

Herb----

This is a bit lengthy but maybe you can use it some how---  
maybe you will need a quick report some time or something---  
Just got started and didn't stop.

I am keeping notes on the people I talk with and zeroes  
of the more important things I find in publications. One of  
these days I'll copy them and send them over to you. If  
there is anything specific you want let me know.

aloha,

June 6-9-74

as you might guess I typed  
this myself.

REPORT ON FOODS AND PLANTS CARRIED ON LONG VOYAGES OF  
EXPLORATION AND SETTLEMENT - PRELIMINARY REPORT

This report is based upon interviews with anthropologists, botanists, food scientists, Polynesians and individuals who have actually sailed the Pacific, as well as a wide range of publications.

Since the ancient explorers and settlers had no maps with solid ~~lines~~ or even dotted <sup>lines</sup> ~~ones~~ delineating geographical or cultural areas, I have extended my research into those areas boarding Polynesia.

There ~~are~~ of course some limits in doing this type of research, at some point <sup>some</sup> ~~much~~ of what we are researching will come to a point where the answer will be an opinion, Yours, mine or someone else's, it will still be opinion. Some of the things we are researching have ~~been~~ <sup>will</sup> ~~been~~ <sup>be</sup> ~~viewed~~ <sup>be</sup> ~~differently~~ by different experts. This report is fairly neutral <sup>as</sup> ~~but~~ some of these things will in the future become the point for some of the decisions that will be made regarding the Polynesian Voyaging Societies Tahiti trip. What foods? In what quantity? In what state of preparation? How the food will be used? Even the make-up of the crew may <sup>be affected by the food chosen</sup> ~~depend on food~~.

### VOYAGING FOODS

The following are the factors that have been considered in determining what foods may have been used on the ancient long voyages.

1. Availability of foods on the islands from which the long voyages may have originated.

2. Daily food and water requirements. While food and water requirements under present day normal conditions are pretty well established, stress needs, especially those of voyagers in open vessels, are less well known. For this study, so far, a certain amount of educated guessing was done.

3. Vessel size and consequent crew size, storage space and in the case of settlement voyages passenger capacity. Based on some documentary research and talks with individuals who have actually sailed the Pacific I feel that exploration would have been done in modest sized vessels. For this I cite the recorded history of oceanic exploration. Explorers seem to have fairly consistently used modest sized vessels. Larger crafts would not have given proportionally greater advantages without disproportionally greater expenditures of man power and materials.

Experienced sailors point out that excepting for pleasure voyages crews are kept to the minimum necessary to conduct the business at hand, which usually means three watch crews. Obviously in ~~the~~ voyages such as the exploring voyages of the Polynesians a certain number of replacements <sup>have been</sup> would be necessary.

While larger craft would mean larger storage ~~areas~~  
they also generally mean larger crews, which would mean  
more food stores.

4. Transit time. The three weeks projected as  
the time for one leg of the Societies voyage seems to  
be reasonably within the limits of most of the long  
voyages of the Polynesians. <sup>that</sup> ~~we~~ have some traditions to draw on.

5. Facilities for on board food preparation.  
Practicality was most likely the determining factor  
in ~~determining~~ <sup>deciding</sup> what foods were used in transit.  
Slaughtering, fire making, cooking and other involved  
food preparation could have been possible but would they  
have been practical? I doubt it. Even relatively calm  
seas are not very conducive to any but the most simple  
cookery. This of course leads to the conclusion that  
animals were not taken on exploring voyages.

6. Total quantities of food. While I have made  
no guesses on quantities of food, when one looks at a  
formula of the food requirements of one person per day,  
multiplied by the number of days in transit again  
multiplied by the total crew it becomes extremely clear  
that quality had to take precedence over quantity. ~~It~~  
~~should be considered that~~ Since the length and destination  
of exploring voyages were unknown <sup>before departure</sup> it is most likely a  
certain amount of reserve food and food for a return voyage  
may have been included in the food supplies. This

leads me to believe that because of the large amount of food ~~this indicated~~ as needed ~~for these voyages~~, dehydrated foods made up the bulk of food supplies.

While a large number of possible foods have been suggested the following are the foods that I feel were most commonly used.

1. Dried fish, including squid etc. prepared in advance of the voyage. Several experienced sailors have pointed out that fishing while sailing is <sup>reasonably</sup> successful only if one has time to stop and troll.

2. Dried pandanus paste and flour. Sir Arthur Gimble reports that pandanus flour and water were often the only food and drink taken on long voyages.\* Pandanus is fairly common through out the Pacific, some varieties being a major source <sup>food</sup> of food. <sup>and</sup> Dried under reasonable conditions it has a life expectancy of several years.

3. Dried breadfruit. \*Ulu reduces considerably in volume upon drying and has a long life expectancy under normal conditions. From my brief experience with it I believe it will stand up rather well under the moist conditions of a long sea voyage.

