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F. R. Fosberg

Collection and Field Note Book

No. 67
(Feb. 15, 1963 - March 20, 1963)

(43404 ----- 43570)

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July 10, 1907

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start with # 43404
end # 43570

(a reward will be sent)

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Books # 67

Standard
Signature Blank

PLANTS OF THE HAWAIIAN IS.
OAHU

Lonicera japonica

Locality 2 mi. north of Turlock, Stanislaus Co., Calif.

Occurrence Planted many years ago in yard, has not spread but is a healthy plant in ~~area in~~ yard

Date 3/19/63

Coll. F. R. Fosberg

Remarks Tangled climber, sterile at this season

Alt. 35 m

No. 43553

return

c/o Native
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(SIGNAL CORPS) 801 ACRES

DER PERMIT 1
COAST GUAR

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ISL

Zidson

All labels in this book
done except those on
pages 6, 188, 190

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1903

California

1

Feb. 15 - Trip by car - Hayward
to Turock -

Hills bet. Hayward and
Tracy are green.

In Tracy area apricot
orchards in full bloom.

Feb. 16 - return to Hayward -

Area between Hughson
and Ceres, but just south
of each, is almost entirely
a mosaic of orchards and
vineyards - with a few
open fields - with some
cottonwoods, locust, Melia,
Washingtonia, olive, evergreens,
and Eucalyptus around
houses.

Orchards are mostly
peach, pruned to a very
definite height, perhaps
12 ft., with branches curving
downward at tips. Grafts
are either staked up and
on wires or pruned back
to erect trunks. There are
some walnuts, either as
orchards or rows along the
roads.

Out of Modesto on Paradise
Road - orchards dominate
until Sunland (?). Here is a
slough (or the Tule River ?)

with large trees - not mostly *Populus*. *Rhododendron* very prominent.

From here a mosaic of open land and orchards probably generally more open land, till crossroad paradise - Philoh ads.

From here scarcely any orchards. On left sloughs & trees, much *Rhododendron* alternating with pasture & cultivation. Then low, dark gray soil. San Joaquin bottom lands. To it higher, very open large fields all cultivated.

To Hwy 132 land is lower, drainage ditches tendency to be marshy.

Left on Hwy 132 - all cultivation, ditches. 3 mi. to San Joaquin R. becoming more marshy to river. Along river are sloughs with trees - *Salix*, *Populus*, *Quercus*? etc. Considerable *Rhododendron*. Marshy land mostly pasture.

West of river is both pasture & cultivation all open. To Rt. 33. Rt.

on 33 to Tracy.

This land is higher, but possibly still originally marsh. One deep drainage ditch.

A few orchards toward Tracy - apricots, blooming. A young walnut orchard, just planted. A few rows of walnut trees along road. Mostly cultivation in large fields. Shallow roadside ditches. Area on it. 90 bet. Tracy & Rt. 33 is low flat, all cultivated. Probably would originally have been marsh.

The rivers - San Joaquin, Turlock & Stanislaus are all flowing with considerable volumes of water, and are all very muddy - not overflowing in spite of heavy recent rains.

Center strip on it. 90 mostly has a hedge of oleander.

Feb. 17 - St Lucas Valley
Partially denuded hills,
with patches of woodland
and, in western part,
of chaparral. Flat
valley bottom with
thickets and patches of
wood - Umbellularia (with
noticeable weeping habit),
Quercus (wislizenii?), Salix
5 km photos near head of
valley - chaparral with
Umbellularia in ravines.

Immediately over
summit are Pseudotsuga,
Sequoia, ~~Pseudotsuga~~
these becoming abundant
down the canyon toward
Nicasia. Arbutus,
Umbellularia.
Esp. in valley bottom
above Nicasia, where there
is a beautiful grove of
spruce redwoods.

Near Nicasia reservoir
a slope, mostly grassy, has
a series of large slump
terraces - on the slumps
are patches of Cornus.

In a wide ravine is a
patch of Salix sp. with
some Rhamnus californicus.

Baccharis pilularis is
scattered on slopes.

Canyon below Nicasia Res.
is densely wooded with
Umbellularia. One local
slope shows very striking
grooved wind-shear. (photos)

Below this the valley
bottom filled with fescue about
4-5 m. tall, catkins just
coming out. This and
Deschampsia are bare. The Deschampsia
is rare, scattered in the
Umbellularia. Some Quercus
wislizenii.

Fairly extensive salt
marsh at head of Tomales
Bay. Slope of Inverness
Ridge above bay densely
wooded. Much building
along road, even out into
salt marsh.

Point Reyes - peninsula bet
Drakes Bay and ocean,
mostly grassy & pastured,
rocky knobs north of light house
partly grassy, partly
covered by a thin scrub
of Lupinus arboreus
(photos). Long strip of
dunes to north back of
beach, with Lupinus & Baccharis.

A little *Gaultheria shallon*
in rocks, *Erigeron* of *crucifera*

- In flower {
- Hamamelis arctopoides*
 - Iris douglasii*
 - Nemophila menziesii* v. *atomaria*
 - Stellaria media*
 - Claytonia*
 - Campanula californica*
 - Phacelia insularis* var. *continentis*
 - Trigonotis*
 - Draba Arabis blepharophylla*
 - Dentaria californica*
 - Berberis aquifolium* (pinnata)
 - Erysimum*
 - Arnica discoides*
 - Oenothera ovata*
 - Phacelia californica*

In a sheltered slope
some sizeable bushes
of *Berberis* in the *Lupinus*
scrub.

California

Feb. 17 - Point Reyes hills ~~just~~
north of lighthouse back
from coast, Marin Co.

43404

Berberis

"

very local on slopes
away from sea

05

Phacelia insularis var. *continentis*
rare, in grassy places
around rocks on hilltop

stiff, compact shrub 1 m. tall,
leaves stiff; flowers yellow.

flowers rose-colored

1963 Guam

Feb. 22 - Arrived on Guam at about 9:20 a.m. The aspect of the island from the air is definitely green.

Superficial impressions from driving around central part of island: Tamuning, Agaña, Barrigada, College of Guam, Harmon Village, etc.

Leucaena is about as luxuriant as ever, but tips of upright branches or stems are bare, for up to 5-6 dm. or more. Lines roads.

Artocarpus - many trees have small branches beaten off and the aspect of the plant very ragged, but small leafy twigs appearing in abundance.

Ficus - branches beaten off, larger ones with an abundance of small sprouts. Many of the trees little more than the complex trunks with short sprouts.

Cocos most trees still standing but looking very beaten up, a few snapped off, quite a few blown over. Some look as though they had been attacked by Anzates, but this not conspicuous. Anderswald, agriculture dept. chief, said that although a few trees look this way no beetles have been found.

Ochrosia - many small trees seen but none seemed to show any typhoon effects. Fully leafed out.

Premna - only one tree noticed but this showed no signs of damage.

Morinda citrifolia - fully leafy, showing no obvious effects of typhoon.

Fibicus - ornamental hybrids - leafy and blooming vigorously.

Thespesia populnea - one or two small plants seen, fully leafy.

Herbaceous ground cover is fully as luxuriant as normally, especially

common components are:

Bidens leucantha, most conspicuous roadside species, flowering abundantly.
Isoglossa hillebrandii, very common, flowering.

Chloris inflata common in grassy places, also Pennisetum setosum

locally abundant in Harmon Field - Harmon Village area, fully covering ground.

Pipturus occasional, not showing any Typhoon effects at all.

Pisonia^{grandis} trees near hospital have all small branches broken off, sprouting abundantly from trunk and larger branch stubs. One tree lying down sending up sprouts.

Pandanus in forest mostly showing no apparent effects - fully leaved out. But in some patches of woods are many trees broken off.

The general aspect of the forest north of Harmon Field is ragged but certainly green.

Anderwald says that after the typhoon it rained hard for about 4 days.

Casuarina equisetifolia ragged looking, with tips of branches dead, but all large and medium, even many small branches sending out small branches with abundant photosynthetic branchlets.

Delonix regia were defoliated but have recovered ~~from~~ partially to almost wholly.

acc. stone -
 Not a leaf left after typhoon
 except palms & Pandanus
 which were shredded.

Leucaena started to
 become green again
 within two weeks.

Artocarpus was by far
 the slowest to start to
 put out leaves again.

Few Pandanus were either
 snapped off or tipped over,
 but some were.

Plants seen

Phyllodendron cf. bipinnatifidum
 Dombeya spectabilis
 Nopalea cochenillifera

Buddleja asiatica - road
 below west gate of Nagasaki
 along ditch. fair colony -

orange Senecio (from Hawaii)

Feb. 23. Trip Agaña - Piti - apt
- Umatac - Meigs - Inarajan -
Talofofo - Yona - Tinian - Agaña.

At ^{Asan} ~~Piti~~ a Casuarina with only a very slight development of new branchlets, others on landward side of Asan Point scarcely at all damaged.

Thespesia and other beach trees, incl. Pithecellobium defoliated, many tipped over. Refoliation not far advanced on Pithecellobium, but well advanced on Thespesia.

On Cabras Island Pluchea indica is abundant. P. odorata occasional, hybrid several colonies - depressed.

On seaward face of island in spray zone

- o Pluchea indica
- c Capparis cordifolia
- a Pemphis acidula
- Pipturus argenteus
- o Callicarpa candicans
- o Achyranthes velutina
- o Ipomoea peruviana
- o Clerodendrum inerme
- o Scaevola taccada
- a Ipomoea tuberosa

all on rough limestone but the Pluchea prob. only on

disturbed areas. Here also Fimbristylis cynosu abundant.

On exposed sloping faces several m. above s.l. The plants were apparently cut down to woody bases, but are now ~~re~~ sending out new branches.

Saccharum spontaneum one sterile clump on breakwater beyond end of Cabras (with the Pluchea)

Battered forest on limestone near base of Cabras with Xylocarpus, Thespesia, Pisonia, Artocarpus marian. Pipturus - all recovering vigorously - the Artocarpus slowest.

On ridge beyond quarry Pipturus is dominant, distal parts dead, vigorously sprouting from bases & trunks.

Beyond Cabras, toward Orto, are thickets or forest of Pithecellobium, some trees toppled, most of them battered, but mostly well

leafed out.

First river of Sasa

Mangroves - some killed - one area counted, of tall stems 1/4 live, 3/4 dead. These still standing. Many have been knocked down and are dead. No mosquitoes.

A patch a little farther away seems mostly living. The leaves are mostly on the upper branches.

A small patch of mangrove at corner of Inner Apra Harbor are more alive than dead.

At Agat, but along beach some Lamanea. This dead but abundant small leafy branchlets. Breadfruit trees on coastal strip tipped over but sending out some branchlets.

Some on landward side of road standing but small branches mostly removed, abundant small branches.

Most of toppled trees pointing south, incl. a number of coconuts.

One coconut snapped off s. of Bangi point on flat at top of beach. Several partly toppled *Pithecellobium* are partly dead, but many branches green and sending out tiny leafy twigs.

Facsi Point - rain - storm - waterfalls everywhere, from here south, water from sword-grass areas ~~are~~ very clear.

Coconut trees in valleys look very peculiar south to Umatac look very peculiar - many old leaves hanging on and small curved leaves.

At Merizo and east many *Artocarpus* knocked down, still sending out sprouts - also *Pithecellobium*. Trees in general here look battered but leafy. The mangroves very little affected.

Coconuts all have lower leaves partly brown. Some have inflorescences.

Small mangrove swamp east of Merizo. trees to 3 m. completely unaffected by the storm.

Rhizophora mucronata + *Bruguiera gymnorhiza* about equally dominant both flowering & fruiting, but not abundantly. *Sonneratia distichum* flat with several *Avicennia* seedlings.

The *Cosmarina* on this south coast is not nearly as battered as in the central part of the island. Probably still retains old green branchlets.

Many trees, especially *Pithecellobium*, are down but may be from 1957.

Near Aga Pt., many more trees are broken and knocked down.

North of this some coconuts down, but standing ones not much damaged. Young ones seem more tipped over than tall ones.

