarpa Boergesen
Porolithon sp.
Porolithon gardineri (Foslie) Foslie
Spyridia sp.
Spyridia filamentosa (Wulfen) Harvey

PHAEOPHYTA

Dictyota divaricata Lamouroux
Padina japonica Yamada
Sphacelaria sp.
Sphacelaria tribuloides Meneghini
Sphacelaria furcigera Kützing
Turbinaria ornata (Turn.) J. Ag.
Zonaria hawaiiensis (Lamouroux) C. Ag.

CYANOPHYTA

Anabaena constricta (Szafer) Geitler
Anabaena variabilis Kützing
Lyngbya sp.
Lyngbya lagerheimii (Möbius) Gomont
Lyngbya majuscula Gomont
Oscillatoria sp.
Schizothrix calcicola (Ag.) Gomont

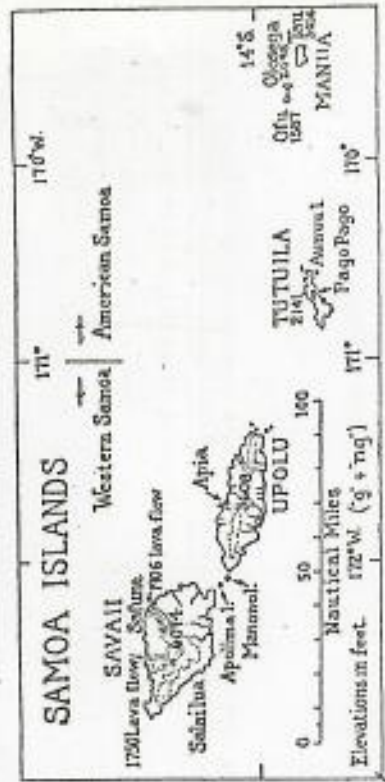
SEAGRASS

Halophila ovalis (R. Br.) Hook

recent years U. S. coast guards and naval vessels have stopped on their routine trips south. The lagoon may be too small for seaplanes; but the island is certainly one of the most beautiful and picturesque under the American flag. Were it not for the mosquitoes and small flies, it would be quite an island paradise.

from E. H. Bryan 1942
American Polynesia
and the Hawaiian Chain

CHAPTER 26 A Glimpse Of Samoa



The main island of the Samoan group rightfully should not be included in this discussion of the coral islands of the central Pacific. They mark the southern boundary of the region, but, like the Hawaiian group, they are high islands, the summits of a great range of volcanic mountains. In order to round out the series, and especially as part of the group flies the American flag, a brief summary will be given.

The distance from Rose Atoll, on the east, to the west end of Savaii is about 290 nautical miles. To the westward of Savaii there are shoals, of which (Pasco Bank) about 90 miles W.N.W. of Savaii, has 50 feet of water over it. On both sides of this mountain range there is deep water, soundings showing depths of 15,000 to 18,000 feet. Between Upolu and Tutuila there is a small gap with a depth of nearly 6,000 feet.

Savaii, at the west end of the main chain, is the largest, highest, and geologically youngest island. It measures 47 land miles east and west, with a greatest width of 27 miles. The area is given as 703 square miles. On top of a 6,000 foot dome there are several small peaks or cones, the highest elevation being about 6,094 feet. There has been recent volcanic activity, an extensive flow having descended the north side in 1750; a smaller one in 1902; and another crater on the N.E. was active from 1905-1911. When the writer climbed down into Matavanu crater in 1924, steam was still issuing from cracks. The slopes of Savaii are well forested.

Upolu measures 47 by 8 to 12, maximum 15, land miles, area 430 square miles. The length of the island is traversed by a range of mountains of rather uniform height and uniform slope with highest elevation about 3,608 feet. Along the ridge are numerous craters, some of which, like Lanutoo, contain crater lakes. The lowlands are fertile and have been cultivated, including plantations of cacao, rubber, bananas, but principally coconut palms. At the middle of the north side is located Apia, chief city, business center, and capitol of Western Samoa. It does not have a good harbor and landing must be made in small boats.

Between Savaii and Upolu are two small islands. Apolima is a tuff crater, open on the north; its floor is a little above sea level. The inner slope is gradual and forested; the outer precipitous and bare of vegetation. Its area is about 2 square miles, elevation 472 feet. Manono is lower and sandy, elevation about 200 feet, with a few volcanic outcrops. It is connected with the N.W. coast of Upolu by fringing reef. Springs are brackish, and the few inhabitants must catch rain water in concrete tanks. Off the east end of Upolu are four small islets, one of which, Nuutele, is a breached tuff crater, like Apolima, about 400 feet high, the flat floor of which has been cultivated.

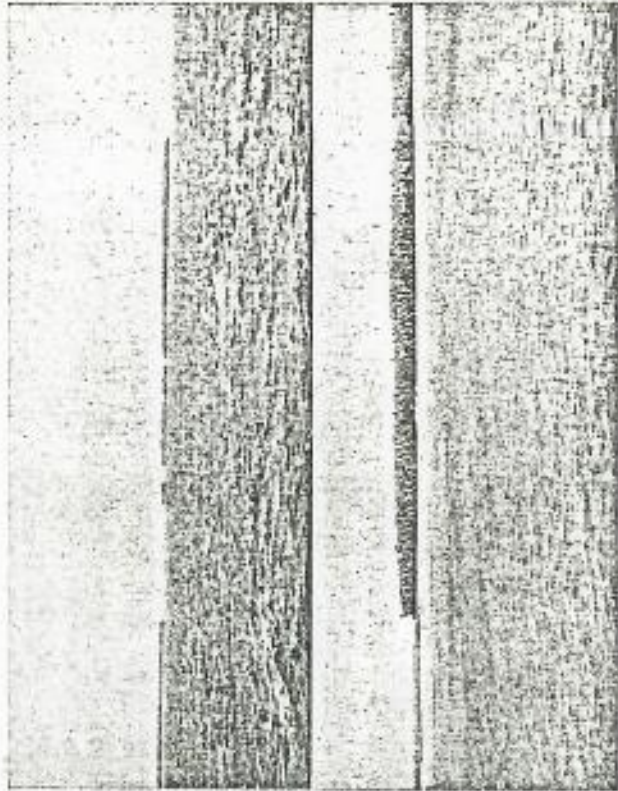
Tutuila is about 18 miles long by 5 or 6 miles wide, with a land area of 40.2 square miles. A mountainous ridge extends nearly the length of the island, with spurs on both sides; highest elevation, Matafao Peak, 2,141 feet. A drowned valley on the south side forms Pago Pago Bay, the best harbor in the South Seas. South of the eastern end is a circular tuff crater islet, Aunuu, about 275 feet high.

Between 60 and 70 miles eastward of Tutuila are three small islands, together called the Manua Group, and with a combined area of 18 square miles. The largest is Tau, 14 square miles; steep, forested slopes; greatest elevation, 3,056 feet. The other two islands, Ofu and Olosega (pronounced o-to-seng-a, for the "g" in Samoa is pronounced "ng") are separated by only shallow water. The elevation of Ofu is given as 1,587; of Olosega 2,095. All three are covered with trees and shrubs, and large areas have been planted to coconut palms. Rose Atoll lies 78 nautical miles eastward from Tau.

The climate of Samoa is tropical, moderated by strong S.E. trade winds from May to November. During the balance of the year (Samoaian summer and fall) the winds are variable, with severe storms and occasional hurricanes. This is called the wet season, although in places, like Pago Pago, where mountains intercept the trade winds, it may rain



Ancient stone murna on Sydney Island, 1924.



Atafu atoll from the north; and a closer view of the northwest point, 1938.

throughout the year. Yearly rainfall: Apia 108 inches (from 69 to 173); Pago Pago, 197 inches (130 to 284). Greatest monthly average during January or February (Apia 16; Pago Pago 21.7); least in July or August (Apia 2.8, Pago Pago 7.8). February is the warmest month at Pago Pago, average 88.28°; July the coolest, average 80.21°F. Relative humidity is high: 70 to 90 per cent during the wet season; 40 to 60 per cent during the dry.

The land fauna and flora are oceanic in character, derived from the west, and, like Hawaii, with little or no American affinity. There are no native mammals except a rat and some bats. There are only 34 species of land birds, of which 14 are endemic, including such forms as the famous tooth-billed pigeon, fruit doves, kingfishers, and a white-eye. The usual species of sea birds are present. Of reptiles there are one land and four sea snakes, and ten or a dozen kinds of lizards. There are some 800 species of flowering plants, of which one-third are endemic; 260 species of ferns, 400 species of mosses, 200 fungi, and 180 lichens.

The Samoans are a Polynesian people of fine physical type. In culture they are closely related to the people of Tonga and the Ellice and Tokelau islands. They differ in some respects from the Tahitians, Marquesans, Maoris and Hawaiians; but all are thought to have come from common stock which migrated eastward from southeastern Asia. An extensive account of their material culture, by Dr. Peter H. Buck, has been published by B. P. Bishop Museum.

Their food consists of fish, bananas, breadfruit, taro, yams, pigs, chickens, various marine animals; and of recent years they have developed a liking for such foreign foods as canned salmon and beef, rice, tea, and biscuits. Agriculture is carried on by natives in small clearings on the edge of the forest.

All Samoans, old and young, love to dance; their siva being accompanied generally by singing. Native clothing consists of a lava-lava or wrap-around kilt, formerly of tapa or fine mats; in addition the women wear a smock-like upper garment, and the men an undershirt, when in public.

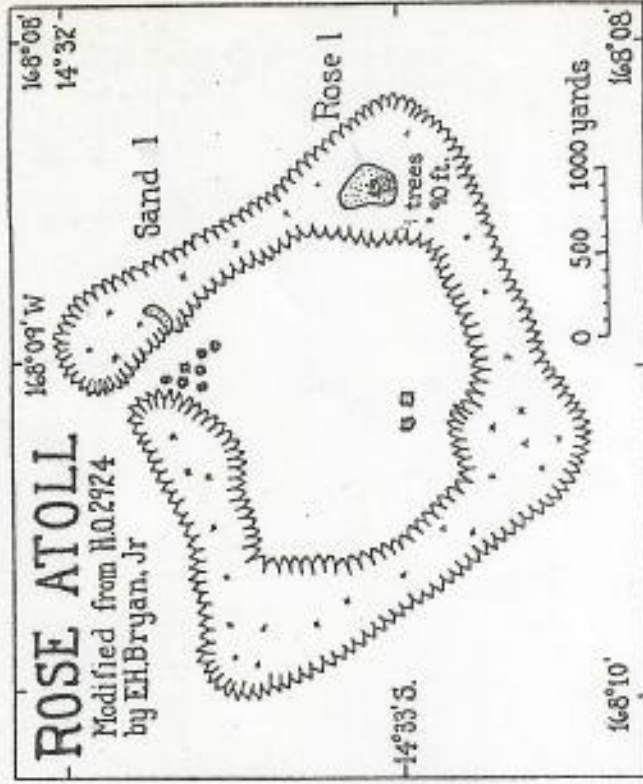
Brought to the attention of Europe in 1722 by Roggveen, Samoa was visited by several early voyagers, and later traders and missionaries. Pago Pago harbor was ceded to the United States as a naval coaling station in 1872. A treaty between Britain, Germany, and U.S.A., June 14, 1889, made Samoa neutral. Trouble between rival chiefs made nec-

essary another treaty, November 14, 1899, by which kingship was abolished, islands west of 171 degrees were given to Germany, and those east to the United States. Western Samoa was occupied by a British expeditionary force, August 29, 1914; and it was made a mandate of New Zealand by the Treaty of Versailles.

Samoa government takes the form of meetings of chiefs and heads of families, accompanied by ceremonial kava drinking. The American Naval Government wisely has left this local government, under three native district governors. Naval doctors have greatly improved health conditions in American Samoa, and also British trained native practitioners guard the health of Western Samoa, so that the native population is on the increase, and despite tropical diseases, health conditions are quite good. The 1937-1938 population is given as: Western Samoa, 54,160 natives and 3,600 others; American Samoa, 11,906.

CHAPTER 27

Rose Atoll



Rose Atoll is the easternmost of the Samoan islands. It is located 78 nautical miles eastward of the island of Tau, and 872 miles south of the equator.

It consists of a squarish ring of marine deposit, the surface of which is a pink coralline algae known as lithothamnium, surrounding a lagoon with depths up to about 50 feet. The square, which is about $1\frac{1}{4}$ nautical miles on a side, is set obliquely so that the longest axis, about $1\frac{1}{8}$ miles is almost east and west. Just west of the north point there is a narrow entrance into the lagoon, with depths of six feet or more, so that whale-boats or small launches can enter. This passage is partly blocked on the inside by coral heads, but it is clear on the east side, close to Sand Islet.

On the east rim of the atoll there are two tiny dots of land. Comparison of maps drawn during the past century shows that these have

changed in size and shape. At present Sand Islet, on the north, is a crescent-shaped ridge of bare sand and coral, about 200 yards long by 50 yards wide. Rose Islet, to the south, is oval, about 350 yards north and south, by 250 yards wide. Its southern half is largely covered by a continuous pure stand of buka trees (*Pisonia grandis*). The northern half is flat, covered with broken chunks of reef material and shells with scattered herbs of *Boerhaavia* and *Portulaca*. In 1938 there were about twenty coconut palms, eight large and a dozen small, which had been planted.

There is a fair anchorage on the north side, near the entrance, in 6 fathoms, safe as long as the S.E. trade winds blow. The condition of the vegetation suggests that the rainfall is moderately heavy, although there is no fresh water on the island.

All that can be seen from a distance are the tops of the buka trees, looking like a rounded loaf of bread on the horizon.

Everywhere we saw great numbers of birds: wideawake terns, boobies, frigates, a few white terns, wandering tattlers, and even a few reef herons, one blue and one white. Lizards and native rats are the only four-legged animals. There are the usual hermit crabs, and fishes and other marine life abound in the lagoon and off the reef.

The surface of the reef is nearly flat, and it is scarcely awash at low tide. Hundreds of boulders are scattered over its surface. Dr. Alfred G. Mayor, who visited the atoll in June, 1920, thinks that these indicate that the reef was laid down at a time when the sea stood about ten feet higher, since eroded away; but other geologists do not all agree. The grove of *Pisonia* trees grows on raised reef rock or coquina, reaching a height of about eleven feet above sea level. Beneath the trees the upper soil is rich in humus from fallen leaves and rotten branches, with considerable phosphate from the droppings of sea birds.

Rose Atoll was discovered by Louis de Freycinet on October 21, 1819, on his voyage around the world in the *Uranie* and *Physicienne*. He named it for his wife, who made the voyage with him. In his journal he describes the appearance of the island and gives a chart, the deficiencies of which are readily explained by the fact that he did not come closer than a mile and a half.

Otto von Kotzebue made the next recorded observations, having passed the island in 1824. Not knowing of its prior discovery, he named it Kordlinkoff Island, in honor of his first lieutenant.

*abound - to be present in large numbers
or in great quantity

Dumont D'Urville passed it on September 23, 1838, in the corvette *l'Astrolabe*. He described it as a heap of sand covered with a bouquet of green, very fresh and pleasant. He estimated the circumference of the reef as between six and seven miles, and noted the break in the north-west curve of the reef.

The first recorded landing on Rose Islet was made by the U. S. Exploring Expedition, under Commodore Charles Wilkes, October 7, 1839. Part of a day was spent in making a survey and observing the geology and natural history. Even then there were but three kinds of plants.

About twenty-five years later, Captain Rantau, making explorations for German interests, made several expeditions to Rose Atoll, on one of which he took his little schooner through the shallow entrance and anchored in the lagoon. He produced a chart of the atoll and his observations are given by Eduard Græffe in a German article on Samoa, published in 1873.

In January, 1920, Commander W. J. Terhune, then naval governor of American Samoa, visited Rose Atoll and erected a concrete monument with inscription: "Rose Island, American Samoa, Trespassing prohibited, Warren J. Terhune, Governor, Jan. 10, 1920." He revisited the atoll in June, 1920, planting the first of the coconut palms. Periodic visits are paid by American naval vessels.

Accounts of Rose Atoll are to be found in Carnegie Institution of Washington Publications 340 and 341, 1924, written by Dr. Mayor, Dr. William A. Setchell and others; and in the Proceedings of the American Philosophical Society for 1921, volume LX, pages 62-70.

Rose Atoll was made a Naval defense area by Executive order of President Franklin D. Roosevelt, dated February 14, 1941. Foreign planes and surface craft are prohibited from visiting the atoll.

It may be questionable whether the lagoon is sufficiently large to serve the interests of trans-Pacific aviation, but in any event, the lagoon would serve as an emergency landing place, and the dots of land would provide another observation spot for America's far-flung interests in the Pacific.

Bryan was there in 1938
... I.C. Messerschmid
... present he would have recorded it!
1867

PHOTOGRAPHS OF ROSE ATOLL

by
George H. Balazs

November 1980

1. *Porolithon*, a pink coralline alga that grows abundantly on the fringing reef of Rose Atoll.
2. Rose Island, as viewed from the fringing reef at low tide.
3. Rose Island, as viewed from Sand Island. A breeding colony of noddy terns (*Anous stolidus*) utilizes this small sand bar.
4. Captain Wally Thompson and crew members of the vessel LEILANI that was chartered for the 150 mile voyage between Pago Pago and Rose Atoll.
5. Rose Island, as viewed from within the shallow lagoon waters of the atoll. A native forest of predominately buka trees (*Pisonia grandis*) rises up to 85 feet above the island's surface.
6. One of the tall buka trees that comprise the native forest on Rose Island.
7. An immature red-footed boobie (*Sula sula*) roosting in a buka tree.
8. Europi, a 72 year old Tokelauan crew member of the LEILANI, who had last visited Rose Atoll 20 years ago.
9. Green sea turtle nesting at night on Rose Island.
10. Green sea turtle stranded at sunrise during low tide while returning from nesting on Rose Island. William Pedro, a biologist with the Office of Marine Resources, American Samoa, poses with the turtle shortly after it was tagged.
11. *Grapus grapus*, one of several species of colorful crabs that inhabit Rose Atoll.
12. Aerial view of Rose Island and fringing reef

ROSE

Named by Freycinet
in 1819 (maybe that's
why people thought he
was the discoverer)

First RECORDED LANDING - (By Westerners)

Wilkes 1839 for 24 hours
(No evidence of human's
noted by Wilkes - US E.E.)

BYU -
293-3878

Bibliography

Requested from
Sachet

Anon.

Rose Island.
O Le Fa'atou 18 (7): 4, 1920.

Flag Day at Manua. [title varies].
O Le Fa'atou 20 (6): 1-2, 1922; 21 (6): 1-3, 1923; 22 (6): 1-2,
1924; 24 (6): 7-8, 1926

[Rose Island fishing survey].
Weekly News Bull. Pago Pago II (7): Feb. 21, 1953.
Excerpt transmitted by Mr. E. Sady.

Boulenger, G. A.

Catalogue of the chelonians, rhynchocephalians and crocodiles
in the British Museum (Natural History).
1-311, London, 1889.

Bryan, E. H., Jr.

Rose Atoll, U. S. A.
Paradise of the Pacific 51 (4): 9, 25-26, 1939.

American Polynesia and the Hawaiian chain.
1-253, Honolulu, 1942.

Couthouy, J. P.

Remarks upon coral formations in the Pacific.
Boston Jour. Nat. Hist. 4: 66-105, 137-162, 1842.

Daly, R. A.

Geology of American Samoa.
Carnegie Inst. Pub.
340: 95-143, 1924.

Dana, J. D.

Geology.
U. S. Exploring Expedition 10: 1-756, Philadelphia, 1849.

Donagho, W.

Journal of the 1938 Line Island Expedition (concluded).
Elepaio 13 (10): 66-69, 1953.

Dumont d'Urville, J. S. C.

Histoire du voyage: in, Voyage au pôle sud et dans l'Océanie ...
1837-1840.
4: 91-92, Paris, 1842.

Dumstrey, H.

Official visit to the islands of the Manu'a district.
O Le Fa'atou 18 (2): 1-2, 1920.

Requested from
Sachet

BIBLIOGRAPHY.

MAILEY, JACOB W., and WILLIAM H. HARVEY. 1862. *Algae*, in United States Exploring Expedition, etc., vol. xvii, 2, pp. 155-192, plates 1 to ix.

MAY, A. DE. 1854. Comparative anatomy of the vegetative organs of the Phanerogams and ferns. (Translated and annotated by Bower and Scott.)

MONTIHAM, GEORGE. 1870. *Flora Australiensis*. Vol. v. Myoporinæ to Proteaceæ.

NORDBOMSEN, P. 1907. An ecological and systematic account of the Caulerpes of the Danish West Indies. D. Kgl. Danske Vidensk. Selsk. Skrifter, 7 Raekke, naturvidensk. og mathem. afd. iv, 5, pp. 339-392 (with 31 figs.).

BOISSIER, Ed., et CH. FLAHAULT. 1859. Sur quelques plantes vivants dans le test calcaire des mollusques. Bull. Soc. Bot. de France, vol. 36, pp. cxvii-cxxxvii.

CHAMISSO, AB. DE. 1831. *Portulacaceæ*, in *Chamisso et de Schlechtendal, De plantis in expeditione speculatoria Romanzoffiana observatis*, etc. Linnaea, vol. 6, pp. 559-565.

COURTHOT, JOSEPH P. 1842. Remarks upon coral formations in the Pacific; with suggestions as to the causes of their absence in the same parallels of latitude on the coast of South-America. Boston Journal of Natural History, vol. 4, pp. 66-105, 137-162.

DANA, JAMES D. 1849. *Geology*, being vol. x of the United States Exploring Expedition. 1844. *Structure and Distribution of Coral Reefs* (3rd Ed., 1st Ed. in 1842; 2d in 1874 and 3rd in 1889).

DE CANDOLLE, AUG. PYRAMUS. 1828. *Prodromus systematis naturalis regni vegetabilis*, etc., vol. 3.

DELESSERT, BENJAMIN DE. 1837. *Icones selectae plantarum*, etc., vol. 3.

FRANKE DEL CASTILLO, E. 1893. *Flora de la Polynésie française*, etc.

EXHACHIS, STEPHANUS. 1838. *Iconographia generum plantarum*.

FINCKH, ALFRED E. 1904. *Biology of the reef-forming organisms at Funafuti Atoll*. The atoll of Funafuti—being the Report of the Coral Reef Committee of the Royal Society.

FOSTER, GEORGE. 1786. *Florula insularum australium prodrromus*.

FOSTER, GEORGE. 1786. *Florula insularum oceanii australis commentatio botanica*, 1786a. *De plantis calcareis insularum oceanii australis commentatio botanica*, 1786b. *De plantis calcareis insularum oceanii australis commentatio botanica*, 1786c. *De plantis calcareis insularum oceanii australis commentatio botanica*, 1786d.

FOSTER, M. 1900. *New or critical calcareous algae*. Det. Kgl. Norske Videnskabers Selskabs Skrifter, 1899, No. 5.

1900a. *Calcareous algae from Funafuti*. Det. Kgl. Norske Videnskabers Selskabs Skrifter, 1900, No. 1.

1901. *New Melobesene*. Det. Kgl. Norske Videnskabers Selskabs Skrifter, 1900, No. 6.

1903. *The Lithothamnium of the Maldives and the Laccadives*. The Fauna and the geography of the Maldiva and Laccadive Archipelagoes, vol. 1, part 4.

1906. *Algologische Notiser*, II. Det. Kgl. Norske Videnskabers Selskabs Skrifter, 1906, No. 2.

1907. *No. X. The Lithothamnium*, in *The Percy Sladen Trust Expedition to the Indian Ocean in 1905 under the leadership of Mr. J. Stanley Gardiner*, Trans. Linn. Soc. (London), vol. 12, pt. 2 (2d ser.).

1909. *Algologische Notiser*, VI. Det. Kgl. Norske Videnskabers Selskabs Skrifter, 1909, No. 2.

FREYCHNER, LOUIS DE. 1826. *Voyage autour du Monde—exécute sur les corvettes de S. M. l'Uranie et la Physicienne*, etc. Navigation et Hydrographie, première partie, and Atlas.

1829. *Voyage autour du Monde—exécute sur les corvettes de S. M. l'Uranie et la Physicienne*, etc. Historique, vol. 2, part 2.

GARDINER, J. STANLEY. 1905. *The Percy Sladen Expedition in H. M. S. Sealark*. The Chagos Archipelago. Nature, vol. 72, pp. 571, 572, figs. 1, 2.

1873. *Samoa oder die Schiffscinseln*. Journal des Muséum Godeffroy, Heft I, pp. 1-32, pl. 1-6.

GRAEZZI, EUGENIO. 1873. *Samoa oder die Schiffscinseln*. Journal des Muséum Godeffroy, Heft I, pp. 1-32, pl. 1-6.

GRAN, H. H. 1897. *Kristinniafjordens Algeflora*. I. Rhodophyceæ og Phaeophyceæ. Christ. Vidensk. Selsk. Skrifter, I. Mathem.-naturvid. Klasse, 1896, No. 2.

GRAY, ASA. 1854. *Botany*. *Phanerogamia*, vol. 1, being United States Exploring Expedition, vol. xv (with Atlas, 1857).

1857. *Botany*. *Phanerogamia*, vol. 1, being United States Exploring Expedition, vol. xv (with Atlas, 1857).

GUILLEMIN, J. B. A. 1836. *Zephyritis taitensis*. Ann. sci. nat., bot., ser. 2, vol. 6, pp. 297-320.

1837. *Ibidem*, suite, loc. cit., vol. 7, pp. 177-192, 241-255.

HILLEBRAND, WILLIAM. 1838. *Flora of the Hawaiian Islands*. Sciences, n. s., vol. 35.

HOWE, MARSHALL AVERY. 1912. *The building of coral reefs*. Sciences, n. s., vol. 35, pp. 537-542.

JONES, J. W. 1904. *The chemical examination of the materials from Funafuti*. The atoll of Funafuti, being the report of the Coral Reef Committee of the Royal Society.

KORSAKOV, OTTO VON. 1830. *A new voyage round the world*. (In two volumes.)

MAYOR, ALFRED G. 1920. *Rose Island (Nuu-O-Manu)* (being a report to the governor of Tutuila, printed both in Samoan and in English, in "O le Fatafata," the monthly newspaper published by government of American Samoa, vol. 18, No. 7, at Pago Pago, July 1920).

1921. *Rose Atoll, Samoa*, in its relation to recent changes in sea-level. Science, n. s., vol. 54, p. 390.

1921a. *Rose Atoll, American Samoa*. Proc. Amer. Phil. Soc., vol. 60, No. 2, pp. 62-70.

ROCK, JOSEPH F. 1913. *The indigenous trees of the Hawaiian Islands*. College of Hawaii Publications, Bull. No. 4.

1916. *Palmyra Island with a description of its flora*. Part 1, pp. 1-40.

SCHIMMEL, BERNHARD. 1805-1873. *Flora Vitiensis*. Published in parts. Part 1, pp. 1-40.

1805, although not dated.

SCHIMMEL, HANS. 1908. *Systematic anatomy of the Dicotyledons*, translated by L. A. Boodle and F. E. Fritsch, and revised by D. H. Scott.

1909. *Ueber die Algenvegetation eines Ceylonischen Korallenriffes mit besonderer Rücksicht auf ihre Periodicität*. Botaniska Studier tillägnade F. R. Kjellman, pp. 184-220, plates 6, and 10 figures in the text.

1909a. *Ecological and systematic studies of the Ceylon species of Caulerpa*. Ceylon Marine Biological Reports, No. 4. Reports on marine algae of Ceylon, No. 1.

WILKES, CHARLES N. 1845. *Narrative of the United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842*, vol. II.

1850. *Atlas of Charts*, vol. 1, being the first volume of charts of the United States Exploring Expedition, under Charles N. Wilkes.

1851. *Hydrography*. This is vol. xxiii of the United States Exploring Expedition.

Handwritten notes and signatures in the top left corner, including "Percy Sladen" and "Stanley".

7 Jan 1983 ✓

Dear Hazel-

I need to have the attached translated rather precisely into English. Would you please arrange this for me, or make appropriate suggestions.

Many thanks.

George Balazs

Hazel-

Tell endangered speciesologist Balazs the fee for this should be paid in fresh turtle cutlets.

Van C.

Ebenfalls noch zur *Samoagruppe* gehörend, wenigstens in gleicher Flucht mit dieser liegend, ist die 70 Meilen von *Manna* nach Osten liegende Insel *Rosa*. Es ist dieselbe, aber nicht eine kleine, allein aus dem Meere emporragende Insel, sondern ein Lagun- oder ringförmiges Corallenriff, mit einer Passage und zwei auf dem Riffe befindlichen Inseln. Dieses ringförmige Corallenriff hat einen Durchmesser von 2 Meilen und zeigt die Passage am Nordwestende mit einer Tiefe von 6 und mehr Faden, am Eingange aber nur $1\frac{1}{2}$ —1 Faden Tiefe, an der Seite gegen die innere Lagune. Capitain *Ranzau*, der wiederholte Male, im Dienste der deutschen Unternehmung, diese kleine Insel besuchte, und dessen freundschaftlicher Güte wir diese Notizen, wie die in der Karte befindliche Skizze über die *Rosa-Insel* verdanken, lief mit einem kleinen Schooner in diese Passage hinein, und ankerte in dem ruhigen Lagunenwasser. Doch ist dieses ein gewagtes Unternehmen, und bedarf schon bedeutender Uebung in der Riffbefahrung. Die Passage, anfangs breit, wird nämlich durch eine Reihe Corallenblöcke, die an der inneren Oeffnung liegen, verengt. Ist man in die Lagune eingefahren, so liegt die eine Insel, eine niedrige Sandbank, gerade zur Linken, an der Nordseite des Lagunriffes. Nach Süd-Osten liegt die zweite höhere Insel dem Riff auf, und stellt einen rundlichen Knollen Landes von ca. 500 Fuss Länge dar, der mit Bäumen bewachsen ist; dieses ist die eigentliche *Rosa-Insel*, von Capitain *Freycinet* zuerst entdeckt, und seiner Gemahlin zu Ehren so genannt. In der Südwestecke der Lagune finden sich zwei Corallenbänke. Die Brandung an der Ostseite während der Passatzeit ist beträchtlich, ebenso steht eine hohe Dünung in der Passage. Die Lagune ist überall ca. 7—8 Faden tief, und beherbergt, wie die umliegende See, eine grosse Menge Fische, was schon frühere Besucher der Insel erwähnt haben. Aus diesem Grunde versuchte der unternehmende Leiter der deutschen Factorei, Herr *Th. Weber*, eine deutsche Fischstation daselbst zu errichten, und kaufte zu diesem Zwecke die zu den Fischgründen *Manna's* gehörende Insel von den dortigen Häuptlingen. Ein Engländer ging mit einigen Eingeborenen dahin ab, um Fische einzufangen und in Fässer einzupökeln. Es zeigte sich aber, dass der Ertrag nicht so reich war als wie man vermuthet hatte, und dass die Fische nur mit der Angel zu fangen, viele Hände erforderten, um in kürzerer Zeit eine grosse Menge Fische zu erhalten. Die Fische selbst, meist Arten von Seebarschen (*Serranus*), Papageifischen (*Scarus*) und Chirurgfischen, waren nicht geeignet zur Conservation in Salz, die überhaupt in dem feuchten Tropenklima nicht anwendbar, oder nur mit grosser Sorgfalt und besonderer Methode zu leiten ist. Es wurde bei dieser Gelegenheit beobachtet, dass auf der Sandinsel sich im Monat August und September eine Menge See-Schildkröten einfanden, um ihre Eier abzulegen. Es waren dieses meist Arten der gemeinen, grünen See-Schildkröte, (*Chelonia mydas* L.) Seltener kam die Carett-Schildkröte (*Chelonia imbricata* L.) Zur Zeit wenn die Jungen auskrochen, war die umliegende See voll von Haifischen, die begierig nach diesen kleinen Schildkröten schnappten, sowie dieselben in's tiefere Wasser kamen. Auf der mit Bäumen besetzten Insel, wo das Haus des Fischers aufgeschlagen war, nisteten eine Menge Seevögel, namentlich *Sterna*-Arten oder Seeschwalben. Es wurden damals auch auf der Insel Cocospalmen gepflanzt, die sehr gut gediehen, und gegenwärtig wohl schon Früchte tragen. Ein Eingeborener mit seiner Familie entschloss sich beim Abbruche der Fischerei allein dort zu bleiben, und ist falls er dort ausgeharrt hat, der Gouverneur dieser kleinen, einsamen Insel der Südsee.

Samoa oder die Schifferinseln.

Von

Dr. Eduard Graeffe.

I. Abschnitt:

Topographie von Samoa.

Ab. 5 Taf.

(Hamburg, Mus. Godeffroy, 1873.)

F. Mus. Godeffroy 181-32.

Samoa or the Navigator Islands

by Dr. Eduard Graeffe

I. Section

Topography of Samoa

Hamburg, Mus. Godeffroy, 1873

p. 32

Likewise belonging to the Samoan group, or at least lying in the same line, is the Island of Rosa, 70 miles from Manua. It is, however, not one small island rising alone from the sea, but a lagoon- or ring-shaped coral reef, with one pass and two islands located on the reef. This ring-shaped coral reef has a diameter of 2 miles, and the pass appears at the northwestern end, with a depth of 6 or more fathoms at the entrance but only $1\frac{1}{2}$ - 1 fathom at the side toward the inner lagoon. Captain Ranzau, who visited this small island a number of times in the service of the German enterprise, and to whose friendly favor we are obliged for these notes as well as the sketch of Rosa Island on the chart, entered the pass with a small schooner and anchored in the calm waters of the lagoon. This is, however, a risky undertaking and calls for considerable experience in reef navigation. The pass, which is broad to begin with, is then narrowed by a series of coral heads which lie at its inner opening. Once one gets into the lagoon, there is one island, a low sandbank, directly to the left, on the north side of the lagoon reef. To the southeast the second, higher, island lies on the reef, presenting a rounded knoll of ground about 500 feet long, with trees growing on it; this is the real Rosa Island first discovered by Captain Freycinet and so named by ~~him~~ ^{him} in honor of his spouse. In the southwest corner of the lagoon there are two coral banks. The surf on the east side during the trade wind season is considerable, so there is a high swell in the pass. The lagoon is generally about 7-8 fathoms deep and holds, like the surrounding sea, a great abundance of fish, as has been mentioned by earlier visitors to the island. For this reason, the managing director of the German trading station, Mr. Th. Weber, tried to establish a German fishing base there and with this objective purchased the island, which was part of Manua's fishing grounds, from the chief of that place. An Englishman went there with some natives to catch fish and salt them down in barrels. It appeared, however, that the yield was not as rich as people had supposed, and the fish were taken only by hook and line, so many hands were required to get a large quantity of fish in a short

time. The fish themselves, mostly species of sea bass (Serranus), parrotfish (Scarus) and surgeonfish, were not suitable for preservation in salt, which generally in the humid tropical climate is not practicable, or is only to be managed with great care and special methods. It was observed on this occasion that in the months of August and September a number of sea turtles made their appearance on the sand island to lay their eggs. Most of them were the common green sea turtle (Chelonia mydas L.) More rarely hawksbill turtles (Chelonia imbricata L.) came. At the time when the young hatched out, the sea roundabout was full of sharks, which voraciously snapped up these little turtles as soon as they came into the deeper water. On the island with trees, where the fishermen's house was put up, a quantity of seabirds nested, namely, species of Sterna or sea-swallows. At that time coconut palms were also planted on the island, which thrived very well and at present ^{already} bear fruit. A native with his family decided when the fishery was discontinued to remain there alone, and as it happens he has held out there, the Governor of this small, lonely island of the South Seas.

* * *

W.G. Van Campen
6147 Palukula Place
Honolulu, Hawaii
96821

INTERLIBRARY LOAN REQUEST

REPORT **B**

According to the A. L. A. Interlibrary Loan Code

Date of request: **1/31/83**

Remarks: **Franked airmail shipping label enclosed**

Borrowing Library

Fill in left half of form; send sheets A, B and C to lending library; and enclose shipping label.

Library
National Marine Fisheries Service
P. O. Box 3830
Honolulu, HI 96812

For use of **Belass** Status _____ Dept. _____

Fold → Author (or Periodical title, vol. and year)

O'le Fa'atomu 18(7). 1920.

554 **1920**

Title (with author & pages for periodical articles) (Incl. edition, place & date)

Anon (or A. G. Mayor?). Rose Island (Num O Mamu) - Report to the Governor of Tutuila, printed both in Samoan and in English.

Any edition

Verified in (or Source of reference)

Atoll Research Bulletin 29:22. 1954 microfilm photoprint

If non-circulating, please send microfilm photoprint

Interlibrary Loans
Library of Congress
Washington, DC 20540

Note: No acknowledgement of receipt or return is required. The receiving library assumes responsibility for notification of non-receipt. Stamps in payment of transportation costs should accompany sheet D: Notice of return. **AUTHORIZED BY: H. Nishimura**

REPORTS: Checked by **CW**

SENT BY: BOOK RATE Express Collect

Other Insured for \$ _____

Date sent **2/17/83** Charges \$ _____

DATE DUE _____ (or period of loan)

For use in library only

NOT SENT BECAUSE: Fold

Not owned by library

Non-circulating

Hold placed

In use

Request again

Other:

Suggest you request of:

Estimated Cost of: Microfilm _____

Photoprint _____

RECORDS: (Borrowing library fills in)

Date vol. received _____

Date vol. returned _____

By BOOK RATE Express Prepaid

Other _____ Insured for \$ _____

RENEWALS: (Request and report back on sheet C: Interim Report)

Requested on _____

Renewed to _____ (or period of renewal)

Call No.
F
DUS39
AL42
1920

Lending Library

Fill in pertinent items under REPORTS; return sheets B and C to borrowing library

NUU O MANU.