4. Dried bananas. Like 'ulu <sup>and pandanus</sup> ~~dried~~ bananas are greatly reduced in volume <sup>when dried and</sup> while retaining a surprising portion of their food values <sup>while</sup> and having a long life expectancy.

\* The Migrations of a Pandanus People, The Polynesian Society Journal #12 Mem.

5. Arrowroot starch. In some areas arrowroot was an important food and as a flour had a long life expectancy. *note high caloric value on page 6A.*

6. Coconuts. The size of the crew and the available storage space may have been the determining factor as to the use of coconuts. Using the formula cited earlier, a crew of 15 using three nuts a day per person for a period of 21 days would use 945 nuts, a large number, requiring a lot of space.

Thor Hayerdahl, who no matter what you think of his theories, *but who's voyaging* ~~his~~ experience ~~a voyage that~~ should give him a fair basis for making a judgement on food requirements for long voyages states that after ~~his raft voyage of~~ *on a sea going raft* 110 days the coconuts "carried in open ree-baskets on deck, kept in perfect condition and supplied refreshing drinks and welcome provisions until the last day of the journey... a supply of coconuts, coupled with fishing carried out enroute, might be the ideal provisions."\* It ~~should~~ be noted that raft travel is much slower than sailing canoe, allowing for trolling, *also storage space is greater*

7. Sweet potatoe. While sweet potatoes could survive such a voyage time wise, salt water would be very destructive.

8. Taro. Cooking enroute would be the problem with taro, which takes a fair amount of time to cook. Just

\*American Indians in the Pacific

how would cooking <sup>have</sup> take place? Fire pits on board ship would of necessity be less effecient that ground pits. Time-wise taro has sufficient life expecency to survive long voyages but salt-water would be damaging.

9. Gourds. Obviously gourds would not be a food item but they were ~~important~~ as water carriers. You might be interested to know of a technique that I was told about years ago at Honaunau by a Hawaiian fisherman. He said that when he and his fishing companions went fishing for long periods of time they would take a water cask. <sup>Each time</sup> ~~as~~ they took a drink they <sup>replaced</sup> ~~added~~ an equal amount of sea water, gradually becoming acoustomed to the increased salt content. They usually limited them selves to a 50-50 mixture <sup>but could go longer.</sup>

As a last thought on voyaging foods I would like to suggest that we give consideration to the <sup>psychology</sup> ~~psychology~~ of the food habits and beliefs of those who will make <sup>the</sup> Societies voyage and possibly <sup>allow for</sup> ~~plan~~ a period of food adaptation.

THREE FOOD VALUES OF SEVEN IMPORTANT FOOD PLANTS IN TWELVE FORMS

Listed in descending caloric value of 100 gram portions

| FOOD ITEM  | CALORIES | PROTEIN<br>in grams | ASCORBIC<br>ACID in mg |
|--|----------|---------------------|------------------------|
| Coconut, mature firm flesh<br>adhering to brown skin | 414      | 4.0                 |                        |
| Arrowroot  | 346      | .18                 |                        |
| Coconut, liquid and meat<br><u>2 coconuts</u>        | 322      | 4.5                 | 14.0                   |
| Pandanus paste                                       | 293      | 2.23                | 115                    |
| Pandanus flour                                       | 196      | 2.94                |                        |
| Taro   | 153      | 1.0                 |                        |
| Sweet potatoes                                       | 128      | 0.76                | 4.0                    |
| Breadfruit   | 128      | 1.4                 | 4.0                    |
| Coconuts, drinking stage<br>water & flesh combined   | 116.     | 1.6                 | 4.0                    |
| Banana, eating                                       | 99       | 1.2                 | 11.6                   |
| Coconut embryo stage                                 | 80       | 1.3                 | 6.0                    |
| Pandanus, edible part<br>of keys                     | 70       | .37                 | 2.66                   |

Adapted from charts in "SOME TROPICAL SOUTH PACIFIC ISLAND FOOD  
PLANTS," Murai, Pen and Miller.



PLANTS POSSIBLY CARRIED ON LONG VOYAGES FOR MEDICAL PURPOSES

Injuries, exhaustion, exposure<sup>20</sup>, and constipation seem to be the most likely medical problems on long voyages. I have done some research in the general field of Hawaiian medicine and will make a report on this latter if it becomes part of the Societies voyaging program.

The many "green" medicines that were common ~~to~~<sup>to</sup> at least/Hawaiian medicine would have dried early in the voyage. Although drying was not common in Hawaiian medicine, dried herbs may have been part of sea-going provisions. The following are ~~these~~<sup>plants</sup> that I feel were most likely to have been included in voyaging provisions.