Lantana is becoming abundant on flats between Aga Point and Marajan.

In Merizo bananas are a bit taller than elsewhere (to 2 m), one bunch of fruit seen.

Coconuts up along east coast are rather sparse and battered looking. None seen down except for a patch about half way bet. Marajan and Talofofol where most of the trees are down, but possibly not.

Trees more and more battered toward Talofofol and especially on the hills just south of the bay, where everything is ragged.

At Talofofol Bay the waves apparently knocked the *Hibiscus* and *Leucaena* down to about 5 m. inland from the road. These trees are putting out leaves again, even those that are down.

The *Nipa* along the stream is somewhat battered and brown, but not more than bent over. At Marajan

it was even less damaged.

North of Talofofs in the next inlet much coral boulder size, was thrown up across the road. Much damage to trees.

Togeha - Casuarina forest along beach still standing but rather thin-looking.

Coconut plantations more and more battered northward, but hard to distinguish between the typhoon damage and previous bad condition of the trees.

Feb. 24 - above Harmon Field some *Occhrosia* rather battered and defoliated, recovering, some scarcely affected.

Notes on weeds -
Paspalum fimbriatum is generally scattered around the island.

Emilia javanica is common on roadsides around south end of island.

Bidens leucantha is extremely common on roadsides and waste places, at least as far south as Talofofs.

None of the common weeds seem to have been adversely affected by the typhoon. Some may have benefitted.

Many *Pithecellobium* tipped over, but mostly sprouting green twigs.

Alocasia macrorhiza - fully normal in appearance.

Pennisetum purpureum has become very abundant all over north and west parts of plateau.

(to p. 52)

- means
ready to record
+ means already
recorded

Feb. 23 -

east of Merizo
on sand flat just back of
shore, dominated by *Paspalum*
distichum

43406

(grass)

6 locally common

2 07

Avicennia

rare on wet sand

~~08~~

Feb. 23 - Harmon Village

1 08

Gomphrena

common weed in lawn

Feb. 23 - breakwater just
beyond Cabras Island
on coral gravel fill

6 +09

Pluchea odorata x *indica*

several clumps,

growing with both parents

1 +10

Pluchea odorata (L.) Cass.~~rare~~ occasional

3 +11

Pluchea indica (L.) Less.

abundant

Feb. 24 - Tarague Beach

2 12

(algae)

abundant on rocks between
tides

(Cladophoropsis

Entenomorpha

det Doty

1 m.

small tufts, culms ascending
to erect.

0 m.

2 seedlings, less than
70 cm. tall, ~~seen~~ only, seen.

90 m.

depressed; heads white.

4 m.

much branched,
conspicuously depressed
shrub; heads purple.erect shrub; sterile
at this season. leaves grayish green.shrub 0.5 m. tall, erect,
leaves bright green

0 m.

1963 Guam

Feb 24 - Campanaya Bay
Forest on slopes along road have many partially bare trees (photos). The terrace shows little evidence of recent damage but back of the depressed coastal area are many beaten down bare shrubs.

Along the coast to the north the front of the taller scrub appears brown. (photos)

Below the cliff is a good "worm-algal" bench (photos). (tide going down, will be low in 2 hours at Apr 11.)

Photos of *Zoysia tenuifolia* patch on terrace just back of cliff edge.

Scrub forest on the terrace is mostly *Mammey* in outer 50-75 m. This is entirely browned, but many dead leaves persist. A few green branches in sheltered places.

Inland the forest becomes mixed with *Ochrosia*, *Barringtonia asiatica*, *Aplous*, *Pandanus tectorius*, *Guamnia*, *Pisonia*, *Cycas*. *Ficus* *prolixa* etc.

The *Mammey* is less damaged here, but still predominantly brown. Some trees of most kinds are down. The cycads have lost lower leaves but still have good crowns. *Ochrosia* seems little damaged.

About 100 m from base of cliff *Tuphanea* becomes abundant.

Epiphytic *Dynrosia* seems unaffected.

Pisonia, here as well as on the slopes, is very much eaten by caterpillars. Leaves are lacy.

Ipomoea (or *Stictocardia*?) and *Flagellaria* are common vines.

Outside this forest *Leaevola* is killed back extensively from tips but trunks and protected branches are alive.

The *Mammey* in the edge of forest is leafless and is dead from 70 to 100 cm. back. Some saplings dead to base, even where sheltered.

sample 1.

"Worm-algal" terraces
(photos of rims) (sample
of rim rock) very
well developed here,
perhaps at mid tide.

sample 2

3

Some samples of rock
surface between terrace
level and inner part
of notch - a rough surface.

4

Samples of rims of
flat bottomed solution
pools well above ht.

6

but in spray area.

Deposits of debris
back 50-75 m. from
edge of cliffs show
that waves came over the
10 m. cliffs.

sample

5

rock surfaces from rough
pitted limestone about 10 m. up cliff
Along east coast road
Pandanus tectorius forests
show little or no effects
of typhoon except a few
trees blown down at edge
along road. Where there
are *Artocarpus* *Elaeagnus*
trees there are badly beaten
up. Small branches have
been whipped off. The
cypresses have no old leaves

Tarague Beach -

Coconut trees are perched
on root mounds
and debris has been washed
up to at least 100 m. back
perhaps 150 m. back of
shoreline. Some coconuts
snapped off. But it
is possible that some
of the exposure of
coconut roots dates
back to 1957, as the
roots are quite dry
and old. Several uprooted
Casuarina trees have been
thrown up to 5 m. or more
on the rocks. (10 m. $\pm$ leveled by R.A.)

At about low tide
level is a small
exposure of white
reef rock, eroding, now
cut in a much greater
exposure of a deeply
pitted reef rock. This
darkly stained by algae,
deeply notched intertidally,
with rough surface
conformable to just about
2 m. above m.t. This
levels precisely with
mushroom rocks and
other exposures well
out on the reef flat.
Abrasive material abundant

enough on the lower ~~to~~ ramp to keep it white for a while, but *Enteromorpha* or *Cladophora* is gaining a foothold on prominences. At least a few inches of material has definitely been removed from beach, probably more and if the root mounds are contemporaneous, much more, at least a meter in places.

Forest back of beach is battered and defoliated.

Along the beach to the westward is a good example of the 11 foot bench, both against the foot of the cliff and especially around the bottom of a very large mushroom rock. This rock is the size of a small room, perhaps 5 m high, very deeply notched at the 11 foot level. It appears to be a fragment that at some past time fell from the cliff. Though at the time it was observed it had not rained for at least 12 hours, water was dripping

from the top of the notch. Small stalactites had formed and a heavy blue-green algal deposit where the water fell, showing that the rock stores an appreciable amount of water.

This rock ~~as~~ suggests that the 11 foot bench could scarcely have been a Pleistocene phenomenon, as the rock in which this notch was cut could scarcely have been in this position that long.

The 6 foot remnants, also, suggest that they were probably not that old, as they would be pitted much more deeply than they are and could scarcely preserve any aspect of a 6 foot surface.

Feb. 24 - Campanaya Bay

- 43413 *Spermacoce*
4 common along roadside
in *Leucaena* thicket.
- 6 +14 *Ipomoea ~~triflora~~ triloba* L.
common along roadside
in *Leucaena* thicket.
- 3 15 *Scaevola* ~~Scaevola~~
common in tide pools
on "worm-algal" terraces
- 6 +16 *Stenotaphrum micranthum*
small patch on ^{(Desv.) Hubb.}
10 m. terrace ~~under~~
edge of *Mammea* forest, on
rough limestone.
- 1 17 *Sporobolus*
very local, on rough
limestone just above
spray zone
- 1 18 *Euphorbia*
rare in pits on limestone
terrace just above
spray zone

1 19

1 20

20 m.

20 m.

0 m.

10 m.

5 m.

5 m.

0 m.

0 m.

Twining in bushes,
flowers dull rose-pink,
open at 10 a.m. closed at 12 noon

prostrate, forming a
loose mat.

dense tufts, leaves
glaucous beneath.

milky; glands greenish.

Feb. 25 - Lates Point,
north of Pago Bay

Forested cliff and
terrace -

Cliff had a full
canopy of *Pisonia* and
Cynometra - this was
opened up by typhoon.

The cycad, very abundant
here, was not defoliated
though, acc. Stone, elsewhere
they lost all their leaves.

Momordica and *Physalis*
are abundant here now
but were not ~~there~~ present
before.

The *Pyrosia* here
has unusually long
stipes. *Intsia* is very
densely leafed out.

On the terrace many
trees are still leafless -
probably *Mammea*.

Feb. 25 - Lates Point, north
of Pago Bay (College of Guam)
Forest on steep limestone bluff

43421 *Achyranthes*
occasional in forest opened
up by typhoon

3 +22 *Morinda umbellata* var. *glandulosa*
common

3 +23 *Clerodendrum inerme*
occasional

1 +24 *Pyrosia lanceolata* (L.) Farw.
common on trunks of
Cycas and other trees

Feb. 26 - Y Piga Conservation Area.

in tangled forest of *Pandanus*
and *Artocarpus*, badly
battered by typhoon

8 +25 *Pyrosia lanceolata* (L.) Farw.
epiphytic on tree trunk 1-3 m.
from ground

1 26 *Taeniophyllum*
rare, epiphytic on tree trunk

2 27 *Asplenium*
occasional, epiphytic on tree trunk

4 +28 *Polypodium punctatum* (L.) Sw.
occasional, epiphytic on tree trunk

11 29 *Nephrolepis biserrata* (Sw.) Schott det.
abundant in ground layer

80 m.

stems ascending

twining, tangled vine;
flowers white.

low shrub; flowers
white with purple
stamens and style.
~~fronds~~ coriaceous

160 m.

elongate rhizome surrounded by
a dense mass of
fine roots, creeping on
tree trunk; blade leathery.
aerial roots pale green, flattened.
flowers white.
fronds thin, pendent.

large clumps, not
forming very regular
rosettes

1976 Garrett fronds erect.

to p. 42

Data from air photos

Ritidian Point - Feb. 15 1963

The vegetation shows little or no evidence of disturbance on reasonably low oblique except for some possibly defoliated trees on the terrace below the road on cliff edge. This is not at all obvious. Beachrock strip to northeast of point seems more clearly visible in these obliques than in a vertical strip of same region taken Feb. 21.

These verticals, about 1/5000 show much more evidence of defoliation but no real signs of extensive breakage or windthrow. This strip is very clear. The canopy trees very largely defoliated, understory not

VI 3006 24 Feb. 63
JAP-GI 45N

0109Z
13-37N 144-51E
Guam

1963 June

Vegetation types -

Sonneratia - generally the whole mass is bent over somewhat, to as much as 45° . The tips of the branches are leafless, the lower parts densely leafy with tangled stems.

Hibiscus tiliaceus forest tends to be blown in one direction and even more tangled than normally, leafy but less so than normally.

Pandanus forest -

Feb. 26 - Yliga Conservation Reserve.

Large breadfruit (same one on transect in 1967) and others in the neighborhood have lost all smaller branches (or where some remain they are dead) but first & second, rarely third order branches are putting forth leafy twigs, these no more than a few cm. long. Some Pandanus knocked down, broken just at or below the top of root cone.

Aglaia mostly bare, beginning to leaf out. Ochrosia shows little effect - has bright green leaves, few broken branches.

Canopy has been almost completely destroyed and a thick ground cover about 1 m. tall of *Carica* seedlings, *Nephrolepis biserrata* with scattered other plants - saplings of *Aglaia*, shrubs of *Martynia*, *Discololux*, *Triphasia*, *Eugenia*, vines such as *Flagellaria*, *Sporaea indica* (photos - first & 2nd under).

Many other trees knocked down, with many ~~of the~~ epiphytes on fallen trees and branches.