I le tausaga o 1839 na oo mai ai i motu o le atu Samoa ni vaa suesue ma fuafua mea o le Fua a le Unaita Setete ma sa ia ia vaa uma i lalo o le puleaga a se alii ofisa o le Fua ua igoa ia Kapeteni Wilkes. E ono le aofai o ia vaa, i le o le uluai alii lenei na ia muai fuafuaina ma suesueina le uiga o motu o le atunuu o Samoa. Sa ahiahi mai lenei malaga e le malo o le Unaita Setete, ma na faatoa maua mai ai lava e le lalolagi i lenei malaga suesue se faamatalaga ma se faasalaga e uiga motu ua taitai o le Nuu o Manu. Ua valusefulu ma le tasi tausaga ua mavae, i le talu mai ai lava ia ona po seia oo mai i ona nei, o loo faaogaina pea lava e tagata taitai o le lalolagi faamatalaga o le fuafuaga o nei atunuu ma faia e Wilkes i ia lava ona po, e aunoa lava ma se mea e tasi na sula.

I ona po nei, o lo ua fai malaga mai ai i Tutuila nei tagata popoto suesue mea mai Amerika atoa foi ma Egelani. O lea na faasaga atu ai Lana Afioga le Kovana Sili ma saia ni atu ai se malaga i Manu'a seia oo lava i le nuu o Manu faatasi ma nei alii popoto i suesue mea o le lalolagi, ina ia mafaia ona maua fuafuaga. Sa iu le malaga ona tuuina atu ai lea e lenei alii poto Dr. Mayor le faamatalaga atostoa i le Kovana Sili e tusa ma lea faau sa ia faasaga atu i ai, ma ua lomina nei i lalo ni nai mea sa ototoo mai ai i lea faamatalaga.

E tusa ma le 240 iata le umi o le motu ma ua 200 iata lona lautele. O le itu sante o le motu na faimu lava i le laau o le Pu'avai, ao le isi vaega o le motu ua na o le oneone lava. O le motu lapo'a na 11 futu lona maualuga i le sami, ao o le maualuluga o laau tetele ua i ai poo o le 80 futu. O nisi o ia laau poo le 26 futu le fua o le tetele o tafu'e faau. O si motu laitiiti lauoneone, na o le 5 futu lona maualuga i le sami, ma ua iloa ai le uiga o le leai o ni laau e tutupu ai fua e mata e osofia pea lava ma lofia e le sami i aso afa.

O lo ua tutupu ai nei foi ni nai laan aina ititi. O i ai niu na totoina e Lana Afioga le Kovana Sili i lana malaga i le aso 10th, o Ianuari, ua foliga mai ua ola ia niu. E le gata i ia niu, a ua i ai foi ma nisi laan 'aina ua toe avatua foi i ni ma ua totoina solo lava i itu eseese o le motu.

O le itu i manu, ua matua mauomano ma le tele, ma itua aiga ua tele i ai o lua o, 'ae fa'aitiiti ni nai isi ituaiga manu e iloa ai. E leai se vai e maua ai i le motu, e leai foi se manu e tasi e iloa ai.

O nai tala ititi ia sa ototoo mai, a ua ma'u lava ona faia ma tusitusia lelei lona faamatalaga atoatoa i ai e tusa ma le susesuga sa faia e lenei ali poto, ma ua le gata ina fiafia i ai ma ua mafai ona maua lona faamatalaga atoatoa, ao se mataupu mafua t'ua lava.

OFISA O LE TEUTUPE O LE MALO SAMOA

UNITED STATES NAVAL STATION
AMERICAN SAMOA

Iulai 12, 1912.

Faamatalaga o tupe ua maua ma tupe ua alu o le Malo o Samoa i le fadi'uga o le kuata ia Iuni 30, 1920.

| Igoa o vaega tupe. | Tupe sa i ai Ape, 1 1920. | Maua ile kuata. | Aofa'ina manu. | Ua alu ile kuata. | Toe ia Iuni 30, 1920. |
|--------------------|---------------------------|-----------------|----------------|-------------------|-----------------------|
| Faleoloa F.S. | 2531.46 | 11448.27 | 13979.73 | 13442.40 | 537.33 |
| Lavalava | 467.43 | 201.20 | 668.63 | 182.61 | 486.02 |
| Falema'i | 54.71 | 575.00 | 629.71 | 443.25 | 186.46 |
| Faamasinoga | 4745.05 | 1804.91 | 6549.96 | 2037.43 | 4512.53 |
| Tiute | 45615.28 | 16510.44 | 62125.72 | 19172.70 | 42953.02 |
| Lafoga | 25285.40 | 21846.32 | 47131.72 | 13951.40 | 33180.32 |
| Aofa'i | \$78699.33 | \$52386.14 | \$131065.47 | \$49229.79 | \$81855.68 |

E \$22,350.00 o loo faamauina i poni ma le \$4000.00 o loo faamauina i tusi faaleoleo o le taua. O tupe ia o le tiute ua aofia ai i luga. O le faamatalaga ua faia nei i luga ua tonu e pei ona faaalua i tusi.

R. C. REED,

Lt. Comdr., Supply Corps, U.S.N.,
Teutupe o le Malo Samoa.

UA SUESUE I AI MA UA TONU:

A. W. BABCOCK,

Lt., Supply Corps, U.S.N.

H. DUMSTREY,

Lt., (j.g.) Chaplain Corps, U.S.N.

L. JENKINS,

Gunnery Sergeant, U.S.M.S.

A. D. MEREDITH,

AMERICA SAMOA.

The afternoon was devoted entirely to sports and sivasivas which were thoroughly enjoyed by all. At the finish His Excellency presented prizes amounting to more than \$50.00 to the winners as follows:

Boat race. 1st Luma, 2nd Faleasao.
100 yard dash. 1st Savali, 2nd Solipo.
Two legged race. 1st Solipo and Toese, 2nd Savali and Fatijua.
Three legged race. 1st Meaalii and Levale, 2nd Savali and Fatijua.
Tug of war. Olosega.
Coin finding contest. 1st Falearao, 2nd Fitiu'a.
Sivasiva. 1st Fitiu'a, 2nd Ofu.

H. DUMSTREY,
Chaplain, U.S.N.

ROSE ISLAND

In 1839 an exploring expedition consisting of six vessels under command of Commodore Charles Wilkes, U.S.N. made the first scientific investigation of the Samoan Islands. This expedition sent out by the United States Government gave to the world the only information we have ever had of Rose Island. Eighty-one years have passed and during all that time navigators have used and are still using the charts prepared by Commodore Wilkes. In spite of the changes wrought by time and the elements no verification or correction has ever been made to these charts.

At the present time eminent scientists from the foremost universities of America and England are visiting Tutuila. His Excellency the Governor taking advantage of their presence extended the trip to Manu'a for a brief visit to Rose Island, for the express purpose of obtaining up to date scientific data of this island. Dr. Alfred G. Mayor, M.E. ScD. of Carnegie Institute, Washington, submitted to the Governor a detailed report which will prove very valuable because of its numerous corrections and additions to our previous knowledge. A brief summary of this report follows:

Rose Island is about 240 yards long and 200 yards wide. The southern half is covered with a dense growth of pisonia trees, the other part being a bare sandy beach. The main island is 11 feet above high water level and the largest trees thereon rise to a height of about 80 feet. Some of these trees have a girth of nearly 26 feet. Sand islet is only 5 feet above high tide level which explains its barrenness, due to the fact that in time of storm the sea must wash completely over it.

Other than the pisonia trees there is little vegetable growth. The coconuts planted by His Excellency the Governor on his recent visit January 10th seem to be growing. To these he added many more which were planted on various part of the island.

Birds there are in plenty, mostly boobies, but there are also a few boatwain birds, noddies and Scot's terns. No fresh water and no mosquitos can be found. The geological structure of the island was explained in detail.

The report covers every detail of scientific investigation and is not only interesting but also of exceeding great value.

OFFICE OF THE ISLAND TREASURER

UNITED STATES NAVAL STATION
AMERICAN SAMOA

July 12, 1920.

Statement of Receipts and Expenditures of the Island Treasurer for the Quarter Ending June 30, 1920.

| FUND. | On hand Apr. 1, 1920. | Received in quarter. | Total Receipts. | Expended in quarter. | Balance June 30, 1920. |
|-------------|-----------------------------|----------------------------|--------------------|----------------------------|------------------------------|
| Drug Store, | 2531.46 | 11448.27 | 13979.73 | 13442.40 | 537.33 |
| Clothing | 467.43 | 201.20 | 668.63 | 182.61 | 486.02 |
| Hospital | 54.71 | 575.00 | 629.71 | 443.25 | 186.46 |
| Judicial | 4745.05 | 1804.91 | 6549.96 | 2037.43 | 4512.53 |
| + Customs | 45615.28 | 16510.44 | 62125.72 | 19172.70 | 42953.02 |
| Native Tax | 25285.40 | 21846.32 | 47131.72 | 13951.40 | 33180.32 |

TOTAL \$78699.33 \$52386.14 \$131085.47 \$49229.79 \$81855.68

+ \$22,350.00 is in Liberty Bonds and \$4,000.00 is in War Saving Certificates.

STATEMENT CERTIFIED TO BE CORRECT AS SHOWN BY BOOKS:

R. C. REED,
Lieut. Comdr. Supply Corps, U.S.N.,
Island Treasurer.

NOTICE: This material may be protected by copyright law (Title 17, U. S. Code).

Examined and found Correct:
A. W. BABCOCK,
Lieut., Supply Corps, U.S.N.
H. DUMSTREY,
Lieut. (j.g.) Chaplain Corps, U.S.N.
L. JENKINS,
Gunnery Sergeant, U.S.M.C.
A. D. MEDVEDT

INTERLIBRARY LOAN REQUEST

REPORT **B**

According to the A. L. A. Interlibrary Loan Code

Date of request: 1/3/83

Remarks: Franked airmail shipping label enclosed

Borrowing Library

For in left half of form; send sheets A, B and C to Lending Library; and enclose shipping label.

Library
National Marine Fisheries Service
P. O. Box 3830
Honolulu, HI 96812

For use of O. Balans Status _____ Dept. _____

Author (or Periodical title, vol. and year)

Pa'atomi 18(2): 1-2. 1920.

new

Call Number Title (with author & pages for periodical articles) (incl. edition, place & date)

F 7
DU819
ALM 7
Dumstrey, H.
Official visit to the islands of the Manu'a district.

Verified in (or Source of reference)

Atoll Research Bulletin 29:22, 1954.

If non-circulating, please send microfilm photoprint

Lending Library

Fill in pertinent items under REPORTS; return sheets

Interlibrary Loans
Library of Congress
Washington, DC 20540

REPORTS: Checked by CW

SENT BY: BOOK RATE Express Collect

_____ Insured for \$ _____

Other

Date sent 2/14/83 Charges \$ _____

DATE DUE _____ (or period of loan)

For use in library only

NOT SENT BECAUSE: ← Fold

Not owned by library

Non-circulating

Hold placed

In use

Request again

Other:

Suggest you request of:

Estimated Cost of: Microfilm _____

Photoprint _____

RECORDS: (Borrowing library fills in)

Date vol. received _____

Date vol. returned _____

By BOOK RATE Express Prepaid

Other _____ Insured for \$ _____

RENEWALS: (Request and report back on sheet C: Interim Report)

Requested on _____

Renewed to _____ (or period of renewal)

st complies with (g) Guidelines (CCG)

er provisions of copyright law (CCL)

is required. The receiving library assumes
tamps in payment of transportation costs

THORIZED BY: H. Nishimura

Le Fakatani



O le Fakatani.

E leunia ma faasalalauina, lea'ei pe'ea o le
Malo o Amerika samoa, i ma'afaga taitai
O le Fala i le fa'atamania atoa ma le fa'aga o
ma o lea'ei pe'ea o

LUTHER W. CARPWHRIGHT,
Fulautasi o le Kovana oili.

O se pe'ea fa'atani ma'afaga ma o nua sa'ua
ma Amerika samoa, ma le fa'atamania o le atunui
i Samoa o Amerika samoa. E taitai'afaga lea'ei
pe'ea i lea'ei i lea'ei i Amerika samoa e nua'ua ma
se taitai.

TOTOGI O FAALIGA E FAASALALAUINA

Itinan atoa \$100. Vae'ina o le Itinan \$5.00,
Koa'iti o le Itinan \$3.00.

O le Fakatani.

Published monthly by the Government of Samoa
each month.

Editor and Manager

LUTHER W. CARPWHRIGHT,
Private Secretary to the Governor.

A paper devoted to the interests, de-
velopment and progress of American
Samoa. A copy of this publication is
furnished, without charge, to each
family in American Samoa each month.

ADVERTISING RATES.

Full Page \$10.00, Half Page \$5.00, Quarter Page \$3.00

O le Asiasiga Faale Malo i Motu o le Itumalo o Manu'a.

Talu ai lona faauuina ma Kovana Sili o Amerika Samoa ua i ai pea i le finagalo o Lana Afioga lona fia asiasia o motu uma ua i ai i lalo o lana pu-leaga ma ia faamasani ai o ia ma ona tagata, atoa ma lona fia silasilā i le uiga o motu. E ui i lea, sa le mafai ona vave taunuu lona faamoemoe ona o le tele o feau sa faasaga atu o ia i ai i le Lotoa o le Fua, a ua faatoa mafai ona faataunuaina lea faamoemoe i aso lata mai nei ma ua mafai ai ona faia lenei malaga ina ua tuu mamaina ana feau, ae ese ai lana lua i malaga i Manu'a i le faamanatuga o le sisiga o le Fu'a i Manu'a Iuni 5, 1919.

O le po o le Aso Lulu Ianuari 10, na tuuyaa atu ai le Afioga a le Kovana Sili i lenei malaga i le manua o ma ua faatasi ai ma Lieutenant W. C. Ives, Medical Corps, U.S.N., ma le alii Faifeau o le Fua, ma malaga atu ai i Ta'u, Manu'a. Sa malaga atu ai foi ma le U.S.S. "Samoa" faatasi ma le manua ma le au pasese na i ai pe 100 tagata atoa ma le uta oloa tele mo lea lava taulaga, ma ua tautai e le Alii Pule o le Lotoa. Sa taunuu faatasi va'a e lua i Ta'u ina ua malama a'e le taeao, ona toe fesuia'i ai lea o le Alii Pule o le Lotoa i le manua ina ia avea ma faafeao a Lana Afioga le Kovana Sili i aso o totoe o le malaga. O J. L. Kelsall o ia lea sa avea ma faamatalaupu a le Malo i lea malaga.

Sa saunia e le Kovana Itumalo o Tufele sauniga eseese uma e tatau ai ma feagai ai ma tausiga o le malaga i le aso atoa. Sa faaitualalua alii uma o le nuu i le faataliga o le taunuu atu o le malaga. Ua mavae lea ona atifio ai lea i le maota ma faia le alofi taute o le fesilafai-ga e tusa ma le aganuu ma le faaloalo faa-Samoa atoa ma lauga. Sa faamalamalamaina e le Afioga a le Kovana Sili le uiga o le faasaga atu o le Malo e faitauina tagata o Amerika Samoa, atoa ma le faiga-faagata mo le pui-puiga o le faama'i ua ta'ua o le "small pox", ma sa faataunuaina lea faiga-faagata i lea lava malaga, ma ua asiasia mulimuli ai le falema'i atoa ma le 'a'ai.

Sa toe tu'uva'a le manua i le itula e ono i le afiafi ma ua malaga faatasi ai ma le alii Kovana Itumalo o Tufele. Sa taunuu la latou malaga i le Nu'u o Manu i le

OFFICIAL VISIT TO THE ISLANDS OF THE MANU'A DIS

Ever since his inauguration as chief executive of American Samoa it has been the desire of Excellency Governor Terhune to visit all the islands under his authority and to become personally acquainted with their people and existing conditions. However, it was not until recently that the press of work at the Naval Station permitted him to leave Tutuila, his only previous visit to Manu'a having been Flag Raising Day June 5, 1919.

On Wednesday evening January 10th Governor Terhune embarked in the U.S.S. "Fortune" accompanied by Lieutenant W. C. Ives, Medical Corps, U.S.N. and Chaplain Dumstre, and sailed for Tau, Manu'a. At the same time the U.S.S. "Samoa" in command of Lieutenant W. A. Macdonald also left Pago Pago in company with the "Fortune" having on board Mr. Cartwright, Mr. Barrow and about 100 natives and a large cargo for the same port. Both ships arrived at Tau on the morning where Lieutenant Macdonald was transferred to the "Fortune" and became aide to Excellency the Governor for the remainder of the voyage. J. L. Kelsall acted as official interpreter.

District Governor Tufele had made elaborate preparations for the entertainment of the visiting party, which remained as his guests the entire day. A long reception line welcomed them to the village after which the ancient and honorable Kava ceremony was observed, when speeches of felicitation were exchanged. His Excellency the Governor explained the taking of the census and also the importance of vaccine for the prevention of small pox which was being given by the hospital compound at that time. Later an inspection was made of the dispensary and the village.

The "Fortune" stood out of the harbor at the party being increased by the addition of District Governor Tufele. At day break Friday morning they arrived off Rose Island. This is an uninhabited coral atoll at the extreme eastern end of the Samoan group of islands. Governor Terhune

NOTICE: This material may be protected by copyright law (Title 17, U. S. Code).

tacno sesei o le aso-Fataile. O se motu le aina leni motu ma na tu i le itu i soga'e o motu o Samoa. Sa asiasia leni motu e Kovana Tile i le tansaga e 1901 i ona po na talia ai e le Unaitē Setete le pule i Samoa, ma na tahu ai ia ona po, e le'i ai lava se tasi Kovana Amerika na tu lulelele i uta i le motu ma o Kovana Terhune lava na faapea. Sa faatasi ai foi le ali Kovana Ikmalo o Tulele ma J. L. Kelsall i le asisiga a Kovana Tile. Sa auina a'e i uta i lea lava tacno se 'au faigaluega e faatuuina se ma'a sima, ina ia latulafia ai maimoaga uma e o i ai i le motu i aso o lumana'i o le lulelele o le pule'aga a Amerika. O upu ia o loo tusia ai i te ma'u faailoga.

Rose Island.

American Samoa.

No trespassing.

January 10, 1920.

Warren J. Terhune,

Governor.

O le itula soouli na afio a'e ai Lana Afioaga i uta i le motu faatasi ma le 'au malaga ma asiasi solo i le motu atoa. Sa latou silafia ai le tele o le la'au lea, o le Pu'avai e tutupu ai i le motu. E leai se lago poo se namu e iloa ai i lea motu, 'ae ma o manu felelei e tannu ma ofaga i la'au i le motu. O nei manu e le masani i latou ma le va'aina o fino o tagata, o lea e felelei mai lava i latou ma latalata mai i tagata e auua ma se mafa'afu lava e tasi.

Na o le tasi lava o le ninu i ai i le motu, peitai na auua ma se fua ona na matua si'osi'oina e puavai ma ua tina lava i tofou. Na aveina e le Afioaga a le Kovana Sili ni fatu ma ni la'au toto ma ua tofoina ai i le motu. O in la'au toto, o niu, fa'i, avoka, tipolo, ma esi. Ua faanoemoe i tupu tele ma tupu olaola ia mea toto, mo aso o lumana'i pe tupu se mala e i ai ni va'a gogofa pe tu'ia latalata i lena motu, a ua mautu ma lava men'ai e tasi a'i i latou.

Ua matua v'i'u lava e le Kovana Sili ma alif ofisa uma ia tama Fitalita na ave i le malaga atoa ma lo latou ta'ita'i vasega o Taelo. O i latou nei na o i le malaga; Faufea, Fautua, Taulaga, Sialofi, Tuita, Taiese, ma Faitasi. O nei tama fitalita ua matua tautai tele ma ua mafai ona latou tautai o le tulua ma le saogalemu i le ava faigata ma le tafatafe tele i le motu. Sa oo ina te'a le ava ona feosofi ai lea o le auva'a i lalo ina ua tau paunia ma taunafai ona ta'ita'ina atu i se mea to'a-fimalie. E le mafai ona le sili fitalita i soo se mea o le lalolagi o i ai i le tautaiaga o va'a i mea fita faapea.

visited this island in 1901 when the United States accepted control of Samoa and since then no American Governor has set foot on its shores until the arrival of Governor Terhune. However, District Governor Tulele and J. L. Kelsall had also been present with His Excellency Governor Tilley.

In the morning a working party was sent ashore to erect a concrete monument so that all future visitors to that island might know that it is American property. This inscription was placed upon it:

Rose Island.

American Samoa.

No trespassing.

January 10, 1920.

Warren J. Terhune,

Governor.

At noon His Excellency and party landed and inspected the island. They found on it a thick growth of Puavai (Gardenia or Hernandia peltata) trees, which seemed to have crowded out all other vegetation. No mosquitoes or flies were evident but immense flocks of birds found shelter in its trees. These birds were so unaccustomed to seeing human beings that they came within reaching distance without the slightest fear. One lone coconut tree was discovered but this was without fruit due to the fact that it was completely surrounded and crowded out by the puavai. With remarkable foresight His Excellency Governor Terhune had brought with him numerous seeds of Samoan fruits which were later planted. These included a large number of coconuts, bananas, avocados, limes, and papaias. It is hoped that they will grow in abundance so that any time in the future should someone be shipwrecked there they would find sufficient food to keep them from want.

The Governor and all the officers greatly admired the skillful seamanship of Sergeant and Coxswain Taelo, and the following named other Fita Fita boatmen, viz: Faafeu, Taulaga, Sialofi, Tuita, Taiese, and Faitasi. These boatmen steered the whaleboat against the powerful ebb current flowing through the entrance channel and, when necessary, left the channel and jutting overboard, dragged the boat over the shoals upon which it from time to time grounded. The Fita Fitas cannot be surpassed anywhere in the world for ability in handling boats in the surf.

O le sami faatatau i le motu na matua tumu i va eseese. O tagi e silia i le ta'i 100 paama le mamafa. E faamomomoni ona o lelei num lelei tele i lagotonga ma ua mamao tele faapea aua e fa'i foi o le fiafia i le tele o i'a e mava ai, a'o le tele foi o mea 'ai e alu mo le tausiga o tagata e to'atele.

Na tu'ua e le manua le motu i le po o le aso-To'ona'i 'ae tu'utania i gatai o Olosega i le taenoa-segei. Sa fausia ma faalooloina lelei le aso-Sa i le va'a. Sa Sannia ma ta'ita'i ina e le Faile'au o le Fua le lotu na faatasi ai le Afoga a le Kovana Sili ma alii ofisa atoa ma le auva'a.

Na oo i le aso-Gauna, ona afifo a'e lea o le malaga i uta i Olosega i le Alii Pule Faalupega o Tuiolesega. Na taunuu i uta ona faatatau i le au ma alii tofia e to'atele o le nuu. Sa faia fiafia tetele ma ta'alo ma siva atoa ma le alofi taute e tusa ma le matalani, ona o le faafiafia ma lava o le malaga. O i'au po na saunuu ai e le Faile'au o le nuu se taunuaifaga mo le malaga atoa.

Na malamalama e le taenoa ona alu lea o le manua i le tu'utalaga i Ofu. Ona alu ifo lea i tai i le manua o le Pule Faalupega o Misa i se fautasi ua tautemina manafia, ma ua latou afifo ai i uta i lona nuu ma Lana Afoga a le Kovana Sili atoa ma nisi ofisa, o lo'o faatalitali foi i latou ma saunuu i tu eseese e totuu ai e tusa ma le faataliga o le malaga. Na muma lava le alofi-taute ma lauga e pei oia muma ai, ona mulimuli ai lea o finia ma ta'alo ma siva. O le itula e tofa i le afiafi na tu'ua'a mai ai le manua i le mea e masani ai.

Sa matua tallalia lelei le Afoga a le Kovana Sili i nuu uma lava e alu i ai. Sa faafia i nuu ta'itasi mea uma latou te mafai ona faia e faifua ai lo latou faaloloina ma lo latou agalelei. Ua le gata i upu ma lauga a ma faafia i mea ma latou faia le niga atotonu o lo latou fiafia ma lo latou faafetai ina ua asinisi atu le Afoga a le Kovana Sili ia i latou. Ua va'ava'i i mea uma ma nuu ma le agalelei ma le tallialo o Samoa e pei oia faasilafia i ai, sa tele foi ma mea alofa sa tu'u mai ma tu'u atu.

H. DUMSTREY.

O LE ALA-SIMA FOU I LE LOTOA O LE FUA

O le ala-sima fou na faavaveina in Iuni 1919, ma ua faamaina lea ala ma faalofaleina poo le umu-sima i le aso 18, Tesema 1919, fautasi ma oia sauniga e tatani ai e i ai lauga ma mea uma faupen. O le toe palu mulimuli mo le faumaga o le galuega, na vali e Lana Afoga le Kovana Sili i luma o le Maota o le Malo, ma ufi ai se pa'aga 'upumememua i ai i totomu le "FAATONU" o le masina o Novema ma le tasi o faatonuga o le telefoni ma le sene e tasi nisi le alii o Mr. F. E. Towle, le alii sa pule i le faiga o lea galuega atoa.

Sa faia seua lauga pu'upu'u e le Afoga a le Kovana Sili ma sa faafia ai o le ulaga o le lelei ma le mungofio o lea galuega, ma ma mafua lava lelei ona o le poto nuu le at-

The waters around the island swarm with fish. King fish, barracudas, skipjacks and mackerel were caught in abundance. One king fish weighed over 100 pounds. It is to be regretted that this excellent fishing ground is so far away for it would not only provide the sport of catching them, but would also furnish food for many people.

The "Fortune" left Rose Island Saturday evening and anchored off Olosega early next morning. The Sabbath was observed very quietly aboard ship. Divine Services conducted by Chaplain Dumstrey were attended by His Excellency the Governor, other officers and the crew.

On Monday the official party became the guests of County Chief Tuiolesega. They were escorted ashore and received by a long line of village officials. A fiafia, taalolo and several sivasivas followed the customary Kava ceremony much to the entertainment and amusement of their distinguished visitor. That evening Kuki, the village pastor and his wife, entertained the entire party at supper.

Early next morning the "Fortune" steamed into the anchorage at Ofu. County Chief Misa came to the ship in a very beautifully decorated fautasi and escorted His Excellency Governor Terhune and other officers to his village where again elaborate preparations had been made for entertainment. The Kava ceremony was first observed at which the usual felicitations were exchanged and then followed a fiafia, taalolo and several sivasivas. At 3 p.m. the "Fortune" got underway and steamed homeward.

Throughout the malaga His Excellency Governor Terhune was royally received at each stopping place. Each village did its utmost to show their respect and to entertain. Not only in word and speech but also by their actions did they show their great appreciation and thankfulness that His Excellency the Governor should bestow upon them the honor of a personal visit. The delightful hospitality for which the Samoan people are noted was everywhere evident and numerous gifts were exchanged.

H. DUMSTREY.

THE NEW CONCRETE NAVAL STATION ROAD

The new concrete road, which has been in progress since June, 1919, was completed and dedicated on December 18, 1920, with appropriate ceremonies. The last cement was spread by His Excellency assisted by District Governor Mauga in front of the Government Offices and covered a brass pipe in which there was placed a copy of the November FAATONU, the latest telephone directory and a penny from Mr. F. E. Towle, the foreman who was in charge during the entire course of construction.

Governor Terhune delivered a brief address in which he stated that his connection with the improvement was mainly that of an accumulator, as the work was attributable to the zeal, energy and ability of the late Public Works Officer.

manu'a ia le Kovana o Manu'a Tufele Pule Faalupega o Fitiuta, Misa Pule Faalupega o Ofu, Tuiolosega Pule Faalupega o Olosega, Asoau Pule Faalupega o Faleasao, ma Logoai Failautusi o le Itumalo o Manu'a, ma ua ma'itino ma iloa tino lava e a'u o Tuimanu'a lava lea ma ona Faatui, o sui o tagata o Motu o Manu'a, ma ua ta'i to'atasi lava i latou ma ioe i le faiga ma le sainiga o le Feagaina o le tuina atu o Motu o loo pine faatasi ma leni molimau, ma ua tu ai le faamaufaaniloga o le alii lava ia, i lo latou lava loto malie e aunoa ma se tauanauina, mo le faaogaina atoa ma mata'upu o loo faaali ai.

I le Molimau na faaalia nei ua 'ou faia ma faama'ina i le faamaufaaniloga o le Faamasinoga i leni aso 16th o Iulai i le tausaga 1904.

E.W. GURR.

Faamasino Itumalo o Tutuila.

TUIMANU'A

Kovana o Manu'a,

MISA

Pule Faalupega o Ofu,

TUPELE

Pule Faalupega o Fitiuta Failautusi Itumalo o Manu'a atou ma tagata uma o Motu o Manu'a,

TUIOLOSEGA

Pule Faalupega o Olosega

ASOAU

Pule Faalupega o Faleasao

LOGOAI

SI O'U ALOFA:

Ina ua oo foi, o le Kovana ma alii atoa ma tagata uma o motu o Manu'a, i lo latou lava loto malie ma le fiafia, ua faailoa mai ai e i latou lo latou malie i le amiotonu, fai mea tonu, ma le poto o le Malo ua puleina e le Unaitē Setete talu ai le sisiga o le Fu'a a le Unaitē Setete i luga o latou motu i le aso 5 Iuni 1900, ma

Ina ua oo foi, o ia lava motu na tunina mai i le Malo o le Unaitē Setete o Amerika, ia Iulai 16, 1904, o motu uma o le atu motu o Manu'a, ona atoa ai lea o le vaega i sasa'e o le motu o Samoa o loo i le itu i sasa'e o logitu 171 i sisifo o le meritiiana o Lonetona ma ua iloina o Ta'u, Olosega, Ofu, ma le Nu'u o Manu, ma isi mea uma, o le sami ma vai ma isi mea uma latou te tuaoi, faatasi ma le pule atoatoa o loo i ai nei ia tei latou ina ia avea lava motu ma se nu'u o le pule'aga poo se Itumalo o le Unaitē Setete, faatasi ma le taofi ina ia faatupuina le filemu ma le manuia o tagata o na motu, ma le faatuina o se malo lelei ma le mautu atoa ma le faatumanuia pea o le pule a tagata o ia lava motu i a latou lava mea totino na masani ai, e aunoa ma se faavaeaina; o leni.

O le mea lea, o a'u o THEODORE ROOSEVELT, Peresetene o le Unaitē Setete o Amerika, 'ou te faaali atu nei i le Kovana, Alii, ma tagata uma o ia lava motu, le fiafia o le Malo ma tagata o le Unaitē Setete ina ua maua mai i le Kovana, ma Alii ma tagata o ia lava motu leni faailoga o lo latou faalofani mai ma lo latou faatuatua i le amiotonu ma le mania alofa a le Unaitē Setete. O le pule e masani ai i mea totino i totonu o ia lava motu o loo faaalia i lea lava ta'u-tuoga, o le a faalalaloia lava, ma lo matou faamoemoe naunau ina ia tumau i luga o tagata lelei o ia motu le filemu, ma le olioli atoa ma le manuia.

MAOTA PA'EPA'E, Uasegitone, Aokuso 19, i le tausaga o lo tatou Alii e tasi le afe iva selau ma le fa-

Tusia e le Peresetene:

THEODORE ROOSEVELT

W.H.U. HAY

Failautusi Sili o Setete

executed the attached Instrument of Cession, and affixed his seal thereto, freely and voluntarily, for the uses and purposes therein mentioned.

IN TESTIMONY WHEREOF I have caused the seal of the Court to be affixed this 16th day of July in the year 1904.

E. W. GURR,
District Judge of Tutuila.

To: TUIMANU'A,
Governor of Manu'a;
MISA,
County Chief of Ofu;
TUFELE,
County Chief of Fitiuta;
and the people of Islands of Manu'a,

TUIOLOSEGA,
County Chief of Olosega;
ASOAU,
County Chief of Faleasao;
LOGOAI,
District Clerk of Manu'a

GREETING:

WHEREAS, The Governor and Chiefs and people of the Islands of Manu'a of their own free will and pleasure, have expressed their satisfaction with the justice, fairness, and wisdom of the government administered by the United States since the flag of the United States was raised over their islands June 5, 1900, and

WHEREAS, The people of said islands ceded unto the government of the United States of America, on July 16, 1904, all the islands of the Manu'a group, being the whole of the eastern portion of the Samoan Islands lying east of longitude 171 west of Greenwich and known as Tau, Olosega, Ofu, and Rose Islands, and all other, the waters and property adjacent thereto, together with all sovereignty or District of the United States, with a view to the promotion of the peace and welfare of the people of those islands, for the establishment of good and sound government and for the preservation of rights and property of the inhabitants of said islands, without discrimination: now,

THEREFORE, I, THEODORE ROOSEVELT, President of the United States of America, do hereby express to the Governor, Chiefs and people of said islands the gratification of the government and people of the United States in receiving from the Governor, Chiefs, and people of the said this token of their friendship and their confidence in the just and friendly intentions of the United States. The local rights and privileges mentioned in said declaration will be respected, and it is our earnest hope that peace, happiness, and prosperity may make their permanent abode with the good people of these islands.

WHITE HOUSE, Washington, August 19, in the year of our Lord one thousand nine hundred and four.

By President:

THEODORE ROOSEVELT

W. H. U. HAY
Secretary of State.

NOTICE: This material may be protected by copyright law (Title 17, U. S. Code).

O LE ASO O LE FU'A A MANU'A

Ole itula e 11:00 p.m., i le aso 4 o Iuni na tuua ai e le Kovana Sili o Amerika Samoa Tutuila ma malaga atu i Manu'a ile manuso e asiasi i motu o Manu'a i le faamautuina o le aso o le sisiga o le Fu'a i Manu'a, ma le faaulufaleina o le Fale A'oga fou i Ta'u.

O e na nofia ai i lenei malaga faale-malo o le Kovana Sili, Faiautusi Sili o Sauniga Samoa, Faafeao i le Kovana Sili, o le Foma'i Sili o le Ofisa Pule i Galuega, o le Faletua o le Kovana Sili o alo tama'ita'i e to'a lua o le Kovana Sili, o le Teutupe a le malo o Samoa i le ma le Tusitusi a Peimasa na malaga ai i le malaga.

Sa taunu'u le manua i Ofu i le taeao sesegi lava o le aso 5 o Iuni ae o a'e le malaga i uta i le 8:15 i se tulula lelei tele lava na saunia e Misa Pule Faalupega. Sa laulaututu faasolopito tamaiti o le a'oga ae taitaina e le faia'oga ma lagi le pese o le vii o le Fu'a i le taunu'u a'e o le malaga i uta, Sa ma'a le alofi taute na faia i le maota o Misa ona toe o ane ai lea o tamaiti o le a'oga ma faia la latou fitafita A'o faia lea faafiagiaga sa o atu le alii foma'i Sili ma le Ofisa Pule i Galuega ma asiasi a laua matagaluega. Sa mae'a se asiasi puupuu i le aai ona foi ifo ai lea o le malaga i tai i le vaa ma faasaga loa mai i Olosega.

Sa taunu i Olosega ona feiloai lea o le Kovana Sili ma Tuiolosega Sui Kovana Humalo ona o a'e loa lea o le au malaga i uta. Ona usu ane loa lea o alii o le nuu ma fesilafai ma le malega faapes foi ma faletua ma taus i le ma tamaiti o le a'oga o loo pepese mai i le pese o le fu'a. Sa tali le malaga i se maota fou ma le matagofie o le alii o Tuiolosega, i le ma se alofi taute mamala na fai ai.

Manu'a Flag Raising Day

At 11:00 p.m., 4 June, the Governor of American Samoa left Tutuila on board the U.S.S. "Ontario" to inspect the Islands of the Manu'a Group on the anniversary of Flag Raising Day, and to dedicate the new school house at Ta'u.

The official party consisted of the Governor, Secretary of Native Affairs, the Aide to the Governor, the Public Health Officer, and Public Works Officer; Mrs. Bryan, Misses Elizabeth and Helen Bryan, Lt. Commander R. W. Swearingen (SC) U.S.N., and Chief Pay Clerk H. S. MacKan, U.S.N., accompanied the party.

The "Ontario" arrived off Ofu on the early morning of 5 June, and the party left the ship about 8:15 in a very clean boat furnished by County Chief Misa. The school children were lined up in charge of the teachers, and sang the National Anthem. After a Kava Ceremony at Misa's house the school children gave an entertainment. During this exercise the Public Health Officer and the Public Works Officer inspected their various Departments. After a brief inspection of the village the party returned to the ship; and the ship got underway for Olosega.

At Olosega, the Governor was met by Acting District Governor Tuiolosega and the party was taken ashore promptly. Here they were greeted by the Chiefs of the village, their wives, and the school children, who sang the National Anthem. The party was conducted to the beautiful new house of Acting District Governor Tuiolosega where a very dignified Kava Ceremony was held. The school children gave an elaborate setting up drill. This was followed by a Talolo by the ladies of the island. After the Talolo the party was escorted to another house where a delicious dinner was served. Due to lack of time, a proposed knife dance was omitted; the party left immediately after dinner for Ta'u.