1. 'Awa. Quick relief ~~of~~<sup>from</sup> the strain of exhaustion, and from pain in cases of injury were among the common uses of 'awa. I was also told by a Fijian that it provides relief in cases of sea-sickness. While voyaging crews would not have been given to sea-sickness, passengers ~~on these voyages~~<sup>on these voyages</sup> might have had some problems.

2. Kukui nut. I can not speak from experience but kukui nuts have the reputation of being an efficient laxative. They would take less space than ~~other~~<sup>some of</sup> remedies and the nut ~~provides~~<sup>shell</sup> near perfect protection.

3. 'Olana. Ear and nose infection which well might be a problem on long voyages are commonly treated with 'olana. The root is hardy and with little care would easily survive.

4. 'Alaea. While not a plant this red soil was important medically and easily carried.

PLANTS AND FOODS THAT MAY HAVE BEEN TAKEN ON LONG VOYAGES  
FOR RELIGIOUS PURPOSES

There is no question that religion must have played an important part in the long voyages and it seems fairly safe to presume that religious rituals took place regularly.

All the food taken would have had value as offerings. Salt water would serve as a purifier.

The following are plants of religious importance that could have survived long voyages.

1. *Ti*. Important throughout much of the <sup>South</sup> Pacific. *Ti* was considered the most religiously powerful plant in Hawaii, ~~and elsewhere.~~ Carried in the manner that Don Anderson reported breadfruit starts were carried from Ponape to distant islands, or some similar manner, small plants with green leaves could be carried successfully. I have not been able to determine if the log alone has power, if it does it could be easily carried and remain viable.

2. 'Olena. Often used in purification rites as well as medically.

PLANTS POSSIBLY USED FOR LIGHT AND HEAT ON LONG VOYAGES

In general I doubt if there was much effort made to produce light on long voyages. However in cases of emergencies such as making repairs to equipment and treatment of injuries some light would be necessary. I have found no record or indication of what would have been used. Since a strong light would have been needed I doubt if kukui nuts would have been the fuel. Coconut oil and trash might have been the answer. After reading Powells report I feel that it might even be possible that small bundles of coconut spaths might have been carried for extream emergencies, both for light and heat.

As stated <sup>earlier</sup> ~~above~~ I doubt if cooking took place on the voyages, but there might have been occassional need for heat to dry out equipment or for an ill-crew-man.

As with light coconut trash could have provided fuel.

PLANTS BELIEVED TO HAVE BEEN INTRODUCED TO HAWAII BY THE  
AGENCY OF MAN

The accompanying list of plants was compiled from several sources. As with other subjects the botanical life of the islands is subject to various view points. There are a number of plants whose history is not agreed upon, such as the hala. In conversation with one botanist I was assured that man would never have brought the variety found in Hawaii as it was not good to eat. Another botanist pointed out its economic importance and said she felt that it was probable that it had been introduced intentionally by man. I might add that I agree with the latter view. A people whose voyages depended on sails would have placed a high value on the plant that provided the material for those sails.

Most of the plants on this list are of economic value, including medical uses, others have religious value and a few have little or no known value to-day.

May 17, 1976

TO: Polynesian Voyaging Society

FROM: June Gutmanis, [REDACTED], Waianae 96792

RE: Sweet potatoes, seeds, plant slips and Hawaiian Medical  
plant material provided for voyage to Tahiti

PER: Authorization T. Holmes

|   |        |
|---|--------|
| 1 packet gourd seeds, four varieties            | N/C    |
| 1 packet <u>mamani</u> seeds                    | N/C    |
| 1 packet <u>hau</u> seeds                       | N/C    |
| 1 packet mountain apple seeds                   | N/C    |
| 4 packets sweet potatoe slips, 1 variety each   | N/C    |
| 250 # sweet potatoes @ 0.25 lb.                 | 62.50  |
| 3 pounds dry <u>mamaki</u> @ \$1.00 lb          | 3.00   |
| 7 pounds dry <u>ko'oko'olau</u> @ \$1.00 lb.    | 7.00   |
| calls to arrange purchase of above              | 2.20   |
| <del>3 pounds</del> <u>Pi'a</u> starch @ \$1.69 | 5.07   |
| 5 pounds <u>olena</u> root                      | N/C    |
| 5 pounds <u>uha loa</u> root                    | N/C    |
| 1/2 pound <u>'alaea</u>                         | N/C    |
| 6 gourds to make medicine containers @ 2.00 ea  | 12.00  |
| Cord and labor to make 3 nets for above         | 30.00  |
| 2 small gourds for <u>'alaea</u> container      | N/C    |
| net for above                                   | N/C    |
| Charges for one of two shipments to Lahaina     |        |
| per invoice [REDACTED]                          | 5.25   |
| sub total                                       | 127.04 |
| 4% tax  | 5.08   |
| TOTAL DUE AND PAYABLE                           | 132.12 |

*June Gutmanis*