In small road running thru reserve, as it goes up the hill, in places the majority of trees have been knocked down, all pointing west or south of west. These include some large *Artocarpus*, some *Ochrosia*, many *Pandanus*.

from p. 34

- +3430 *Martynus thompsonii* (Mun.) Fob.
 7 common in undergrowth
 7 +31 *Mikania micrantha*
 common.
 2 +32 *Dentella repens* Forst. f.
 common on bare hard red soil

Feb. 27 - Ritidian Point

at top of cliff, on limestone

- 5 +33 *Melothria guamensis* Mun.
 in open ground at side of road
 3 +34 *Capricorn frutescens* L.
 common in edges of thicket
 2 +35 *Wilstroemia elliptica*
 occasional on cleared roadside
 (seedlings common in forest)
 4 +36 *Melothria guamensis*
 occasional in forest

same - on lower terrace

- 8 +37 *Ixora triantha* Volk.
 common in undergrowth
 in forest on limestone

same - on sand flat back
of beach

- 5 - 38 *Portulaca*
 common

Feb. 27 - Northwest Field.

west side

- 3 39 *Phathoglottis plicata* Bl.
 occasional in open grassy roadside

scrambling, sparsely
 branched shrub, fruit
 reddish, aril white.

very prostrate, fls. white.

160 m.

vine; flowers white,
 fruit green, fleshy.
 shrubs 1 m. tall; flowers
 greenish white, fruit green.
 shrub 2 m. tall, with
 unpleasant odor when
 broken; sterile.
 vine, flowers white.

35 m.

shrub 3 m. tall; ~~fruit~~
 bracts pale at base;
 fruit green, as many as
 6-8 in a head.

8 m.

2 m.

prostrate, fleshy,
 flowers yellow, petals notched
 at tips, stamens 10-14,
 flowers closing at about 10:30 a.m.

160 m.

erect, flowers magenta.

(to p. 48)

Feb. 27 - Ritidian Point

On slope to south all large trees are bare but the understory is fully green.

Ficus on rampart is bare, coming back slowly.

On plateau the canopy is very thin - *Pisonia* is hairy from being eaten by insects. *Premna* is fairly leafy.

Intsia very leafy, also the two trees of *Kentia*, *Macaranga* is well leaved out. *Ficus* mostly still bare. Many other trees bare. *Pandanus* uncommon here, but seems in good shape.

Beach below Ritidian Point waves obviously washed up to base of cliff, breaking the *Tournefortia*, so young coconuts, etc. in the outer edges of the vegetation at back of beach. much debris in coconut grove, small trees bent over but few large trees down. Back of this on lower rocky ground the forest of *Hernandia*, *Ficus*, *Aglaia*, *Lepotea*, *Psychotria marianensis*, *Premna*, etc., badly

battered, but no trees seen down. *Pisonia* almost completely defoliated by caterpillars. *Mammea* completely defoliated or leaves dead.

General direction of fall or bending of trees is east to west (on north coast. (photos)

Denuded ground around old installation has

Thunarea

Biden

Cenchrus echinatus

Ipomoea pes-caprae

Lepturus repens

Timbristylis cymosa

Chloris inflata

Wedelia

First terrace above the flat back of beach - canopy is destroyed - *Ficus*, *Pisonia*, *Mammea*, are almost completely leafless, *Pandanus*, *Ochrosia* not badly defoliated.

Barringtonia somewhat defoliated.

In understory - *Cycas*, *Aglaia*, *Triphasia* not badly defoliated. *Carica* coming up in abundance. Seedlings of *Barringtonia* also abundant.

Same terrace a bit south of Ritidian Pt.

Pinna. *Ficus* both defoliated, the *Pinna* by insects (beetle collected on leaves may be responsible). *Gehroia* & *Guettarda* not much defoliated. *Guamnia*, *Cycas*, *Tournefortia*, *Isora*, *Melaleuca*, *Cestrum* all in understory not badly defoliated.

Ficus in this area seems to have been defoliated, then put out bunches of ~~the~~ slender twigs 10-20 cm long, which have then been dried up and lost their new leaves and are largely dead.

Clearing about 1 km from tower - mostly a solid stand of *Bidens* with some patches of *Lesbania cannabina*. Down on terrace at base the forest has a considerable proportion of defoliated trees. One *Heliconia* (?) straight down half way to cliff.

Amantes Point - a number of *Casuarina* blown down to west, near top of cliff. *Ficus* beaten up, defoliated, except in ravines.

Some *Pandanus* blown over locally, all either uprooted or broken in root zone - only one tree seen broken off above roots.

Numerous swiftlets around steep cliffs, overhangs, & caves.

A tremendous shaft drilled in the limestone just back of cliffs, connected with a cave or crack in an indentation in cliff.

Feb. 27 Amantes Point

- 43440+ *Hedyotis foetida* var. *marianensis*
4 in thickets at top of cliffs

Feb. 27 - Ritidian Point

- 41 *Eugenia*
rare in forest on rough limestone

Feb. 28 - Togcha Bay

- 42 *Euphorbia heterophylla*
abundant in disturbed ground near road

Feb. 28 Ylig Bay

- 43 *Turbinaria ovata* ←
Also *Tania tenella* Kuetzing
plants cast up on beach
- 44 *Sargassum*
plants cast up on beach
- 45 *Hedyotis*
on rough limestone rocks in spray zone
- 46 *Phyllanthus amarus*?
on rough limestone just above sea

Feb. 28 - Pago Point

- 47 *Physalis angulata*
roadside
- 48 *Physalis lanceifolia*
in cultivated ground

Feb. 28 - Pago Bay

- 49 *Euphorbia charnissii* Baiss.
in gravel at top of beach

110 m.

shrub 1 m. tall; flowers white.

150 m.

small tree, sterile.

5 m.

erect, stems fistulose and weak, bracts yellowish at base, not at all red.

0 m.

Also *Turbinaria turbinatus*
Sphacelaria triluloides Meneghini
~~Ecol~~ *Ectocarpus*

0 m.

(great masses of floats from windrows at high tide mark)
fleshy, corolla white, lobes narrowly oblong.
(note long fruits).

1 m.

1 m.

40 m.

corolla ^{lobes} yellow, green center
surrounded by brown, anthers bluish.
sprawling, sparsely branched herb; corolla white with green center, anthers bluish.

1 m.

leaves white beneath, involucre glands green.

Feb. 23 - Agaña Swamp
 a number of fairly large trees uprooted along the south margin of the swamp. Trees fell to east.

Sinajang: *Pithecellobium* trees badly broken, some uprooted.

~~East of~~ Pago River -
 Small strip of *Nyssa* along banks of river - older leaves mostly either broken off or if still standing, almost dead. New ones coming. Strip of *Phragmites*, *Nyssa*, *Acrostichum* and *Rhizophora* + *Bruguiera* separated from w. bank has the *Nyssa* leaves broken and all the mangroves dead except a tiny clump near ~~the~~ highway that still have some leaves near the tops, one or two other trees still show some signs of life. Many of the dead trees are still standing, some broken off. Of still living trees at least one is *Bruguiera* and one *Rhizophora apiculata*. The west bank of this channel is a tangle of *Hibiscus tiliaceus*

mostly beaten down and half broken, ~~but~~ but very leafy.

(B&W. photos of mangroves begin roll 3)

Shore of Pags Bay, about ~~middle~~ middle, is a steep ^{beach} beach of small pebbles, lined on lower edge with *Paspalum distichum*, upper slope with old coconut trees, there are rounded root masses 0.5 to 1 m. high, packed with pebbles. Apparently these are the result of earlier typhoons, but there has been some minor excavation around these recently. The strip of dense *Paspalum* sod along the bottom of the storm beach is definitely pre-typhoon as are various *Scaevola* and *Tournefortia* bushes that have tops battered and are sprouting from bases. There is some burial of bases of *Scaevola* at top of storm beach by loose pebbles, but not very significant.

Notes on weeds (old)

Mikania micrantha
has become widespread
seen at Yliga, Sinajana
Pago, Nimitz Hill.

Bidens leucantha has
reached at least as far as
Toogha Bay on east coast.
At Yliga it is growing with
B. pilosa. *B. leucantha* is
not abundant yet ^{even locally} on this
side much south of Yoha.

Where the two grow side by side
they do not look conspecific.
Leaf shape & margins are
not the same, the *B. leucantha*
being predominantly trifoliate
and finely and bluntly serrulate;
the *B. pilosa* 5-foliate, sharply
serrulate, leaflets longer, more
pointed.

Heliotropium ovatum var.
depressum (but not very
depressed) is a pioneer on
gravel either exposed or
deposited by typhoon - is
very abundant.

1963 Guam
(from P. 51)

The *Leucaena* here shows no more damage than in upland. Probably waves here had relatively little force. Some plant debris up to 11 ft. above water-line.

Pago Point - The *Leucaena* in exposed places is bare much farther back from tips, here to 2-3 m.

Physalis lanceifolia has white flowers with greenish centers, bluish anthers. *P. angulata* yellowish flowers with greenish center ~~with~~ bordered with brown, bluish anthers.

Yona - Most larger trees except a few coconuts have been badly battered and trimmed back to larger limbs.

Ylig Bay - broad sand flat back of beach - a thin layer of sand has been spread over this. Waves have washed inland almost 200 m.

Part of this was covered by *Leucaena* scrub, which has been bent inland. Bare sand has a good stand of *Stachytarpheta* in flower. Locally *Phragmites* must be coming up through a layer of sand probably from a buried layer of rhizomes - culms very slender, less than pencil, to 2 m. tall, beginning to flower. (Photos of bent down *Leucaena* scrub).

Beyond Tojcha River - *Casuarina* grove on sand flats back of wide beach. - The sand over the rough limestone terrace - one part has had more sand piled on it. some trees broken, some bent inland, mostly some sand has been removed (photos).

Patch of *Leucaena* almost completely destroyed, a few sprouts from base (photos).

In the tallest casuarina forest a foot or so of sand has been removed, exposing white rather rough limestone. On this an abundance of *Wedelia* seedlings, some *Sporobolus per-caprae*, some *Euphorbia chamissonis*, some *Lepturus* and a broad-leaved grass. *Scaevola turgida* in sand pockets. (photos) *Calliandra*,

On sand pioneers are *Scaevola*, *Wedelia*, *Thunbergia*, *Sporobolus per-caprae*, *Lepturus*,

Casuarinas on the rock flat have root systems extensively exposed. Trees look battered but recovering. Some on sand have been blown down. Some broken off.

Tournefortia battered, some blown down but sprouting (photos)

Hibiscus tiliaceus blown down to almost prostrate but leafy (photos).

Beyond Jones Beach an area of forest of *Artocarpus*, *Fernandina*, *Landanum*

is very battered, only main limbs of *Artocarpus*, *Fernandina* left, sprouting leafy twigs in abundance, esp. the *Fernandina*.

assate Bay Cove beyond this, just before going round point to Talofos, has much boulder rubble but this must come from road riprap. (photos). A beautiful crescent beach (photos) with curved beachrock. Traces of 3 terraces and notches on point.

On point is open scrub forest of *Barringtonia asiatica*, *Quettarda*, *Tournefortia*, *Thunbergia*, *Hibiscus tiliaceus*, *Cycas*, battered almost still leafless. The *Tournefortia*, *Cycas*, and *Thunbergia* are coming back fastest.

Shrub layer of *Calliandra*, some *Capparis*, etc. still almost intact, incl. a little *Allophylus* & *Eugenia remwardtiana*.

The amount of washed debris piled in this forest shows

That waves surely came
over it, perhaps 10 m above
sea.

Tips for about 1 m. are
dead on all the trees.

Mammies on bluff
back of road is brown
almost leafless.

Ornamental & fruit trees.

Cocos nucifera

Few trunks snapped. more trees uprooted, but a very small percentage. Very many have broken leaves still hanging vertically. Almost none have any nuts, even small ones remaining, though new inflorescences are beginning to appear.

Delonix regia.

Smaller branches are dead at tips, new foliage appearing in abundance, shape is generally preserved. A few are uprooted or partially so.

Samanea saman.

Defoliated but new leafy twigs are coming out on all but the smallest branches. Shape preserved very well.