A Kava Ceremony was held at Ta'u. It was announced that the speechmaking would take place at the new school. All hands proceeded to the school, which is about seventy five percent complete. The Superintendent of Education acted as Master of Ceremonies. The school children seated on the floor opened the ceremonies by singing a hymn.

Sa taina se fitafita a tamaiti o le a'oga mo le faafinfiaga o le malaga, ona sosoo lea ma le taalolo a tamaitai o le nuu. Sa mae'a le taalolo ona tuumuli loa lea o le malaga i le tasi maota sa sauni ai se taumafataga matagofie. Sa le oo le siva nifo'oti na fai a faia ita ua le lava o le taimi; na faasaga atu loa le malaga i Ta'u ina ua uma le taumafataga.

Sa tannu le malaga i Ta'u fai loa lava ma le alofi taute. Sa faaalua o le a taofia lauga o le a sei' fafo'a fai i le Fale A'oga fou.

Na maea le alofi taute gasolo atu loa tagata uma i le Fale A'oga fou. O le Alii Pule o A'oga o ia lea sa ta'ita'i i le faiga o sauniga o le faaulufalega. Sa amataina i le viiga na lagi e tamaiti o le a'oga ota nonofo lea i lalo amata loa sauniga.

I le lauga a le Kovana Sili i le faaulufalega, sa faaalua aie ia ona o le tau o le fale, e (\$3000) ua togia mai tupe e \$11,000 mai le 'Au Faipule o le Unaiti Setete e faafou a'i mea na faaleagaina e le sfa ia Januari 1, 1926. Sa ia faafetai atu la Sootoa Pule Faalupega ona o lona foai ane o lona fasi fanua mo le a'oga, ma faali atu foi lona fiafia tele i tagata o Manu'a ota o le tele o galuega ua latou fesoasoani atu ai i le faiga o le fale, ma ua sili i lo le tele o galuega na osi ai le feagaiga. O lo ua tusia ai i le Fale A'oga a le Malo i Ta'u. Sa faapupulaina foi e le Kovana Sili o le a'oga o le a faia lava ma A'oga Itumalo i Manu'a, ia tutusa ma le A'oga a Pola ma le A'oga a Tama i Leone i Tutuila.

Na uma le lauga a le Kovana Sili ona tuao'i lea ma le Failautusi Sili o Sauniga Samoa, tau i ai Tuilosega Sui Kovana Itumalo, tau i ai le Poma'i Sili, tau i ai Sotoa Pule Faalupega, ae mulimuli le Pule o Aoga (Faifeau a le Malo).

Ua le taumate o le lauga a le Pule o Aoga o le lauga lea na fiafia i ai tamaiti. Sa ia faaalua e tolu lava mea e tatau ona maua, o le faleaoga o faiaoga ma tamaiti unaana, i le ma le faiga e manuia ai le aoga, o tamaiti o le aoga e tatau ona ia G-A-L-U-E, GALUE; G-A-L-U-E, GALUE!

Sa faalua le sauniga i le tatalo na saunia e Inkopo Faifeau Ta'u ona sisi ae ai lea o le Fu'a lagi ma tona pese.

Ona tuumuli ai lea o le malaga i le fale o Sotoa Pule Faalupega o Ta'u sa saunia ai se taumafataga manuia e le faletua o Sotoa.

Sa faaina le fanua o le Aoga e le Ofisa Pule i Galuega a'o faia le faaulufalega, ma sa faa-faigata le fuaga o le fanua ona o le toatele tagata ma tamaiti sa miomio ai a'o faia le faaulufalega.

Sa alifio i tai le malaga i le va'a i lea aso ua goto le la ina ua uma o le taumafataga uma ma ni galuega e tele na faia i lea aso a'o se aso manuia lava.

O le itula e 8: p.m. na faasaga atu ai le malaga i le Nu'u o Manu. O le Nu'u o Manu o se auu manu maulalo ma e tusa ma se ma'ila lona faatamalosaga ma na i ai le ava i le itu i matu-sisifo e ofi ai tulua i totoau i le mea pei se tau-laga lava. O le tele o le vaega o le nau o se auu manu lava a'o le itu i sasae ua i ai sina lauelele ma ni lauu tetele maualuga.

Na aua ae i ai i uta le Kovana Sili i le motu ma lona Faletua ma o la alo e toalua, ma le Faiafusi Sili o Sauniga Samoa i le ma le alii Faafeso atoa nu isi, ma sa vaania ai e i latou ituniga manu eseese e tele. O le matafaga e tumu lava i tamai manu e paepae solo ai i o latou otaga i le matafaga atoa lava, o nisi e faatoa fofoa mai lava mai le atigi ao nisi ua faatoa faumafai ona tau faataitai o latou apau. O le itu i saute sa i ai se faiva mataiga lava. Na tei lava ua mana ni manuu i lea mea i ni tama'i i'a e tele ua paulia i ni nai suasami i mea omoomo o le papa i le tai pe, faasaga loa atu lava Talalotu le leoleo o le Kovana Sili a tui le matau ma toggi gatai i le e ono lava malauli na mau ai i lea mea pe tusa ma se itula e tasi. O le tele le alo laitiiti o le Kovana Sili na ia toso ae le isi malauli e ono a'i

Na oo i le itula o aiga i le noauli ona fo'i ifo lea o le malaga i tai i le va'a, ona uma lea o aiga o le noauli toe alu le vaa-afi fagota agai i tai ma ata i le gutu o le ava ae taunilomilo le manua i le motu ma fagota solo lava. E faaleai ni ia a e na o i le vaa-afi ao e sa fagogota i le taunili o le manuu i a latou ala tetele sa toso, sa mana ai lava le mau in tetele, o pala, o tagi, o malauli

Na toe sefulu minute tar le lima faasaga loa mai le malaga i Tutuila, taunuu i le 7:35 a.m. o le aso 7 lea o Iuni

Iuni 26, 1926,

Mai: Le Kovana Sili.

I: Kovana Itumalo uma, Pale Faalupega ma Pulenu'u.

MATAUPU: Malaga i le va o nu'u poo Faalupega.

1. O la'u poloaiga na faia i le aso 11 o Ianuari 1926, mo le faasaina o malaga ona o le itu i le oge, ua soloia nei.

H. F. BRYAN,

Kovana Sili o Amerika Samoa.

NAI TALA FOU

Sa launu'u mai linae se folau manuia Amerika e igoa o le Guinevere i le aso 4 o Me, ma sa toe tuuva'a atu i le aso 7 o Me.

O le aso 8 o Me taunu'u mai ai linae le setima Niu Sila o le Tofua na aumai ai i Tutuila nei le alii miliona Amerika o Mr. W.B. Leeds ma lana 'au malaga, ma toe tuuva'a loa ai lava le Tofua i Fiti i lea lava aso.

In his dedication address, the Governor explained that the cost of building the school (\$3000) was being paid from the \$11,000 granted by the Congress of the United States to repair the damages done by the hurricane of 1 January, 1926. He thanked Sotoa, County Chief, for his donation of part of the land; and expressed gratification that the people had done much more work on the school than they were required to do in their agreement. A temporary sign had been erected: "Ta'u Public School". The Governor explained that the school was to be the Manu'a District School, corresponding to the Poyer School and the Leone Boys School in Tutuila.

The Governor was followed by the Secretary of Native Affairs, Acting District Governor Tuiolosega, the Public Health Officer, County Chief Sotoa, and the Superintendent of Education (Chaplain Hester).

It was very evident that the Chaplain's address made a hit with the pupils. He said that three things are necessary, the school, the teachers and studious pupils. To make the institution successful, the pupils must **W O R K, WORK; W-O R-K, WORK!**

After a prayer by Iakopo, Faifeau of Ta'u, the flag was hoisted and the National Anthem sung.

The party was then taken to the house of Sotoa, County Chief of Ta'u, where a delicious dinner was served by Mrs. Sotoa.

During the ceremony, the Public Works Officer was engaged in surveying the school grounds. This was made very difficult by the large number of adults and children moving about and often getting in the way.

It was sunset before the dinner was finished, and the party returned to the ship after a very strenuous but delightful day.

At 8:00 p.m. the "Ontario" got underway for Rose Island. Rose Island is a low coral reef about a mile and a half in diameter with an opening into the lagoon on the northwest side. The greater part of the reef is awash at high tide but on the eastern edge is a clump of very high trees.

The Governor, Mrs. Bryan, Misses Elizabeth and Helen Bryan, the Secretary of Native Affairs, Lieutenant Commander S. N. Moore, U.S.N., and several others landed near the clump of trees where a great variety of birds was found. The beach was covered with young birds in all stages of development from those just breaking through the shell to those making their first test of their wings. Excellent fishing was found in that portion of the lagoon on the southern side of the island. Here bait was easily obtainable in the small pools left by the previous high tide and six skipjacks were caught in about an hour's time, by Taleleu (orderly) with the line of an enthusiastic onlooker, George Peters, interpreter; Miss Helen Bryan hauled in one fish after it had taken the bait.

The party returned to the ship in time for lunch. After lunch the "Ontario's" motor launch was used for trolling up and down the entrance to the lagoon while the "Ontario" circled the island. The fishing party in the launch had very little luck but those trolling from the stern of the "Ontario" hooked several Kingfish, Tuna, and Skipjacks.

At a quarter of five, the "Ontario" got underway for Tutuila, arriving at 7:35 a.m., 7 June.

23 June 1926

From: The Governor.
To : All District Governors, County Chiefs and Pulenuus.
Subject: Malagas Between Villages and Counties

1. My order dated 11 January, 1926 prohibiting malagas on account of the food situation, is hereby revoked.

H.F. BRYAN
Governor of American Samoa

NEWS ITEMS

The Yacht, "Guinevere", American Registry, Mr. Palmer and party on board, arrived for a short visit on 4 May; the "Guinevere" departed on 7 May.

On 8 May, the New Zealand Steamship "Tofua" arrived from Apia, Western Samoa, disembarked Mr. W. B. Leeds and party and departed immediately for Suva, Fiji.

On 10 May, the S.S. "Sonoma" arrived from San Francisco, California, via Honolulu, T.H., with cargo, mail and the following passengers for Pago Pago: Sister Mary L. Demers, Sister Mary M. LaPlante, Sister Mary A. Laplante and Mr. E. Ramos.

On 10 May, the S. S. "Sonoma" departed for Sydney, Australia, via Suva, Fiji, with cargo, mail and the following passengers from Pago Pago: Chief Nurse I. F. Erskine, U.S.N., Dr. Margaret Mead, Mr. G. Reid and Mr. E. Reid.

On 11 May, the S.S. "Sierra" arrived from Sydney, Australia, via Suva, Fiji, with cargo, mail and the following passengers for Pago Pago: Faalele, Avo Saniton and Saniton.

On 11 May, the S. S. "Sierra" departed for San Francisco, California, via Honolulu, T.H., with cargo, mail and the following passengers from Pago Pago: Mr. and Mrs. F. W. Furkert, Miss Furkert, Miss Jefferson, Mr. W. B. Leeds, Mr. Sullivan, Mr. J. T. Powell, Miss F. Schafer, Miss V. Schafer, Mr. and Mrs. Salamao and infant.

THE FA'ATONGA

NOTICE: This material may be protected by copyright law (Title 17, U. S. Code).

le Faatonga.

E lomia ma lantolaitania lelei pepe e le Malo o Amerika Samoa i maunua taitaof.

O se pepe faasius toan lava ma o mea toea i le Amerika Samoa, ma le faasius o le Malo o Samoa e Amerika Samoa. E taitaofa ma lelei pepe Samoa taitaof i Amerika Samoa e maunua ma se toea.

TOTOGI O FAALIGA E FAASALALUINA.

Iunai ma \$20.00. Vae-luaga o le Iunai \$5.00. Kuata o le Iunai \$8.00.



le Faatonga.

Published monthly by the Government of American Samoa.

A paper devoted to the interests, development and progress of American Samoa. A copy of this publication is furnished, without charge, to each family in American Samoa each month.

ADVERTISING RATES.

Per Line—\$10.00, Half Page—\$20.00, Quarter Page—\$10.00.

FLAG DAY IN MANU'A.

On 5 June, the Governor, accompanied by the Secretary of Native Affairs and several of the officers from the Station, proceeded to Manu'a for the Flag Day there. At the request of the District Governor, so that suitable arrangements could be made, the celebration was held on 6 June. The speeches delivered on this occasion are published elsewhere.

On this trip were the District Governors, County Chiefs, District Judges and practically all the other High Chiefs, and Talking Chiefs from Tutuila. In the speech of District Governor Tufele of Manu'a, mention is made of the fact that the only time previous to this that all of the High Chiefs of Tutuila were in Manu'a was many years ago when they all assembled at Tau and made the division of what is now American Samoa into Counties and Districts.

The lavish hospitality of the Manu'a Chiefs was a thing that will probably be talked of for generations. The following program as prepared by Tufele, was carried out:

March with band to Malae.

Governor and officials proceed to Malae.

Kava Ceremonies.

Invocation.

Address by S. D. Hall Secretary of Native Affairs.

Address by District Governor Tufele.

Address by Governor Edwin T. Pollock.

Salute to colors and 21 guns from "Ontario", band playing "Star Spangled Banner."

Benediction, and exercises by the school children.

Several excellent aivas, followed the officials program:

On the way to Tau the "Ontario" stopped at Ofu and Olosega and took practically everybody to Tau, and the morning of the 6th brought many people and much of food from Fitiuta. When all were assembled the ceremonies began. A photograph of the Government officials, with the District Governors, County Chief, District Magistrates- etc., was taken.

On the 7 June, the Governor and some of the officials visited Ofu and Olosega and were received by the respective County Chiefs. On 8 June a similar visit was made to the villages of Faleasao and Fitiuta where Tufele again showed his lavish hospitality. This visit of the Governor to Fitiuta was the first visit of a Governor there for about nine years and was greatly appreciated by the chiefs of the County.

On the night of the 8th the "Ontario" proceeded with the party, which included Leoso and Fao of the Western District of Tutuila, Tufele and a large part of his men from Fitiuta County, to Rose Island.

The day of the 9th was spent at Rose Island where all hands indulged in fishing with considerable success. About two dozen coconut trees were set out in favorable positions on Rose Island, so that in time it is expected that they will furnish subsistence for any castaways. But one coconut tree was found growing on the Island, as those set out several years ago on Sand Islet at Rose Island had apparently succumbed to the wind and sand.

The "Ontario" returned to Tau the morning of the 10 June, loaded copra and took on board those to return to Tutuila. Similar stops were made at Ofu and Olosega. The matter of water supply at Fitiuta, Tau, Olosega and Ofu was taken up.

The "Ontario" arrived at the Naval Station the evening of the 10th with everybody greatly pleased with the "malaga".

INVOCATION, BY JEREMIA, VILLAGE PASTOR OF TAU

O Lord, thou art the Lord of all kingdoms in this world. We are gathered here this day to commemorate the emblem of the United States.

There are gathered this day all the chiefs of American Samoa, His Excellency the Governor, the Naval Officers, all the departments of the Government.

That the commemorating of this Flag be for all times a day of great rejoicing to the people of American Samoa. May this Flag Day be baptised with the Spirit of God, and blessings from heaven pour down upon the assembly—Amen.

TATALO FAAP'U, SAUNIA E IUTA FAIFEAU O FITIUTA.

Le Atua e, ua e silasila i mea ua faia i le aso ua faamanatuina nei. Ia manuia le Kovana Sili. Ia manuia alii ofisa uma o le Malo. Ia manuia le vaega o le Malo ma ona taitai uma. Ia manuia alii Kovana Itumalo ma alii maotofi uma o le Malo o Amerika Samoa. Ia manuia le itumalo atoa mai ona vaega eceese. Ia manuia uso malo eceese ua faatasi mai ai.—Amene.

ASO O LE FU'A O MANU'A

LAUGA A LANA AFIIGA KOVANA SILI EDWIN T. POLLOCK,
FAIA I TAU, IUNI 6, 1922.

O le Kovana Itumalo o Tufele, Alii Faatui, Alii ma tagata uma o Manu'a. Si o'u alofa

Ua ou matua fiafia i lenei fesilafaiga ma outou i le aso nei, ua le gata i le itu o la'u faatos asiasiga mai lenei i lo outou atu motu, a'o le itu foi, o lenei aso o se aso taua ia te outou, faapea i tatou uma nei.

Ua tatou aofa faatasi iinei ma tamalii sili uma mai Tutuila, faapea alii tofia o le Fua, ma ua avea i latou ma sui o Tutuila ma le Unaitete Setete. E toatele tagata ua taofia ona o feau tatau ai.

O lenei lava aso ua taua pea i tausaga uma. Ua faasino lenei lava aso ma faamanatuga o le sisiga o le Fu'a Amerika, ua fai ma faamau faailoga o le fesootaiga fealofani i le va o tagata o Amerika Samoa ma le Unaitete Setete. Ua i ai i outou finagalo le malamalama o mea uma ua faia ona o lenei fesootaiga fealofani. Ua molimau mai i le aso nei le finagalo malo o tagata uma ua aofia nei, i le faaaloalo i lenei Fu'a o le sao-ofoga o loo ua agiagia i o tatou luga, faapea itu uma o le lalolagi. I lenei lava Fu'a, ua tatou mautinoa ai lo tatou malu ma le pui puiga lelei mai i o tatou fili uma, faapea tagata uma ua i ai i lalo o lana tausaga. O lenei lava Fu'a na sisi iinei i lo-outou finagalo, ma ia tatou faatuatua faamaoni i ai. O le lelei ma le manuia atoatoa o tagata o Amerika Samoa mo aso o lumanai, ua matua faamaonia i lenei lava Fu'a ua i o tatou luga.

E pei ona faaalua i le Aso o le Fu'a i Tutuila, o le tamaoiga o Amerika Samoa ua faasino i le tele o le popo ua mafaia. Ua faailoa mai i ni molimou vaai o le a sili atu lenei tausaga i nisi tausaga ua mavae. Ua i ai i le "Faatonu" faamatataga o le popo i lenei tausaga, ua sili atu ai i tausaga ua mavae i le faiga o aso e pei ona tatou i ai nei, e ui i lea, ia tatou finafinai pea ma galulue faatasi.

Ia tatou faasaga i le saliga o le popo ma fasi le manu amu.
"Ua fesoasoani mai le Atua ia i latou—ua faamafai ona su'e le manuia."

O le a ou faitauina atu nei le tusi ua faamaonia ai lo outou finagalo i le sisiga o le Fu'a, ma le tuuina atu o le atu motu o Manu'a i lo outou lava finagalo malie i le Unaiete Setete. Ua ou fiasia i le faamanuia atu nei i nisi o nei alii sili sa tusia o latou suafa i lenei tusi i tausaga e tele ua mavae, e i ai Tufelet, Aso'au, ua faamalo atu nei ia te oulua.

Ua faanoanoa tele le faamoemoe ona o nisi o i latou sa tusia lenei tusi ua aveesega mai ia i tatou, e ui i lea, ua tatou mauitinoā e leni se itu'ua salamo ai o latou finagalo ona o mea sa latou faia, ua tatou manuia ai ignei ona po.

O le sisiga o le Fu'a i le fitula nei, o le a faailogaia i le faaalaloalo a le Malo Tele i le papa o fana, ona faai'u lea le aofia i le tatalo.

Ua ou manao e toe faapopopo ni nai upu ona o le itu ua le mafai ona talatalaina o lo'u matua fiasia tele i le vaavaai atu i tamalii uma o Manu'a ua potopoto mai nei; faapea foi i latou mai Tutuila ua afiio mai. Ua ou fiasia atoatoa i lenei faaalaloalo lelei ua mamalu ai lenei sauniga, o lea, ou te faaoo atu le faafetai mo le malo, faapea lo'u malie atoatoa i le faaalaloalo ua latou faia ia Tufelet.

O LOO IA TE I LATOU UMA UY MAUA LENEI FEAGAIGA

SI O MOTOU ALOFA ATU!

Ina ua osi feagaiga i le aso 16 o Fepuali i le tausaga e 1900, o Malo Tetele o Siamani, ma Peretania Tele, ma le Unaiete Setete o Amerika ona o le vavaveesaina le vaega o Motu o Samoa o loo i le Itu i Sasae o logitu 171 i Sisifo o le meritiana o Lonetona, ma tuuina atu le Pule i ai e Malo o le Unaiete Setete o Amerika.

Ina ua oo foi, i le aso 17 o Aperila i le tausaga e 1900, o Motu o Tutuila ma Aunuu, o le tusi lea vaega o Motu o Samoa i le itu i Sasae o logitu 171 i Sisifo o le meritiana o Lonetona, sa to atu ma tuuina atu i lalo o le pule ma le faamanahu o le Unaiete Setete, o le malo foi o malo foi o motu na ua pule i ai i lea lava aso le Malo o le Unaiete Setete.

Ina ua oo foi, ina pule i ai lea Malo, o Motu foi ua tusia i lalo ua iloaina o Motu o Manu'a, o le vaega lea ua totoe o Motu o Samoa o loo i le itu i sasae o logitu 171 i sisifo o le meritiana o Lonetona, o loo i lalo foi o le faamanahu o le Unaiete Setete, ua pule i ai faatasi ma le pule i Motu o Tutuila ma Aunuu.

Ina ua oo foi, ona o le fesili o Lana Afioga a Tuimanua, le Tupu o Manu'a ma ona Faatui, ina sisi le Fu'a o le Unaiete Setete i le aso 5 o Iuni i le tausaga e 1900, i le Motu o Tau, ina ja faamanahu ina o Motu o Manu'a.

INA UA oo foi, o Tuimanua atoa ma ona alii, ua fiasia ma lotomalie i latou i le faamasinoga toonu, ma le amiotonu, ma le poto o le fudgamalo ua pule i ai Kovana Sili o le Kolone o Tutuila ma Manu'a ma alii tofiua ua galulue faatasi ma le Kovana Sili, O LEA.

BENEDICTION, BY IUTA VILLAGE PASTOR OF FITIUTA

O Lord, thou art have seen all what has been done for the celebration of this day; we ask for blessings upon the Governor, all the officials of the Government and the leaders of all departments, the people of this district and all the visiting brothers we have here assembled—Amen.

MANU'A FLAG DAY ADDRESS

AT TAU 6 JUNE, 1922

BY

GOVERNOR EDWIN T. POLLOCK.

O le Kovana Itumalo o Tufele, Alii Faatui, Alii ma tagata uma o Manu'a.

Si o'u alofa.

It is with the greatest pleasure that I greet you to-day, not only because it is the first opportunity for meeting you in your own group of islands, but also because this day means so much to you and to all of us.

We have here all the highest chiefs of Tutuila, and all the officials from the Naval Station whose duties would let them come and represent Tutuila and the United States. More would have come had it been permitted.

This day means more each year as the years go by. It commemorates the raising of the Stars and Stripes and marks one more year of friendship between the people of American Samoa and the people of the United States. The people of American Samoa need no words from me to tell them how that friendship has been proved by all. The number of people here testifies to the regard which all present hold for that symbol of freedom, "The Star-Spangled Banner", which waves over us whether we are in a cold region far to the north or here under the Southern Cross. So long as that Flag waves, just so long can we, you and I, feel that we have the protection of the great country whose protecting arm guard her people wherever they may be. That Flag was raised here by your request and the protection it gives all of us was yours for the asking. The future welfare of American Samoa and the welfare of its people is assured under the Flag we love.

As stated on Flag Day at Tutuila, the prosperity of American Samoa depends on the amount of copra we cut. That this year is going to be more prosperous than any previous years seems almost a certainty. The FA'ATONU shows that this year's shipments are ahead of previous years so far, but we must keep working and work together.

Cut copra and kill the beetles.

"The Lord helps them that help themselves."

I will now read the document that confirmed your verbal request for hoisting of the Stars and Stripes and voluntarily ceded Manu'a to the United States. It gives me particular pleasure to greet some of those high chiefs who signed that paper so long ago.

O Tufele, O Asoau, Si'o'u alofa.

It is greatly regretted that the others are gone from our midst, but I am sure they feel as you do that they have had no regrets.

The hoisting of the Flag will be followed by a national salute and then the benediction.

I want to add that words fail to express my appreciation including all the chiefs from Manu'a here, also those from Tutuila who have done us the honor to be here. I am greatly pleased that they should have done us the honor to come with us, and I want to thank them for the honor they have conferred on us and for the respect they have shown to Tufele.

TO ALL TO WHOM THESE PRESENTS SHALL COME.

GREETING:—

WHEREAS, the Islands of the Samoan Group lying east of longitude 171 west of Greenwich were, on the 16th day of February, 1900, by arrangement between the Governments of Germany, Great Britain, and the United States of America, placed under the protection of the Government of the United States of America.

AND WHEREAS, on the 17th day of April, in the year 1900, the Islands of Tutuila and Aunu'u, being portion of said Islands of the Samoan Group lying east of longitude 171 west of Greenwich, were, by the chiefs and rulers of Tutuila and Aunu'u, ceded to and placed under the sovereignty and protection of the United States of America, and the government of said Islands was thereupon assumed by said United States.

AND WHEREAS, in administering said government, the Islands hereinafter described, known as the Manu'a Islands, being the remainder of said Islands of the Samoan group lying east of longitude 171 west of Greenwich, have been under the protection of the United States of America, and controlled and governed in conjunction with the Islands of Tutuila and Aunu'u.

AND WHEREAS, at the request of Tuimanua, the King of Manu'a, and his chiefs, the United States Flag, was, on the 5th of June, 1900, raised on the Island of Tau, of the Manu'a Group, for the purpose of granting protection to the people of the Manu'a Islands.

AND WHEREAS, Tuimanua and his chiefs, being content and satisfied with the justice, fairness, and wisdom of the government as hitherto administered by the several Commandants of the United States Naval Station, Tutuila, and the officials appointed to act with

INTERLIBRARY LOAN REQUEST

INTERIM REPORT **C**

According to the A. I. A. Interlibrary Loan Code

Date of request: **1/31/83**

Remarks: **Franked airmail shipping label enclosed**

REPORTS: Checked by _____

Borrowing Library

**Library
National Marine Fisheries Service
P. O. Box 3830
Honolulu, HI 96812**

SENT BY: BOOK RATE Express Collect

Other Insured for \$ _____

Date sent _____ Charges \$ _____

DATE DUE _____ (or period of loan)

For use in library only

NOT SENT BECAUSE: ← fold

Not owned by library

Non-circulating

Hold placed

In use

Request again

Other:

Suggest you request of:

Estimated Cost of: Microfilm _____

Photoprint _____

RECORDS: (Borrowing library fills in)

Date vol. received _____

Date vol. returned _____

By BOOK RATE Express Prepaid

Other _____ Insured for \$ _____

RENEWALS: (Request and report back on sheet C: Interim Report)

Requested on _____

Renewed to _____ (or period of renewal)

Fill in left half of form; send sheets A, B and C to Lending Library; and enclose shipping label

For use of **G. Balass** Status _____ Dept. _____

Fold → Author (or Periodical title, vol. and year)

**0 10 Pa'atoma 20(6), 21(6), 22(6), 24(6). 1922-26
p.1-2 p.1-3 p.1-2 p.7-8.**

Title (with author & pages for periodical articles) (Incl. edition, place & date)

Anon. Flag day at Manua. Title varies.

Any edition

Verified in (or Source of reference)

Atoll Research Bulletin 29:22, 1954 microfilm photoprint

If non-circulating, please send and estimate for microfilm photoprint

Call No. **F 9
DUB19
ALAB**

Lending Library
Fill in pertinent items under REPORTS; return sheets B and C to Borrowing library

**Interlibrary Loans
Library of Congress
Washington, DC 20540**

Note: No acknowledgement of receipt or return is required. The receiving library assumes responsibility for notification of non-receipt. Stamps in payment of transportation costs should accompany sheet D: Notice of return. AUTHORIZED BY: **H. Nishimura**

le Huatunni.

Es tomo sin fawakobawin jehol pepa e to
Mado e Amerikol shamay i mawidaw hahkel.

Des pepa fawakobawin jehol pepa e to
mo Amerikol shamay, ma to fawakobawin to to a hahkel
i jehol e Amerikol shamay. E hahkelawin jehol
pepa i oloka indaw i Amerikol shamay e shamay ma
se toloka.



le Huatunni.

Published monthly by the Government of Ameri-
ca, Siam.

A paper devoted to the interests, de-
velopment and progress of American
Siam. A copy of this publication is
furnished, without charge, to each
family in American Siam each month.

Sa malaga atu le Kovana Sili i Manu'a faatasi ai ma alii ofisa ma le 'au Faaili ma le Lotou o le Fu'a ma Afi ma Fallauga o Tutu'a. Sa tuuvaa atu i le itula 8:00 a.m. Iuni 16, e asil ai i le faanatanaga o le 20 o tausaga talu le sisiga o le Fu'a Amerika i motu Manu'a. O le aso tonu o lena sauniga o le aso lina o Iuni ma tuupoia i le aso 12 o Iuni ona o le mana'o o alii o Manu'a ona le ita i le gulu ma le leaga o aso na le oo ai ae faato'a taunu'u le aso 16 o Iuni ona faimalaga o le Manuao.

Taunu'u le Manuao i Ta'u i le itula e 3:30 p. m. a ua le m'fai na saofia o uta ona o le tetele o le gulu ona tu'nvaa loa lea mo alessao, na alu a'e ai lea i uta o le Kovana Sili i le tulala o Kovana Itumalo o Tufele. Sa faaialoaina le afio a'e i uta o le Kovana ma lana aumalaga e A'oga a Manu'a i le latou laulaututu ma sa le Pese o le Fu'a. Ona malaga lea i uta ua faasaga atu i Ta'u, ma na talimalo i ai Kovana Itumalo Tufele. Ua mavae se faaafoga, ona tu'u ai lea e le Kovana Sili se teu fualaau i luga o le agamau o Tufele-Timali. Ua toe illu atu le Kovana Sili i le linaua i Paleasao, a'o le aumalaga atos ua tofafa i lea po i le laota o Tufele.

Sa tupa se mafa faafuase'i ina ua la'u a'e i uta le pasese i alessao, o le tama Leone e igoa ia Matus, o lona popole i le fia ave oo i uta, un oso i le sami ma 'a'au ona malemo ai lea o ia. Sa amafaf e Foma'e toe faola ia te fa'a ua lea se aoga. Ua teu-quina o ia i Manu'a ona o le faigata o se ala e aumai ai lona no i Tutu'a.

Ua malama le taeso ona illu atu ai lea o le aumalaga i le pasese faatasi ai ma Tufele ma Sotoa, ua malaga atu i Ofu i le pasese ma i lona aumalaga Fesilafa ma lea ma Misa, Fule Faafuapega, a ua o a'e ai i uta i lona va'a. Sa matua tali telefa le aumalaga le Afi o Misa ma alii uma o Ofu. Ua mavae le faalalo sa fai ona asiasi atu lea o le Kovana Sili i le Palema'i ma ua toe fo'i i i ta'i i le Manuao ua faasaga i Olosega.

Ina ua taunu'u i Olosega, ua talia le malaga e le Fallauga o alessao, ona ua le o i ai o Tuiolesega o lo'o faagasegase. Sa ma-a manuia le la'u a'e i uta o le pasese i le ava o Olosega i le lea se faalavelave e tupa ai ona o le gulu ina ua tetele i fa aso. O le ovava Sili ma nisi na tu'u a'e i latou i Sili ma savavali mai ai i osega. Ua taunu'u le Kovana Sili i Olosega, ona asiasi atu lea e alii o Tuiolesega ma faamafanafana atu i lona gasegase ma le aomeoe ia maua vave sona lelei. Ona faasaga atu ai lea i le aalalo, ma se taumafutaga sa saunia e le nu'u o Olosega, i toe illu atu le Kovana Sili ma tuuvaa atu ai ma Paleasao i le pasese ma Ofu ma Olosega e ave i Ta'u.

O le afiafi o le aso 17 sa fa' ai se faalaga a le a'oga i Ta'u a sa to'atele alii tofia sa ma'moa ai. O le a'oga lea ua tausia e Su'a, ua faapes i ai le faatatauga a e sa i ai, ua sili lena faalaga faalaga a nisi lava a'oga o a'oga o Amerika Samoa. Ua faalo atu nei i le Itumalo o Manu'a ona o le ma'elega ua maua i a A'oga.

O le taeso o le aso 18, o le Aso o le Fu'a lea, ua amata ona solo po ma'i tagata i Ta'u, a ua tu'utaata foi le Manuao i gatai fa'u ma ua o a'e ai i uta le 'au Faaili ma Seila e aua ai i Sauniga le aso. Ua taunu'u le Kovana Sili i le itula e 10 ma ua faasaga a i se faalalo sa saunia i le Maota Talimalo se ia oo lava i le la e 11, o le itula lea o le a faasaga atu ai i le aofia e pei ona usani ai. O le faamatalaga lena o mea sa faia, sa sauniunia e Kovana Itumalo Tufele; o lauga fo'i o lo'o lomai se tasi itulau o sei pepa. Ua faapes lona faiga:

- 1 Faalaloaga i le Fu'a.
- 2 Tatalo amata saunia e Iuta Faifeau o Fitiuta.
- 3 Lauga a Kovana Kellogg.
- 4 Sisiga o le Fu'a, faalo i fana e 21, talua o le Pese o le Fu'a
- 5 Lauga a Kovana Itumalo Tufele.
- 6 Lauga a Kovana Itumalo Sutele.
- 7 Tatalo faa'u, saunia e Ieremia, Faifeau Ta'u.
- 8 Fesilafaga ma le Kovana Sili ma le aumalaga.

The Governor and party of officers and band from the Naval Station, High Chiefs, Talking Chiefs and Chiefs, left for Manu'a on the U.S.S. "Ontario" at 8:00 a.m. June 10th, to attend the 20th anniversary of the raising of the American Flag over the Manu'a group. The celebration was to have been held on June 30th but at the request of the chiefs of Manu'a was postponed until June 12th and heavy seas prevented the "Ontario" from leaving until the 16th.

The "Ontario" arrived at Tau at 3:30 p.m. but on account of the heavy surf could not land boats so proceeded to Faleasao where the Governor and party were taken ashore in the boat of District Governor Tufele. The school children of Manu'a were lined up on the shore in costume and greeted the Governor and party upon their arrival with the national song "The Star Spangled Banner". The Governor and party then walked over the trail to Tau, where a reception was held in the Governor's honor by District Governor Tufele. After the reception, the Governor placed a wreath on the grave of the present Tufele's father, Tufele-Fimali. The Governor then returned to the "Ontario" at Faleasao, most of the official party accepting Tufele's hospitality to stay at his home.

A very tragic incident occurred landing at Faleasao, when Malua, a native of Leone, in his haste to get ashore, decided to swim and was drowned. The Doctors worked strenuously to revive him but all attempts failed. He was buried in Manu'a, as it was impossible to bring his body back to Tutuila.

Next morning the official party accompanied by Tufele and County Chief Sotoa returned to the "Ontario" proceeded to Ofu for an official visit to that island and upon arrival were greeted by Misa, the County Chief and taken ashore in his boat. They then walked to the village of Ofu and enjoyed a reception given by Misa and the chiefs. After the entertainment the Governor inspected the Naval Dispensary and returned to the "Ontario", which proceeded to Olosega.

Upon arrival at Olosega the Governor and party were met by Malemo, High Talking Chief, in the absence of Tuiolesega who was ill, and were taken ashore in his boat. A very thrilling passage over the reef was had and everyone considered themselves fortunate that there were no serious consequences. The boat landed near the village of Sili and the Governor and party walked to the village of Olosega. Upon arrival at Olosega the Governor and party visited Tuiolesega, who was confined to his bed and expressed hopes for his speedy recovery. Afterwards a reception was held in the guest house and greetings were interchanged, then a feast was enjoyed by all. The Governor and party then returned to the village of Sili and boarded the "Ontario", which proceeded back to Faleasao, taking passengers from both Ofu and Olosega to Tau.

The evening of the 17th, a school entertainment was held in Tau, which was attended by many of the official party. It was under the direction of K. Sua and according to those who were there, was the best school entertainment ever seen in American Samoa. Manu'a deserves congratulations on the efficiency of its Public Schools.

The morning of the 18th, Flag Day, the people commenced coming in early to Tau, the "Ontario" anchoring off the village and the Naval band and two squads of bluejackets arriving to take part in the celebration. The Governor arrived about 10:00 a.m. and held an informal reception in the guest house until the ceremonies started at 11:00 a.m. The following program, all arranged by District Governor Tufele, was carried out: (The speeches are elsewhere in this issue).

1. Parading of Colors.
2. Invocation by Iata, Pastor of Fitiuta.
3. Address: Governor Kellogg.
4. Raising of Flag, 21 gun salute, Band playing National Air as flag is raised.

Ua mavae le aofia ona asia lea e le Kovana 'Sili ia le alii o Mauga sa faagasegasea, ona sosoo lea ma le tatalaga o le vai o Fitiuta sa fai ai, na amata lea sauniga i le itula 11:30 se ia oo i le 12:30 a. m.

I le taugagaifo o le la, sa fai ai taologa ma ua faapea:

1 Tuuga taufetuli mo Tane. O Pisa na mua, pito i ai Mei a'o Mafeanu lona tolu.

2 Tuuga Taufetuli mo Fafine. O Levao na mua, pitoane i ai Loosivale, a'o Filofiga lona tolu.

Ona maua lea o le tonu o le a le faia uma isi taologa, ae tau o siva ia faia. Sa matua lelei ona faia o siva uma ma lelei foi ona teuteuina. O le siva a Ofu na maua le sili, pitoane i ai le siva a Olosega a'o Faleasao na maua le tolu. Sa faia foi ni taga faa-Fita-fita e le A'oga a Manu'a ma se siva sa taina e le ausiva a Tutuila. O le taalolo na faai'u i ai sauniga o le aso, ua matua lelei tele ai i nisi lava taalolo ua vaaia i Amerika Samoa.

Ua faauma sauniga uma o le fiafia ina ua lata i le po e le Kovana Sili ma ua faafetai tele atu o ia i le Itumalo o Manu'a i lo latou faaalalo ma le talimalo ma faamavae atu ia te i latou uma, ina o le a sauniuni le malaga mo le Nu'u o Manu.

Ua tuua Ta'u e le Kovana Sili ma le aumalaga mo Faleasao, ma ua o ifo ai i tai i le Manuao i le itula e 10 i le po. Taunu'u i le taeao po i le Nu'u o Manu, ona o a'e lea i uts ma toto niu ma maimoa solo i le motu, a'o le tele o nisi itula sa faaogaina i le faiga o faiva.

I le itula e 6:00 p. m. na toe foi ai le Manuao i Faleasao e sarni le pasese na tuua ai, na taunu'u i ai i le taeao po o le aso 20. Ona toe faasaga a'e lea i le Luanu'u, e tu'u ai o e na o i le aso ma aumai ai foi nisi i Tutuila. Taunu'u i Pago Pago i le itula e 3:30 p. m.

Ai nei aso uma o le malaga na matua faailoa ai le talimalo ma le faaalalo o alii o Manu'a i Alii ma Failauga o Tutuila faapea foi ma le au Faaili. Ua matua malie atoatoa i latou i lenei malaga ma ua le mafai ona faagaloina.

MALAGA I SAMOA SISIFO

I le itula e 8 i le taeao Iuni 1st, sa malaga atu ai le Kovana Sili ma le Faletua, faatasi ai ma se nu malaga o Alii Ofisa o le Lotoa o le Fua, ma le alii Failautusi Sili mo Sauniga Samoa, ma alii Tetele ma Failauga o Amerika Samoa, le au-va'a o le Fautasi o Pago Pago ma le 'au Faaili e tusa ma le 270 le aofa'i uma o i latou sa faimalaga atu i Samoa Sisifo i se asiasiga faale Malo i le Kovana o Samoa Sisifo ma 'auai ai i sauniga o le aso soifua o le Tupu o Peritania.

Sa maeu le lelei ma le malu o le sami i le aso na fai ai lea malaga, o le itula e 3:30 p. m. na lafo ai le taula o le Manuso i Apia. O fautasi, tulula-motoa, tulula taualo, paopao, ma isi lava ituaiga va'a eseese sa i ai i le taulaga na o uma ifo i tai e faafetaia i le manua. Sa asiasi ifo i tai le Kovana o Samoa Sisifo e tusa ma le faiga e pei ona masani ai, ona toe liliu a'e lea o ia i uta ma toe alu ifo i tai lona va'a e sami i le Kovana Sili ma le Faletua. O nisi foi o le aumalaga na o a'e i uta i se tasi itula.

Sa matua faaloaloina le taunu'u a'e i uta o le Kovana Sili i sauniga e tusa ai, a'o le itu i le Aso-Sa na pa'u tonu i ai lo latou taunu'u atu, ua le papaina ai ni fana. O le Kovana Sili ma le Faletua, faatasi ma le Kovana o Samoa Sisifo ua faasaga a'e i latou i Vailima ma talimalo i ai le Kovana o Samoa Sisifo ma lona Faletua. O alii ofisa ma o latou auiga ma le Faamasino Sili o Hall, sa talimalo i ai alii tofia ma alii o Apia. O alii o Amerika Samoa ma Failauga faapea le 'auva'a o le Fautasi ma le Faaili, sa talimalo i ai alii tetele ma Failauga o Samoa Sisifo i Mulinu'u.

O le Aso-Gafua sa tuu lea e fai si maimoaga ma tafaoga, a'o le po o lea aso sa fai ai se siva tele na saunia e le Sefaute Kalapu i Mulinu'u. O le taugagaifo o le la o lea lava aso, sa fai se taaloga o le Futipolo i le va o le 'au a Amerika Samoa ma le 'au a Peritania Samoa ma ua manumalo ai le 'au a Peritania Samoa.

O le Aso-Lua, aso Soifua lea o le Tupu, o se aso taua tele lea, na faasaga atu ai faigamea eseese. O le tuaga fautasi na ruamua o le fautasi o Amerika Samoa ma fautasi o itu o Samoa Sisifo o se sauniga ta'uta'ua lea, ma ua manumalo ai le fautasi o Amerika Samoa.

O le taeao sa faia ai se faaliga solo Motoka ma ua teuteuina sa matua manaia tele, a'o le itula afiafi na faasaga atu ai i faigamea i Mulinu'u. O le po o lea lava aso sa faia ai se siva faapapalagi i Vailima ma ua matua lelei tele. O alii ma failauga o Amerika Samoa sa matua faaloaloina i latou i sauniga eseese e pei o le aganu'u a Samoa na saunia e Alii ma Failauga o Samoa Sisifo ua le mafai ona faamatalaina.

O le taeao o le Aso-Lulu Iuni 4, ina na mavae se faamavaega, ona gasolo ifo lea i tai le pasese i le Manuso ma ua tu'uv'a lona mai i Tutuila, taunu'u i le itula e 5:30 p. m.

Ua faaalua e alii tofia o Samoa Sisifo o se faato'a malaga tele lenei ma le manuia ai sauniga uma sa faia ma latou ma'utinoa. Ua faaloga foi Amerika Samoa i lenei sauniga e le mafai ona toe faagaloina.

TA'ULELEIA I LE MAMA

O nu'u ua aupito sili le mama ai nu'u uma o Amerika Samoa i le masina o Iuni, o Faleasao.

5. Address: District Governor Tufele.
 6. Address: District Governor Satele.
 7. Benediction by Jeremia, Pastor of Tau.
 8. Reception by Governor Kellogg and official party.
- After the reception the Governor and party went over to see District Governor Mauga, who had been taken ill.

In the afternoon the sports were carried out as follows:

1. 100 yard dash for men. Won by Pisa, Sivale second and Mei and Mafoanu tied for third.
2. 100 yard dash for women. Won by Levao, Lesivale second and Filofiga third.

It was then decided to postpone the remainder of the events and have the Siva Sivas. All teams were in elaborate costume and the dancing was excellent. Ofu won first place, Olosega second and Faleasao third. Drills by Manu'a schools were also given and Tutuila danced an exhibition Siva which was enjoyed by all. A Taalolo then arrived for the Governor, which was one of the most elaborate ever seen in American Samoa.

The day was fast coming to an end so the Governor called a halt to the festivities and congratulated the Manu'a people on their magnificent entertainment and bid all "Tofa" as it was necessary to leave for Rose Island.

The Governor and party then left for Faleasao and boarded the "Ontario", which proceeded to Rose Island at 10:00 p.m., arriving early in the morning. Most all went ashore to plant coconuts and visit the Island, the Governor inspecting at 10:00 a.m. The rest of the day was spent in visiting and fishing.

At 6:00 p.m. the "Ontario" proceeded back to Faleasao to pick up passengers for the other islands and Tutuila arriving early the morning of the 20th. She then proceeded to Ofu and Olosega, leaving and picking up passengers and then went on to Tutuila, arriving at 6:45 p.m.

During all this time the Naval Band, High Chiefs, Chiefs and people of Tutuila were feasted and entertained by the Chiefs and people of Manu'a. All enjoyed a good time and a wonderful trip which will never be forgotten.

VISIT TO WESTERN SAMOA

At 8:00 a.m. June 1st, the Governor, Mrs. Kellogg, and a party of officers and their families from the Naval Station, the Secretary of Native Affairs, about 270 High Chiefs, Talking Chiefs and Chiefs of American Samoa, the Pago boat crew and the band; sailed for Western Samoa on the U.S.S. "Ontario" to return the visit of the Administrator of Western Samoa and to participate in the celebration of the King's Birthday.

The weather was very pleasant all the way over and at 3:30 p.m. the "Ontario" anchored in the harbor of Apia. Immediately race boats, motor boats, small-pulling boats, ~~paopos and in fact every~~ boat that would float came out to greet the "Ontario". The Administrator came aboard and paid his official call on the Governor and then returned to shore, sending his boat for the Governor and Mrs. Kellogg. The rest of the party went ashore shortly afterward.

Upon the Governor's arrival on shore the customary ceremonies were observed with the exception of salutes, which on account of the day being Sunday were not fired. The Governor and Mrs. Kellogg then left with the Administrator for Vaillima, where they were entertained during the stay. The officers and their families and Judge Hall were entertained by the families of officials and residents. The American High Chiefs, Chiefs, race boat crew and the band were taken care of by the High Chiefs of Western Samoa at Mulinuu.

Monday was spent in sightseeing, the night being given over to a ball given by the Seiaute Club and Sivas and entertainment at Mulinuu. A rugby game was a feature of the afternoon, between American and Western Samoa, which was easily won by Western Samoa.

Tuesday, the King's Birthday, was an eventful day, sports and various entertainments following in rapid succession. First was the Fautasi race, the American Samoa crew starting against seven Western Samoa boats, which gave it an international aspect. It was a very easy victory for the American Samoa crew, which led all the way.

A parade and decorated automobile contest was enjoyed in the morning and in the afternoon the sports at Mulinuu, which were most interesting. At night a delightful ball was held by the Administrator at Vaillima. The chiefs were entertained by Sivas and feasting at Mulinuu, that is, the elaborate program which the Western Samoa Chiefs had arranged for them, a continual succession of feasting and entertainment, was still going on.

Wednesday morning, June 4th, after many fond farewells, the guests boarded the "Ontario" and sailed for Tutuila arriving at 5:30 p.m.

Western Samoa officials stated that this was the most successful and largest malaga that they know of having been held. American Samoa has already placed it in its archives as a never-to-be forgotten event.

SANITARY ROLL OF HONOR

The cleanest village in American Samoa for the month of June was Faleasao.

OLE FA'ATAMU

NOTICE: This material may be protected by copyright law (Title 17, U. S. Code).

O le Faatamū.

E lona ma faasalalauina lona i papa o le Malo o Amerika e aunoa i maunua laia.

O se papa faasino lea i lea maunua o Amerika aunoa, ma le faasaliga o le aluuga i lona o Amerika aunoa. E faasalalauina lona i papa i lona i lona o Amerika aunoa o aunoa ma se lona.

TOTOGI O FAALIGA E FAASALALAUINA.

lona atoa \$10.00. Vasaiga o le lona \$5.00. Kula o le lona \$2.00.

O le Faatamū.

Published monthly by the Government of American Samoa.

A paper devoted to the interests, development and progress of American Samoa. A copy of this publication is furnished, without charge, to each family in American Samoa each month.

ADVERTISING RATES.

Full Page \$10.00. Half Page \$5.00. Quarter Page \$2.00.



Malaga i Manu'a mo le Aso o le Fu'a luni 5, 1923.

Sa malaga atu le Kovana Sili ma alii ofisa i Manu'a i le manuaio i le taeao o le aso 4 o luni, mo le itu i le faafiafia o le luasefulu-tolu o tausaga o le faamanatuga o le sisiga o le Fu'a Amerika i motu o Manu'a. O Kovana Itumalo Mauga ma Satele ma nisi Alii sa faatasi ai ma le Kovana Sili i lea malaga.

Taunuu le manuaio i Tau i le itula e 4:00 p.m. i le afaifi, ona afio a'e ai lea i uta le Kovana Sili ma le au malaga i le tulula o Tufele, Pule Faalupega o Fitiuta. Ua tofafa ai le aumalaga i le maota o Tufele i lea po.

O se faaaliga ua aupito sili i a'oga i Amerika Samoa, sa faia e le a'oga i Tau i le po o le aso-Gafua i le malae o le a'oga i Lagopua aso 4 o luni e tuaoi ma le aso o le Fu'a, ma ua ta'ita'i ai le faiga o lea a'oga e K. Su'a.

Sa manaia ona teuteuina o le malae o le a'oga ma ua malamalama lelei foi i moli, ua atili ai le fiafia o le Kovana Sili ma lana aumalaga atoa, faapea foi ma malo sa i ai i lea po. E tele mea lelei esese o le faaaliga sa faia, ma ua lelei foi ona saununia. Ua mitamita tele le nuu o Tau i la latou a'oga, ma ua faamalo atu ai le Kovana Sili i lea faaaliga.

O se itu sa matua fiafia tele ai ma le 'atagia i le faaaliga, e le siva lea, na auai uma i ai tamaiti o le a'oga.

O sauniga o le Aso o le Fu'a na amataina i le taeao o le aso 5 o luni, itula e 10:00. O le alii Sui-Failautusi Sili mo Sauniga Samoa o le lauga-mua lea o le aso. Ua lomia lea lauga i se tasi itulau o lenei "Faatonu".

Ona saunoa loa o Kovana Pollock i le aofia e faapea:

LAUGA A KOVANA SILI POLLOCK I LE ASO O LE FU'A A MANU'A, 1923.

Kovana Itumalo, Pule Faalupega, Tamali'i, Failauga ma tagata o Amerika Samoa, le aofia potopoto.

Ua atoa le tausaga i le aso nei na ou faatoa vaai ai i nei motu matagofie ma feloa'i ai ma outou. O lena lava aso talu ai o le a faamanatuina pea i le talaaga faasolo mai o nei o motu, e avea ai o se aso aupito sili ona taua ia Manu'a, talu mai ona po o le pouliuli e le'i i ai se potopotoga tamalii faapenei i Amerika Samoa. Sa matua taua la'u vaai i nei motu i le tausaga ua te'a atu nei, e ui lava i lea, ua sili atu lenei aso. O lo'u lotu naunau ia Amerika Samoa e tuputupu pea i luma e tusa i lo'u malamalama i lona uiga ma ona tagata. O lenei lotonaunau e tumau pea i aso ou te ola ai, o lea, afai o le a ou tuua nei motu i se aso, ua ou faamoemoe lava ia tatou toe feloa'i.

O nisi o i latou sa tatou faatasi ai i le tausaga ua mavae, o loo ua muamua atu i latou i le malaga umi tatou te faasolo atu nei i ai e ui lava i lea, ua ou matua talitonu o loo mafuta o latou agaga faatasi ma i tatou i le aso nei.

O i latou nei o Tufele Timali, Asou, Le'iato, ou te faaloalo i le faamanatuina o outou suafa.

I la'u malaga lats mai nei i Niu Sila, sa matou feloa'i ai ma nisi o outou uso, o tagata Maoli, ua matua molimsau mai lenei itu ona o le faiga o la latou amio, o le lotu alofa tele; na o le itu i le gaganua na esese ai. O loo ia i latou se laau ua igoa o le "Manuka" na latou aveatua mai Manu'a nei. Sa ou tuuina i se tasi o latou alii se tugase 'ava, ma faamatala atu i ai lona faiga, aua ua le mafai ona ola o lenei laau i lo latou laueleele. Ua tuuina mai e lenei alii ia lana faafetai ia ou faaoo atu, ma le tasi foi o le tugase 'ava foi o le a teu pea e ia ma faaoo atu i tagata o lona atunuu le talaaga e uiga i ai. Sa tuuina atu foi ia te ia se siapo e faailoa ai le lavalava o lona tupuaga i Samoa nei.

E ui lava i faaloalo ma mea faafiafia i Nuu-Sila, a ua sili atu lo matou fia toe liliu mai i Samoa, aua o le mea lea o loo i ai o matou manatu atoatoa.

TRIP TO MANU'A FOR FLAG DAY, 5 JUNE, 1923

The Governor with a party of officers from the Naval Station left Tutuila on the "Ontario" on the morning of 4 June to proceed to Manu'a for the celebration of the twenty-third anniversary of the raising of the American Flag over the Manu'a Group. District Governors Mauga and Satele and a party of High Chiefs accompanied the Governor on the trip.

The "Ontario" arrived at Tau about 4.00 p.m. and the Governor and party were taken ashore in the boat of County Chief Tufele of Fitiuta County. The party remained at the home of Tufele for the night.

What was probably the best school program ever rendered in American Samoa, was presented on the school grounds at Lapopua on Monday evening June 4th, preceding the Manu'a Flag Day exercises, by the pupils of the Ta'u Public School, under the able direction of their principal, K. Su'a.

The grounds were nicely arranged and well lighted, which added to the pleasure of the Governor, his official party, the visiting chiefs and other guests. The songs, drills, recitations and other program numbers were carefully prepared and creditably rendered. The people of Ta'u are justly proud of their school, and Governor Pollock took occasion to compliment both.

The most pleasing part of the entertainment was that practically every child in school took part in at least one number of the program and all took part in the excellent siva siva.

The official ceremony of the Flag Day celebration took place at 10:00 the morning of the 5th June. The Acting Secretary for Native Affairs, Mr. W. G. Jeakle, made the first address of the day. The address is printed else where in this issue of the FA'ATONU.

Governor Pollock then addressed the assemblage as follows:

ADDRESS OF GOVERNOR POLLOCK FLAG DAY, MANU'A, 1923.

District Governors, County Chiefs, High Chiefs, Talking Chiefs and People of American Samoa, which includes all present:

One year ago today I first had the pleasure of seeing your beautiful Islands and of meeting you here. That day has passed into history as the greatest day Manu'a has known since the first time all the highest chiefs of American Samoa were gathered here so many hundred years ago when your honored ancestors first assembled here. I was impressed with these islands a year ago, and I am even more impressed with them today. My affection for American Samoa has grown as I knew the islands and the people better. It will remain with me as long as I live, and when I go to that Great Beyond "in the West" I hope to see you again.

Some of those who were here with us last year have passed on ahead of us, but their spirits, I am sure, are here with us today.

Tufele-Timali, Asoan, Lei'ato, I salute your memory.

Recently a trip to New Zealand brought me in contact with some of your distant cousins, the Maoris, whose characteristics of hearty hospitality and welcome, showed that they were your cousins, although they spoke a rather different tongue. They have a tree called the "Manuka", which they took from Manu'a with them. I presented the Chief with a kava root, but had to explain the kava ceremony as kava will not grow in that climate. The Maori Chief asked me to thank his cousins for the greetings and said that he would always keep the root and would tell all the other Maoris about it. A tapa was also given him to show what his ancestors wore in Samoa.

While we were overwhelmed with hospitality in New Zealand we were glad to return to our beloved Samoa again, for we feel that nowhere is there such a place as American Samoa where our many friends are.

O le tausaga ua mavae atu, ua tatou vaai ai ni mea e tele ua faia mo outou, ma ua aoga ai mo tatou uma. O le tu'iga o ava, o faiga o val inu, itu i le faiga o falema'i, o povi ua aumai i Ofu, ma le tele o le popo ua maua e sili atu ai i isi tausaga. aua o le poutu lenei o le manuia ma le tamaoaiga ia Amerika Samoa.

O loo i ai pea lo tatou fili, ia tatou faasaga tau ma le filifiliga pea i ai, o le manu'ainu lea. Na o le finau mau'ai pea ma le faamaoni, tatou te manumalo ai i lenei fili mata'utia. Ia tatou afaatasi i le faasaga atu e fai mea uma mo lona faatama'i atoatoa.

Ua faanoanoa ona ua le afaatasi ai ma le Failautusi Sili mo Sanniga Samoa i le aso nei ua ou taofi lava ua sili atu lona maelega i mea mo outou i se isi lava ua tuana'i. O ana galuega mama ma le sa'osa'o o ana l'uga ua tatau ona teu i o tatou loto taitoatasi uma O lana upu faumavae lenei na mana'o ia faitauina atu i o outou luma.

I ni vaiaso ua tuana'i nei, sa avanoa ai pea le tofiga o le Faalupega o Fitiuta e tusa i le faiga o le tulafono ma le aganuu a Samoa, e ui lava i lea, sa i ai se tasi ua faalaloaina e Samoa sa faasaga atu i le faiga o galuega o lenei tofiga. O lenei, ina ua faataunuuina o le faamauiina o le igoa o Tufele, e tusa i le tulafono, o lea, ua ou folafolaina atu nei i luma o le malo, o Tufele Faatoia ua avea ma pule faalupega i lenei foi itu, e leai se tasi e faagaloina le maluu o lona tama mamalu.

O se itu matua faigata le filifiliga o se tasi i le tofiga o le kovana Itumalo, aua ua i ai sili faalupega lelei e toatele ua mafai ona faia i ai o filifiliga; e ui lava i lea o le faiga i le Itumalo o Manu'a ua matua maunino ma malamalama i tagata o le Itumalo, le ua totau i ai lenei tofiga o le Kovana Itumalo ona o lona poto ma le malamalama ma le tasi, e pei ona ogatasi ma le aganuu a Samoa o ia o se alo o se alii taua o le faasologa mai o alii tetele o le atunuu. Ua molimau mai lenei itu o lona faamaoni i le tausaga o lenei tofiga i nai aso ititi sa ia tasi ai; o ia lava ua faamoemoe i ai mo le igoa ta'ulelela o lona aiga, mo Manu'a, mo Samoa, ma le Unaitete Setete.

Tufele Faatoia, Kovana Itumalo, o le a ou faitauina atu nei lou tasi tofiga o le Kovana Itumalo, a mavae ona tatou faasaga atu lea i le sisiga o le Fu'a na oo mai ai le filemu i nei atunuu i tausaga e lua-sefulu ma le tolu ua tuana'i seia oo mai i le aso nei.

Ia tatou tautua ma le faamaoni i lenei lava Fu'a ma ia faamamaluina i le lotomama ma le loto nu'u.

Ua faamanuia atu nei ia te oe, ia sili atu lou faautauta i le tele o tausaga o lou soifuaga ua maua ma ia e tautua sanniga uma o le itumalo e tusa ina o tautua e lou tama mamalu. O tagata uma o Manu'a o le a faamoemoe ia te oe faapea Amerika Samoa, faapea foi i Amerika, ona malamalama i nisi aso i mea ua tatou faia i Samoa.

Ia i ai le Atua i lenei aofia, faapea itu uma ua i ai le Fu'a.

TUSI TOFIGA O TUFELE FAATOIA

Me 28th, 1923.

Mai le: Kovana Sili.
Ia: Tufele-Faatoia, Tau, Manu'a.

Mataupu: O le tofia e avea ma Kovana Itumalo o Manu'a.

Ina ia tusa ma le faatonuga ua i ai i le Mataupu e 3 o le Tusi Tulafono ma Pola'iga o le Malo o Amerika Samoa, ua tofia ai nei oe i le tofiga o le Kovana Itumalo o Manu'a, ina ia nofoia ai le tofiga o loo avanoa talu le malū o Tufele-Timali.

Ina ia tusa ma se tasi faatonuga ua i ai i lea lava mataupu e 3 o lea, o le a i ai ia te oe le tofiga i aso uma lava o le malie o le finagalo o le Kovana Sili o Amerika Samoa, poo lou faamavae foi, poo le malū, ma ua avanoa ai lea lava tofiga.

E amataina lenē tofia i le aso 5th o Iuni, 1923.

EDWIN T. POLLOCK,
Kovana Sili.

TUSI FAAMAVAE A LE FAAMASINO SILI

O se mea e matua faanoanoa tele ai a'u lou tou Failautusi Sili mo Sauniga Samoa e faao atu lenē faaliga ona ua le mafai ona tatou faatasi ma auai ma outou i sauniga eseese o le faamanatua o le Fu'a, ona o le itu i la'u faamalologa ina ua talia mai e le failautusi Sili o le Fua ma ua ou faasaga atu nei a fai-malaga atu i le Uniate Setete.

Ou te le tau faamatalaina atu le ulga o itu eseese o le taua o le faatua o le Fu'a Amerika i luga o lo outou atunuu. Ua lava lo outou fiafia i le faamanatua le aso rā fai ai lea sauniga.

O lo ua atili ona taua le aso ona ua mafai ona tofia ma fau'u ina le Kovana Itumalo mo Manu'a ma tu ai i le tofiga sa avanoa talu ai le malū o Tufele Timali, le tagata e manatua pea i mafaufauga o tagata o Samoa ma ua iloa lona suafa i tala'aga tuufaasolo. Ou te talitonu i lo'u tsofi atoatoa, ona o alii ma tagata o Manu'a o le a le taumate o le a outou matua tuuina atu lo outou faaalosio ia Tufele Faatoia, ma le matua lagolago faamaoni i ai e tusa ma le tofiga. O lo'u manatu, o le a fisis e le ntalii e tusa ma le faiga a le taua. Tau ina ia faamanuiaina le nofo a Tufele-Faatoia. Ia selesele foi e tagata o Manu'a le manuia ma le tamao'auga atoa ma le nofo faiofani i lalo o lana tausiga ma lana faatonuga.

E ui ina le faatasi lo'u tino ma outou i le aso nei, a'o lo'u loto ma lo'u agaga e le a mafaufau mai ia te outou i le aso nei ma lo outou nofia i le faaalosio i la tatou Fu'a atoa ma lo tatou malo.

Tau ina ia faamanuia mai tatou ta'itoatasi uma e le na te ta'i-ta'iina o tatou faanoemoega ma ia i ai i lo tatou va a'o tete'a outou ma a'e.

We have seen many things in the past year which have helped you and all of us. The boat passages through the reef, the water works built with others contemplated, dispensaries improved for the care of the sick, cattle introduced in Ofu, and a large increase in the output of copra on which the prosperity of American Samoa depends. We still have enemies to fight, or I should say, one enemy to fight. I mean the coconut beetle. It is only by persistent effort that that dangerous enemy can be conquered. Every effort must be made against it.

I regret that the Secretary of Native Affairs could not be with us today, for I consider that he has worked harder and given more effort to help you all than anyone else. His conscientious work and his fairness in rendering judgments which cannot favor both sides should appeal to all. He left a message which will be read later.

For a few weeks Fitiuta County was without a County Chief appointed in accordance with the law and Samoan custom; although one was recognized by the Samoans and carried on the duties of County Chief. It was a pleasure, as soon as the law regarding the registration of the name Tufele had been complied with, to recognize officially Tufele-Faatoia as County Chief; although all of us regretted the passing away of his illustrious father.

It is a difficult duty to select a District Governor when there are several excellent County Chiefs to choose from; but in the case of the Manu'a District not only have the people of that district recognized one as well fitted to assume the duties of District Governor by virtue of his abilities, but also by reason, according to Samoan custom, of his being a worthy son of a most worthy father, and descended from a long line of High Chiefs of character and force. In this short time he has already shown that he will fill the position of District Governor faithfully and well, and be a credit to his family, to Manu'a, to American Samoa, and to the United States.

Tufele-Faatoia, Kovana Itumalo, I will now read your appointment as District Governor, after which we will repeat the raising of the Flag which brought peace to these islands twenty-three years ago today.

May that Flag always be served faithfully and well. May it be upheld with honor and dignity.

May you, a man wise beyond your years, administer the affairs of this District as well as did your honored father. The people of Fair Manu'a look to you, as do the people of all American Samoa, and in far-away America they will sometime realize what this Flag Day means to us all.

God be with you and with all of us here assembled as well as with all others who cherish the Stars and Stripes.

TUFELE FAATOIA'S APPOINTMENT

May 28, 1923.

From: The Governor.
To: Tufele-Faatoia, Tau, Manu'a.
Subject: Appointment as District Governor of Manu'a.

In accordance with the provisions of Section 3 of the Codification of the Regulations and Orders for the Government of American Samoa you are hereby designated and appointed to the office of District Governor of Manu'a, District of American Samoa to fill the vacancy created by the recent death of Tufele-Timali.

In accordance with a further provision of said Section 3 you will hold office during the pleasure of the Governor of American Samoa or until such time as by your resignation or death a vacancy is created in said office.

This appointment becomes effective as of June 5, 1923.

EDWIN T. POLLOCK,
Captain, U.S. Navy,
Governor.

JUDGE HALL'S MESSAGE

It is with sincere regret your Secretary of Native Affairs conveys to you the message that he is unable to be with you on this anniversary date and participate in the celebration and ceremonies in connection therewith. Having been granted a leave of absence by the Secretary of the Navy I am this day on my journey to the United States.

It is needless that I mention the vast importance of the unfurling of the Stars and Stripes over your land. It is sufficient that you, with feelings of sincere appreciation and hearts filled with gladness, celebrate the anniversary of the date on which this event occurred.

This day takes on added importance in that a District Governor for Manu'a has been designated and appointed to fill the vacancy created by the death of Tufele-Timali, a man whose memory will long linger in the minds of the people of Samoa and whose name will be handed down in reverence in tradition and history. I am proud in my confidence that the Chiefs and people of Manu'a will give to Tufele-Faatoia unswerving respect, loyalty, and devotion. I cannot but feel that great spirit of the father continues and now lives in the son. May Tufele-Faatoia be blessed with success. May the people of Manu'a reap peace, prosperity and contentment under his guidance and direction.

Though separated from you in body today yet I am with you in thought and in spirit and in my mind will I picture you assembled paying tribute to our Flag and our Government.

May He that guides our destinies bless each and all and be with thee and me while we are absent one from another.

Ona lauga lea o le Kovana Itumalo fou e faapea :

"KOVANA POLOKA :

Ua ou talia lou tofia o a'u i le tofiga o le Kovana Itumalo o Manu'a.

'Ou te folafola atu nei i le Malo lo'u matua tuuina atu ma le faamaoni o la'u tantua e le aunoa.

'Ou te matua taumafai i itu eseese uma ina ia 'ou manatua le faigata ma le mamafa o le feu o le a 'ou faasaga nei i ai.

'Ou te folafola atu foi i alii ma tagata uma o lo'u Itumalo lo'u matua faasaga atu e taumafai i mea uma 'ou te fais ina ia faatupuina le latou nofo feslofani, ma le manuia atoa ma le malilie o finagalo.

'Ou te aioi atu nei foi ma tagi atu ia te outou alii ma tagata uma o le Itumalo o Manu'a, ina ia outou lagolago mai ma le faamaoni ma fesasoani mai i le faiga o feu o le tofiga o le a 'ou faasaga atu nei i ai.

O le tagata, e amio faale-tagata lava ia, ma ua mafai ona sese sua o le tagata. Tau ina ia faatonuina ma ta'ita'ina a'u e le Tama i le lagi."

Sa faai'uina sauniga o le aso i mea faafiafia, e i ai taga-faafitafita a a'oga, siva, atoa ma isi mea.

I le taeao o le aso 6 o Iuni sa fai ai se asiasiga puupuu i le nuu o Ofu e le Kovana Sili ma le aumaluga, ma sa asiasi atu foi i le alii Pule Faalupega.

I le afiafi o le aso 6 o Iuni, na afio atu ai le Kovana Sili ma alii Kovana Itumalo o Tutuila ma Manu'a atoa ma le toatele o Alii Tetele o Amerika Samoa faatasi ma ofisa o le Latoa o le Pua, e mamoa i le vai fou o Olosega faato'a mae'a nei. Sa 'auai le Kovana Sili ma le 'au malaga atoa i le tatalaina o le vai. O le taliga o le malo e le alii Faalupega o Tuiolosega ma lona nuu e uiga i mea taumafa, o se mea lea na matus ofofofia. I tausaga ua mavae sa aunoa le nu'u o Olosega ma se vai lelei faapea. O le mea e i ai le sima ua i ai i luga o le mauga ma ua 1000 futu le maualuga o le vai. Ua i ai se tasi sima i lalo ifo o le sima tele poo le 600 futu lona maualuga, ma ua faatuina lea sima e vavaeina i ai se malosi tele o le vai ne'i tupu se faalavelave i le vai.

O lenei galuega sa faia e le nu'u o Olosega ma le sa pule ai i le feu o Eika lea atoa ma le alii pule Faalupega, o se feu fita tele lava, ona o le itu i le a'ega o le auata e alu i le mea e i ai le sima. E tolu ta'elega ua faatuina i le sa'i. Sa matua tuteuina lelei ta'elega atoa ma fale mo le sauniga o le tatalaina o le vai na faia i lea aso. Sa faia sauniga eseese o le faa-faiafa o lea aso, e i ai siva ma taalolo ma le fitafita a le a'oga atoa ma se taumafataga tele na faia i lea lava aso, i le ma le laulelei o le nu'u ma le manaia o le lau-oneone pa epa e ua atili ai ona atoatoa o le matagofie o lea sauniga.

Na mavae le po na moe ai le malaga i Olosega, ona malaga ai lea o le Kovana Sili i le manua i le Nu'u o Manu, ma sa totoina ai niu pe 150. Pe tusa ma niu e 12 sa totoina i le malaga muamua ua ola lelei.

Sa toe liliu le manua i Tutuila i le aso 9 o Iuni faatasi ma alii uma o Tutuila na auai i le malaga. I aso a'o fai malaga taamilo le manua i motu o Manu'a, sa faasaga atu ai le Alii pule o A'oga ma faia ana asiasiga i a'oga uma a le Malo ua faatuina i motu o Manu'a. Sa asiasi foi e le Kovana Sili ma le an malaga i le nu'u o Fitiuta, ma ua lelei foi ma manuia lea nu'u faapei lava o sa'i uma i Manu'a.

The new District Governor addressed the people as follows:

"GOVERNOR POLLOCK:

I accept from you the appointment to the office of the District Governor of Manu'a.

I pledge to the Government my continuous sincere and loyal support.

I shall in every way try to know the responsibilities that I now assume.

I will also pledge to the chiefs of my district my every effort and try to promote and assure their peace, prosperity and happiness.

I will now ask to you chiefs and people of the District of Manu'a for your sincere and loyal support and cooperation in the performance of my duties.

Man is human and liable to make errors. May the Father in heaven guide me and direct me.

The exercises were concluded by a native entertainment, consisting of drills by the school children, sivas, etc.

On the morning of the 6 June, the Governor and party made a short tour of inspection of the Island of Ofu, and paid a visit to the County Chief.

On the afternoon of 6 June, the Governor accompanied by the District Governors of Tutuila and Manu'a, most of the High Chiefs of American Samoa and officers from the Naval Station inspected the new water works systems which has been recently constructed on the Island of Olosega by the Governor. The party also attended the formal opening of the systems.

The entertainment furnished by the County Chief of Olosega, Tuiolosega, and the people of his county was most lavish. Previously the village of Olosega has had practically no fresh water supply. The reservoir is on the Plateau of Olosega on the other side of the mountain from the village and over 1000 feet elevation. An intermediate tank of about 500 feet elevation had to be built to prevent undue pressure in the lower water main.

The work done by the men of Olosega under the supervision of Chief Quartermaster R. W. Akers, U. S. Navy, and the County Chief was very difficult on account of the stiff trail leading to the plateau. Three bathing pools were built in the village. The pools and many of the houses of the village were decorated in honor of the occasion. The entertainment for the visitors included a beautiful flower drill by the school children, several sivas, and a taalolo for the Governor, also a most elaborate feast for all the visitors. The village of Olosega covers a large area of glistening coral sand which was as beautifully clean as any place could have been.

After spending the night ashore at Olosega the Governor and party proceeded on the "Ontario" to Faleasao to land some of the party, thence to Fitiuta where the Governor and some of the officers and chiefs of Tutuila visited the village which was like all Manu'a villages, in fine condition. That night the "Ontario" proceeded to Rose Island where about 150 coconut trees were planted. About a dozen of the trees planted last were growing well.

The "Ontario" returned to Tutuila on the 9th June, bringing all the visiting Tutuila chiefs from Manu'a. While the "Ontario" was making the rounds of the Islands, Lieutenant Albert, Superintendent of Education made an inspection of the public schools in the Manu'a Group.

LAUGA A LE SUI - FAAMASINO I LE ASO O LE FU'A I
MANU'A, IUNI 5, 1923.

Ua ou matua fiasia lava ina ua faaavanoaina o a'u e lauga atu ai i o outou luma e tusa ma le avea o a'u ma outou Sui-Fallautusi Sili mo Sauniga Samoa i le aso nei, ma ua faanoanoa tele lava le loto ina ua tatou le faatasi i le sauniga nei ma Tufele-Timall, Asoau ma Leieto atoa ma isi o e ua i'u soifua ma ua valaauina e lo tatou Matai Silisili i le tausaga ua mavae.

I lenei sauniga, o le faamanatuina lea o le aso na sisi ai le Fu'a ma ua sili i tausaga e 20 i le aso, le aso na faaali ai lou tou gaua'i atu i le Unaiite Setete, le aso na faato'a sisi ai le Fu'a Amerika i luga o motu o Manu'a, ma ua avea ma faamamaluga a lena Malo Tele ia te outou, ma ua toe oo mai ai foi i le aso nei o ua fai ma sui o lena Malo ina ia auai i le faa-fiafiaina ma le faamanatuina o le sisiga o le Fu'a Amerika i luga o motu o Manu'a.

O le a faapei le aso (Iuni 5, 1923) ona manatua pea i loto ma finagalo o alii ma tagata uma o Manu'a e pei lava ona manatua o lena aso ua 23 nei tausaga talu ai, aua o le aso nei, o le a tofia ai le Kovana Itumalo o lona to'a tolu lea o Kovana Itumalo o Manu'a, ma ia nofoia ai le tofiga na ia Tufele-Timall, o se alii Samoa ua matus ta'uta'ua i ni mea lava e tele, i le ma mo'omo'oga lava o lo'u loto, talosia ina ia mulimuli tonu le ua faaulu nei i ai upu o lou tou Itumalo i tulagavae o le na la soso'o.