Hibiscus hybrids -

so completely recovered that it would be difficult to know that anything had happened.

Verticillium merillii

Shows no apparent effects of typhoon.

Cassia fistula

One tree seen, this badly broken.

Plumeria rubra

Temporarily defoliated, but no other effects except some trees partly tipped over.

Adenanthera pavonina

One tree seen - defoliated but recovering without apparent damage.

Tectona grandis

Small and medium branches torn off but trunks ~~and~~ and large branches sending out abundant vigorous leafy branchlets.

Phyllanthus acidus (? - 10-12 pairs of alternate ovate glabrous leaflets) almost completely unaffected by storm.

Persea americana

smallest twigs dead, only.

Annona squamosa

No apparent effects on small tree.

Casuarina equisetifolia
Generally stood up well -
lost smaller branches and
all of the needles, putting
out new ones in abundance.
Where on shallow sandy soil
some tipped over. In Bromsgrove one uprooted
& broken off - one 3 dm. dbh.

Artocarpus attilis and *mammensis*
Generally lost all medium
and smaller branches, and very
slow to put out new leafy
twigs. Some large ones tipped
over. ~~This~~ Root systems
of those tipped over are very shallow.

Craucaria exelsa
Green but branches
more or less broken off

Mangifera indica
small branches broken ^{not} off,
many leaves on main branches.
Others with dead smaller branches,
leaves on large.

Erythrina variegata v. *orientalis*
Leafless but putting out new
leaves, not obviously damaged.

Cecropia
Some branches broken off.
no leaves.

Rorystonea oleracea?
few leaves left but
otherwise intact.

Carica papaya
most large trees are
broken off part way up
and are sprouting from
the stump.

Terminalia catappa
all branches broken off
but now sprouting,
sprouts are up to 1.5 m.
4 internodes.

Pithecellobium dulce -
many trees broken
and uprooted, but sprouting
vigorously.

Citrus - some tipped over,
some rather burnt back
from tips, some not much
hurt.

Musa spp.
~~these~~ shoots were killed
to ground, but now are
mostly 1 m. or more tall,
one or two seen with bunches
of young fruits.

Mar. 1 - along east coast road

Mixed forest with *Artocarpus*, *Pisonia*, *Pandanus*, *Ochrosia*, etc.

Badly battered, canopy almost destroyed, many *Pandanus* knocked down, broken at or below the top of the root zone.

Artocarpus bare except for clumps of new leafy twigs on limbs and larger branches.

Mammea - rather small trees, mostly defoliated but with some green leaves still, not brown as on cliffs.

Mirindia citrifolia seems scarcely to show any effects. *Ochrosia* in very good shape.

Cycads abundant here, many up to 5 m. tall, all have a rather sparse crown of leaves.

Pisonia with leaves badly eaten - perhaps by a green geometrid caterpillar (collected)

Claoxylon and *Gramin* are partially defoliated but recovering.

Locally more *Pandanus* down

than standing - many uprooted

Large *Intsia* (photo) and small *Pisonia*, as well as *Ochrosia*, seem severely affected by storm.

Ground is covered by *Nephrolepis* and some *Polypodium scolopendria*. Small patches - tufts of *Pennisetum petosum*. One *Terminalia catappa* at edge of woods seems scarcely affected.

Momordica is very abundant at edges of forest and in openings and here and there generally.

A series of 12 photos of this forest (to about no. 32 on roll 3). Kod - first 6 on roll 3.)

Across road the land has been cleared with a bull dozer, leaving a few trees, mostly *Artocarpus* standing. These were badly hit by typhoon, many knocked down - all pointing south.

(Photos here - end roll 3, (dod.)) Soil here is thin & bright red, friable.

Anas-Mats Reserve

Canopy of forest completely destroyed. Many trees down. Locally Pandanus is broken off above root cone, generally below, or uprooted. Ochrosia either uprooted or scarcely affected at all.

Justicia uprooted, also Hibiscus tiliaceus either ~~to~~ bent down or uprooted. Pemna broken off. Ficus standing but small branches gone - tufts of leaves on larger branches.

The forest generally is a great tangle, many trees down. Several Mammonea broken off. More Pandanus down than standing. Many broken off above root cone.

One large Pandanus dubius seen - broken off above root crown.

This forest about as hard hit as anything seen on island so far. Bidens leucantha very abundant in paths and openings.

Mar. 1 - east of Barrigada on
East Coast Road.

43450 Boerhavia

4

in open bull-dozed clearing

5 + 51

Polygala paniculata L.

common along roadside

5

52

Achyranthes

common in edges of thickets
and in cultivated ground

Mar. 1 - 2 miles northeast of
Campanaya along East
Coast Road

3

53

Cyperus ligularis L.

occasional along road
in edge of forest.

Mar. 1 - plateau back of
edge of cliff between
Anao and Mati Points

7

+ 54

Hyptis spicijera

common in semi-cultivated
ground

1

55

Taeniophyllum

common on fallen trees

3

56

Citrus ~~bengalensis~~

rare in forest along trail

Mar. 2 - road from Nimity Hill
to Mt. Alutorn & Mt. Tenjo

5

+ 57

Loranthum halepense (L.) Pers.

common locally on roadside

120 m.

prostrate, stems red; leaves
dark green above, white beneath,
flowers pink.

roots with wintergreen odor;
flowers white.

spawling sparsely
branched herbs.

160 m.

160 m.

plant erect, aromatic, to
1 m. tall; corollas blue.

roots green, flattened to trunk.

small tree; fruits immature,
spherical, aromatic, said
to be inedible but used
for washing hair.

260 m.

small tufts, erect.

In Guam Market

Membricus

Solanum lycopersium

Allium cepa var. - fruit

Capricorn frutescens

Cucurbita (manon, hubb)

Curcuma lomentum

Citrullus

Ipomoea batata

Arec

Phaseolus vulgaris

Vigna sesquipedalis

Solanum Melongena

Lactuca sativa

Lycopersicon

Raphanus sativus

Colocasia (los: am)

Ipomoea aquatica

Prophocarpus tetragonolobus

Beta (chard)

Musa (fl. heads)

(cut up and cooked with meat)

Mar. 2 - Cotal Conservation
area, east of Apra Heights
in savanna on hills of
red volcanic soil

43458

Thelypteris

3

in small wooded ravine

4

59 *Timonius*

common, edge of wooded ravine

1

60 *Timonius*

common

1

61 *Timonius*

common

1

62 *Timonius*

common

2

63 *Timonius*

common

1

64 *Timonius*

common

4

65 *Timonius*

common

5

66 *Melastoma*

very common

2

+67

Glochidion marianum M.-A.
occasional

2

+68

Treyerinetia marianensis Merr.
rare

168 m

shrub 3 m. tall, fruit green.

shrub, fruit green.

shrub, fruit green.

young plant 0.8 m. tall, sterile.

shrub, sterile.

sapling, sterile.

shrub, ripe fruit black.

shrubs 0.5-1 m. tall; flowers

white, bracts subulate

to narrowly boat-shaped.

shrub; flowers yellow.

vine, climbing, closely adherent
to Pandanus trees. fruit reddish
when ripe.

Mar. 2 - Cortal Reserve

No apparent unusual erosion or enlargement of erosion scars result of typhoon. Any difference would only be detected by careful measurement.

Much damage by driving jeeps around area.

Melastoma has been conspicuously ~~the~~ killed distally but sprouting below. Several other shrubs - Geniostoma, Myrtella, Decaspermum etc. show some dead branchlets, but in general there is little effect of the storm. Some of the Casuarina have broken branches, but generally they show no damage at all, except perhaps some sparseness. Mat of needles beneath, generally well rotted, esp. in somewhat protected spots.

Melastoma has white flowers, subulate to narrowly boat-shaped bracts.

all Dianella seen has white flowers.

Gleichenia is first colonist in some erosion scars, but Stachytarpheta is occasional.

Some fair sized Casuarina, but not very tall, occurrence very patchy.

Plants seen in eroded areas, not in ravine forest:

Timonius glabra
 Lygodium scandens
 Decaspermum frutescens
 Scaevola
 Gleichenia
 Cheilanthes
 Myrtella
 Wilkstroemia
 Melastoma
 Geniostoma
 Cassytha
 Telaria (Diplazium)
 Casuarina
 Limeria
 Spathoglottis
 Pouteria ferruginea
 Miscanthus
 Blechnum
 Machaonia

Phyllanthus saffordii
 Diadella ensiformis
 Chrysosplenon aciculatum
 Flagellaria

Hypoxis capitata

Pomox littoralis

Stachys phyllanthi

Centella

Waltheria

Scleria

Lycopodium commune

Nephrolepis

Taxodium seems to be

hairy when seedlings and
 to become less so as it gets
 older.

Pouteria bushes show
 every gradation from glabrous
 to golden sericeous.

Pandanus, large trees,
 in ravine forest, broken off
 above root cone, pointing
 south.

Plants in ravine forest
 hatch

✓ Pandanus tectorius

✓ Cananga odorata

Melastoma

Scaevola

Lygodium scandens

✓ Pouteria ferruginea

✓ Scleria sp.

✓ Hibiscus tiliaceus

✓ Morinda citrifolia

✓ ~~Cas~~ Blechnum

Blechnum

✓ Glochidion marianum

✓ Geniostrum

✓ Freycinetia

✓ Thelypteris

✓ Nephrolepis

✓ Phyllanthus saffordii

✓ Triplaris

Casuarina

Myrtella

Wikstroemia

Cyper

Miscanthus

✓ Premna

✓ Davallia

Hypoxis capitata

Mar. 2 - road up Mivinty Hill
from Liti - Apra area -

Casuarina 10-15 m. Tall
lining this rd. show serious
defoliation - some trees do
not seem to be putting forth
any green branchlets at all,
some are a little green,
others not seriously damaged.
Same is true of those on
road to Alutoma & Tenjo, but
most of these seem nearly
or quite dead. This seems
generally true, but the effects
are very localized - trees side by
side show very different
amounts of damage.

Tips of Miscanthus
are dry and brown.

Mar. 3 - Tarnaning

Beach in front of Brown
House has been somewhat
eroded, sod of *Thunarea* and
Paspalum & *distichlis* was
removed about 3 m. - is
gradually extending out again.
Lime tree tipped over.

Turman Bay - north end
Fajai Beach
All large *Lithocarpus*
uprooted. Some coconut uprooted
or partly toppled.

Coconut trees mostly
have a few very short leaves
now, some old dry ones
hanging vertically. Were,
acc. owner, normal leafy trees
before typhoon. Those close
to cliff are still in good
shape, also a patch just
back of beach are almost
normal.

Bet. Fajai and Gognga beaches
forest is somewhat battered,
esp. *Artocarpus* trees. *Pandanus*
locally dominant, undamaged
except a few trees uprooted.

Bet. Gognga & Naron beaches
forest on the limestone bluffs
is *Artocarpus*, *Pandanus* (both),
Ficus, *Achroia*, *Hernandia*, *Fremsia*.

As usual the *Artocarpus* is most damaged and the *Schrosia* least. *Hernandia* has small branches ripped back, but is sprouting vigorously. *Pandanus* not much damaged here. This forest rather protected.

Large open flat back of beach here - possibly from sand excavation.

Bidens leucantha, *Conyza canadensis* very abundant, also *Paspalum*. ~~Many~~ other plants killed in ~~here~~ The areas with *Bidens* are generally high enough not to have been inundated. The *Paspalum* flats are low and moist. Remains of *Bidens*, *Asclepias*, etc. apparently killed by salt water.

A low beach ridge in front of salt flats has *Ipomoea pes-caprae*, *Fimbristylis*, *Thunbergia*, etc. and some very young *Bidens*. Some *Paspalum* here.

Areas of *Scaevola* scrub rather battered.

Gognga Beach has large *Barringtonia*, *Hernandia*, and *Thespesia*, as well as *Coccoloba* and *Pandanus*. These are not battered very much, except that one *Pandanus* is broken off about the root cone. *Hernandia* has lost smallest branches.