I nei tausaga e 20, ua vaala le alualu pea i luma o le lelei ma le manuia o motu o Manu'a. Ua ou le taofi foi o le a ou taumafai ona laulautasi atu o la'asaga eseese e uiga i le alualu i luma o lou tou manuia. E leai foi so'u taofi ou te talatalaina atu le loloto ma le lautele o ia laasaga uma taitasi. O mea mautinoa lava ia mea uma.

E ui i lea, ua outou fesili ifo ea ia te outou i le fesili lenei: Ana faapea e le fesoasoani mai ma lagolago mai le faamamaluga ma le tauniga a le Malo Tele e ana le Fu'a ua tatou potopoto ai i le aso, e le na manu ea e le mafai ona maua ma faataunuuna le tele o mea ua manuia ai nei?

ADDRESS OF ACTING SECRETARY OF NATIVE AFFAIRS

W. G. JEAKLE,

FLAG DAY, MANU'A, JUNE 5, 1923.

I am happy indeed to avail myself of the privilege of addressing you as your Acting Secretary of Native Affairs today, though I am sincerely regretful that we have not with us Tufele-Timali, Asoau, Leiat, and those others who have answered the call to the Great Master during the past year.

On this, the anniversary of that day over a score of years ago, when declaring your allegiance to the United States the Stars and Stripes were first planted in the Manu'a Group and the assurance of the protection of that great nation was given you, representatives of that country are again with you to fittingly celebrate the anniversary of the raising of the Star Spangled Banner over Manu'a.

June 5th, 1923, like that day twenty-three years ago will be ever remembered by the chiefs and people of Manu'a because today the Third District Governor of Manu'a will be appointed to fill the place of one of the greatest Samoan chiefs ever known, Tufele-Timali, who recently went to his reward, and it is my heartfelt wish that your new executive will follow closely in the footsteps of his predecessor.

These years have witnessed a gradual but marked progress in the Manu'a Group. It is not my intent to attempt to enumerate all the various steps concerned in this progressive development, nor shall I discourse at length on any one of them. They are self-evident, especially as to education was shown by the exercises of last evening.

I would, however, have you ask yourselves this question:

Without the aid, cooperation and protection of that nation whose flag we today honor would not many of these things have been impossible and others less readily accomplished?

23 Aug 90

Sea Turtle Tagging

Tags N105 + N106 (one on each front flipper)
Hawkebill ♀ 42 cm shell length (round), 23 Aug 1990

Vaisa Pt. (near Tafuu Cove on N. side Tutuila)

- Afono resident caught it while diving + brought it to DMWR office for tagging, then release at same site. He was advised ~~to~~ it is best ~~not~~ to eat turtles alone.

- Said some turtles still nest in bays near Afono (esp. Amalan, also Oa).

Tom Morrell
Dept Marine & Wildlife
American Samoa

tag N 104 - (misfire), not used.

send form
tag to him

7 Sept 90

George -

Tag N104 was a misfire, probably because it was my first tag in a year + I didn't clamp tight enough.

Tags N102 + N103 were applied on 17 Aug 90.

Also had report of turtle eggs ^{buried} on a beach in Fagatele Bay (a National Marine Sanctuary) on Tutuila Island, in mid July 1990.

Regards,

Peter Craig

Rose Trip - Follow-up Rat eradication program

27 April - 2 May 1991

Nightly surveys @ 2 hour intervals

- 0 Turtle Tracks made during visit

1 Hawksbill observed in Lagoon by Roger DiRosa (USFWS)

Tom Morell

George,

Thought you
would like a
copy - let me
know if you have
corrections.

Also I finished
the "shroud" book and
found it very fascinating
- quite convincing that
it was Christ's shroud.
I'll return it soon. JK

UNITED STATES GOVERNMENT

FISH AND WILDLIFE SERVICE
HONOLULU, HAWAII*Memorandum*

TO : Refuge Manager, FWS, Honolulu, HI (RWR)

DATE:

12/15/82

FROM : Assistant Refuge Manager (Remote), FWS, Honolulu, HI

SUBJECT: Trip Report - Rose Atoll NWR - October 1 - 15, 1982

Personnel: Gerald Ludwig - Assistant Refuge Manager, FWS, Remote Islands
 George Balazs - Turtle Biologist, University of Hawaii, on loan to NMFS
 William Pedro - Biological Assistant, Office of Marine Resources, American Samoa Government
 Richard Davis - Science Specialist, Department of Education, American Samoa Government
 Ropeti Tofeano - Student, Leone High School, American Samoa Government

Transportation: Pago Pago to Rose Island and return.
Sausauimoana, ca 70 foot multi-purpose fishing vessel from the Office of Marine Resources, Paul Pedro, Captain, 4-man crew.

Itinerary: October 1 - Depart Honolulu for Pago Pago via South Pacific Islands Airline
 - Meet with Henry Sesespasara enroute.
 - Meet with Dick Wass, William Pedro, Captain Paul Pedro, Rick Davis and George Balazs to discuss trip.
 October 2/3 - Purchased food and supplies for trip.
 - Visited Anunuu Island to investigate story of poison turtle.
 October 4 - Pack Sausauimoana. Met with Dr. Richard Wass to discuss papers by Monroe about Tridacna studies. Met with Sesespasara, Wass, Davis, W. Pedro and P. Pedro to discuss trip.
 - Depart Pago Pago for Rose Atoll at 2:00pm.
 October 5 - Spotted Rose Island about 6:00pm. Circled island.
 - Used 14' dinghy to transport supplies to island about 8:00am. Set up camp on south side of island within Pisonia forest.
 - Spend late morning and afternoon measuring clams next to Rose Island, marking additional clams for growth studies; conducting transects on NE side of atoll and doing general observations of habitat and birds.
 - Observations of birds and turtles done at dusk and evening.
 - Covered natural history subjects with Samoan student and helped him with field studies.
 - Balazs and Pedro surveyed turtles during night (none seen).
 - Pedro observed husked coconuts that indicated trespassing on island.

- October 6: -Circled island to survey turtle tracks, habitat etc.
 -Continued clam transects until 5:45 pm. Water got too dark to work in safely after 5:30 pm.
 -Davis and Ludwig got very sunburned. Searched for turtles during the night. Balazs tagged two turtles during evening.
- October 7 -5:30pm Circled island and spotted whale jaw bone on coralline algae reef flat about 100 m north of Rose Island.
 -Davis, Tofeano, Pedro and Ludwig continued clam transects.
 -Fisherman on Sausauimoana cut hand; Paul Pedro wants to take him to Tau tomorrow. Davis and Ludwig very sunburned and cut up from coral.
 -Black noddy transect conducted during late afternoon;
 -White Tern transect done in early evening by Ludwig and Davis until 9:00 pm. Searched for Pololo worms during night but they did not appear. Sausauimoana departed for Tau during early evening; Ropeti went with the boat in order to return home (by plane from Tau) by White Sunday. Balazs and Pedro tagged two turtles during evening.
- October 8 -5:30 am, circled island. Spotted tracks of turtle that had crawled across ca 200m of sandflat during low tide.
 -Davis and Ludwig continued clam transects throughout day.
 -Coast Guard plane flew over island during early afternoon.
 -During early evening (8:00-9:00pm) a fishing boat was observed drifting west about a half mile south of the atoll. Pedro and Balazs looked for turtles. Rain and wind was heavy during the evening (wind to 25+mph).
- October 9 -5:30am Circle island. Sausausimoana returned from Tau today. Doctor on Tau could not stitch hand of fisherman because of time elapsed from time of accident.
 -Coast Guard plan flew over atoll again.
 -Davis, Pedro and Ludwig continued clam transects.
 -Observed juvenile coconut ~~crabs~~ in camp (this and all subsequent evenings). Balazs reported seeing shredded coconuts that suggested presence of adult ~~crabs~~.
- October 10 -5:30am Circled island and counted birds etc. Spent morning with Davis or Pedro measuring length of atoll sides during low tide.
 -Davis, Pedro and Ludwig dove on pinnacles at extreme west side of lagoon and measured length frequencies of clams.
 -All of us were chilled by dive. Weather on surface was hard rain and 25mph winds, lagoon had whitecaps.
 -Balazs took underwater photos and observed turtle sleeping holes around the pinnacles.
 -Four crew members came to shore for a few hours to "celebrate" White Sunday. I took Captain Pedro around the island. He had been on Rose Island 8-10 years ago.

- October 10 (continued) -George tagged two turtles during the evening.
- October 11 -5:30am. Circled island. Sausauimoana left for Tau with Balazs and W. Pedro at 6:00 am.
 -Davis and I measured the reef sides and did length frequency distributions and transects during the days.
 -An early morning attempt to do transects on SE side of lagoon was aborted. Large waves were hitting the outside of the reef, washing over the reef shelf and flowing out into the lagoon. The current caused by the waves was too strong to swim against (or even standup in 1m deep water). Made bird observations during early evenings. Circled island several times during the night to search for turtles. I observed one track, but no turtles.
- October 12 -5:30am circled island and observed another turtle track.
 -Finished shallow water transects, continued length-frequency distributions and reef measurements.
 -Sausauimoana returned about 3:00pm.
 -Observed tridacnid spawning at 5:40pm on NE side of island.
 -Weather was clear but continued to be windy.
 -8:00pm made round of island and found a tagged turtle (George tagged last week) building a nest on NW side.
- October 13 -5:30am found turtle digging nest at north tip of island. Tagged it.
 -Fishing boat anchor line broke during the night so they drifted until morning and then returned.
 -Davis and Ludwig finished transects and reef measurements and then did photography of habitats.
 -7:47pm found turtle building nest on northeast side of island. We tagged it.
 -8:00pm observed another nesting turtle, on south side of Rose Island. It had dug out part of egg pit so we left it alone. Later observed 75 eggs being laid. Tagged the turtle after it finished nesting.
- October 14 -5:30am circled island. Observed turtles mating in lagoon shallow west of Rose Island. Also saw fresh tracks on SW side of island.
 -Cleaned tents, stove and other equipment and packed.
 -Cut vegetation around refuge sign.
 -Measured additional clams near island and made distribution map.
 -Photographed clams, fish near island but choppy water caused difficulties. Continued to photograph clams etc., near pinnacle at SW side of lagoon.
 -Paul Pedro brought the Sausauimoana into the lagoon. We packed up and loaded boat at 1:00pm. Left atoll at 2:30pm.
 -Observed humpback whale along NW side of atoll as we were leaving.

October 15

- Arrived Pago Pago at 2:00 am.
- Unpacked boat, Ludwig, Balazs, W. Pedro, Wass and Sesespasara. Balazs and Pedro had visited Tau, Ofu and Olasanga Islands and interviewed many people about turtles and use of Rose Atoll clams.
- We related our general findings to Henry Sesespasara, Head, Office of Marine Resources and to Dr. Richard Wass.
- 4:00pm departed for Honolulu via South Pacific Islands Airlines.
- 9:30pm arrived at Honolulu.
- 10:45pm arrived home.

Highlights: Spawning of giant clams *Tridacna maxima* was observed on October 12, 1982. Rain and winds hampered investigations during part of the trip. A fishing boat that was probably from Korea passed near the atoll. The Coast Guard patrol plane passed over the atoll twice. Practically no nesting of seabirds was observed. Evidence of trespass on Rose Island was found.

Physcial Environment: The weather was generally favorable during the first three days away from Pago Pago. Skies were partly cloudy and winds were light. The evening of the third day on the island brought heavy rain and wind that continued until Monday morning when Pedro and Balazs left for Tau. The weather then cleared up except for the winds and occasional showers. By Thursday the weather had returned to partly cloudy and light winds.

Open water temperature in the lagoon (at 10m deep) remained about 28°C throughout the trip. Lagoon surface temperatures reached 31-32°C during late afternoon on sunny days. Underwater visibility varied between 20 and 60 meters.

The Pisonia trees on the island appeared to have many of their leaves gone. This may be seasonal occurence or due to high winds.

Rose Island had evidence of high waves hitting it since our March visit. About midway along south and east side of the island several Tournafortia trees had been under-cut and overturned by waves. Vegetation drift lines and a gravel berm also indicated that waves from the east had washed about 1/3 of the distance across the island at a point directly east of the northernmost Pisonia trees.

High waves and tides had not erased the turtle pits that were observed on Sand Island during the March 1982 field trip. A total of 27 additional pits were observed on Sand Island. Only one may have been successful according to Balazs.

Tides were very high and low during our visit. I was able to walk to within a few meters of the lagoon drop off on a gravel bar during low tide one evening. The high tides allowed waves to reach the vegetation line on all sides of Rose Island (except the extreme northern tip).

Vegetation: Sand Island was devoid of vegetation (as usual). Rose Island appeared to have been affected by severe weather conditions since the March 1982 field trip. Tournafortia trees were overturned along the east and south sides of Rose Island. Many small Tournafortia trees were sprouting in the gravel area on the north side of the island.

Pisonia trees had much fewer leaves present than during previous trips in November 1981 and March 1982. Possibly these trees lose many of their leaves at this time of the year, however, high wind, heavy or very light rain and possibly heavy salt spray may have caused leaf damage also.

The Boerhavia-Portulaca openings were quite lush. The lack of birds at this time may have allowed this low vegetation to grow better than it had prior to previous visits.

Marine vegetation did not appear to be different than during previous visits. The dominant vegetation in the shallow (<5m) water is coralline algae and zooxanthalloe in coral: a Padina sp dominates the solid substrat on the bottom of the lagoon. Occasionally patches of Halimeda sp are found among the corals and coralline algae. The sandy slopes and bottom of the lagoon have scattered patches of a feather-like (ca 5-10cm) green algae that has prostrate branches. This may be a species of Caulerpa.

Mammals:

1) Humpback Whale (Megaptera nouaeangliae). A humpback whale was observed on October 14, 1982 as we left the atoll. The animal was an adult and it was sounding about 80m out from the NW side of the lagoon. Two or three other humpback whales were also observed east of Aunuu Island on October 3. They were slapping their front flippers against the upper water surface.

2) Polynesian Rat (Rattus exulans). The only terrestrial mammals observed at Rose Atoll were Polynesian rats (Rattus exulans). These were abundant only in the Pisonia forest; a few were also seen in the leaf carpeted areas of the Tournafortia thickets.

These rats have little fear of people. They would often be scampering over and underfoot while we were eating supper. Five to ten rats could usually be seen at a time during the evening from any spot in camp. During the day, one or two rats could usually be seen within ten to thirty meters of the camp.

Birds:

1) Red-tailed tropic bird (Phaethon rubricauda). One adult was observed on the south side of the island. It was at the base of a Pisonia tree and within 10 meters of the beach.

2) White-tailed tropic bird (Phaethon lepturus). None were observed.

3) Masked booby (Sula dactylatra). Masked boobies were observed soaring above the two islands and on the ground tending to young. Most of the birds that were observed were adults or juveniles. One nest with a naked chick and an egg was seen. Most of the non flying birds were observed in the Boerhavia "meadows" between the Pisonia and Tournafortia thickets. Some of the juveniles were also in the openings in the Tournafortia forest. Population estimate: Adults 25;

juveniles, 13; downy chick, 1; naked chick, 1; and egg, 1.

4) Brown booby (Sula leucogaster). Twenty to thirty adults and juveniles started to follow the boat as it came within a mile of the atoll. These birds were attempting to catch the tuna lures that were being towed behind the boat. Three of the birds were caught by the lures and had to be brought to the boat to be released. No eggs, or non-flying juveniles were observed on the islands. An estimation of the number of brown boobies present on the atoll was difficult because many of them would be roosting in the trees during the day. Transects were of no use in estimating the number of birds in the trees because they would fly up well ahead of the observer. Population estimate: adults, 300; flying juveniles, 300.

5) Red-footed booby (Sula sula). Red-footed booby adults and juveniles joined the brown boobies that were following the boat as we approached Rose Atoll. Ten to fifteen could be seen at a time as we circled the island. An accurate count of these birds was nearly impossible because they would fly out of the trees before they could be counted. Total counts in the air were also not accurate because many of the birds would be in the trees while others were soaring overhead. Most of the pre-adult birds were flying juveniles. An accurate count of nests was not made because of the thickness of the vegetation cover and the height of the nests in the Pisonia forest. A few downy young were seen in the nests. The presence of eggs could not be determined. Population estimate: 500, adults and flying juveniles; 10 downy chicks.

6) Great frigate bird (Fregata minor). Great frigate birds were observed soaring above the Pisonia trees or roosting in the trees. No active nests were observed although they may have been present. The thickness of the canopy made observation of the nests almost impossible. About 40-50 frigates were usually observed at a time above the island during the early morning or later afternoon.

7) Lesser frigate bird (Fregata ariel). Lesser frigate birds were usually soaring among the greater frigate birds, boobies and terns that were above Rose Island or along the reef edge. About 10-15 birds could be seen at a time in the early morning or late afternoon. No nests were observed although they may have been present in the high Pisonia trees.

8) Reef heron (Egretta sacra). A single reef heron was observed on the reef at the southwest side of the atoll. No herons were seen on Rose or Sand Islands however.

9) Snowy egret (leucophoyx thula). No snowy egrets were seen.

10) Golden plovers (Pluvialis dominica). Golden plovers were seen within the Pisonia and Tournafortia forests during the day and night and along the beaches in the early morning, late afternoon and during the night. Two of these birds were in the continual process of determining who was going to be eating in the vicinity of the field camp throughout our stay on the island. Population estimate: 14 adults.

11) Ruddy turnstone (Arenaria interpres). Ruddy turnstones were observed whenever we walked along the beach. A maximum of 20 were seen at one time. The birds were usually feeding along the beach or on the many rocks that were exposed at low tides on Rose and Sand Islands.

12) Wandering tattler (Heteroscelus incanus). One or two of these birds were observed on every trip around the island during the day or night. Population estimate: 5 adults.

13) Sanderling (Crocethia alba). I did not identify any sanderlings on this trip.

14) Bristle-thighed curlew (Numenius tahitiensis). Curlews were observed in the Pisonia and Tournafortia thickets and along the beaches. Two to four of these birds were observed on every early morning trip around the island. There may have been more than four birds on the island (Rose) but that could not be determined for sure. Four birds was the maximum seen at one time.

15) Gray-backed tern (Sterna lunata). Gray-backed terns were not distinguished from sooty terns. These have been observed during the previous field trip in March. No positive identification could be made on this trip because of the height that the tern flock was circling at.

16) Sooty terns (Sterna fuscata). Sooty terns provided a continuous cacaphony of noises throughout every night that we were on Rose Island. In addition to the noise there was a nearly continuous light "rain" of tern crap. The birds did not settle on Rose Island during our stay but they had been on the ground and laying eggs at least once before we got to the island. A "patch" of about a hundred or so eggs were found in the southwest side of the Pisonia forest. All of the eggs had been broken. Most likely the egg damage was done by rats or crabs. The terns were frequently seen landing and taking off from Sand Island during the day. No eggs were found on that island however. Each evening and during much of the day the terns formed a flock that soared overhead on Rose Island. Their raucous noise made sleeping difficult for the first few nights. Population estimate: 800-1000 adults.

17) Brown noddy (Anous stolidus). Only one brown noddy was seen at Rose Island and none were at Sand Island. The single brown noddy that was seen flew out of a Tournafortia tree on the northern tip of Rose Island and then fell into the water. The feathers of the bird were in disarray when it flew.

18) Black noddy (Anous tenuirostris). There were decidedly fewer black noddies present on the islands than during my previous visits in November 1981 and March 1982. Transects that were run in an east-west and in a north-south direction (see map) revealed only two inactive nests and the possible remains of two others. I checked sites where I had observed nests during previous visits but I did not find the nests. In fact, I did not see any active nests during many observations

in the Pisonia forest. There were adult black noddies along the transects and scattered throughout the Pisonia forest. They were flying about or roosting in the branches of the trees. Thirteen adult birds were seen on the NS transect and none on the EW transect. The area of the transects is 3400m² and the area of forest utilized by these birds is estimated to be about 12,500m². The total number of black noddies in the forest is therefore estimated at 48 adults. Counts of black noddies were made during mid-afternoon, on partly sunny day with light tradewinds blowing.

19) White tern (Gygis alba). Paired and unpaired white terns were observed every day that we were on Rose Island. All birds that were observed were adults. It is possible that eggs were present but no adults were seen that appeared to be attending nests. No non-flying white terns were seen.

The number of white terns that were present along the NS and EW transect in the Pisonia forest were counted by Davis and Ludwig (as were the black noddy counts). The white tern counts were done during the early evening on the same day that the black noddy counts were made (October 7, 1982). Eighty-nine birds were seen on the NS and 41 birds were observed on the EW legs of the transect. This gives an estimate of 382 adult white terns in the estimated 10,000m² of usable nesting habitat in the Pisonia forest (see Shallenberger's 1980, November report).

20) Long-tailed New Zealand cuckoo (Urodynamis taitensis). I did not observe this bird but Rick Davis heard and saw a bird that may have been a cuckoo.

21) Wattled honeyeater (Foulehaio carunculata). No positively identified honeyeaters were observed although a bird about the size and color of the wattled honeyeater was seen in the Boerhavia meadow on the southeast side of the island. The behavior of the bird was not the same as that of wattled honeyeaters that I had seen in Pago Pago. This bird stayed on the ground unless startled.

Other bird observations:

No other species of birds were observed on Rose or Sand Islands. The single blue-gray noddy that was frequently observed during the March 1982 trip was not present during this trip. Several shearwater species were observed at sea during the transit between Rose Island and Pago Pago.

Reptiles:

1) Green Sea Turtles (Chelonia mydas). George Balazs and William Pedro circled Rose Island several times each evening and searched for turtles that had come ashore to lay eggs. They also visited San Island to look for evidence of turtle nesting. Ludwig also circled Rose Island each morning to determine if any turtles had come ashore after Balazs was done with his nightly surveys. Ludwig also continued the evening and morning surveys after Balazs and Pedro left for Tau and Ofu Islands. Rick Davis provided additional help to all of the survey people. Observations of turtles that were in the lagoon were also recorded.

George Balazs tagged four turtles and had one observation of a track that was on the beach with no turtle attached to it. Ludwig tagged three turtles and observed one turtle that Balazs had tagged during the previous week. Three additional tracks were seen by Ludwig.

One of the turtles that Ludwig tagged laid 75 eggs in a nest on the southeast side of Rose Island.

The location of the turtles that were tagged by Ludwig and Davis is shown on the accompanying map.

Balazs visited Sand Island on the first day that we got to the atoll and located 27 pits that had been dug by turtles. He felt that only one of the pits had eggs in it. George stated that it is very likely that the large rubble that composes most of Sand Island may greatly hamper successful nesting of the turtles. George also felt that the heavy gravel and rubble substrate on the northeast and east side of Rose Island may also hamper nesting in those areas.

All turtles that were spotted on the island were found after dark with one exception. I found and tagged a turtle on the northern tip of Rose Island at 6:00am on October 13. The turtle had dug a number of false nests and appeared to be covering a true nest when I spotted it.

Ludwig made the following observations:

- October 6: Two large green turtles seen in lagoon.
- October 7: One small green turtle seen grazing along NE side of lagoon drop-off.
- October 8: Eight adult turtles seen at the surface of the lagoon.
- October 11: No turtles were seen on three excursions around the island during the night but tracks indicated that one had come ashore between 8:00pm and midnight and another between midnight and 5:30pm.
- October 12: A large female was found at 8:28pm. Carapace length=109cm.
Tagged: 5792 and 5793 on left front leg and 5791 on right
(Balazs had tagged this turtle during the previous week)
Tide: Low
Location: Found beneath Tournafortia on the northeast side of Rose Island.

Additional observations: Six turtles were seen in the lagoon during the day.

- October 13: 8:08am, Large female found beneath the Tournafortia on the northern tip of Rose Island.
Tagged: By Ludwig: 5794 put on right front leg.
Carapace length: 98cm
Tide: Low
Turtle was covering last of a series of 4-5 pits.

Additional observations: Two large and one small turtle were seen in the lagoon.

7:45pm, Large female found beneath Tournafortia on the northeast side of Rose Island.

Tagged by Ludwig and Davis: 5797 on left front leg
5798 on right front leg

Carapace length: 99cm

Tide: Low (high was about 4:30pm)

This turtle was checked two hours later. It had dug 3-4 false nests by then. The following day two additional nests were found.

8:10pm, Large female found beneath Tournafortia on south side of Rose Island.

Tagged by Ludwig and Davis: 5799 on left front leg.

Carapace length: 94cm

Tide: Low

Turtle was digging egg pit when it was first located. We waited for an hour and returned to find that the egg pit was nearly finished. We watched the turtle lay 75 eggs and then cover the nest. At that time we did the tagging.

October 14: 5:41am, Observed three turtles mating between Rose Island and lagoon drop off.

Fish:

Limited observations of fish were made while clam surveys were being conducted. Black tipped reef sharks (Charcharhinus melanopterus) were abundant in the shallow lagoon waters. Up to 8 could be seen at a time in the waters just south of Rose Island. These small sharks were also seen very frequently while we were conducting transects and doing reef measurements. They often approached within a few feet while we were in the water and persistently stayed nearby even though we tossed rocks at them. The presence of many specimens less than about 30cm in total length suggests that pupping had occurred shortly before we arrived at the atoll and may have continued while we were there. No other shark species were observed.

A butterflyfish, Chaetodon trifacialis, and angelfish, Centropyge multispinis, scorpionfish, Pterois volitans, and a malacanthid, Malacanthus latovittatus, and an unidentified surgeonfish were also observed. These fish were not previously recorded on Dr. Richard Wass' surveys.

Invertebrates:

1) Crown-of-thorn starfish (Acanthaster planci), were much more abundant on the reef than had previously been noted. These large starfish were seen on about 1/5 of the transects. They were also observed moving over the sandy areas on several occasions. Rich Davis accidentally punctured his hand on one that had been taken out of the water for observation. The wound was very painful and it caused his hand to swell up to about 1/2 again its normal size. William Pedro suggested that Davis place the starfish on his hand and allow the tube feet to draw the venom out. This procedure did not provide much relief. William said that the Samoan name for the starfish meant that it could cure wounds that it inflicted. He cited examples of when the pain of the wound had gone away when the starfish was used. This time it did not work.

Damage to corals that was caused by the starfish was evident in many parts of the reef.

2) "Giant Clams" (Tridacna maxima). The principle objective of the field trip was to gather information on the biology and population size of this clam. This work was done in response to a request by the Office of Marine Resources to open the refuge to clam fishing.

Growth data was obtained from clams that had been marked on previous field trips. Additional clams were marked with plastic tags that were nailed to the reef. Previously tagged clams were also marked in this manner. The marked clams are located on portion of reef rock that extends south of the two elongated emergent reef rocks that are on the southwest side of Rose Island.

Fifty meter and 4.30 meter transects were surveyed in three generalized habitats of the lagoon. The habitats were the shallow contiguous reef rock areas (covered with coralline algae) that is usually just below the low tide level. The second habitat was in the sandflat area that had isolated coralline algae pinnacles. The second habitat extended toward the center of the lagoon to the bottom of the slope that marked the edge of the deep water in the center of the lagoon. The third habitat started at the base of the steep drop off and extended 50 meters out into the lagoon. The depths of the habitats were 1/2 -2 meters (habitat one), 1-3 meters (habitat two) and 10-18 meters (habitat three).

A total of 98 transects were conducted. Most of these were done by Ludwig and Davis. William Pedro and Ropeti Tofeano also assisted.

Length frequency data was also obtained by several methods. Davis, Ludwig and Pedro compared by a rapid, method with a slower more precise method. The rapid method consisted of categorizing as many clams that could be found within 5 minutes into 0-50mm, 50-140mm and greater than 140mm intervals. The more precise method involved carefully searching for all clams in an area and categorizing them into 10mm intervals. The second method was done for about 45 minutes. It was rapidly concluded that the first method was biased for larger clams. Additional length frequency surveys were also conducted in which a careful search was done for 10 minutes with clams categorized into the <50mm, 50-140mm and >140mm intervals.

Spawning of *Tridacna maxima* was observed shortly before sundown on October 12. At 5:12pm, when the tide was high but starting to fall. Davis and Ludwig were doing length frequency counts near the edge of the drop off midway along the northeast side of the lagoon. There was a slow current toward the lagoon entrance and much mixing of warm (ca 31°C) water that was coming from the shallow coralline algae reef flats with the cooler water of the lagoon. Visibility was about 20 meters. I noticed one of the larger clams (ca 160mm maximum length) contract its mantle a few times. It did not retract the mantle into its shell however. After a few contractions a "puff" of milky fluid was ejected from the excurrent canal. This was followed by several more contractions and then another puff of fluid emerged. The time between gamete (presumably) ejections was about 30 seconds. A cluster of 6 clams was about three meters away and upstream. I watched them for 90 seconds and three of them ejected puffs of milky fluid. The others within the cluster were contracting but did not eject fluid.

Small blue damselfish (*Chromis*^{sp}) were actively feeding on particles that were within the milky fluid.

Several other clams were also ejecting fluid or contracting within a 15 meter radius of the first clam that was observed.

Davis and I then went to an area just south of Rose Island to conduct another length frequency count. This area had a stronger current that was being caused by oceanic waves washing over the reef. Visibility was about 60 meters. The water temperature was quite homogeneous and about 28°C.

Many clams were present in this area but none were contracting or emitting the milky fluid.

The substrate in both areas was sand/rubble with coralline algae blocks. The blocks were covered with algae on the upper surface and had a mixture of hard and soft corals on the sides. The depth of the first area was about 1.5 meters to the bottom and the blocks were about .5 meters high. The depth in the second area was two meters and the blocks were 1.5 meters high.

3) Red Hermit Crabs (Coenobita sp). Very few of these clams were noticed during this visit. Only one or two were seen per trip around Rose Island each night. Ten to 15 were seen per trip during previous visits to this island.

4) Sally light foots (Grapsidae species). Six to ten of these were seen among the rocks on the south side of the island during each low tide.

5) Coconut crabs (Birgus latro). Juvenile coconut crabs emerged from cavities at the base of the Pisonia trees every evening. One to five of these were observed each night. Pedro and Balazs saw several coconuts that may have been husked by adult crabs but no adults were seen.

6) Palolo worms (Eunice viridis). Palolo worms were expected to emerge from the reefs for breeding during our stay on Rose Island. We checked on the nights they were to come out (October 7-8), but did not see them. The worms did not emerge at Pago Pago either.

Other invertebrates:

Many other species of marine invertebrates are present in the lagoon. There were very few insects noticeable on land.

Other points of interest:

Husked coconuts that were found on the beach indicated that trespassers had been on the island.

A fishing boat was seen off the south side of the atoll on the night of October 12. We tried to contact the boat by radio but they did not answer. William Pedro felt that the boat was owned by Koreans. The boat was gone the following evening.

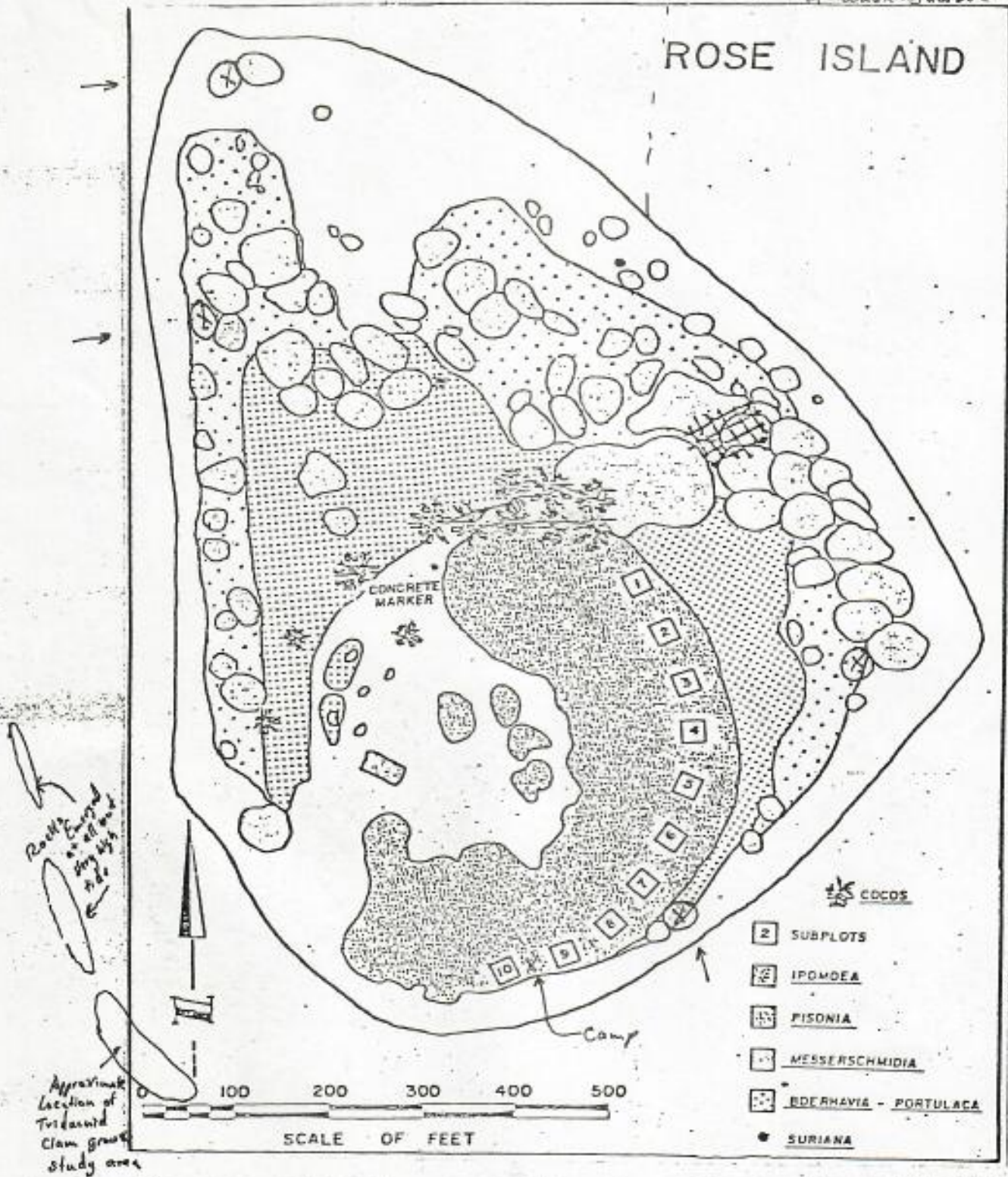
A Coast Guard plane flew over the island at low altitude on two days.

The Sausauimoana caught about 1,000lbs of fish during its stay at the atoll. The catch was mainly jacks (carangids) that were caught at night. Some tuna were also caught while they were trolling around the atoll.

Edge of
coralline
algal flat.

X approximate location
of whale jawbone

ROSE ISLAND



Rocks
to be
studied
at low tide

Approximate
location of
Tridacna
clam growth
study area

- COCCOS
- SUBPLOTS
- IPOMOEA
- PISONIA
- MESSERSCHMIDIA
- RADERHAVIA - PORTULACA
- SURIANA

→ (X) Location of
Turtles tagged
or observed by
Ludwig and Davis
(Balzer^{and others} made additional observations)



AMERICAN SAMOA GOVERNMENT
PAGO PAGO, AMERICAN SAMOA 96799
OFFICE OF MARINE AND WILDLIFE RESOURCES

In reply refer to:

February 26, 1987

M E M O R A N D U M

TO: Refuge Manager, Fish and Wildlife Resources
Honolulu, HI. (R.W.R.)

FROM: Fishery Biologist, *DL*.
Office of Marine and Wildlife Resources
American Samoa Government

SUBJECT: Rose Atoll Trip-1-87 (February 12-16, 1987)

PERSONNEL

OFFICE OF MARINE AND WILDLIFE RESOURCES:

| | | |
|----------------|---|------------------------|
| ITANO, David | - | Fishery Biologist |
| BUCKLEY, Troy | - | Fishery Biologist |
| VE'AVE'A, Lei | - | Biology Technician |
| KNOWLES, Bill | - | Wildlife Biologist |
| SO'OTO, Kiso | - | Biology Technician |
| PEASE, Richard | - | Teacher, DOE volunteer |

DEPARTMENT OF EDUCATION, AMERICAN SAMOA GOVERNMENT:

| | | |
|--------------------|---|-----------------------------|
| LE'I, Matt | - | Marine Awareness Instructor |
| LEOSO, Nikisone | - | Pava'ia'i Elementary |
| DELA ROSA, Shirley | - | Pava'ia'i Elementary |
| ILALIO, Faatea, | - | Alataua-Lua Elementary |
| TUPULUA, Vaigalu | - | Siliga Elementary |
| SAUNI, Netini | - | Leone High School |
| ANUSOLIAI, Lokeni | - | Tafuna High School |
| SCANLAN, George | - | Tafuna High School |

INTRODUCTION:

Rose Atoll NWR was visited on February 13-16 by biologists from the Office of Marine and Wildlife Resources, American Samoa Government and educators from the Department of Education of American Samoa. This multi-purpose trip was originally conceived to give Samoan school teachers the opportunity to experience the unique environment of the refuge and convey their impressions to island students. The biological staff of the OMWR joined this trip in order to: assess any damage that hurricane Tusi may have inflicted upon the refuge, supervise the activities of the DOE teachers and to continue to assess the marine and terrestrial resources of Rose Atoll NWR. This report will emphasize the activities of the OMWR fisheries biological staff while reports on the birds, rats and vegetation will be submitted by the wildlife biologist (Knowles). This report will also include the activities of the crew of the Sausaumoana.

TRIP ITINERARY:

- February 12-87 - Departed Pago Harbor 1530 hours. The weather conditions were excellent with calm seas and virtually no surface winds. Arrived opposite Maga Pt., Ta'u 2300 hours and proceeded to Rose Atoll on course 087° mag. Moderate N.W. swell and 5 knot N.W. breeze.
- February 13-87
- 0600 - Sighted Rose Island 15° to starboard. Trolled around atoll. Hooked and lost one wahoo.
- 0800 - Set anchor inside lagoon near Rose Island. Off loaded teachers and supplies.
- 1030 - Dive #1 at Transect #3.
Finished coral transect work started last trip at T-3-30ft. Marked area for fish count in the afternoon.
Three grey reef sharks in area.
- 1400 - Dive #2 at T-3. Performed two surface and two bottom fish counts. Located T-4 and marked area for the next days work.

February 14-87

- 0730 - Dive #3 at T-4. Two surface and two bottom fish counts
Took samples of Ctenochaetus striatus for NMFS bottom-
fish assessment program.
- 0930 - Searched by towing and snorkeling unsuccessfully for
T-5.
- 1230 - Guided teachers to lagoon pinnacle to observe fish and
Tridacna. Sighted one green sea turtle. Took teachers
to Sand Island.
- 1300 - Crew of Sausauimoana repaired Rose Island sign.
- 1430 - Dive #4 at T-1 (channel). Two surface and two bottom
fish counts. Sighted two large green sea turtles in
ava, one male and one female. Pictures were taken of
turtles.
- 1600 - Dive #5 at T-5. Marked area for next days transect.
- 1700 - Removed otoliths from Ctenochaetus striatus, and recorded
data with assistance from Netini and Lokeni.

*** Matt, Shirley, George, Niki were already on board Sausauimoana for evening
bottomfishing trip outside lagoon.

February 15-87

- 0800 - Dive #6 at T-5. Two surface and two bottom fish counts.
Photographed large male green turtle in 90ft. seaward of
T-5.
- 1030 - Located T-2 and marked area for next transect.
- 1200 - Took otoliths and recorded data from assorted bottom
fish assisted by Matt, Shirley and George.
- 1330 - Dive #7 at T-2. Surface and bottom fish counts.
- 1500 - Loaded gear and personnel on Sausauimoana.
- 1630 - Depart Rose Atoll.

February 16-87

0030 - Arrive Ta'u Harbor. Discharge Knowles and So'oto.
Proceed to Pago.

0800 - Arrive Pago Harbor.

PROJECT DESCRIPTIONS:

All field work for the fisheries division was concentrated on the five previously monumented transects established last year (see map). T-3 was not completely surveyed for coral cover last October due to rough sea conditions from the southeast. This work was completed during this trip and used the same methods used on the October trip. Two 50 m. replicate transects were run on the 30 ft. depth contour. Corals were identified and measured using the random point quarter method at 10 stations per transect.

Fish were identified and enumerated at each transect by two 40 x 50 m. surface counts and two 10m x 50m bottom swath transects. Divers quickly entered the water upon reaching the previously marked transect location and counted the large, highly visible and/or elusive species that tend to avoid SCUBA divers. An underwater tape recorder was then used to record data from the bottom line transect. At the completion of the first count the recorder was given to the next diver to perform a replicate count on the same depth contour. The results will be listed in attached tables. All fish counts were centered on the 30 ft. depth contour.

The Office of Marine and Wildlife Resources is currently conducting a bottom fish stock assessment survey of American Samoa in conjunction with the NMFS, Honolulu lab. We are attempting to obtain data from the entire region and were pleased to acquire some otoliths from some Rose Atoll specimens. Species sampled included Ctenochaetus striatus, Lutjanus kasmira, L. gibbus, Aprion virescens and Caranx lugubris. None of the deepwater species were captured.

UNUSUAL OBSERVATIONS

TURTLE SIGHTINGS:

February 14-87

- 1300 - Inner lagoon - one green turtle - medium size.
- 1500 - Channel entrance - one large male green and one large female green turtle.

February 15-87

- 0900 - T-5 - one large male green turtle.

FISH OBSERVATIONS:

The school of Caranx sexfasciatus was present in or near the channel entrance to the lagoon and several pairs were observed in pre spawning behavior. Darkly colored males were travelling directly below and slightly behind the lighter colored females. Most of the fish were in the 2-3 kg. size class. No actual spawning was observed.

A small school of Decapterus sp. was observed on the outer reef slope which may be a new record for Rose Atoll. The dark phase Forcipiger longirostris and Hemitaenichthys thomsoni were sighted which are uncommon around Tutuila.

RESULTS

CORAL:

The data collected on T-3 indicates an area dominated by coralline algae sparsely covered by small colonies of Pocillopora, Pavona and encrusting Montipora. There is very little soft coral in this area. This information will be added to the data collected on the October '86 trip and will be summarized in another report. There was no evidence observed that would indicate that Hurricane Tusi had any adverse impacts upon the coral communities of Rose Atoll.

FISHES:

FISHES:

The results of all fish counts made during this trip are listed in Table 1. The vertical columns indicate surface or bottom counts at each transect. The "L" or "R" indicates whether the replicate transect ran left or right from the marker stake for a diver facing toward the atoll. Fishes marked with an asterisk were observed during dives but did not enter any transect count.

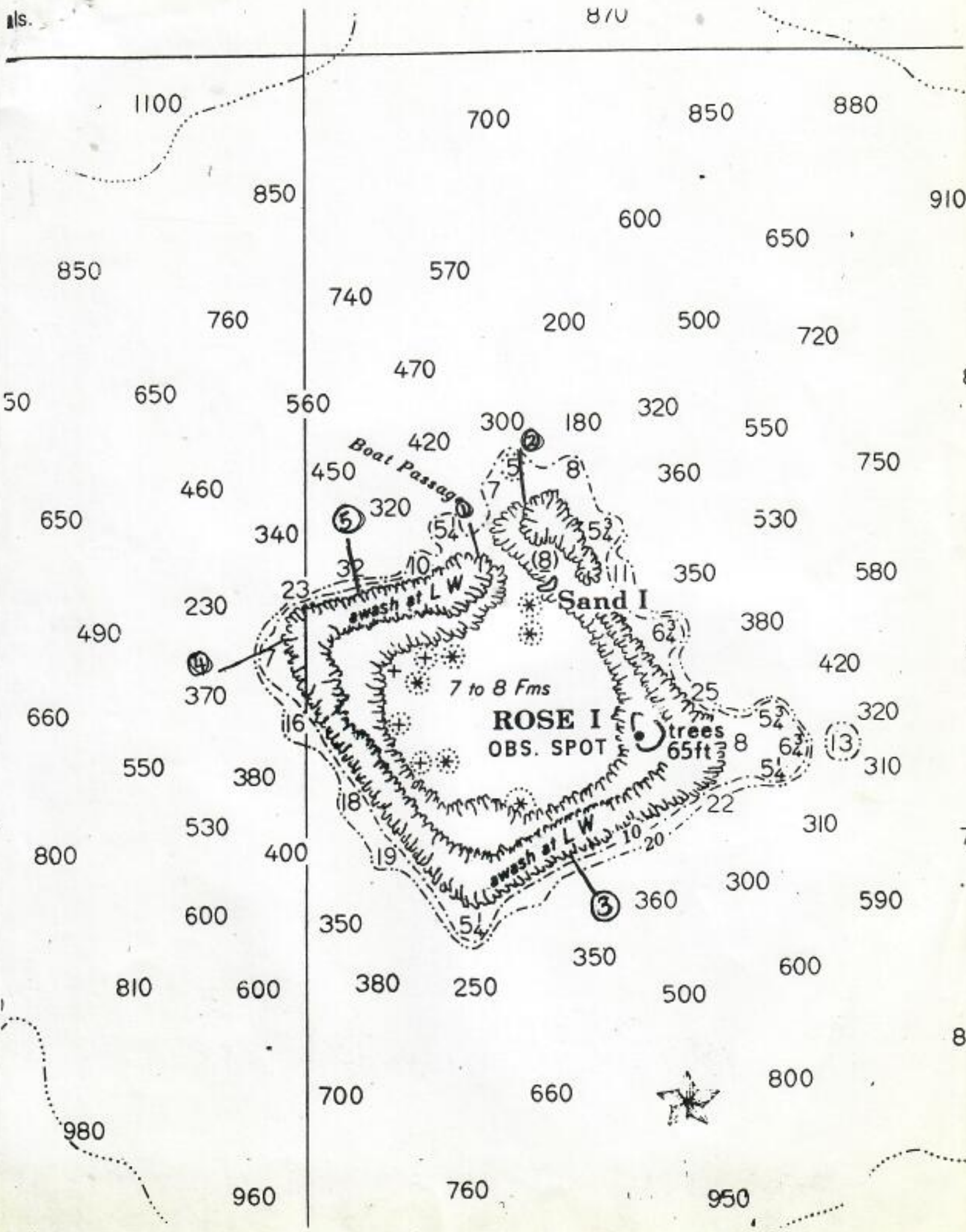
Comparisons of fish counts by earlier investigators indicates little change in the reef fish community at Rose Atoll during the past 6 or 7 years. Species diversity is generally low as compared to Tutuila although large predatory individuals are more abundant.

"SPECIES"

| | I-1 | | I-2 | | | | I-3 | | | | I-4 | | | | I-5 | | | | | |
|----------------------------|---------|---|--------|----|---|---|-----|----|---|---|-----|----|---|----|-----|----|---|---|----|----|
| | Surface | | Bottom | | S | | B | | S | | B | | S | | B | | S | | B | |
| | L | R | L | R | L | R | L | R | L | R | L | R | L | R | L | R | L | R | L | R |
| Plectroglyphidodon dickii | | | | | | | 1 | 1 | | | 1 | 9 | | | 4 | 1 | | | 1 | 10 |
| P. johnstonianus | | | | 4 | | | | 1 | | | | 1 | 3 | | 2 | 1 | | | 2 | 4 |
| Pomacentrus brachialis | | | | | | | 1 | 3 | | | | | | | | | | | | |
| Stegastes nigricans | | | | | | | | | | | | | | | 1 | | | | | |
| Neocirrhites armatus | | | | | | | | 1 | | | | | | | | | | | | 2 |
| Paracirrhites arcatus | | | | 3 | | | | 4 | | | | 4 | | 2 | 2 | | | | 3 | 6 |
| P. forsteri | | | | 1 | | | | 1 | 2 | | | | | | | | | | | |
| P. hemistictus | | | | | | | | 1 | 1 | | | 3 | 1 | | 1 | | | | | 1 |
| * Liza vaigiensis | | | | | | | | | | | | | | | | | | | | |
| * Sphyræna barracuda | | | | | | | | | | | | | | | | | | | | |
| Sphyræna sp. | | | | | | | | | | | | | | 15 | | | | | | |
| Bodianus loxozonus | | | | 1 | | | | | | | | | | | | | | | | |
| * Cheilinus undulatus | | | | | | | | | | | | | | | | | | | | |
| C. unifasciatus | | | | 3 | | | 1 | 1 | | | 2 | | | 1 | | | | | 1 | 1 |
| Coris aygula | | | | | | | | 1 | | | | 1 | | | 1 | | | | | 3 |
| Epibulus insidiator | | | | | | | | | | | | | | | | | | | | 1 |
| Gomphosus varius | | | | 3 | | | 6 | 2 | | | 9 | 7 | | 6 | 4 | | | | 9 | 6 |
| Halichoeres hortulanus | | | | 1 | | | 4 | 2 | | | | | | 1 | 1 | | | | 1 | 2 |
| Hemigymnus fasciatus | | | | | | | | | | | 1 | | | | | | | | 2 | 1 |
| Labroides bicolor | | | | 1 | | | | | | | | | | | | | | | | |
| L. dimidiatus | | | | | | | | 1 | | | | | | | | | | | | 1 |
| L. rubrolabiatus | | | | 1 | | | | 1 | | | 3 | 5 | | 1 | 1 | | | | | 6 |
| Pseudocheilinus hexataenia | | | | 1 | | | 1 | 2 | | | | | | | | | | | | |
| Stethojulis bandanensis | | | | | | | | | | | | | | | | | | | | 2 |
| Thalassoma lutescens | | | | 1 | | | | | | | 1 | | | | | | | | | 1 |
| T. quinquevittata | | | | | | | 16 | 1 | | | 5 | 5 | | 4 | 4 | | | | 14 | 3 |
| Scarus chlorodon | 1 | | | | | | 2 | 1 | | | | 3 | | 2 | 1 | | | | | |
| S. frenatus | 1 | 1 | | 1 | 1 | 2 | 1 | | | | | | 1 | 1 | 1 | 18 | | | | 1 |
| S. gibbus | | | | | | | | | 1 | | | | | | | | | | | |
| S. niger | | | | | | | | | | | | | | | | | | | | 1 |
| S. oviceps | 1 | | | | 2 | 1 | | | | | | 1 | 2 | | | | | | | 2 |
| S. schlegeli | 2 | | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | 1 | | | | | |
| S. tricolor | 2 | | | 1 | 1 | 2 | 1 | | | | | | 2 | 3 | 2 | | | | | 1 |
| Blenniidae | | | | | | | | 1 | | | | 3 | | | | | | | | |
| Nemateleotris magnifica | | | | 1 | | | | | | | | | | | | | | | | |
| Zanclus cornutus | | | | 1 | | | | 1 | | | | | | | | | | | | |
| Acanthurus achilles | | | | 10 | | | 35 | 22 | | | 11 | 4 | | 14 | 14 | | | | 36 | 13 |
| A. glaucopareus | | | | 13 | | | | | | | 7 | 15 | | 30 | 6 | | | | 6 | 15 |
| * A. lineatus (only one) | | | | | | | | | | | | | | | | | | | | |
| A. nigrofasciatus | | | | 2 | | | | | | | 3 | 1 | | 3 | | | | | | |
| A. pyroferus | | | | | | | | | | | | | | | | | | | | 1 |
| * Ctenochaetus strigosus | | | | | | | | | | | | | | | | | | | | |
| C. striatus | | | | 27 | | | 24 | 16 | | | 32 | 26 | | 34 | 20 | | | | 26 | 14 |
| Naso brevirostris | | | | | | | | | 2 | 4 | | | 9 | 1 | 3 | 6 | | | 2 | |
| N. hexacanthus | | 3 | | | | | | | | 4 | | | | | | | | | | 3 |
| N. lituratus | | | | | | | 3 | 2 | | | | | | 1 | | | | | | 1 |
| N. unicornis | | | | | | | | | | | | | | 1 | | | | | | |
| N. vlamingi | 7 | | | 1 | | 1 | | | | | | | | | | | | | | 1 |
| Zabrazona flavescens | | | | 3 | | | | | | | | | | | 1 | | | | | 2 |
| * Z. scopas | | | | | | | | | | | | | | | | | | | | |
| Z. veliferum | | | | 2 | | | 1 | | | | | | | | 4 | | | | 2 | 1 |
| * Gymnosarda unicolor | | | | | | | | | | | | | | | | | | | | |
| Balistapus undulatus | | | | | | | | | | | 1 | | | | | | | | | 1 |
| Balistoides viridescens | | | | | | | | | | | | | 1 | 1 | | | | | | |
| Melichthys niger | 1 | | | | | | | | | | | | | | | | | | | |
| M. vidua | | | | 1 | | 7 | 3 | | | | 4 | 6 | | 5 | | 5 | 7 | | 10 | 6 |
| * Ostracion meleagris | | | | | | | | | | | | | | | | | | | | |
| * Canthigaster valentini | | | | | | | | | | | | | | | | | | | | |
| * Diodon hystrix | | | | | | | | | | | | | | | | | | | | |
| Scarus sp. | 3 | | | 1 | 1 | | 2 | 1 | | 1 | 6 | | | | 1 | | | | | 1 |

als.

870





United States Department of the Interior



FISH AND WILDLIFE SERVICE
PACIFIC/REMOTE ISLANDS NWR COMPLEX
P.O. Box 50167
HONOLULU, HAWAII 96850
PHONE: (808) 541-1201 FAX: (808) 541-1216

9 September 1993

George Balazs
U.S. Department of Commerce
National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822-2396

1 - large green
1 - 60-70 cm green
1 - 60-70 cm hawksbill

Dear George:

I'm glad the tagging went well. You're so lucky your animals are big and strong and can carry those transmitters. I wish I could do that with Sooty Terns. Thanks for the reprints. Don sent me a copy of the faecolith paper so he got some reprints I guess.

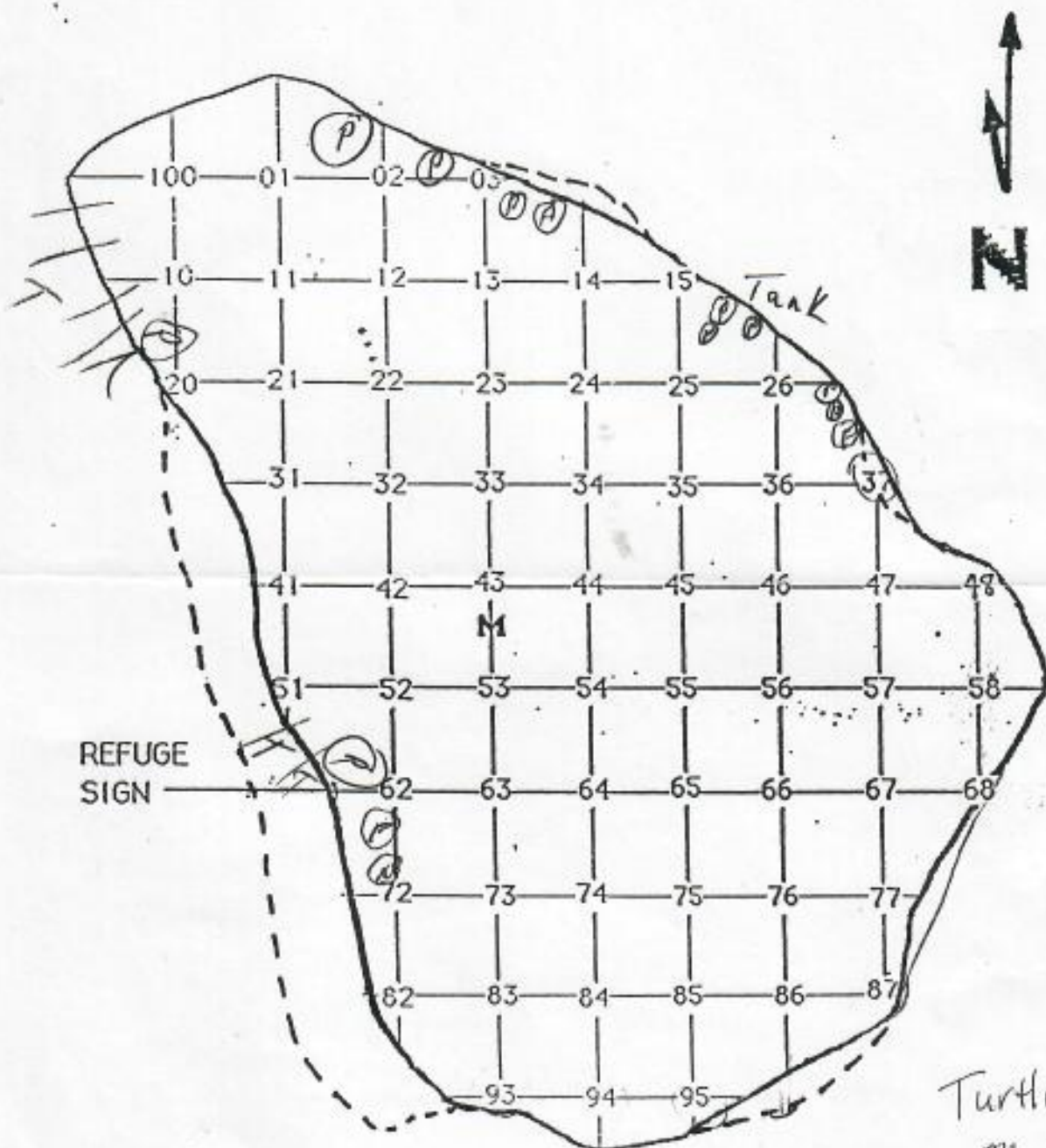
We visited Rose from 11 June to 25 June 1992. Members of the expedition were Beth Flint, Nanette Seto, Pepper Trail, and Jim Murphy. The trip report is one of those many things that I still have to finish but I will give you the turtle details here. We mapped all tracks and pits (enclosed) on the first day of arrival and then raked them over. We maintained a schedule of turtle walks at 3 hour intervals (2100, 2400, 0300, 0600) for all the nights spent on the island. We had no turtles come up during the entire visit and found no new tracks or pits. We visited Sand Island twice during our stay at the atoll and found no pits or tracks there on either trip. We observed 2 Green Turtles and one Hawksbill during a snorkel at the pinnacle nearest the entrance channel on 18 June. None of them appeared to have any tags. In general it was a slow trip with respect to turtles but I think an important one because it was on that trip that the last rat was caught.

Please let me know if I can supply any more details.

Aloha,

Beth

ROSE ISLAND SAMPLING GRID



Turtle sign
on 11 June 1992
raked over to
make it easier

Rose Atoll



AMERICAN SAMOA GOVERNMENT
 PAGO PAGO, AMERICAN SAMOA 96799
 OFFICE OF MARINE AND WILDLIFE RESOURCES

PLCW Stewart SE SUI file
 Dr: ~~2 Copy for Report files~~
 (1) Trip Report File
 (2) Rose Atoll file

In reply refer to:

Sarcy
Stew

March 19, 1987

Dr. Richard Wass, Refuge Manager
 (Remote Is. - Rose Atoll)
 Fish & Wildlife Service
 P.O.Box 50167
 Honolulu, HI. 96850

Dear Dr. Wass,

Here is my trip report on the Rose trip. As you can see the report was written for four different audiences, so there are sections you may want to skim. I have enclosed Dick Pease's report to me on his activities and the new map. There are some minor problems with the map, but it is clearly better than the old one. The copies of the slides will shortly follow the report.

Sincerely,

Bill Knowles

Bill Knowles
 Wildlife Biologist





AMERICAN SAMOA GOVERNMENT
 PAGO PAGO, AMERICAN SAMOA 96799
 OFFICE OF MARINE AND WILDLIFE RESOURCES

In reply refer to:

March 17, 1987

TO: Dr. Richard Wass, Refuge Manager
 (Remote Is. - Rose atoll)
 Fish and Wildlife Services

FROM: Bill Knowles, Wildlife Biologist
 Office of Marine and Wildlife Resources

CONCERNING: Trip Report - Rose Atoll National Wildlife Refuge.
 (February 12 - 16, 1987)

MEMORANDUM

PERSONNEL: OFFICE OF MARINE AND WILDLIFE RESOURCES

SAUSAUIMOANA:

Paul Pedro (skipper)
 Palela Pule
 Iona Iona
 Motu Feagaimalii

FISHERIES:

David Itano
 troy Buckley
 Lei Ve'ave'a

WILDLIFE:

Bill Knowles
 Kiso So'oto

DEPARTMENT of EDUCATION, Science Teacher:

| | |
|-------------------|-------------------------------|
| Matt Le'i | Marine Awareness |
| Nikisone Leoso | Pava'ia'i Elementary School |
| Shirley Dela Rosa | " " " |
| Netini Sauni | Leone High School |
| Lokeni Anuusoliai | Tafuna High School |
| George Scanlan | " " " |
| Faalea Falio | Alataua-Lua Elementary School |
| Vaigalu Tupulua | Siliaga Elementary School |

ITINERARY:

February 12, 1987

1535 hours - Depart Pago Pago Harbor

February 13, 1987

0600 hours - Troll around atoll, observe 3 porpoises outside reef.

0800 hours - Drop anchor inside Lagoon. Unload equipments, supplies, wildlife biologist and teachers.

0830 hours - Circuit island looking for turtle tracks, observe storm damage. Teachers follow behind doing debris count.

0930 hours - Overnight people set up camp.

1000 hours - Show Dick Pease tagged trees on Pisonia transect and cement marker for orientation in making map.

1100 hours - Circle island and Pisonia forest for preliminary damage assesment.

1500 hours - Observe Frigatebirds

1630 hours - Walk Pisonia transect with George Scanlan recording nests, eggs and chicks.

1800 hours - Set rat traps, everyone assists.

2030 hours - Turtle circuit with receding tide.

February 14, 1987

0500 hours - Turtle circuit

0600 hours - Circuit again noting masked and brown boobies.

0730 hours - Check rat traps assisted by teachers.

0830 hours - Cover Tournefortia for nesting birds with Kiso So'oto.

1130 hours - Discuss vegetation with Dick Pease, note phenology and health of plants.

1300 hours - Discuss in greater detail Nature and purpose of refuge.

1400 hours - Walk Pisonia forest observing rats, chickens, bird activity off of transect.

1600 hours - Circuit island photographing storm damage turtle tracks and birds.

1700 hours - Reset rat traps

2100 hours - Night count of white terns in Pisonia.

February 15, 1987

- 0530 hours - Turtle circuit
- 0730 hours - Check and collect rat traps and flagging.
- 0900 hours - Do Sand Island survey, set up new photo point for vegetation.
- 1100 hours - Relax, enjoy island, search for signs of Gilligan.
- 1500 hours - Break camp, load SAUSAUIMOANA.
- 1630 hours - Depart Rose Atoll.

February 16, 1987

- 0130 hours - Kiso and I are dropped off at Ta'u for work there.

INTRODUCTION:

This trip was sponsored by the Office of Marine and Wildlife Resources and the Coastal Zone Management/Department of Education Marine Awareness Program. The trip had four major purposes: 1) to assess the damage to the terrestrial and marine environments caused by Typhoon Tusi, 2) to sample the established coral and fish transects, 3) to survey the bird and rat populations and the flora, 4) to instruct local teachers on the Natural history of Rose Atoll and on the type of research being done, as part of the Marine Awareness Program. David Itano will report on the marine work and the teachers will submit their own report. This report is on the results of the terrestrial work.

Before proceeding it is appropriate here to make special mention of the extra effort put forth by Richard Pease. Dick, a science teacher at Leone High School, has an M.S. in botany. During the November 1986 trip it became obvious that the existing vegetation map badly needed updating and, at my request, Dick agreed to do the necessary ground work as his teacher project. He put in three long, hard days running transects that resulted in valuable data and a new map. This information will be extremely important in future work. Additionally, his project provided fellow science teachers Netini Sauni and Lokeni Anu'usoliai an unique opportunity to learn how botanists work and provided OMR wildlife technician Kiso So'oto some training in vegetation work. Dick's efforts were clearly "above and beyond the call of duty" and a special thanks is deserved.

WEATHER:

The seas on both ends of the journey were very calm. We were able to see the Manu'a Islands shortly after clearing Pago Harbor. During our stay at the atoll we had clear skies, lots of sun and temperatures as high as 33°C. We had one very brief light drizzle on the afternoon of 13 February. There were only light breezes, if any. This was a time of full moon and spring tides; high tide was around sunrise and sunset.

TEACHERS:

I felt that this trip was a good learning experience for six of the teachers. There are still a few bugs, but these can be worked out by tightening the selection process. I do feel things would go more smoothly with fewer people. Additionally, based on our discussions, it became apparent that it is necessary for us to discuss in greater detail why it is necessary to be sensitive about disturbing the island's ecology (even to the extent of not removing dead bodies) and why it is important to have places such as Rose Atoll.

In general, using teachers as assistants was satisfactory. The teachers who did assist were enthusiastic and good learners; I was especially impressed at how "hawk-eyed" they were. However, because they are inexperienced, it was more like having 1½ people working, not two. It is likely some information was lost. The major difficulty, however, was loss of time as much time was spent organizing, motivating and double checking. However, from the view of Office of Marine and Wildlife Resources the new awareness gained by teachers compensated for these problems. It may be advisable for there to be at least one expedition a year with two wildlife biologists to get all necessary data.

TYPHOON TUSI DAMAGE:

It was immediately evident that high waves and winds generated by Typhoon Tusi on 17 January 1987 reached Rose Atoll. The location of the damage on Rose Island and the direction the uprooted *Tournefortia* lay indicate that the waves were traveling in a south, south-easterly direction. Both Sand and Rose Islands suffered damage. David Itano reports that the reef had very little damage.

SAND ISLAND:

Sand Island was completely washed over by waves bringing up new coral rubble of a lighter color. The island's shape was also changed; it is now longer and narrower than it was. Using photographs, the measure the island is now roughly 90 m long and 40 m wide at it's widest. The bench on the western and northern (channel) side is considerably higher than in November. It was not possible to precisely locate the spot used to take vegetation photos in November (see Hu November Rose Atoll Trip Report) because I could not see over the bench to locate the rocks on the south end of Rose Island. The point is now roughly ^{0.1^o} meter [↑] passed the new low water mark. It appeared that some new material was added to south and eastern sides.

The vegetation on Sand Island was devastated (photos 2 & 3). All of the Boerhavia was gone. Of the 35 Tournefortia plants on the island in November 18 were washed away. Of the remaining: 6 were uprooted and 14 had no green leaves. Of the 3 plants with green leaves; one had an estimated 95% leaf loss, one ⁷ 70% and one 50%. The coconut seedling survived but its continued survival is questionable. The vegetation photos were taken from a new photo point with the following coordinates (uncorrected for declination): 290° to midline of the channel, 275° to the coral plateau just inside of and to west of channel and 130° to rocks just north of Rose Island. This point is roughly 35 m from southwest tip of the island, shooting northeast. It may not be possible to locate the coordinates at high tide.

There were no nesting birds on Sand Island, nor were there any corpses or other signs of the nesting that was present in November (see birds section for more details). There were 8 sets of turtle tracks with 20 pits that were clearly post-storm (see turtle discussion for more detail).

ROSE ISLAND:

Rose Island suffered from moderate wave and limited wind damage. The wave damage primarily occurred in the perimeter Tournefortia on the North end of the island from about 25 m east of camp (which is just east of plot 10 on the old maps to the bulge on the west side, (fig. 1). Damage was heaviest in the area from which Sand Island is visible.

The Tournefortia was hit the hardest. Many plants on the perimeter were uprooted, roughly 15 - 20% of the shrubs had some green leaves, approximately 50% still had dead leaves hanging from branches. There is a line of debris piles 1 - 3 m across in the Tournefortia. This line varies from 5 - 20 m from the high water mark and is located on the northern end of Rose Island. There was limited wave damage to within 4 m of the cement marker; the Boerhavia in the northern half of the "mini-meadow" just west of the cement marker was dead and had a burnt appearance. All of the Portulacca in the main Boerhavia meadow was dead, but seedlings were sprouting.

It is certain that the nests, eggs and non-flying chicks of ground nesting species located in the Tournefortia were destroyed. There were no eggs or chicks found in this area, nor was any evidence of previous nesting found (it is likely that the rats quickly scavenged any remains). However, we did find 32 new nests on the ground in this area.

The location of the debris piles, the patchiness in the severity of damage and direction of the uprooted plants pointed indicate that several waves of different energy and travel direction reached Rose Island.

NOTE: The waves also blew out the planks of the large wooden refuge sign. The SAUSAUIMOANA's crew was able to repair the sign, but it needs replacing. The blue goose sign was also uprooted, some teachers found and reposted it, but its location is different.

The wind damage was more limited. There were branches blown down and some leaf loss as indicated by many new apical leaves. There were 2 Pisonia trees blown down; however, Dick Pease, who examined the trees more closely than I, believes they were dead prior to the storm. Based on this, I estimate that, on the Beaufort Wind Scale, the wind gusts reach 9 and possibly 10.

We found the remains of 6 adult-sized birds on the ground and one, with a broken wing, in a tree. The 6 on the ground were scavenged and identifiable only as boobies, the one in the tree was a red-footed booby. It seems likely that high winds would have caused some egg and chick losses amongst the tree nesters. We did not find any evidence of such, however, the rats probably would have quickly cleaned up such evidence.

SURVEY of WILDLIFE POPULATIONS:

I followed, with three minor differences, the methods used by Darcy Hu and myself on the November 1986 trip and detailed by Darcy in a letter 15 January 1987. I was able to do all the outlined jobs, except band birds. I did not feel comfortable with some of the people who wanted to go along so I did not do any banding.

The first difference in method concerns the night counts of white terns on the Pisonia transects. Office of Marine and Wildlife Resources purchased two (2) Eveready 3 - D cell Skipper Searchlights to give better illumination of the canopy. The flashlights were successful in this; but there was also an increase in the number of times the flighter Noddies and red-footed boobies flew off and disturbed the terns. Also due to a lack of volunteers, I did this count alone. This did not affect the results and with a full moon, raucous birds and the beady red eyes of cannibalistic rats for company, I recommend it for those who enjoy the eerie.

The second change was in the method of counting nesting birds in the Tournefortia. The storm debris made moving through and observing in the Tournefortia more difficult than usual. The visibility was especially poor. Therefore, Kiso and I walked together, with Kiso observing tree nesters and myself ground nesters. In places where it was impossible to get through one person held the line while the other walked around. Effective transect width varied from 4 - 5 m in the interior to 15 m in the perimeter. All activity was found in the perimeter, therefore, I redid the perimeter double checking the results. Because of the amount of debris in the interior, it is possible that nesting activity was missed. However, I do not think there would have been more than one or two nests because we were very careful in searching, neither Dick Pease or I saw any adult activity in these areas during other activities and in most places the tangle of branches above and on the ground would have made access difficult for adult birds, but not for rats.

.....

The final change was in rat trapping. I set 25 traps in the Tournefortia. One trapline was an open ended rectangle of 20 traps placed roughly 3 m apart. This trapline was roughly 20 m north of the wooden refuge sign. I chose this new location because it allowed me to set traps under leafless shrubs in the heavily damaged perimeter (traps 1,2,-3,18,19,20), in the area of a debris pile (traps 4,5,16,17) and in Tournefortia with leaves (traps 6 - 15). On the second night I did not see traps 1,2,19,20 due to low activity in the immediate area. 5 traps were set in the Pisonia/Tournefortia mixed area north of the cement marker. 57 traps were set 3 - 5 m apart on the Pisonia transect. I only set 57 because I held back traps to run a parallel trapline to ascertain the effectiveness of peanut butter as a bait that would attract rats but not hermit crabs or birds. However, between flagging the traplines and finishing setting the first trapline, I realized that the paucity of plovers and the speed with which rats were taking the bait would make such a test invalid and did not set the traps. For each trap we recorded trap number, what was caught, sex of rats or if scavenged; or whether trap was sprung with or without bait, or unsprung with or without bait.

RESULTS by SPECIES:

12-16 FEB. 87

TURTLES:

Upon landing on Rose Island, we walked around the island mapping all turtle tracks (fig. 1). There were four sets of tracks with 10 pits that were clearly post-storm (slide 6). There were also six sets of pre-storm tracks (slide #7). These latter tracks were all mapped during the November trip, two sets were laid down while we were. All of these tracks were faint and very washed out; to me they appeared as "last seasons" tracks. It is possible these tracks will not be visible by next October. Some old pits were still discernible.

The post-storm tracks showed some signs of wash out; i.e., different colored rubble on the bottom and rounded edges. There had been a large low pressure system generating winds and heavy rains on Tutuila and the Manu'a Islands for several days, ending on 7 February. I found evidence of recent heavy rains in the form a pool of freshwater in the hollowed-out base of a Pisonia tree.

.....
Therefore, it seems likely to me that these tracks were laid down between 18 January and 6th of February. There was no onshore turtle activity while we were on Rose Island, nor were there any signs of hatchlings.

*Turtle nesting
in Jan &
Feb?*

There were 8 sets of post-storm tracks on Sand Island. Two sets showed that the female dug 2 or 3 pits than moved 3 - 6 m before digging 2 or 3 more pits, then she went back to sea. I did not see this on Rose Island on this trip. There were 20 pits associated with the tracks. The time the turtles come on shore is the same as Rose. There were no pre-storm tracks or pits on Sand Island.

GECKOS:

A single mourning gecko was observed on the underside of a Pisonia leaf about 1 m off of the ground.

INSECTS:

It appeared to me on this trip that there were many more flies and ants present than there were in November. This is probably due to the increased amount of decaying flesh and leaf litter. On one night I suffered from many ant bites, something that did not occur in November. Also the downed Tournefortia created a spider web paradise.

MAMMALS:

MARINE:

Three porpoises (genus and species unknown) were observed just outside the reef while the SAUSAUIMOANA was trolling around the outside.

RATS:

Rats were observed on all parts of Rose Island, including foraging on the beach and in the Pisonia canopy. No rats were observed on Sand Island. Rats were seen in numbers at all times of the day and night, there was a slight decrease in activity during midday.

Trapping success was higher than in November (Table below and attached - data sheets).

Table 1 - Rats caught, number in parenthesis is % of traps set.

| DATE: | PISONIA: | TOURNEFORTIA: | TOTAL: |
|-----------------|----------|---------------|--------|
| November 8-'86 | 53 (72) | 4 (31) | 57(66) |
| " 9-'86 | 37 (51) | 5 (42) | 42(49) |
| " 10-'86 | 29 (40) | 3 (23) | 32(38) |
| February 14-'87 | 62 (98)* | 19 (76) | 81(92) |
| " 15-'87 | 47 (77) | 17 (80) | 63(79) |

* Includes two rats caught in one trap.