At foot of cliff bet. Gognga + Praton beaches are large *Barringtonia*, *Thespesia*, + *Tournefortia*.

peer acc. Souder

Plumeria did well

Delonix did well

Mangifera (broken but survived)

Royal palm mostly went

Pithecellobium (broken badly)

clump palms went

Calophyllum inophyllum

2/3 of trees uprooted

acc. Souder

Araucaria excelsa

larger ones badly broken

Torenia bicolor

Mamillaria fasciculata

Kalanchoe tubiflora

Adiantum trapeziforme

Dianthus caryophyllus

Stereocarpus purpureus

Chlorophytum comosum?

Epidendrum (red & orange)

Crossandra undulata

Heliconia (very slender, orange, etc.)

Dombeya spectabilis

Anthurium andraeanum

Costus

Euphorbia tirucalli

Dieffenbachia picta

Asparagus sprengeri

Caryota mitis

Lepidium virginicum

Nephrolepis cordifolia

Pilea (large, like microphylla)

Mar 14 - Helicopter trip - 9:00 a.m.

Forest on so. slope Barrigada Hill battered and defoliated but few trees down.

Coconut plantations on of Barrigada Hill & on of Harmon have very few trees down. Patches of forest in this area are in good shape.

Bright green shrubs are myrsinoides.

Forest near Harmon Val. are in good shape. But on cliffs as of it more defoliation & less in Amanto Pt. Coconut plantations below Amanto ~~are~~ are badly battered. Forests in Tuman, at north end many broken trees, less in central part. ~~Some~~ Some coconuts down near beach, none inland.

Forest at south end below hospital are very defoliated - much more than generally so far, also on top near hospital.

Very good forest on island off Tamarina, not much damage. Cliff top. Tamarina is mostly *Leucaena*.

Fort Leve. V. forest badly damaged, trees down pointing inland. Bluffs & slopes of Summit Hill badly battered.

Much bamboo in ravine in grass area of Summit Hill. *Casuarina* locally much burned, no pattern.

Mangrove swamps in rather bad shape at head of Apra Harbor.

Leucaena looks "combed", pointing south and west, around Apra H.

Orote Pen. trees on rocks at tip mostly down. Little damage is. local defoliation on plateau. *Cycas* enormously abundant. Dominant *Schinus* canopy is opened as now.

Canopy is beginning to reform, but still completely ineffectual. Apra coverage is medium. *Cycas* on Orote Pen.

Base of Orote P. is almost all *Leucaena*.

where not open.

Agat & S., up over
Lamlam.

Ravine forest on w. slopes
not in leaf shade. But
very local. Many scars,
but are many up then
breaking. no obvious
new mts. on w. slopes

here broken trees in the
ravine, mostly Pandanus.
much defoliation esp. on
upper slope

Forest on Almagosa and
Lamlam. has larger
trees very local. but
almost none broken.

Ravine forest s. of Lamlam
on w. slopes shows much
defoliation, some broken
trees. Southward, along
Inagan ravine forest looks
battered.

Mangroves around Therio
untouched.

Photos of Mt. Schroeder.

Cocos? - have tree down
much debris inland abt
Casuarina dry at tips.
(photos).

No visible effect on Therio
reefs. Entire Therio area
lined with low mangrove.

Very little notable
effect on coastal strip,
except a few coconuts
down and some browning
of leaves.

S.S. Celly - not even
much defoliation on
dead tips. Water in
ravine. Ground grass
not affected.

Browning in ravine
forest toward ~~Manaja~~ Manaja.

A few trees down in
ravine toward ~~Manaja~~ Manaja.
but Hibiscus forest shows
little or no effect.
Inland from ~~Manaja~~ Manaja
much damage and
corrosion in ravine - much
damage in trees around
~~Manaja~~ falls.

Large crown scar
in Van Dae area. Both
quite active.

Some breaking in trees
esp. Pandanus on
south part of lake-
front drainage

Large trees around
Talofa falls shows lost
smaller branches. some
defoliation, canopy appears
less on ridge
compared to valley floor

North side of Talofof drainage has some forest
much more battered.

Most trees still bare.

North of Talofof V. the ravine forest is
more brown than green,
but still few trees
green, not many
broken.

On cliffs Mammals
is bare. (Talofof north)

Back of Topcha there
are thousands of small
trees (Foucaea?) brown
all printing s. w.

Crosses here near Yina
specially have to be.

Large area Foucaea
only appearing at tips
except locally on
hills just s. of road
up to about river, where
it is quite green.

Bamboo thickets
w. of pass very tangled
but green.

N. of this the ground
is brown but brown
but Foucaea shows
only bare tips above
solid green.

Some broken trees
in cliff area n. of
College. but nothing
like the devastation
in 1950.

Platan forest north
along s. e. road shows
opening of canopy but
little breakage.

Some along cliffs
northward. No broken
here, only partial
defoliation.

Only on Platan
some breakage, some
Foucaea along.
(Andersson C. 1)

Broken trees from west
forest become sparse
northward, E. of
Bavagada hill.

The canopy left here.
Around Mabo Pass
Base many broken trees
printing s. w.

N. toward Santa Rosa
perhaps less defoliated
still some breakage
but dense printing s. w.
area.

W. of Santa Rosa
canopy gone, ground
few broken trees, however
south. More broken trees

northward all pointing south.

Q. mas. Mait. Ave. lots of broken tree trunks w. & s.w. forest generally esp. down on cliffs are terrace.

Some broken trees s.e. of Santa Rosa but less.

Across top towards N.W. field. High area. Cocks down locally pointing s.w. Many trees down in forest all pointing south.

Trees here locally very battered. Many trees down pointing s. & s.e. Defoliation less than s. of Santa Rosa but still very serious. More trees down here than elsewhere. (in n. part of loop.)

Less broken trees but still many s. of drainage mostly pointing south.

some toward N.W. 7, but less.

In N.W. 7. only a few trees down. smaller growth "combed" by south.

Plateau land of Ritidra. It has canopy opened, crown all hollowed, rather few trees down. S. of Ritidra almost no trees down.

Southward become greener, along N.W. side of N.W. 7 field, still much defoliation. Smaller veg. "combed" southward.

S. of N.W. 7. a few trees broken, all toward south.

Forest in rough better shape around Comuna.

Center. Some defol. & breakage on cliffs.

South of this a little breakage to south but forest is green. Small growth "combed" to south.

Little breakage south of this toward T. mm. 04.

Leucosoma "coral" s.
 s.w. Hammer 7

W. of N.A. 5 Agaña
 forest largely Ilex
 is green, little Miconia
 some broken or down the
 along cliff, point very 2.

19. 46.

Photos available

NA 9 of Agaña
 Central Caroline File.

Eniwetok

10 Jan. 61 8 frames

15 Mar. 61 3 frames

Elato

no date 21 frames

6-5-61

15 March 61 6 frames

Faraulap

no date 3 frames

but rephotograph

Jalperut

no date 4 frames

15 March 61 1 frame

rephotograph, closer.

Igalik

15 March 61 5 frames

Lamotrek

6-5-61 4 frames

15 March 61 3 frames

but rephotograph

Magur

17 March 61 2 frames

Isle Olimarao

no date 6 frames

6/5/61 2 frames

15 March 61 3 frames

rephotograph

Pikelot

no date 5 frames

15 March 61 2 frames

Pisaris

17 March 61 7 frames

Pulap

no date 5 frames

6-5-61 3 frames

17 March 61 3 frames

rephotograph

Pulusuk

6-5-61 2 frames

15 March 61 3 frames

and series marked Latawal is Latawal folky
6 frames

Puluvat

no date 17 frames

6-5-61 2 frames

15 March 61 3 frames

~~West Faye~~~~Spitfall~~~~no date~~

Ulul

17 March 61 5 frames

Namunika Atoll

mostly poor - rephotograph

West Faye

21 Oct. 54 4 frames

but rephotograph

Woleai

no date 33 frames

no date ones are all
marked HOG.

rephotograph Latawal

Cnds. Asbury

Mar. 3 - Agaña Heights
planted in garden.

- 2 43469 *Jasminum*
2 70 *Cassia glauca* ~~surattensis~~ *surattensis* Benth. f.
3 71 *Justicia*: *spicigera*
1 +72 *Garcinia mangostana* L.
1 73 (grass)
2 74 *Senecio confusus* Britt.
2 75 *Cydistia*
2 76 *Gaillardia*
2 +77 *Crescentia alata* HBK.
3 +78 *Parkinsonia aculeata* L.
2 +79 *Cryptostegia grandiflora* (Roxb.) R. & S.
2 80 *Clerodendrum bungei*
1 +81 *Guaiacum officinale* L.
1 +82 *Pittosporum tobira* (Thunb.) Ait.
3 +83 *Malpighia coccinea* L.

450 m.
50 m.

- scrambling shrub.
— shrub 1.5 m. tall, with disagreeable odor when broken; flowers yellow.
— loosely branched shrub; flowers scarlet.
— shrub 3 m. tall, sterile; (recovering from typhoon); petioles purple.
— used in flavoring meat.
— creeping or scrambling herb, rays orange to scarlet, disk orange.
— woody vine, with strong garlic odor when broken, flowers lavender.
— flowers maroon with orange mouths.
— tree; original ones brought to Guam by Pafford; flowers said to be very ill-scented. "cross tree".
— small tree; flowers yellow.
— climber, flowers ^{deep} lavender.
— sap milky.
— leaves maroon-purple beneath, buds white.
— small tree; sterile.
— shrub; odor very oily and unpleasant when broken.
— shrub 1 m. tall, fls. pinkish white.

- 43484 *Jasminum multiflorum*
 1 85 *Juniperus*
 3 + 86 *Lantana sellowiana* Link & Otto
 2 87 *Lantana camara* f.
 2 88 *Lantana camara* f.
 1 89 *Sansevieria*
 2 90 *Jasminum*
 4 + 91 *Thunbergia erecta*
 2 + 92 *Joyisia matrella*
 forming lawn
 Mar. 3 - Nimitz Hill
 3 93 *Pinus luchuensis* Mayr
 single planted tree
 Mar. 3 - Piti, near
 old Agriculture Station site
 4 94 *Eugenia*?

- shrub, flowers white
 - fragrant.
 - glaucous, shrub 2 m. tall.
 - purchased as "prostrata juniper".
 - depressed aromatic shrub,
 - flowers purple.
 - low shrub, flowers
 white with yellow eye.
 - fruit lead blue.
 - ~~low~~ shrub 1 m. tall,
 flowers orange turning
 - scarlet.
 - leaves erect, mottled;
 fruits with one locule
 developed, two not.
 - immature.
 - semi-scandent;
 - flowers white.
 - shrub to 1 m. tall,
 corolla tube and throat
 yellowish, limb deep
 - purple.
 - dense mat, rather
 bumpy.

170 m.

tree 5 m. tall, 2 dm. thick
 near base. trunk gray-brown,
 scaly.

20 m.

large old tree, trunk
 1.5 m. thick; leaves without
 odor or pellucid dots; sterile.

Mar. 3 - Agaña Heights

43495

*Taeniophyllum*on trunk of Crescentia tree
in gardenMar. 3 - Gognga Beach,
Tumon Bay

+96

Stictocardia tiliaefolia
common back of beachMar. 3 - Nason Beach,
Tumon Bay

97

*Paspalum setaceum*common locally on
bare coral sand

March 4 - Orote Point

+98

Desmanthus virgatus (L.) Willd.locally abundant on
cleared limestone flats

99

*Sporobolus*occasional at edges of
rough limestone cliffs

50 m.

roots flattened, green.

2 m.

(Desr.) Hall

climbing in trees;
corolla purple, stamens
unequal in length,
anthers white, some-
what falcate but not
at all curled; stigmas
capitate.

1 m.

depressed tufts,
culms spreading.

40 m.

suffrutescent herbs
up to 1.5-2 m. tall; stamens
white.dense tufts, leaves
pale, glaucous beneath.