As in November, all traps had the bait removed. This time however, there was only one hermit crab caught, (0.6% of traps set) as compared to 16 (6%) in November. The ratio of identifiable males to females was 4♂ to 3♀, roughly the same as November. Of the 135 rats caught 21 (16%) were completely eaten with only fur and long bones remaining and 5 (4%) were partially eaten. I did observe rats feeding on trapped rats corpses while doing the night white tern count. Finally, there was one rat who was caught only by the tail; it escaped when I picked up the trap. How the rat managed to do this is a mystery, but it may partially explain the number of sprung traps without a rat.

The use of trapping success as a population index is useful, but one must be careful to check for other explanations for any changes that may have occurred. There are three possible explanations: that the results are due to the exclusive use of Victor rat traps, that there was a significant population increase, or that there was an increase in trappability of the rats.

As Hu reported in his report for the November trapping, there was a significant difference in the number of sprung traps with no bait and no rat between the McGill and Victor traps (Hu 1987). On this trip we used the better Victor traps exclusively. I do not believe this is the explanation because in November, of the total number of Victor traps set 19% had no bait no rat compared to 14% in February and because of the greatly increased trapping successes in the Tournefortia. Also, in February, 6 (25%) of the no bait rat traps were found in the same area on the same morning. This suggests a rat particularly adept at removing bait without getting caught.

I do not believe there was a significant increase in the rat population. It is possible that there was a slight increase in the population, but I did see other signs of a large increase in the rat population.

I believe that there was an increase in the trappability of the rats caused by hunger and severe competition for food. This is supported by: observations of rats foraging for food on the sandy beaches; the increase in trapping success in the presumably less desirable *Tournefortia* habitat, including on the rubble under leafless shrubs; the higher rate of cannibalism; observations of fighting rats; several rats in poor to bad condition (I was able to catch one in my bare hands); that on the first night in the *Pisonia* we had caught close to 50% of the rats we were to catch before we had finished setting the trapline, and 6 dead rats found lying in the *Pisonia*. Based on my experiences with other murids and cricetids, this evidence strongly suggests that the rat population has exceeded the carrying capacity (which has perhaps been lowered by the storm and low-levels of bird activity) and the hungry rats were much less cautious, and therefore more easily trapped. If this is the case, the rats population should soon undergo a rapid decline; however, it may also mean an increase in rat predation on bird eggs and chicks and turtle hatchlings in the interim.

BIRDS:

Both the number of birds and of active nests was low. Paul Pedro, the captain of the SAUSAUIMOANA who has made many trips to Rose Atoll, said bird activity was the lowest he had ever seen. There was very little nesting, during the entire visit I saw only four chicks and 14 nests with incubating or closely brooding adults. There was, however, evidence that the birds would soon be nesting again (see species accounts for details).

There are two probable reasons for the low levels of bird activity, 1) it is the result of the storm or 2) it is a normal seasonal low. There is little doubt that Tusi caused high egg and chick loss. This explains the absence of chicks. It is doubtful that there was high adult mortality and so the storm may not explain the low adults numbers. Of course, many of the adults may have dispersed to feed palegically before reneating.

Unfortunately, there have been no reports on bird activity at Rose Atoll for the months of December, January, or February. Fefer (1982) reports high levels of nesting with many eggs and chicks in the only report for March. Thus, that the low level of activity is normal for this time of year (perhaps exacerbated by Tusi) can not be ruled out.

En route to the Atoll we saw many mixed feeding flocks. These consisted primarily of brown and masked boobies, there were only a few sooty terns. Near the Manu'a Islands I saw a pale-morph wedge-tailed shearwater and a *Pterodroma* spp.

Red-tailed, Tropicbird, White-tailed Tropicbird:

RED-tailed TROPICBIRD:

There was 1 nesting bird on the 65 m *Pisonia* transect. I saw 2 other adults on the ground and one pair on the ground that were not nesting.

Every afternoon there was considerable aerial activity, including calling and chasing. I did not see any courtship displays. There were roughly 20 birds involved, but it was impossible to get an accurate count.

WHITE-tailed TROPICBIRD:

I saw one white-tailed tropicbird flying over the *Tournefortia* and heading out to sea on 13 February. This was the only time I saw the bird.

MASKED BOOBIES:

There were no masked booby chicks or eggs found. There were 7 pairs (were always with 0.5 m of each other, frequently showed a wing display directed at one of the pair and drove off other boobies) and 4 individuals in the *Boerhavia* and one other pair and 2 individuals in a clearing by the wooden refuge sign. On the 14 February turtle circuit 8 - 10 masked boobies flushed out of the *Tournefortia* with a large number of brown boobies. This gives a minimum number of 30 masked boobies on Rose Island.

GOLDEN Plover:

Plover numbers were clearly down from November. The maximum count during any circuit of the island was 4. I saw only 2 in the *Pisonia* during our entire stay.

NOTE: I observed a plover in breeding plumage on Tutuila for the first time on 6 March.

RUDDY Turnstone:

The largest group of turnstones observed was 8. I did not see the turnstones as regularly as I did in November.

BRISTLE-thighed Curlew:

There were a maximum of 6 curlews. They were found under the perimeter *Tournefortia* or in the *Boerhavia* meadow.

GREY-backed Tern:

I saw one bird that probably was this species. Unfortunately, it did not remain in view long enough for a positive identification.

Sooty Terns:

I saw no Sooty Terns on Rose Island during our entire visit and there were none nesting on Sand Island. I did see 4 terns flying over Sand Island heading out to sea on the morning of 15 February and 5 more flying over Sand Island when we were departing the atoll.

Brown Noddies:

There were no noddies nesting on Sand Island, although there were approximately 50 birds roosting there when we arrived. None of the noddies remained on Sand while we worked there, although some did roost on the rocks just offshore. This is in contrast to November when they were nesting.

Brown noddies were also in the Pisonia. There was considerable noddy activity in the Pisonia at night, but I was generally unable to distinguish species.

BLACK NODDIES:

There were some black noddies in mixed flocks of brown noddies and white terns flying in and out of the Pisonia during the day. There was one noddy fledgling sitting on a Pisonia branch about 3.0 m off of the ground on the 65 m transect. It was a stage 5 with only a small amount of down visible. Based on the amount of white on the head Harrison's, descriptions (Harrison 1983) and comparisons with photos of Brown Noddy chicks taken in November, this was a black noddy chick. However, because there were no black noddies seen in November, this is a troublesome identification.

WHITE TERN:

White tern activity around camp was lower than in November. There was one stage 5 chick on the 135 m Pisonia transect. On the day count I counted one incubating adult; on the night count two incubating adults (one being the same as the day count) and two suspected. Based on memory, there was a greater proportion of the tern's high up in the canopy this time than in November.

On 4 occasions I saw a bird carrying a small fish in its bill and chasing after or hovering over other terns. On one of the occasions I was able to watch the bird for 5 minutes before it flew out of sight. There was a single occurrence of a bird hovering over, then sitting on ("mounting") a perched bird, occasionally pecking the head on one side or the other. This continued for 3 minutes.

VEGETATION:

Outside of the storm damage the vegetation appeared healthy. Some of *Tournefortia* on the edge of the *Boerhavia* meadow and *Boerhavia* in the meadow had flowers or fruit. Most of the vegetation work was done by Dick Pease and his report is attached.

.....

A few comments on the new map are appropriate. First, comparisons with aerial photographs taken from a Coast- Guard C130 on 2 March 1987 by Gene Witham, indicate that the locations of the different types is accurate. Second, the island has clearly changed shape and has gotten smaller. Third, is that the *Tournefortia/Messerschmidia* is moving into the *Pisonia*, mostly in the area of the dieback reported by Amerson et al and in the *Boerhavia* areas. Fourth, I have included both old and new maps for turtle tracks and storm damage to allow comparisons with previous trips (note there will be errors in placement between the two maps, on the next trip the marked trees need to be precisely located and placed on the new map). Finally, I recommend that this new map be used on subsequent trips.

cc: Ray Tulafono, OMWR
Robert Morrow, CZM
Rick Davis, DCI

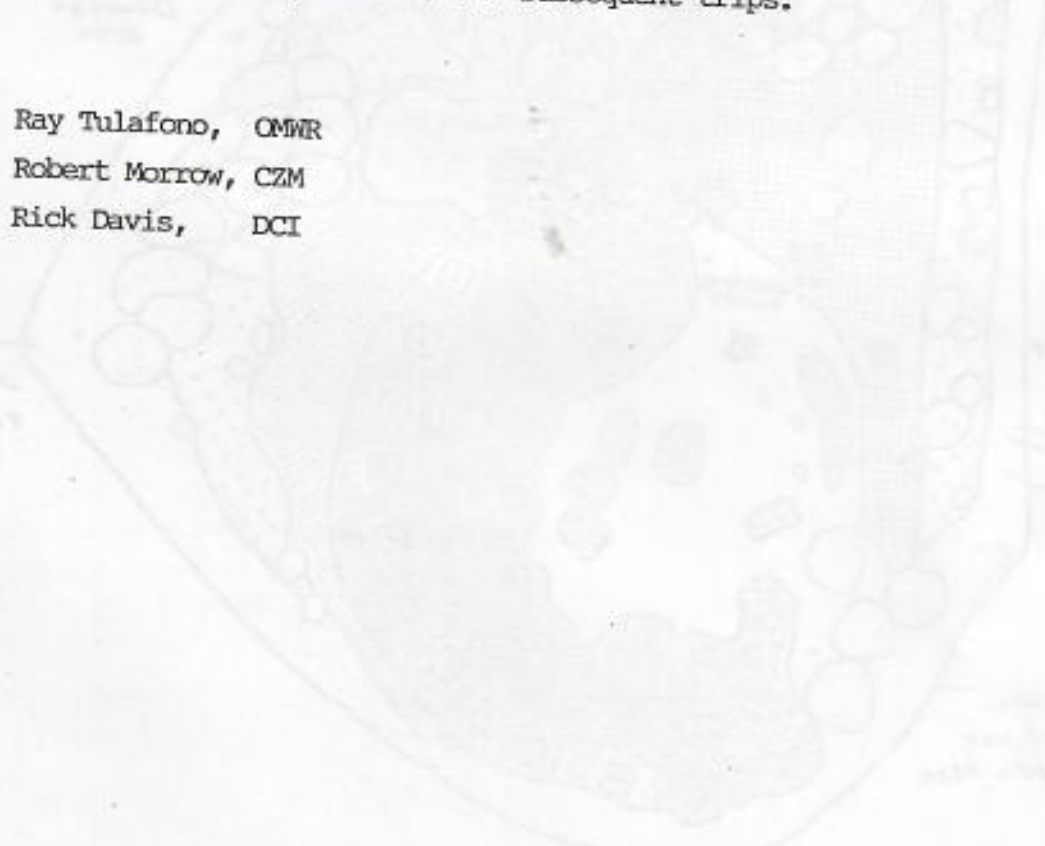


Fig 1

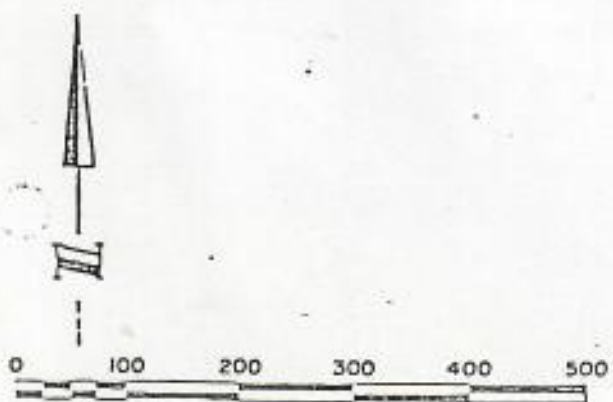
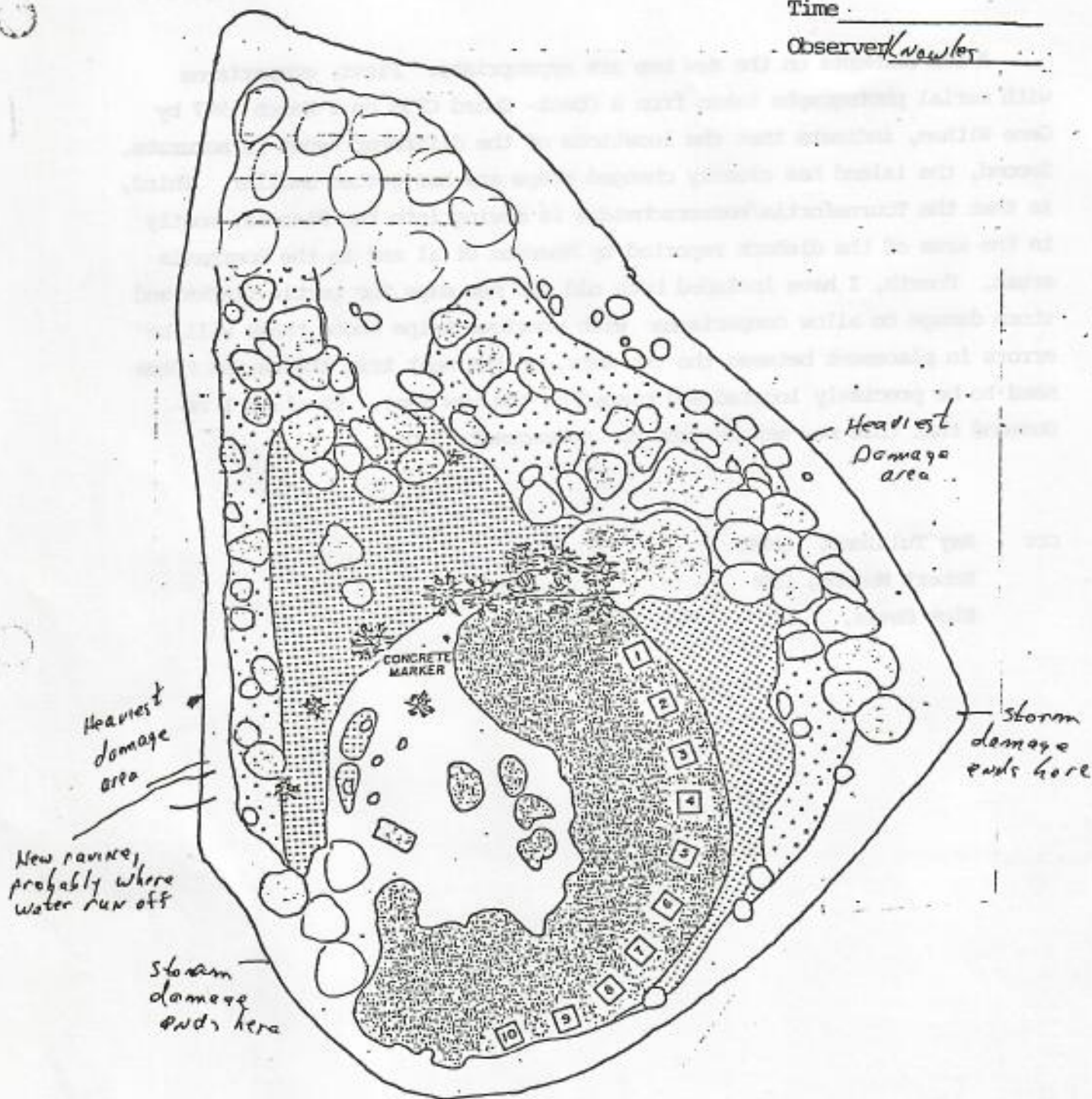
Storm Damage Area

ROSE ISLAND

Date 13 Feb 1987

Time _____

Observer K. Nowles










-  COCOS
-  SUBPLOTS
-  IPOMOEA
-  PISONIA
-  MESSERSCHMIDIA
-  BOERHAVIA - PORTULACA
-  SURIANA

Fig 2

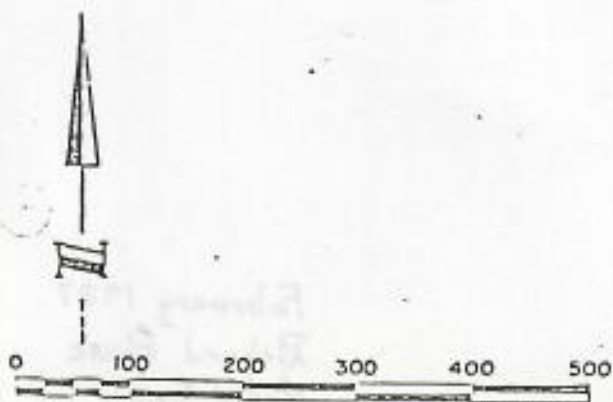
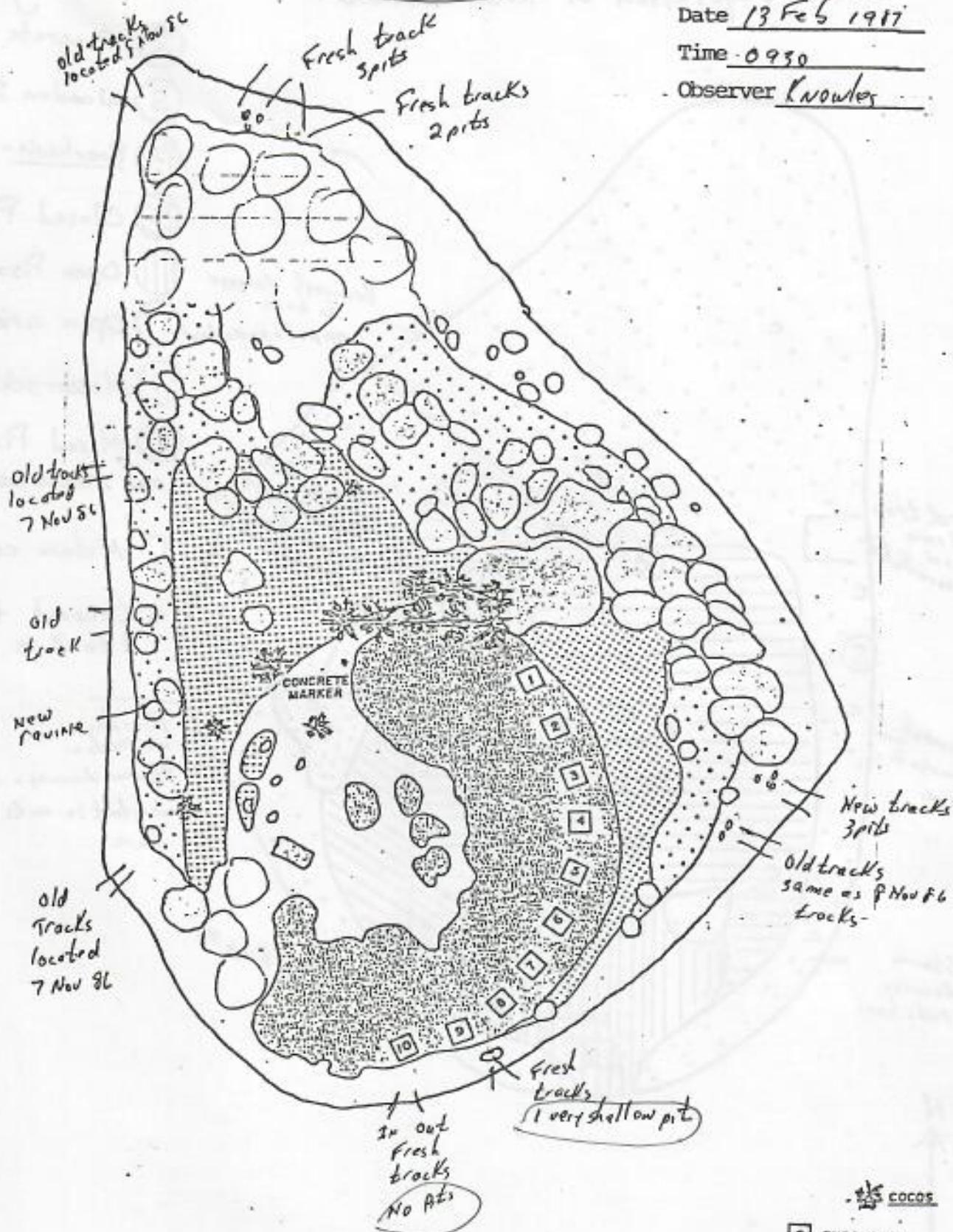
Turtle Tracks

ROSE ISLAND

Date 13 Feb 1977

Time 0930

Observer Knowles

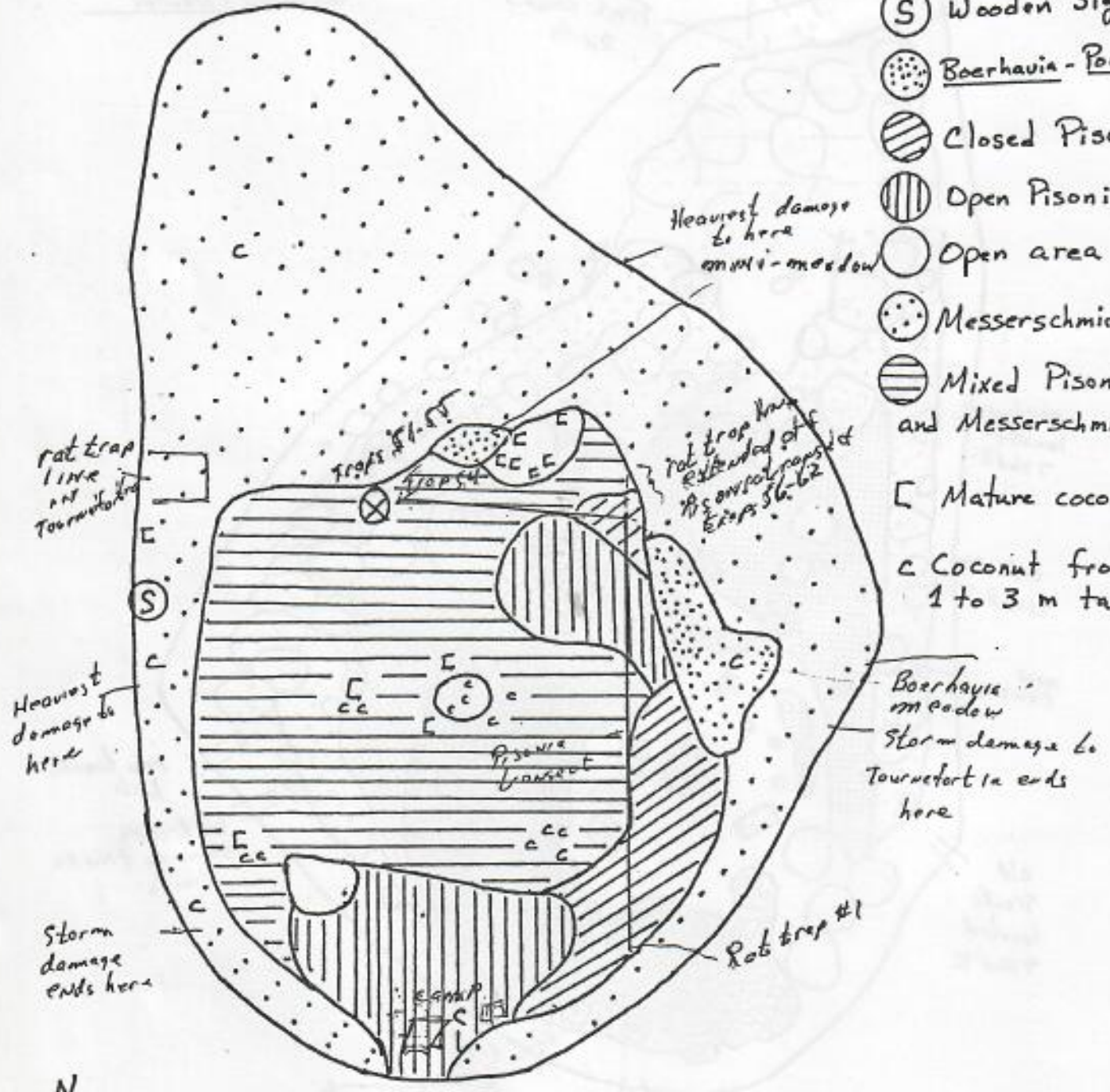


- COCOS
- SUBPLOTS
- IPOMDEA
- PISONIA
- MESSERSCHMIDIA
- RORHARIA - PORTULACA
- SURIANA

Fig. 1 Location of Storm Damage
 Also shows location of rat trap line, Pisonia transect and camp
 The Vegetation of Rose Island

Key

- ⊗ Concrete marker
- Ⓢ Wooden Sign
- ⊙ Boerhavia - Portulaca
- ▨ Closed Pisonia
- ▩ Open Pisonia
- Open area
- ⊙ Messerschmidia
- ▨ Mixed Pisonia and Messerschmidia
- ⌈ Mature coconut
- c Coconut from 1 to 3 m tall



48 m

Figure 1

February 1987
 Richard Pease
 Nefini Sauni

Fig 2a. Location of Turtle Tracks, 13 Feb 1987

The Vegetation of Rose Island

key

- ⊗ Concrete marker
- Ⓢ Wooden Sign
- ⊙ Boerhavia - Portulaca
- ⊙ Closed Pisonia
- ⊙ Open Pisonia
- Open area
- ⊙ Messerschmidia
- ⊙ Mixed Pisonia and Messerschmidia

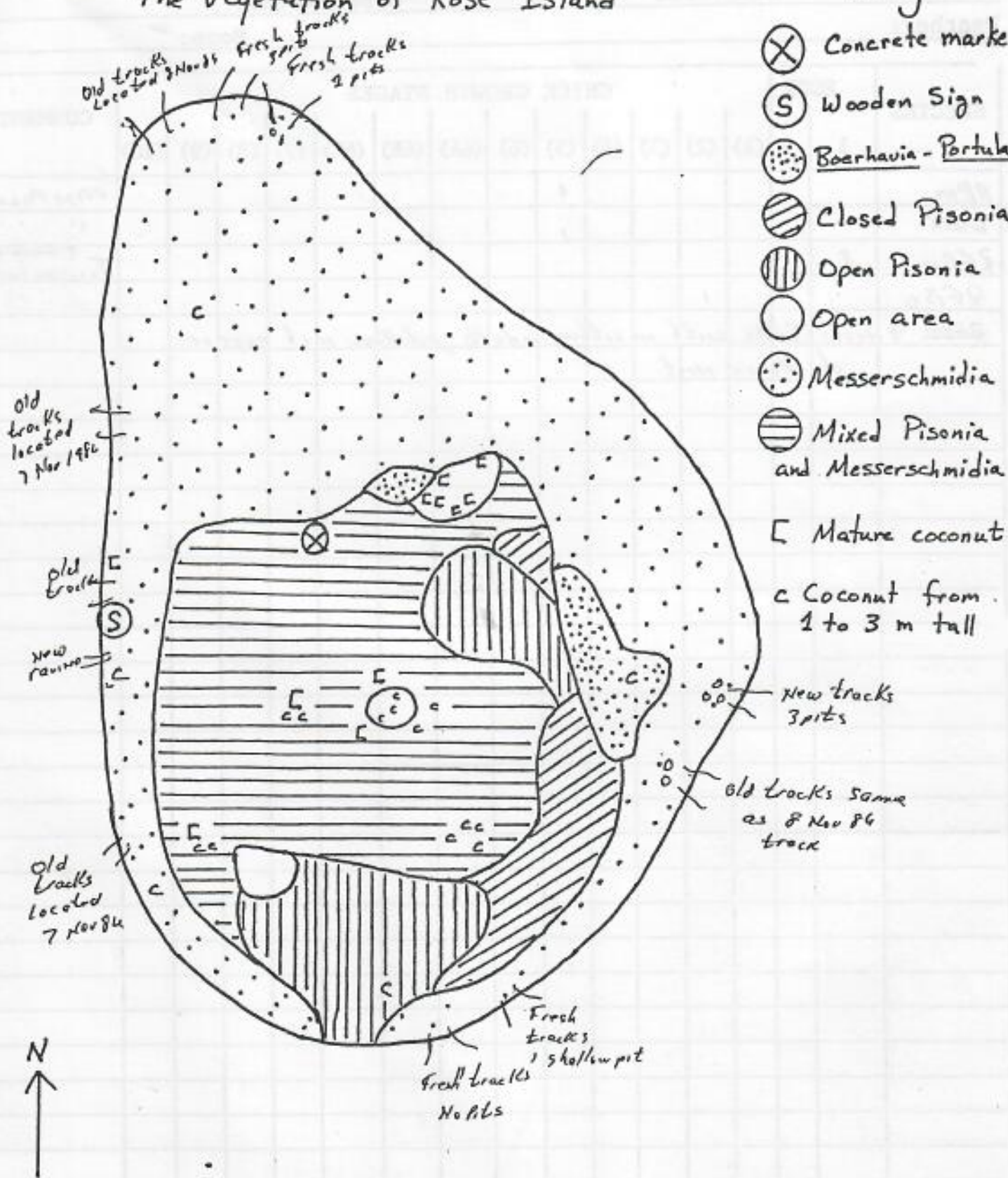


Figure 1

February 1987
Richard Pease
Netini Sauni

Island Rosetransect length 185 200mDate 14-15 Feb

transect width _____

Time AM# of traps 57 in Pisonia 5 in TournefortiaSpecies Rattus exulans

total area of colony _____

Weather Hot clearObserver(s) Kauffman

Results from 15 Feb in parenthesis

| trap ID # | RAT (sex: M or F) J = juvenile | no bait, sprung | no bait, unsprung | crab | | |
|-----------|-----------------------------------|-----------------|-------------------|------|--|-------|
| 1 | x | (x) | | | | |
| 2 | y (M) | ? | | | | |
| 3 | x (M) | | | | | |
| 4 | y (M) | | | | | |
| 5 | x (M) | | | | | |
| 6 | y (M) | | | | | |
| 7 | x (M) | | | | | |
| 8 | x (M) | | | | | |
| 9 | x (F) | | | | | |
| 10 | y (F) | | | | | eaten |
| 11 | y | (x) | | | | |
| 12 | y (F) | | | | | eaten |
| 13 | x (F) | | | | | eaten |
| 14 | x (F) | | | | | |
| 15 | y (F) | | | | | |
| 16 | x | (x) | | | | |
| 17 | y (M) | | | | | |
| 18 | y | (x) | | | | |
| 19 | y | (y) | | | | |
| 20 | y (M) | x | | | | eaten |
| 21 | y | (x) | | | | |
| 22 | y | (x) | | | | |
| 23 | y | (x) | | | | |
| 24 | x (M) | | | | | |

Comments Trappers collected rats from traps 1 to 34 No sex, the marked x
6 had been eaten.

Island Rosetransect length 700m +Date 14+15 Feb

transect width _____

Time Am

of traps _____

Species Rattus exulans

total area of colony _____

Weather 1st, ClearObserver(s) Kawabata

* Results from 15 Feb in parentheses

| trap ID # | RAT (sex: M or F) J = juvenile | no bait, sprung | no bait, unsprung | crab | | |
|-----------|--------------------------------------|--------------------|----------------------|------|--|------------|
| 25 | X (?) | | | | | (eaten) |
| 26 | X | (X) | | | | |
| 27 | X | (X) | | | | |
| 28 | X (?) | | | | | (eaten) |
| 29 | X (M) | | | | | |
| 30 | X (M) | | | | | |
| 31 | X (M) | | | | | |
| 32 | X (F) | | | | | |
| 33 | X | | | | | (not set) |
| 34 | X (?) | | | | | (eaten) |
| 35 | F (?) | | | | | |
| 36 | ? (M) | | | | | eaten |
| 37 | F (F) | | | | | |
| 38 | M? (?) | (X) | | | | eaten |
| 39 | R? (M) | | | | | eaten |
| 40 | R? (?) | | | | | eaten |
| 41 | M (?) | | | | | eaten |
| 42 | F (M) | | | | | |
| 43 | F | (X) | | | | |
| 44 | M (M) | | | | | |
| 45 | M | (X) | | | | |
| 46 | (F) | | | | | not set |
| 47 | M (F) | | | | | |
| 48 | M (M) | | | | | head eaten |

Comments _____

Island Posetransect length ≈ 30 mDate 14+15 Feb

transect width _____

Time Am# of traps 20Species *Rattus exulans*

total area of colony _____

Weather Hot, clearObserver(s) Knoules

Results from 15 Feb in parentheses

| trap ID # | RAT (sex: M or F) J=juvenile | no bait, sprung | no bait, unsprung | crab | |
|-----------|------------------------------------|--------------------|----------------------|------|-----------|
| 1 | M | | | | (Not set) |
| 2 | | | X | | (Not set) |
| 3 | F (F) | | | | |
| 4 | F (F) | | | | |
| 5 | M (F) | | | | |
| 6 | F (M) | | | | |
| 7 | (M) | | X | | |
| 8 | (M) | | X | | |
| 9 | M (F) | | | | |
| 10 | | X | (X) | | |
| 11 | F (F) | | | | |
| 12 | M (M) | | | | |
| 13 | M | (X) | | | |
| 14 | | (X) | | X | |
| 15 | F (M) | X (X) | | | |
| 16 | F | X (X) | | | |
| 17 | M (F) | X | | | |
| 18 | M (F) | | | | |
| 19 | M | | | | (Not set) |
| 20 | F | | | | (Not set) |

Comments Trap lineTraps 1, 2, 18, 19 under
leafless *Tournefortia*

traps 4, 5, 16, 17 in debris pile area

traps 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 in area where plants have some leaves

THE PLANT COMMUNITIES OF ROSE ATOLL

An Updated Vegetation Map of the
Terrestrial Vegetation of Rose Atoll

Prepared for the
Office of Marine and Wildlife Resources

American Samoa

Richard W. Pease
February, 1987

THE VEGETATION OF ROSE ATOLL

In February of 1987, I was allowed to join a group of wildlife biologists and teachers on a trip to Rose Atoll. My purpose in visiting the atoll was to make an updated vegetation map of Rose Island. The map being used at that time was about ten years old and no longer represented the actual plant cover on the island. I worked with Netini Sauni and we were helped on some of the transects by Kiso So'oto and by Lokeni Nuusolia.

The positions of the plant communities were determined by running six transects across the island, three from south to north and three from east to west. Distances were measured using a 36 meter tape and the direction maintained using a compass, allowing for 12 degrees of declination. The positions of these transects are shown in Figure 4. At intervals of 36 meters along these transects we recorded the dominant plants and the changes from one plant community to another. We also noted the positions of coconut trees, damage from the January 17, 1987 Hurricane Tusi, and anything else pertinent to the vegetation. The results of the basic measurements and observations are shown in Figure 1.

The vegetation on Rose Island can be divided into five major plant communities, Messerschmidia, open Pisonia, closed Pisonia, mixed Messerschmidia/Pisonia, and Boerhavia ground cover. The island is covered by herbs or canopy except in the two open areas noted on the map and in some irregular areas in the northern Messerschmidia growth.

The open Pisonia areas are composed of large, older Pisonia trees whose crowns overlap slightly and trunks are 10 to 15 meters apart. There is no other vegetation in these areas. The closed Pisonia contains smaller, younger trees that are as tall as the older ones but are closer together and form a dense canopy. The Messerschmidia forest is a dense tangle of live and dead branches with the trees growing close together and branches overlapping from tree to tree. The center of the island is a mixed area of Messerschmidia and older Pisonia, resulting in a dense forest with two stories, although the Pisonia crowns do not make a closed canopy. The Boerhavia occurs in two places, a larger meadow and a smaller patch. In the larger meadow, located on the east side of the island, the Boerhavia is found in combination with Portulaca while in the smaller patch the Boerhavia occurs alone. The coconut trees are

found in three groups where seedlings and small trees are growing around the fruit bearing trees. In addition, approximately 20 isolated seedlings are established on the island and these are noted in Figure 1. Although the larger Boerhavia meadow is a small percentage of the island's area, it is a significant nesting place for birds. This meadow is covered by Boerhavia and Portulaca. The smaller area to the northwest contains only Boerhavia.

Several significant changes have taken place in the vegetation on Rose Island since the last plant community map was made, about 1975. Both Ipomoea and Suriana are completely absent. No individuals of these genera were found either in May of 1986 or February of 1987. The area covered by Boerhavia and Portulaca has been greatly reduced. The herbs are now restricted to one meadow on the east side of the island and to a smaller patch near the center of the island. In May, 1986, this meadow was a mixture of Boerhavia and Portulaca. In February of 1987, the Portulaca was present only as small plants less than five centimeters in diameter, either seedlings or growth from roots. The Boerhavia covered about 60% of the meadow and I expect the Portulaca will fill the other 40% quickly. It is possible that Boerhavia was more resistant to Hurricane Tusi's effects than the Portulaca. Also, in May of 1986, a large patch of moss and another large patch of leafy liverwort were noted in the interior of the island. These were gone in February, except for a small piece of decomposing tree trunk that supported some moss. A second smaller patch of Boerhavia is located nearer the cement marker and lacks Portulaca entirely. The areas once covered by these herbaceous plants and by Ipomoea have been taken over by Messerschmidia. The southern part of the island is still dominated by Pisonia, however its area appears slightly reduced and the Messerschmidia seems to be moving into that forest resulting in a significant area of mixed Pisonia/Messerschmidia forest. The coconut trees are increasing slowly in number. The large trees are healthy and bear fruit, but most of the small seedlings are badly eaten, probably by rats, and most will not survive. There are, however, approximately 20 strong coconut trees over one meter tall that will most likely grow to full size. These are indicated on the map in Figure 1.