1963 Guam

Mar. 4 -rote Point

High limestone point with a ragged rim. On rim is *Phyllanthus marianus*, and on top of cliff, *Sporobolus* sp. Entire top has been cleared and is overgrown with *Leucaena* except where in grass.

Below cliff is an island with forest that has scrub forest that is brown, probably *Mammee*.

On a shelf at foot of "Spanish Stairs" has coconut grove. A pond with algae below this.

Mar. 5 - Trip to south end of island -

Head of Apra Harbor - the mangrove swamps had some trees still alive but many are down.

Casuarina around Roxas Village as scarcely damaged.

Hibiscus forest near Agat is a tangled mass with many broken trees.

Agat - fallen trees pointing south. South of this, most are south, but a few point north. Then a number of *Pithecellobium* point west.

Near Fachit Pt. a few *Casuarina* and *Pandanus* are broken, pointing in various directions. Patches of ravine forest look rather devastated.

Ravine forest in Cetti shows little evidence of typhoon.

W. side of Mt. Achroa, grassy above, wooded below - one tannish erosion scar well down on ridge to west.

Eichhornia in pool at mouth of Umatac stream flowering abundantly. The clumps

of bamboos are bent down somewhat to westward.

Seedlings on storm beach

- c *Pamphis*
- c *Thuarea*
- c *Tournefortia*
- n *Sophora*
- n *Vigna*
- o *Ipomoea tuba*
- c, l, a, *per-caprae*
- a *Scaevola*
- o, l, c *Lepturus*

Cosos I.

elevated reef platform just above h.t. or perhaps at h.t. has mats of *Pamphis*, *Sesuvium* + tufts of *Fimbristylis* on a flat, somewhat irregular surface, apparently somewhat abraded, or the pitting is not sharp. (photos here)

Storm beach above the platform has depressed *Pamphis* seedlings of *Pamphis*, *Thuarea*, *Ipomoea per-caprae*, *Vigna*, *Lepturus*, *Tournefortia*, *Scaevola*, *Sophora*, *Ipomoea tuba*, a few *Tournefortia* bushes.

The beach ridge back of this has *Scaevola* scrub badly killed back but abundantly growing from base, a few *Tournefortia* bushes, likewise killed back and growing from base, and a sparse stand of *Casuarina* about 4 m tall, upper parts dead, sprouting from lower trunk. A little *Thuarea* and *Wedelia* at edges of scrub: also some *Lepturus*.

Sporobolus per-capitatus, but these not old plants.

Inland the *Casuarina* is more abundant, taller less damaged. But where it is sparse, even inland the damage is severe.

Transect into *Scaevola* scrub on cobble or boulder ridge - *Scaevola* slopes up - wind sheared - on outer slopes of ridge where there is some sand *Thunbergia* forms a thin ground layer with occasional *Euphorbia* chama. many *Scaevola* seedlings. *Lepturus* + *Ambristylis* in ^{thinner} places. Inward, where scrub is 3m tall there is less sand, boulders larger, less *Thunbergia* more *Euphorbia*, a few scattered other seedlings - *Morinda*, *Hedyotis*, etc. some *Cassytha*, mostly dead.

Scaevola gets more & more tangled & taller. Many dead branches but vigorous sprouting. Very matted and tangled inland, more

Morinda seedlings, a few *Carica* seedlings. Max. ht. 4m. +

Eastward on reef platform *Pemphis* becomes more abundant, covers greater part of surface except locally. Locally as much as 3-4 dm. tall, ^{very locally to 1m.} a few tiny plants of *Lepidolobium distichum* and *Hedyotis albida-punctata* here much less common. *Wedelia* locally at foot of storm beach, also *Lepturus* becomes common on inner parts of platform, esp. where there is some gravel, though this may also accumulate around *Lepturus*.

Near cross channel the beach ridge curves inward, and there is a grove of *Casuarina* on the flat, with *Lepturus* between. Distal 1-2 m. of branches of *Casuarina* are dead. None are down. Some *Hedyotis* here, flowering. *Pemphis* generally flowering.

In cross channel are a few *Rhizophora* ^{& *Barringtonia*} seedlings 0.5-1 m. tall. several wandering tattlers, curlews, a dark reef heron, fairy terns.

In outer part of channel *Pemphis* scrub 1-2 m. tall, a very few small *Casuarina*, sprouting only from lower trunk & larger branches. large *Sesuvium* mats and patches of *Paspalum distichum* on cobbly or sandy places.

(b+w. photos)

In interior of small islet are a number of *Leucaena* 3-5 m. tall, mostly partly broken or down, not flowering, fruiting abundantly. rabbit not quite right for *L. leucoscephala*.

Here many coconut trees are down, pointing south, many *Casuarina* either uprooted or broken off 1-3 m. up, pointing in various directions.

Locally $\frac{1}{3}$ to $\frac{1}{2}$ the *Casuarina* stand are down.

Lawn of *Thunaea* & *Lepturus* covering ground, or *Scaevola* scrub, or *Ipomoea pes-caprae* in open places.

Toward east end more *Casuarina* down than standing. *Thespesia* not much damaged, except at tips.

Along lagoon beach many *Casuarina* are uprooted, pointing mostly inland or lagoonward, a few in various directions. Those uprooted are mostly completely dead.

Inland, locally, all trees are down, in other spots few. (photos of place where all are down b+w) (one b+w where most are standing - note branchlets along trunk)

Thespesia along beach mostly knocked down but still living - yellowish green. (several b+w photos)

Larger *Thespesia* still standing but battered (photos) (end both rolls along lagoon beach)

Along lagoon beach
as a whole many more
Casuarinas down than
standing. Few down
along seaward side.

Those standing
Casuarinas & others
very badly battered
along lagoon beach.

Sample

14 rock from seaward
reef platform.

Mar. 5 - above Merizo Annex
photos of Mt. Schroeder
conservation area from
Merizo Annex water tank.

Appears to be mostly
Miscanthus with, perhaps,
some Pinna on ridges. No Casuarina.

At water tank Glossogyne
is colonizing bare soil - tuff-breccia.

A large fire has burned
over the peak across the
valley to the right.

Ficus trees are almost
bare in ravine forest.
Some ravine forest
very brown.

Merizo - Inarajan
Ipomoea crassicaulis
established east of Merizo.

Flats toward ^{Agaña Bay} ~~Inarajan~~
where brush is cleared
from under coconuts are
covered by Wedelia & Pisonia
per-caprae.

Inarajan - Pago

Bet. Tocha & Qlig the Hernandia
trees have all large branches
covered with leaves, small

112

1907 Quon

over and gone.

113

- #3 Mar. 5 - Cocos Island
 34500 *Leucaena*
 5 in forest in interior
 8 01 *Leucaena*
 common in forest in interior
 5 02 *Leucaena*
 common in forest in interior
 5 03 *Lesuvium portulacastrum* forma
 common on reef platform
 at about extreme high tide level
 3 +04 *Hedyotis albido-punctata* (Mun.)
 local at inner side of forb.
 reef platform under *Casuarina*

Mar. 5 - Merizo Annex,
 on bare ground near water tanks, decom-
 posing tuff.

- 3 +05 *Glossogyne tenuifolia* Cass.
 common
 1 +06 *Phyllanthus simplex* Retz.
 rare
 2 +07 *Emilia sonchifolia* (L.) DC.
 common
 2 +08 *Emilia javanica* (Burm.f.) Rob.
 common
 5 +09 *Heteropogon contortus* (L.) Beauv.
 common

1 m.

- tree 6 m. tall, broken off by
 typhoon, completely dead.
 slender tree 5 m. tall,
 flowers white, fruit immature.
 tree 5 m. tall, blown over
 by typhoon, immature
 fruits on sprouts from trunk.
 prostrate, stems green,
 leaves subglossy, some-
 what compressed; flowers
 pink.
 plant subfleshy, stems
 prostrate to ascending,
 corolla white; fruit green.

90 m.

- stems spreading from
 a rosette; flowers yellow.

- corollas bright rose pink
 (this plant looks a bit
 like a hybrid but probably
 isn't. corollas are slightly
 longer than usual, heads
 larger).
 flowers brick red.

- tufts; awns twisting
 when mature.

Mar. 6 - arrived 4 p.m.
n.e. coast opposite Pan American
area -

White storm beaches
of pebble gravel, inter-
tidal beaches of sand and
gravel.

series of beach rock -
an older but poorly
consolidated intermittent
strip near low tide,
being quarried by waves. (sample)

Above this a wide thin
apparently rather new
strip (about 8° dip). This
also being quarried and
slabs thrown upon storm
beach. (sample).

Ground terminal area
and among houses, on
leveled compacted soil. *Lepturus*, *Trinipistylus*, *Dactyloctenium*
are the commonest plants,
abundant ~~in~~ ~~the~~ ~~area~~ ~~of~~ ~~the~~ ~~area~~
~~of the area~~ tiny tufts
separated from each
other, and depressed.
Lepturus, scarcely
fruiting. Small to medium
Boerhaavia. This very disturbed
flora is very depressed
and trampled here.

Mar. 7 - rented car (mileage 49787.4)

Beale I - *Lepturus gasparianus*
common all along road
as far as bridge.

Base of Flipper Point - a
dry channel almost
across the base of the Point
is washed, in places,
down to a hard reef platform
that is somewhat undulating
on the top surface. Over
this is a bed that is
mostly tightly packed
Tridacna shells with
considerable smaller
material, esp. the small
hairy dark colored clam.
(sample). In with these
shells are some coral and
fragments of shells, plus
very fine silt-like material.
This not continuous but
found here and there
in small bits.

Above the *Tridacna*
layer is a layer of
compacted sediment, mostly
a mixture of sand and
small pebbles, 30-40 cm. thick.
(sample)

Much of the channel
bottom is covered by loose

Tridacna shells and reef-rock boulders, in places embedded in sand. The sand is locally much compacted and encrusted on the surface by a layer of blue-green algal crust.

On point side of channel the sandy layer is much thicker.

~~On top of it~~ is the middle of it. 3 1/2 ft above tide at 11:45 about 3 1/2 ft. below maximum elevation on Flipper Point is, locally a putty-like bedded layer of clay-like silt, probably held by Schizothuria (sample) several cm. thick.

Photos of layers on landward side.

Small *Pisonia* scattered in open ~~brush~~ *Tournefortia* woodland, flowering locally.

The herbaceous vegetation is mostly dry.

Wake I - near ~~the~~ Japanese Monument - under rocks - beetles, cockroaches, earwigs, isopods, a pseudoscorpion, ants etc. in a concentration. *Amaranthus dubius*. Patches of *Gossypium* scrub.

Around old Japanese garden site

Cyperus rotundus

Catharanthus

Euphorbia glomerata

West end of Peale I.
About 5 acres have
been bull-dozed and
leveled.

This has come up to a
stand of seedlings of
Tournefortia - mostly
from 5 to 40 cm. high, a
few scattered ones up to
1 m. A few patches and
scattered tufts of *Lepturus*
or both spp. a few mats
of *Boerhaavia* and *Ipomoea*
tubs, a few *Heliotropium*
seedlings. (photos)

Also occasional *Portulaca*
oleracea and *Lutes*.

On north side a broad
storm beach about 40-50
m wide of white large rounded
coral pebbles, occasional
Tridacna shells.

Diverse population of
Lepturus repens, from a tiny
compact form with short
leaves and sessile spikes
to a much more diffuse
form with long-pedunculate
spikes. Also some

Peale I east of Joran
Sta. scrub forest or open
scrub forest of *Tournefortia*
with patch of *Cyperus*
rotundus and one of
Cynodon in openings.
a clump of *Vitex* and
one of *Leucaena*.
Patch of *Paspalum distichum*
and a large shrub, almost
15 ft. tall, of *Coccoloba*.
Elevania very local.
Lida occasional.