✓
Bird nesting
reduced

The vegetation on Sand Island was almost eliminated by Hurricane Tusi. In May of 1986, I counted 25 fairly large Messerschmidia trees and 15 saplings. Of these 40 plants, only 17 were still present and only three were still alive, one

retaining about 50% of its leaves still alive, another with about 30% of its leaves and the third with 5% green leaves. The northernmost tree, with 30% of its leaves was probably protected during the storm by another tree that was upwind and next to it. That tree had been uprooted. None of the other plants showed any signs of life. The only coconut seedling was about one third buried in the new coral rubble and may or may not live. In May of 1986, Boerhavia was growing well on Sand Island, occurring in colonies that were more or less circular and about three meters in diameter. The plant seemed to be spreading by runners and the center of the larger colonies had stems about 40 centimeters tall. In February, 1987, the only evidence of these colonies was the dead stems sticking through the new coral rubble in two places. Whether or not the herb can regrow from the root remains to be seen, it did seem able to withstand the storm on Rose Island. A map of Sand Island is shown in Figure 3.

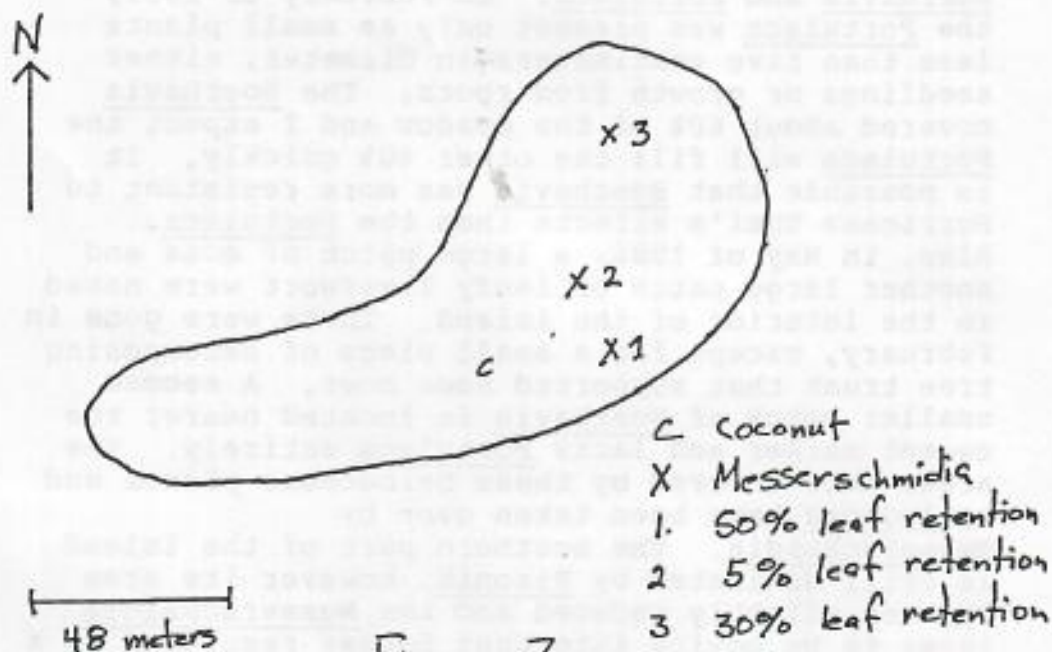


Figure 3

Conspicuous by their absence from Rose Island are the epiphytes. Trees as large as the Pisonia generally support orchids, bromeliads, ferns and nonvascular epiphytes. I have seen none in two visits to the island. It is possible that branches old enough to have epiphytes are too heavily coated with bird droppings for these plants to germinate or to survive. It is also possible that some other factor is responsible, such as salt in the air, ants that keep the branches free of plants, or that the birds or rats

eat the seedlings of the epiphytes.

It is also noteworthy that the areas delineated on the vegetation map contain only the species indicated by the key to the map. Except in the mixed Pisonia/Messerschmidia forest and at the borders where the plant communities contact each other, there is no mixing of the plants. The Boerhavia does not grow under the Messerschmidia or Pisonia trees, nor does the Portulaca.

Further studies of the plant communities that might prove useful include Pisonia and Messerschmidia population and density counts, height and diameter measurements of the trees, a soil analysis in each of the plant communities, and an epiphyte study by protecting a section of branch from birds, bird droppings, and rats to see if epiphytes can become established. While an epiphyte study of this nature would be of botanical and ecological interest, it might also be undesirable since it would involve some interference with the life on the island.

This study shows the importance of maintaining Rose Atoll as a wildlife refuge. Succession is taking place in the plant communities. The effects of Hurricane Tusi demonstrate the harshness of the environment and the fragility of the small ecosystem. However, records indicate that the same animal species have been on Rose Atoll for over a century and if left to evolve on its own, the atoll will continue to provide a much needed nesting place for turtles and birds.

Plant Community Transects

Rose Island

February 1987

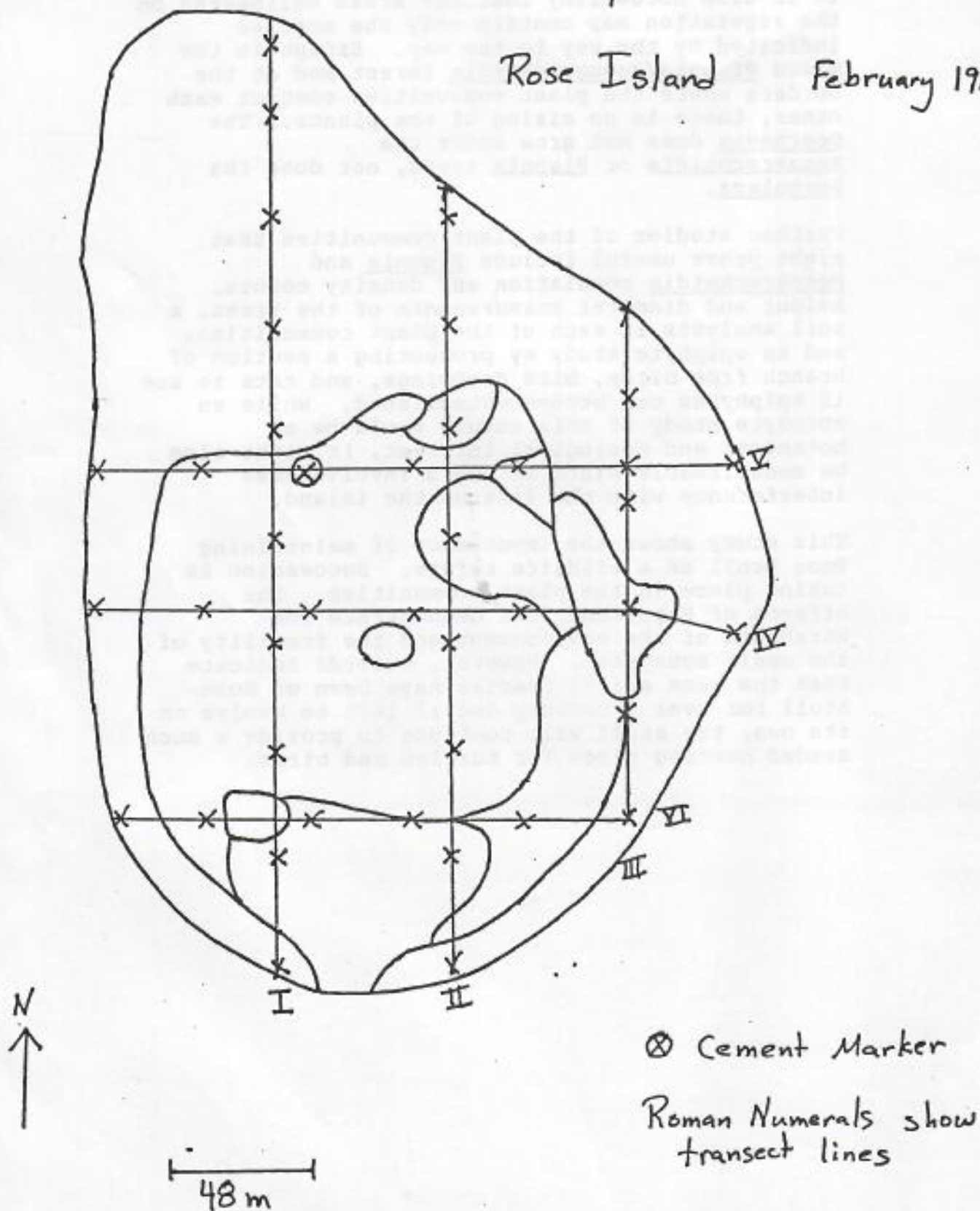
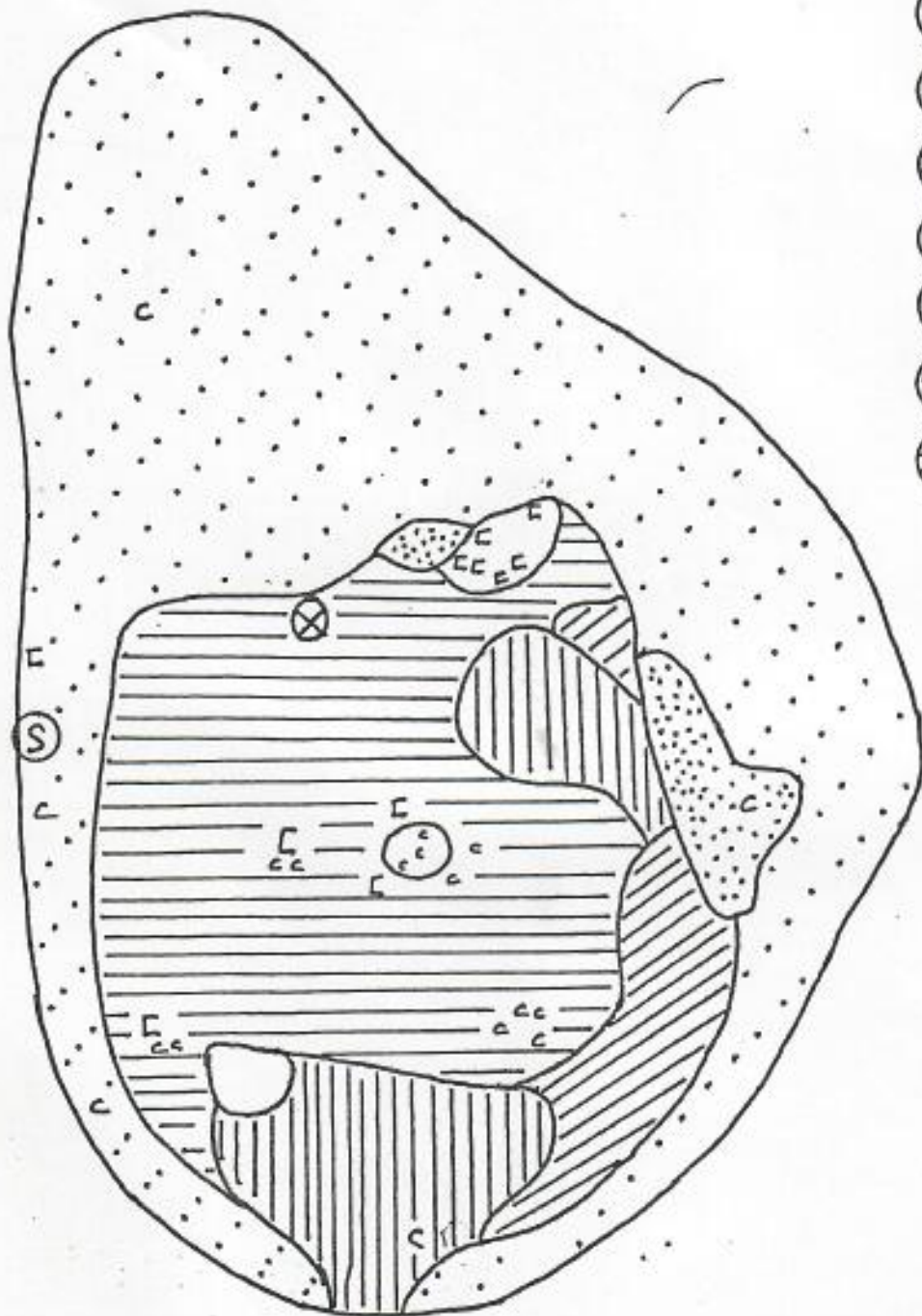


Figure 4

The Vegetation of Rose Island

Key

- ⊗ Concrete marker
- Ⓢ Wooden Sign
- ⊙ Boerhavia - Portulaca
- ▨ Closed Pisonia
- ▧ Open Pisonia
- Open area
- ⊙ Messerschmidia
- ▨ Mixed Pisonia and Messerschmidia
- ⌈ Mature coconut
- c Coconut from 1 to 3 m tall



48 m

Figure 1

February 1987
Richard Pease
Nefini Sauni

TO: ROSE ATOLL NWR FILES
FROM: DARCY HU *Darcy*
SUBJECT: ROSE ATOLL TRIP, 4-12 NOVEMBER 1986

Personnel

Darcy Hu, biologist, USFWS, Honolulu
Bill Knowles, biologist, Office of Marine Resources, Gov't. of American Samoa
Rick Davis, teacher trainer, Dept. of Education, Gov't of Am. Samoa
Five Teachers, Dept. of Ed., Gov't of Am. Samoa
Scott Fulson, University of Hawaii at Manoa, Marine Sciences (R. Radke's lab)
Stu Fa'asega, Office of Marine Resources, Gov't of Amer. Samoa

Introduction

This trip to Rose Atoll was jointly sponsored by to the Dept. of Education and the Office of Marine and Wildlife Resources, Government of American Samoa. Rick Davis instructed 5 Tutuila school teachers in natural history of the Atoll. The teachers also conducted research projects on the reef and assisted with various biological tasks as requested. Bill Knowles and I surveyed seabirds, turtles and vegetation on Rose and Sand Islands. In response to reports from an October 1986 trip of extensive rat predation on seabirds and consequent reproductive failure on Rose Island, we initiated a trapping program which should yield an index of rat populations in future trips. Scott Fulson and Stu Fa'asega conducted Tridachna surveys for Dr. Richard Radke's ongoing clam studies.

Itinerary

4 Nov - arrived Pago Pago in evening
5 Nov - met with Office of Marine Resources personnel
trips to Vatia and antenna tower overlooking Pago Harbor
6 Nov - repacked equipment and loaded Salsola
departed Pago Pago at 1630
7 Nov - arrived Rose Atoll 0035, offloaded by 1115
circled island recording turtle tracks
relocated Pisonia transects and set rat traps along them
circled island at night looking for turtles
8 Nov - turtle circuit to look for fresh tracks
checked rat traps
covered Tournefortia area in back-and-forth swaths recording seabirds
repacked and knifed Pisonia transects
reset rat traps
banded and recaptured masked and brown boobies
9 Nov - turtle walks at 0015, 0130, 0200
am. turtle walk; one tagged
Sand Island survey; photo stations set up
checked rat traps

notes on Rose vegetation during beach circuit
frigatebird scrutiny; lesser vs great
reset rat traps
masked booby banding and recaptures
10 Nov - 2 early am. turtle walks and one at dawn
checked and packed rat traps
snorkelling in lagoon
depart Rose Atoll at 1300
11 Nov - arrive Pago Pago at 0430
offload and repack
rest
12 Nov - depart Tutuila 0045
arrive Honolulu 0830

We had good weather during the trip, with light to moderate SE winds and infrequent, short rains. Maximum and minimum temperatures (degrees F) from Rose Island are listed below by the date they were read. Maximum temps were probably reached the previous afternoon; minimums were likely from the early morning hours of the day of reading. I read all temperatures between 0630 and 0830.

| | min | max |
|---------|-----|------|
| 8 Nov. | 76 | 83 |
| 9 Nov. | 78 | 81.5 |
| 10 Nov. | 80 | 82 |

We camped at the south end of the island, under Pisonia. There was no evidence of recent landings on the island. The refuge sign was still readable, although somewhat obscured by Tournefortia. At some point, we may want to move the sign beachward several meters. It appears from the position of a blue gonow sign north of this one that the vegetation line, at least on the west side of the island, has moved beachward since the signs were erected. When next painted, a Samoan translation of the "no trespassing" phrase (now in English and Japanese) should be added.

Vegetation appeared generally healthy. Tournefortia was flowering, and although there was lots of dead wood underneath the bushes, the canopy was solid. The Pisonia forest had several areas of sparse or absent overhead cover (I counted 3) where dead trees were both standing and fallen. Some of these trees may have died recently. In the largest opening, just inland (W) of the campsite, Tournefortia may be moving in. I think this is the major site of the dieback noted in the past +/-15 years. There was little evidence of recent sexual reproduction in this species. I saw only a few yellow flowers on the Portulaca; most were without seeds or flowers. Boerhavia was flowering; plants also had green and mature seeds. The coconuts had fruit on and around them. Some nuts were sprouting, and people (crew members from the boat, apparently) have planted some of these near the campsite and possibly elsewhere on Rose Island. I saw one that was planted either during this trip or on the previous one.

On 9 November, we counted 35 Tournefortia plants of various sizes on Sand Island. There were some small bushes, indicating reproduction. The larger shrubs had newly-opening flowers. Boerhavia is the only other plant species on the island. It was flowering and had green seeds; the leaves looked quite healthy.

Using a 35mm lens, Bill Knowles took a series of slides from a single point on Sand Island. I took three compass readings from this point (uncorrected for declination):

- 285 to midpoint of entrance channel
 - 140 to two low rocks on the S end of Rose Island
 - 220 to middle of the nearest coral plateau inside the atoll.
- straight in from the main channel.
Copies of these slides will be filed under the heading 'Rose Atoll Vegetation' in the slide file.

I strongly recommend updated aerial photographs for both islands; vegetation has changed quite a bit from the veg maps produced by Asaroom in 1975. Coast Guard flights may provide a photography opportunity.

We flagged and renumbered the Pisonia transects first established by Shallenberger and used subsequently for breeding population estimates for some species. We also measured the trunk diameter at breast height (1.6m) of each numbered tree. The accompanying map shows both old and new numbers. Diameters are listed below.

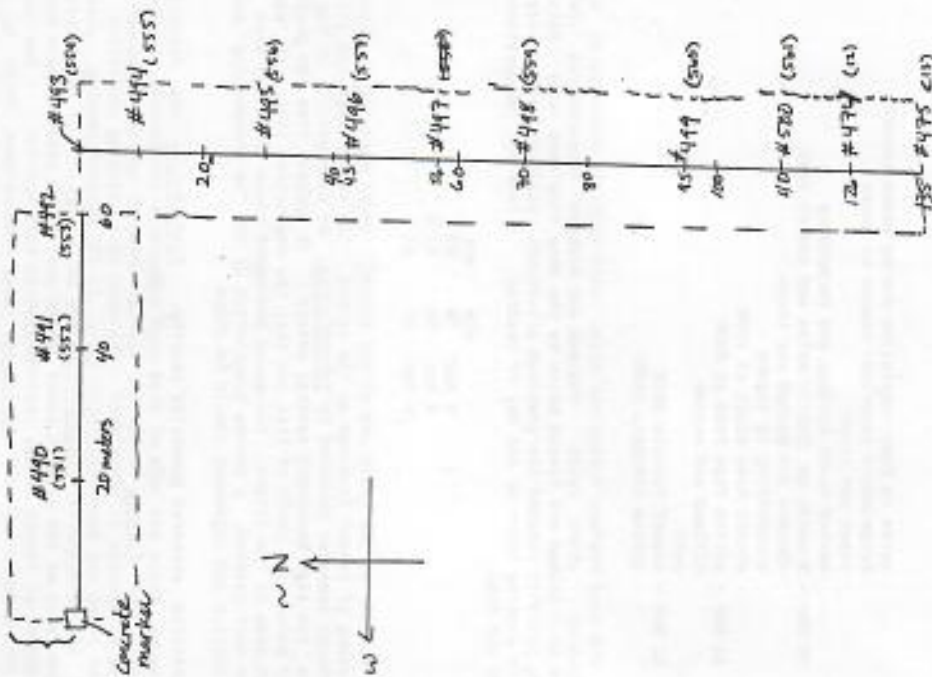
| 1986 tag # | diameter(cm) |
|------------|-------------------------|
| 480 | 115 begin 60m transect |
| 492 | 55 |
| 492 | 150 |
| 493 | 168 |
| 494 | 150 begin 135m transect |
| 495 | 72 |
| 496 | 55 |
| 497 | 64 |
| 498 | 65 |
| 499 | 134 |
| 500 | 147 |
| 474 | 147 |
| 475 | 77 |

We attempted complete coverage of the Tournefortia by walking back and forth, although the branches underneath made walking very difficult and reduced visibility. The main problem I encountered was trying not to overlap or miss areas on successive passes. Flagging at least the ends of the lines should help. In spite of the difficulties, complete coverage is preferable to sampling, if it can be done in the time available. However, if time is limited, then transects should be run, approximately along E-W lines, because of the limited sight distances, these should be narrower than the Pisonia transects, perhaps 10m wide total. Systematic placement of transects is probably easiest, perhaps 1 every 20-30m. However, until updated vegetation maps are drawn, accurate extrapolation from such samples will be impossible.

Bird activity was low; sooty terns, white terns and masked boobies were the most active nesters, although we also found a few red-tailed tropicbird and brown noddy nests.

Species accounts follow. Data forms are attached at the end of this report.

ORIGINAL
FIELD RESEARCH CENTER
ROSE ISLAND



1986 Pisonia transects on Rose Island. Numbers in parentheses are 1984 tags.

red-tailed tropicbird: we saw 2 stage (10) chicks, one in Tournefortia, the other in Pisonia. We also found a dead (probably > 1 week) chick, stage (8-9). In Tournefortia. I noted one pair and a single adult on the ground, neither with an egg or chick, and no aerial courtship. The birds that we saw are apparently stragglers, as Fefer reported the beginning of breeding in his April 1984 trip.

saundered booby: breeding in low numbers around the circumference of the island and in the Boerhavia meadow. Large numbers (+/-30 individuals) roosted in the meadow at night. All chicks were stage (8-9) except 2 which hatched from a single nest while we were there. With assistance from the teachers, we banded 11 birds: 8 fledgling-aged and 3 adults (copy of banding schedule attached). Our daytime chick counts were less than 8, probably because the older HV birds left the island during the day. We also recaptured 14 previously-banded adults; information attached. In April 1984, this species was initiating breeding; a visit in late May or June would allow a better breeding population estimate.

brown booby: we banded one fledgling chick and an adult. I saw no other chicks on the island. However, adults returned at night to the Boerhavia meadow to roost.

red-footed booby: we banded one adult, a white-tailed brown morph with a 7A band. I saw no nests. Adults and flying juveniles roosted in the Tournefortia at night.

frigatebird SP.: I could see no nests from the ground. The only known chick was a starving, approximately stage (5) individual that remained perched just off the ground about 20m from camp. It was not being fed, and may have fallen from a canopy-level nest. From size and coloration, I suspect this may have been a lesser frigatebird chick. During a 40 minute period in the afternoon on Nov. 9, I saw only one lesser frigatebird, an adult male, and one immature of uncertain identity, among the frigatebirds passing overhead. Because of the limited view provided by the canopy opening behind camp, I could not count the total number of birds in the air, although I would guess 80-100. Shallenberger reported a 3:2-2:1 ratio of airbornes great to lesser frigates in November 1980. Naughton a 10:1 ratio, and Fefer reported a 3:2 ratio in April 1984 and a 4:1 ratio in Oct. 1984. My inexperience with lessers may partially account for the low percentage seen this time.

reef heron: we saw both a light and dark morph reef heron on 10 Nov. The white morph bird was first spotted on the rocks just off the southwest end of the island. It then flushed to a rock out on the northeast reef flat.

golden plover: this species was most obvious on the beaches, with a maximum count of 23 winter-plumaged birds on Nov. 8. However, birds roamed the interior of the island, as well. Two of these were killed in rat snap traps. Several more frequented the capsule, where they readily ate pieces of roach.
I don't know if all the plovers were resident, but at least one camp recognizable by an old foot injury, remained with us throughout the stay. It usually foraged clandestinely until chased by another individual whose territory apparently included the camp.

Sooty terns: the highest count was on Nov. 8, when 24 birds were on the northwest beach.

Bristle-thighed curlew: this species frequented the beaches, but also ranged into the interior. The highest count was on Nov. 8, when 6 birds were along the NW shore.

Gray-backed tern: I saw no birds of this species on either Sand or Rose Islands. Earlier visits (pre 1980) reported breeding on Sand. The recent vegetation of this island may eliminate such of the suitable habitat in the atoll.

Sooty tern: birds were nesting under Tournefortia, primarily at the north end of the island, but also elsewhere around the island perimeter. Chicks were stages (2-4), except for a few flying young just beside our camp. I made no count, although roughly estimated 3000-4000 pairs on the island. The 500-600 chicks (visual estimate) on Sand were approximately 30% stage (3) and 70% stage (4). They were grouped under the Tournefortia bushes and were largely unattended by adults.

Brown noddy: these were nesting on Sand Island among the coral rubble. As eggs and chicks were very difficult to see, my count of 10 eggs and 20 chicks (5 stage (2), 13 (3), 1 (4) and 1 (5)) is certainly an underestimate.

Black noddy: I saw no birds of this species. Old black noddy nests remained in the Pisonia, and egg fragments littered the ground underneath. Some of the eggs had rat holes in them. However, it was impossible to tell whether predation was the principle cause of failure. From past reports, black noddy breeding chronology appears to be variable. In Nov. 1981, birds were in all stages from eggs to flying young. In Oct. 1982 Ludwig found no active nests, although some adults were roosting on the Pisonia transects. In Oct. 1984, only a few nests were verifiably active; these had eggs. It does seem unusual that no adults were even roosting on the island at this time.

White tern: we censused this species in the afternoon and at night, using the 2 Pisonia transects originally marked by Shallenberger. Our daylight counts were higher, perhaps because our lights were not powerful enough to illuminate the upper branches of the tallest trees. We were also able to spot eggs much better during the day. Apparently, white terns were breeding in relatively low numbers; at higher densities they may be much more difficult to accurately count during the day.

I used two categories for censusing: 1) eggs or chicks (or an adult I was sure was incubating or brooding), and 2) suspected eggs or chick-like adult whose posture suggested it was brooding or incubating, but was too high, etc. to be sure). Using Shallenberger's figure of 10,000² of white tern nesting habitat on the island and category 1 counts, I estimate 40 nests island-wide. If the category 2 counts are included, the estimate becomes 51 nests. For comparison:

| | |
|------------|----------------------------|
| Nov. 1980 | 102 pairs |
| Nov. 1981 | 27 pairs |
| *Oct. 1984 | 221 pairs, mostly on eggs. |
| Nov. 1988 | 51 pairs. |

* The 1984 trip report estimate used different areas in the calculations; the 221 pair figure is derived using the same areas as in 1986.

Evidence of rat predation in the form of holed eggs is difficult to detect, since shell fragments of this species look similar to those of black noddies.

(684) 633-4456 OMR

GREEN TURTLE

We walked around the island upon our arrival, mapping all visible turtle tracks and pits. We repeated this each subsequent morning, looking for new tracks. We also circled the island at least once after dark each night, usually at and around low tide. At 0145 on 9 Nov. we saw a large turtle resting under *Tournefortia* on the NE shore of the island. It was gone when we returned at 0215. Then at 0700, we tagged a 101cm long (curved carapace length) female that we spotted out on the NE reef flats: 6887 R. 6888 L. This may have been the same individual that dug one large and 2 small pits on that shoreline sometime earlier that morning. I don't know if this was the same turtle that we saw up on the beach.

| | |
|------------|--------------|
| Morning of | sets of pits |
| 8 Nov | 4 |
| 9 Nov | 2 |
| 10 Nov | 0 |

On 9 Nov we counted 8 relatively recent tracks on Sand Island. By following the tracks, we attempted to determine the number of pits made during one emergence from the water. We counted only those tracks and pits in which the disturbed sand was still colored differently from the rest of the substrate. I don't know how long it takes for such sand to bleach white.

Mammals

Bumback White: one whale surfaced and tail slapped just outside the reef while we were off loading onto Rose Island on Nov. 7.

Polynesian Rat (*Rattus exulans*): rats were abundant and active in all vegetated parts of Rose Island. We set 73 snap traps in the Pisonia, using the 2 established transects as rough guides, and set an additional 13 traps in *Tournefortia* adjacent to the northeast bench (running inland beginning

approx. 60m north of wooden refuge sign). Traps were baited with raw coconut and set, unstaked, each of the three evenings at or just before dusk. We checked them the next morning, springing all unspringing traps and removing dead rats. We recorded trap brand (Victor or McGill), sex of the rat, or whether the trap was sprung, still baited, or had caught something else (usually hermit crabs). We did not record brand or sex on the first morning's check.

Total number of rats trapped. Numbers in parentheses are % of the total number of traps set.

| | | |
|---------|----------------|---------------------|
| | <u>Pisonia</u> | <u>Tournefortia</u> |
| 8 Nov. | 53 (72) | 4 (31) |
| 9 Nov. | 37 (51) | 5 (42) |
| 10 Nov. | 29 (40) | 3 (23) |

In Pisonia, the catch decreased each night. The sample size in *Tournefortia* is too small to show any clear trend. However, the lower catch percentages there conform to my impressions of less rat activity in this habitat than in the Pisonia and dense *Tournefortia* towards the interior. This also confirms that rats are active even in beach halitrope lacking any soil or leaf cover underneath.

The following table summarizes the sexes of rats caught in Pisonia the second and third trap nights. A chi-square test on the totals for both nights revealed no significant deviation from a 50:50 sex ratio. Because of the small sample size, *Tournefortia* data are not examined here.

Sexes of rats trapped in Pisonia.

| | | | |
|---------|---------|---------|-------|
| | male | female | total |
| Nov. 8 | 19 | 17 | 36* |
| Nov. 10 | 19 | 9 | 28* |
| Total | 38(39%) | 26(41%) | 64 |

* excludes one rat of unknown sex.
 $\chi^2 = 2.26$; P accepted; rats were trapped from a population having an equal sex ratio.

Victor traps were more effective than McGill's, according to tallies of the 2nd and 3rd nights' trapping. Although exclusive use of Victor may render future trapping surveys not strictly comparable to this one, I recensored them. At a minimum, brands of traps should not be mixed.

Total counts combined from Nov. 9 and 10. Numbers in parentheses are percentages.

| | | | |
|--------|----------|----------|---------|
| | no bait, | rat | total # |
| | no rat, | of traps | |
| Victor | 12 (19) | 49 (73) | 67 |
| McGill | 56 (72) | 16 (21) | 78 |

There was no sign of rats on Sand Island.

The deleterious effect of rats on seabirds worldwide has been well documented (Hoors and Atkinson 1984), and Polynesian rats are known seabird predators on Kure Atoll (Woodward 1972). There, they eat the eggs and young of red-tailed tropicbirds, sooty terns, gray-backed terns and brown noddies, as well as great frigatebird adults and possibly white tern chicks. Predation levels on seabirds vary annually on Kure; Rose is probably similar. Reef herons, reported nesting in *Pisonia* trunks during several past visits, may be affected by rats. Sverdrhoff and Needham (1970) (in Amerson et al., 1982) saw "large numbers...preying on turtle hatchlings and eggs." In November, 1974, personnel interviewed when rats attacked two turtle hatchlings (FY 1975 Narrative Report). During an October 1975 trip, rats were eating flowers from fallen *Pisonia* inflorescences; Amerson et al. (1982) reported them eating fruits, as well. Rats may be a serious perturbation on Rose Island.

Black noddies and white terns on Rose Island seem especially vulnerable, both because of their nesting habits and their low numbers or absence during this trip. Sooties, brown noddies and gray-backed terns may be threatened if rats invaded Sand Island. Therefore, any incidental observations of direct predation on birds should be recorded. However, a more exact assessment of the effect of rats on the reproductive success of these birds is probably only possible during an extended stay on the island. Egg shells on the ground indicate that hatching success may be depressed; if trees can be isolated, a comparison between black noddies and white terns nesting in rat-proofed (trunks girdled with metal sheeting) and unattended trees would be very helpful.

Rose Atoll is the largest and most protected nesting site for green turtles within more than 600 miles (G. Balazs, pers. comm.). Some quantitative determination of the extent of rat predation on hatchlings requires presence on the island during hatching. However, Szilz (1978) reports that the incubation period for the green turtle ranges from 54-88 days. If it is impossible to accurately predict hatching given a known lay date, then chances of witnessing hatching on a short trip are not good. Moreover, predation may rise and fall with rat populations, so lack of it during one time period does not mean rats are not a problem.

Stomach content analysis may shed light on rat diets, optimally with collection at different times of the year. On Kure Atoll, rats normally exist largely on plant matter (Wirtz 1972), switching to birds when plant foods become scarce (Woodward 1972). From bare bark patches, it appears rats on Rose were feeding on *Pisonia*. They may affect other plant species as well. Apparently, some whole animals and digestive tracts were taken by Shallenberger in 1980 and Naughton in 1981. I can find no record of analysis results. Ideally, vegetation surveys should also be conducted before and after any eradication efforts.

The investment needed to document the effects of rats on Rose Island is substantial. If we are going to commit resources to a longer stay and/or multiple visits to the atoll for further study, I recommend trying to eradicate this species during these visits, as there is no compelling reason to have them on the island.

Kaemohale, comparative indices of rat populations should be collected during future visits. An attempt at an actual population estimate would also be helpful, if a fairly simple and quick method is feasible. Bill Knowles expressed interest in this. Information on population cycling is critical to the success of eradication efforts, which must be initiated when populations are relatively low. In 1965 on Kure Atoll, where no young are born from September to December, the population declined from Sept., reaching a low in May (Wirtz 1972). The months following the winter storm season may be worth investigating on Rose. Furthermore, it appeared from debris that the island had been washed well inland sometime within the last year, perhaps also reducing rat numbers. Once a low cycle has been detected, a two to three week camp on Rose Island, with a follow-up visit within 3-4 months, the estimated time to sexual maturity (Jackson and Sarabehn 1962), is minimally necessary for successful eradication.

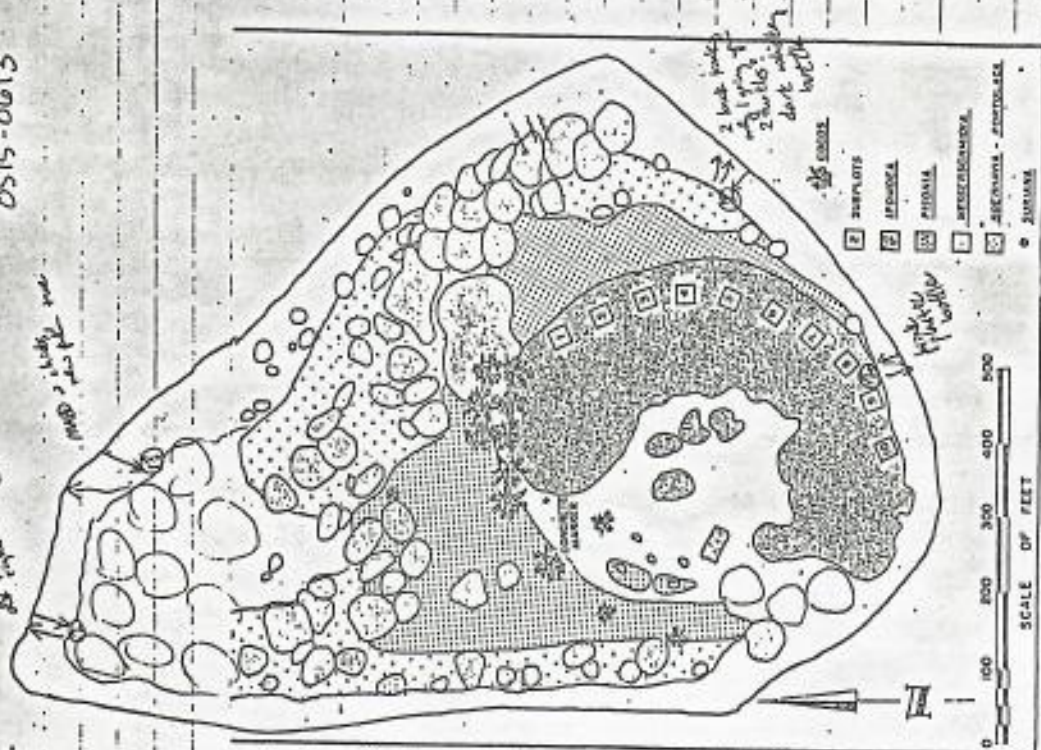
Bait preferences and the use of fumigants and poisons should be investigated in future trips. Strecker et al. (1962b) tested several baits; they found that rat tastes varied somewhat, but that toasted coconut was superior to dry rice or copra. They did not test fresh coconut or peanut butter, a bait suggested by Steve Berendzen.

The problem of accidental plover take in the snap traps is seasonal; however, we should attempt to minimize this in the future. Placing traps inside tubing or underneath some sort of cover may exclude these birds. Seabird chicks (masked booby, primarily) may be trapped, too, so precautions against accidental take should perhaps be extended throughout the year. Live trapping is another option.

112

8 NOV 86
0515-0613

8 patches (same water)
1000' x 1000' area



112

9 NOV 86
0626-0734

6887 R, 6888 L

Believe logged buffer is same as seed circles in last plot
Turtle tagged here
Turtle seen at 6887 L

Spide, 1/2 hr 25 min
came in for the
first time