Peale I. - west of bridge, on
north coast -

A very diffuse form
of *Lepturus repens* is
common in deep ravine.
not far from *L. gramineus*
and *L. repens* var. *sept.*

Beachrock exposure
is wider westward, but
a very rough dark upper
layer, then 1 to several
lower smoother light
gray layers extending
much farther landward,
apparently rather recently
exposed by high storm
waves. Is hard to the top,
at or ab. above high tide. (not
leveled)

1963 Wake

Peale I. - base of
Flipper Point

sample The Tridacna layer, 18",
lies on a layer 10" thick of
sand and gravel, which
sample lies on a hard irregular
bedrock surface which
slopes up from the
bedrock bottom of the
channel

Actually this gives the
impression of an old
very gently sloping
erosion ramp which
runs along across the
base of the point. The
point may well be
a more recent feature, a
spit built out at right
angles to the shore.

Mar. 7, 1963 Wake Islet

Samples

- 15 Tridacna shells from
deposit on Peale Islet.
at base of Flipper Point.
- 16 Tridacna shell with
material in which it
is embedded, layer
above no. 15
- 17 coral gravel from layer
below #15, lying on
bedrock
- 18 silty sand from between
shells in layer of #15
- 19 bedrock under #17
- 20 compacted dry surface
~~reef~~ sand in channel
at base of Flipper Point
- 21 exposed reef-rock in
channel at base of Flipper Point
- 22 putty-like layer from
base of Flipper Point.
- 23 small clams from
Tridacna deposit (#15)

Mar. 7 - Peale Islet, near
bridge

- 47510 *Lepturus repens* var. *subulatus* Forb.
common locally in depressions

Mar. 7 ~~Islet~~ Peale Islet,
Toki Point

in cleared area on coral
sand and gravel, beginning
to be revegetated by *Tournefortia*

Albugo platensis

parasitic on *Boerhaavia repens*

- 5 +12 *Lepturus gasparicensis* Forb.
common

- 1 +13 *Lepturus repens* var. *septentrionalis* Forb.
common

Mar. 7 - Peale Islet near Flipper Point
occasional in woodland

- 3 +14 *Pisonia grandis* R.Br.

Mar. 6 - Wake Islet,
near Terminal Area.

- 1 +15 *Eleusine indica* (L.) Gaertn.
~~at~~ common on compacted
trampled soil.

Mar. 7 P. Wake Islet
near ~~Japanese~~ monument

- 7 16 *Gossypium*
forming a loose, open
scrub

creeping, forming a loose
mat; spikes ascending.

infected ~~parts~~ stems
erect, shortened.
small bunches,
culms ascending to erect,
small tufts.

shrub 3 m. tall, flowers
whitish, very fragrant.

low shrub flowers
white with five
dark purple spots in
center.

- +43517 *Amaranthus viridis* L.
rare in open ground

Mar. 27 - Wake Islet,
near old Japanese garden site.

- 1 18 *Boerhavia*

- 1 +19 *Cordia subcordata* Lam.
occasional in open scrub

- 5 +20 *Euphorbia glomerata* (Mill.) Wheeler
locally common, sheltered
places

- 2 +21 *Catharanthus roseus* (L.) G. Don
persisting locally

Mar. 27 - Wake Islet
near Japanese monument

- 5 +22 *Cenchrus brownii* (Brown) R. & S.
rare on disturbed ground

- 5 23 *Puccinia?*
local, parasitic on *Euphorbia prostrata*

Mar. 8. Wake Islet,
old TAL compound

- 5 +24 *Phyllanthus amarus* Schum. & Thonn.
~~persisting from cultivation~~
very local, but abundant

where found, around buildings

- 1 26 *Bougainvillea*
planted around house

stems and leaves light
green
shrub 3 m. tall.

woody ~~erect~~ plants
to 1 m. tall; ~~fls. glabrous~~
involucral glands white,
flowers magenta.

spreading much-branched
plant, mature fruits dark
purple.
causes normally prostrate
stems to grow erect.

bracts bright crimson red.

Mar 8 - Wilkes I. Fulbright

Broad reef flat with a small strip of eroded beachrock and a great boulder field. The boulders notched and gnarled are mushroom-like. A zone about 30 cm. ~~from~~ ^{at} low tide ~~and~~ high, is conspicuously chewed by fish (sample).

The chewed zone corresponds well to the notch. Parrot fish and others seen biting occasionally, but not very often. Tops of *Portia* colonies are much bitten in the dead parts, and in an inch or so of the living margin, in the "microstol" colonies. The zone of chewing has a small *Ectocarpus*-like brown alga, but this extends a bit higher.

Soft corals of a number of kinds very common, especially near outer edge of reef.

The reef flat has abundant coral growth with channels up to 2 m. deep between masses of coral.

Beachrock sample.

Large group of frigate birds, many males with distended pouches, sitting in *Tournefortia* trees. 3 red-footed boobies, probably young, in nearby tree.

Much *Sida* on Wilkes along road.

In cleared area at end of Wilkes is a ^{low} vegetation of *Portulaca lutea*, *Lepturus heliotropium*, *Sida*, *Lepidium*, *Brerhavia* (2), a few scattered *Tournefortia* bushes (1 m. or tall).

The pattern is a mosaic of patches of ~~at least~~ dominant stands of each of these, especially *Sida* and *Portulaca*, and mixtures of any combination of ~~the~~ them. The *Portulaca* and *Heliotropium* reach 0.5 m. a somewhat more. The *Sida* 1.5 m. (orange fls. no red center). Both species of *Lepturus* are present.

This land has been recently cleared of *Tournefortia* (2-3 years ago?).

Same plants except *Lepidium* found under *Tournefortia*, but not in such numbers.

except where *Tournefortia*
is open.

Coal Export Corp.
N. Y. - Yokohama

Birds - Wilkes (flying)
2 white tailed tropic birds (Wilkes)
3 red footed boobies (Wilkes)
sooty terns (large colony on Wilkes)
common noddies (a number
on rocks, Kure Pt.)

Frigate Birds

1 fairy tern sitting in *Tournefortia*
2 red tailed tropic birds (Wilkes, flying)

Red footed boobies -

about 10-12 pairs nesting
in *Tournefortia* trees,
young reaching full size,
wings feathered out,
possibly some eggs.
In same trees with
frigate bird nests.

Frigate Birds - 10-12 pairs
nesting, eggs and
almost grown young.
Males sitting or soaring
with pouches inflated.
In same trees with red footed
boobies.

Brown booby - 20+ pairs
nesting on lagoon side
of point, just back in
vegetation. Young or
with wings somewhat feathered
out. Adult plumage dark
reddish-sooty brown on back.

at 790 Dosh

Stachytarpheta jamaicensis
abundant

Heliotropium ovatum is
still present, ~~very local~~ ^{common}

Cnysa bonariensis common
other weeds

Euphorbia glomerata

E. cyathophora

Fimbristylis cymosa

Cenchrus echinatus

Euphorbia hirta

Pennisetum setosum

Pluchea odorata

Old 79L compound

Passiflora foetida

Casuarina equisetifolia

Carica papaya

Catharanthus roseus

Ricinus communis

Terminalia catappa

Ficus carica

Cremum asiaticum

Coccoloba uvifera

Scaevola purpurea

Rhoeo spathacea

Kalanchoe pinnata

Phyllanthus ^{adpressus} undulatus

Phyllanthus ^{glaber} oxyperdium

Sansevieria guineensis

Bougainvillea

Leucaena leucophylla

Pandanus tectorius

Thespesia populnea

Cocos nucifera

Pond in angle of Runways

Vegetation of margins
mostly *Sesuvium* with

some *Fimbristylis cymosa*

and *Lepturus repens*,

with scattered shrubs

of *Pluchea odorata* on

slightly higher ground.

Upper slopes weedy, esp.

with *Imagrostis amabilis*.

much *Ipomoea tuba*.

1 pintail duck

1 flock turnstones 15-20
plovers

Around housing

Euphorbia tirucalli

Codiaeum variegatum

Pennisetum acidula

Scaevola taccada

Cocos nucifera

Catharanthus roseus

Plumeria obtusa

Around terminal

Cordia alliodora (in pots)

Cocos nucifera

Mar. 8 - west end of Wilkes Islet, near Kukui Point.

43

in ~~low~~ low vegetation on coral sand + gravel flat

+43526

Lepidium ~~*bidentatum* Montb.~~ ~~*mauiense* C. & B.~~

locally abundant not far from beach

5

27

Boerhavia repens L. abundant

5

+28

Heliotropium anomalum H. & A. very common

5

+29

Sida fallax (Walp.) Walp. abundant

5

30

Boerhavia common

1

31

Albugo common, parasitic on *Boerhavia* (#43530)

5

+32

Portulaca lutea Sol. abundant

5

+33

Lepturus gasparicensis Fosb. common

5

+34

Timbristylis cymosa R. Br. very common

suffrutescent

prostrate ^{red} stems up to 1 m. long radiating from root crown; leaves pale beneath; flowers pink. dwarf shrub. stems erect, to 50 cm. tall; flowers

leaves fleshy;

~~white~~ fragrant, corolla deeply lobed, white, with tiny yellow eye. only one kind observed, though many plants examined.

shrub 1 m. tall; flowers clear orange, no red center. prostrate green stems radiating from root crown. leaves pale beneath; flowers white. changes habit of plant.

stems erect, very thick, green, brownish at base, flowers yellow, ~~stamens~~ 1-2 cm. across, petals deeply notched; stamens 25-30.

bunches, ~~culm~~ culm and spikes ascending to erect. dense tufts

- +43539 *Lepturus repens* var. *septentrionalis* Fosb.
common

Wake Islet,
Mar. 8 - FAA Dock,
in weedy ground around
pier

- 2 +36 *Coryza canadensis* (L.) Cong.
occasional
3 37 *Heliotropium ovalifolium*
common
3 38 *Pennisetum polystachyum* (L.) Schult.
retrosum (Sw.) L. Rich.
local

Mar. 9 - Wake Islet, north
shore, Terminal area

- 2 39 *Sphacelaria*
Polysiphonia
forming a dense felt or mat
on the reef flat which collects
fine sand.
2 +40 *Lepturus repens* var. *septentrionalis* Fosb.
on gravel flat back of beach

Mar. 8 - Peale Islet, site
of former Peale Lake

- 2 +41 *Lepturus repens* var. *septentrionalis* Fosb.
on disturbed sand and gravel

tufts, spikes ascending &
spreading, on long peduncles.

flowers white.

erect; flowers white.

erect clumps, fruiting
almost past.

small tufts.

dense spreading tufts

Mar. 8 - at a very low tide the erosion ramp and part of the reef flat in front of the quarters area, north coast of Wake I. is exposed.

There is scarcely a distinction between the erosion ramp and the reef flat except that the latter is covered by ~~palms~~ ^{palms} for, which may not be able to gain a foothold on the slightly greater slope of the ramp. This is the lowest erosion ramp I have seen - the whole area being almost at base level.

Across it are perpendicular channels about 5-10 cm wide and deep, parallel, running out 40-50' into the reef flat. In the reef flat part these also are lined by ~~palms~~ ^{algae} felt, clean in the erosion ramp.

They vary from a few inches to a few feet apart. They seem exactly comparable to the channels seen in other reefs - cf. ferns, Kwajalein, Ulithi (Tracy & Schlanger), etc. but are small and have about cut as deep as they can. Some have gravel in them.

the line separating the clean area from the buried area is remarkably straight for at least several hundred m.

photos and b.w. will "

The beach is cut back into a higher gravel beach, leaving an abrupt scarp. The material of the beach below is fine sand, that of the scarp is small pebble gravel. as is the beach & berm behind it.

At short intervals for a way along this there are masses of pebble material seemingly thrown down on the sand beach, as though a wheel barrow load had been dumped there or some one had pushed down ~~the~~ a section of the scarp, but no section had collapsed. There were a few feet to several yards apart and extended perhaps 2 m. or almost the width of the sand ~~to~~ beach. Alexander suggests cusp formation process, but this seems inadequate.

photos

Mar. 9 Kukui Point

Photos of bite marks on rocks between high and low tides, also of cockroach colony on rock surrounded by water at ~~the~~ high tide. (coll.)

Some photos of area, and also some of *Porites* with bite marks, of soft corals, etc. (end of bed. roll 4, beginning of 5) (beginning of b & w. roll 5)

South shore Wilkes I. just west of causeway over west channel.

Erosion ramp on old beachrocks (photos) with small "solution pools" (photos)

Surface of ramp at about mid-tide is a mottled bluish (photos + sample) and interior of pools is a pink-gray (photos + sample) or dark gray. (photos + sample) Colloidium free (Ducos cement) of interior of pink pool. Photos of pot holes.

Three main series of beachrock - pools. Mottled surface in most

seaward, abrasion surface sample from next, which is much paler gray. Landward one is very locally developed and not so case hardened. (sample) (photo). This is mainly conglomeratic

Wake Islet - just east of old Luwa Maru wreck - Very wide series of beachrock beds, at least 40 paces wide from inner edge to where beachrock seems to change almost imperceptibly to reef rock. All is conglomeratic.

The reef conglomerate (sample) is much eroded. The actual reef flat is very narrow here.

Photos of beachrock, reef conglomerate, gravel overlying it, huge boulder thrown up (single *Porites* (?) colony)

Tournefortia shrubs killed by storm washing over gravel.

May 9. Wake Islet, south coast w. of Pearcock Pt.

Exposed platform of unbedded rock, pale gray except for dark outer margin. This forms a terrace just above high tide. In this are several areas of beachrock - old & eroded. The whole may be beachrock + coarse conglomerate, bedding very obscured & truncated. May be really platform. (photos. box)

Heliotropium dwarf scrub in open areas back of beach between Tournepotis (finished bod. roll 5).

Kulua Point - at high tide large parrot fish of several species move around in small schools, several species together, leisurely nipping at coral, making the large marks seen on the rock.

In general the land surface of the island has been almost completely disturbed. In all probability no original vegetation remains, except possibly some *Sesuvium* flats and *Pemphis* scrub along the lagoon margins.

The fact that almost the entire indigenous and spontaneous flora of the island is of an extreme pioneer character causes the secondary vegetation to look rather natural and at least some of the original vegetation types to recur after disturbance.

Of these, a scrub forest of *Tournepotis*, ~~with~~ with or without scattered *Cordia* and *Pisonia*, is the most prevalent. Its stature varies from 2 to about 6 m. and spacing from closed to open. This has little undergrowth when closed, but the branches are very low and spreading and those of adjacent trees are usually tangled together. Where it is open there is an abundant herbaceous to scrubby growth of many species (cf. next p.)

Mar. 9 - Peale I.

Beach rock at about middle of north coast - several beds, partly quarried by waves and pieces thrown up on beach. Compact layer broken off. (photo) Several thin hard layers landward, then a thin poorly consolidated layer most landward of all. Landward layers are white or very pale.

Tridacna locality.

ctd. from p. 143

especially *Lida pallax*, *Heliotropium anomalum*, *Pluchea odorata*, and *Lepturus* spp., *Poerhavia* etc. *Portulaca lutea* is common locally, and even occurs in closed forest, but not in very vigorous condition. Occasional dead branches of larger *Tournefortia* trees, and even a few whole dead trees, recognizable by lack of bark on trunks and larger branches, persist from the 1952 typhoon, but these do not change materially the aspect of the vegetation.

Judging by the stand of *Tournefortia* seedlings on the ~~low~~ cleared area at the west end of Peale Islet, this type may, under some conditions, reestablish itself immediately after disturbance, without any intervening ^{successional} stages. Where it does not, as around installations, may possibly be due to compaction, or perhaps to competition with such aggressive pioneers as *Pluchea*, ~~Lepturus~~, and even *Cenchrus*, *Eragrostis* and other herbs.

(ctd. on p. 144)

samples - ctd. from #125.

- 24 sand slightly green from algae, sand flat at about 1-1.5 m. alt., base of Flipper Point, Peale I.

- 25 beach rock from north coast of Wake Islet west of terminal area.

- 26 eroded beachrock from same place.

- 27 reef conglomerate from south coast of Wake Islet e. of wreck of Lauva Mam

- 28 south coast of Wilkes Islet rims of solution pools on erosion ramp at mid-tide level.

- 29 surface of erosion ramp, same place

- 30 abraded surface of old beachrock cuesta, same place, landward.

- 31 Wilkes I. samples of landward series of beachrock.

- 32 rock bitten by fish, Kulu Point

- 33 old beachrock, Kulu Point

- 34 Peale I. north coast incipient beachrock from landward of several series of old calc hardened beachrock.

- 35 from under a stone near Japanese monument. Wake Islet

- 36 on plants

- 37 clustered on rock that is partly submerged at low tide, swimming easily when brushed into water. (said to be common on rocks in edge of sea elsewhere on island). Kulu Point, Wilkes Islet.

Pandanus tectorius

~~single~~ same tree seen in
1961 + 1963, much larger
than in 1952.

Cenchrus brownii

one plant seen at Japanese
monument 1963.

Cenchrus echinatus

generally distributed in
open disturbed areas

Chloris inflata

still common in disturbed
areas 1961, 1963.

Cynodon dactylon

seen in ADS area 1961,
one sizeable patch on Peale
Islet 1963.

Dactyloctenium aegyptium

one of the commonest plants
in disturbed areas, 1963.

Digitaria ciliaris

not seen 1961, 1963.

Digitaria gaudichaudii

not seen 1961, 1963.

Digitaria insularis

common
~~seen~~ around old Japanese

garden site 1961, also
seen 1963

Eleusine indica

common in disturbed
places and persisting around
former disturbances, 1963.

Eragrostis amabilis

generally distributed
and abundant in open
places.

Eragrostis proaoides

not seen 1961, 1963.

Lepturus gasparicensis

Collected in ADS area 1961,
abundant generally on
Wilkes & Peale Islets 1963,
but rare on Wake.

Lepturus repens var. *sept.*

Common generally

Lepturus repens var.

local on Peale Islet near bridge.

Paspalum auriculatum

Collected at FAA Dock 1961,
not seen 1963.

Paspalum distichum

several patches on Peale I., 1963

Pennisetum polystachyum
Found sterile at 7A9
Doch 1961, more abundant,
fertile, at same place 1963.

Setaria verticillata
not seen 1961, 1963.

Sorghum dochna var. *technicum*
not seen 1961, 1963.

Zea mays
not seen 1961, 1963.

Cyperus rotundus
first noted
in 1961,
collected in old Japanese
garden site 1961, seen there
again 1963, and several
patches on Peall & 1963.

Cyperus pumilus
collected around old Japanese
garden site 1961, not seen
1963.

Fimbristylis cymosa
generally distributed, 1963.

Fimbristylis dichotoma
Collected at 7A9 Doch
in 1961, not seen 1963.

~~Coccoloba~~ *Cocos nucifera*
a number of small trees around

buildings 1963, none
more than 3 m. tall.

Caladium sp.
not seen 1961, 1963.

Dieffenbachia sp.
not seen 1961, 1963.

Phyllodendron oxysandium
seen in pot 1963.

Phyllodendron undulatum (?)
in pot 1963.

Raphidophora aurea
not seen 1961, 1963.

Eichhornia crassipes
not seen 1961, 1963, has
undoubtedly disappeared as
~~the~~ the cistern where it
grew seems no longer present.

Rhoeo spathacea
seen in pot 1963.

Heterocallis purpurea
seen in pot, 1963.

Ananas comosus
not seen 1961, 1963.

Cordyline fruticosa
seen in pots, 1963, not very
flourishing.

Sansevieria
seen in pot, 1963.

Allium sp.
not seen, 1963.

Crinum sp.
planted around buildings,
not flowering, 1961, 1963.

Hymenocallis littoralis
not seen 1961, 1963.

Casuarina equisetifolia
commonly planted around
buildings, ^{all} trees have reached
5 m. tall, 1963.

Ficus carica
still present and fruiting,
2 m tall, 1963.

Ficus rubiginosa
not seen, 1961, 1963.

Coccoloba uvifera
still present 1961, 1963; on
Peale Islet a fairly large tree
in 1963.

Boerhavia repens
Common generally, 1961, 1963,
in places very abundant.

Boerhavia sp. (white fls.)
Common generally, with
B. repens, but less common, 1963.

Boerhavia sp.
Occasional, apparently inter-
mediate between the others.

Bougainvillea spectabilis
seen around houses 1961, 1963.

Pisonia grandis
still formed forest 1961, in
1963 only scattered trees.

Amaranthus dubius
Found again in 1961, occasional
locally in 1963.

Amaranthus gracilis
not seen, 1963.

Amaranthus tricolor
not seen, 1963 (?)

Amaranthus viridis
Collected 1963 (very rare) ^{all} 43517
in open ground, Wake Islet.

Lescurium portulacastrum
Common generally in low

places, especially along lagoon margins and ~~on~~ occasionally on flats near outer beaches, 1963. Stems unusually red - this true generally.

Portulaca lutea

Common, seen 1961, 1963, especially abundant in cleared area on west end of Wilkes Islet. ^{usually strong} very tall form, branches ascending, light green, no trace of anthocyanin.

Portulaca oleracea

Seen in 1961, 1963, occasional around buildings and disturbed areas.

Portulaca ~~lutea~~ samoensis
Not seen 1961, 1963.

Brassica oleracea var. italica
Not seen 1961, 1963.

Lepidium s-waihiense

Found in 1961, 1963. In 1963 the Lake Peale colony still persists even though the ~~pond~~ pond has been bulldozed out of existence. A large colony just back of beach ~~at~~ at Kulru Point, Wilkes Islet, 1961, 1963.

~~Raphanus~~
Raphanus sativus
Not seen 1961, 1963.

Leptocarpum tectorum
Not seen 1961, 1963.

Kalanchoe pinnata
Persisting in IAS compound 1961, 1963.

Bauhinia sp.
Not seen 1961, 1963.

~~Phaseolus vulgaris~~
Leucaena leucocephala
~~Collected~~ ^{seen} on Peale Islet 1961, well established in same spot 1963, one plant seen also in IAS compound, 1963.

Phaseolus vulgaris
Not seen 1961, 1963.

Phaseolus sp. (red fls.)
One plant ^{in garden} seen 1961, not seen 1963.

seen next
to T. T. T.

Codiaeum variegatum
Planted around houses, 1963, apparently thriving.

Euphorbia cyathophora
Very common in 1961, perhaps somewhat less so, but still

general in disturbed places, 1963.

Euphorbia glomerata

Common, locally abundant, 1961, 1963.
Reaches a most unusual stature
and ~~size~~ woodiness here.

Euphorbia hirta

Common in recently
disturbed places, 1961, 1963.

Euphorbia pulcherrima

not seen, 1961, 1963.

Euphorbia thymifolia

Collected 1961, not seen 1963.

~~*Phyllanthus amarus*~~

Pedilanthus tithymaloides
Collected in DAS compound
1961, seen there 1963.

Phyllanthus amarus

Flourishing colony at DAS
compound, 1963.

Tribulus cistoides

Collected, Wilkes Islet near
channel, 1961, not seen, though
searched for, 1963. Three plants
only seen in 1961.

Ricinus communis

Seen planted in DAS compound
in 1961, persisting and apparently
thriving in 1963.

Abutilon albescent

Abundant around old Japanese
garden site in 1961, not seen 1963.
^{seen also near}
~~near~~ MOTS area,

Gossypium

Widespread, locally common,
1961 and 1963.

Hibiscus ornamental hybrid

Seen in 1961, not in 1963.

Sida fallax

Abundant on Wilkes Islet
1961, 1963, occasional elsewhere.

Thespesia populnea

Planted around housing
areas, and apparently thriving
in 1963, as well as persisting
in DAS compound.

Passiflora sp.

Not seen 1961, 1963.

Passiflora foetida var. *hirsuta*

Established at DAS compound
1961, ^{still} doing well 1963.

Euphorbia thymifolia
seen in that in houses
near, 1963

from
p. 155

Carica papaya
Still persisting around
JAG compound 1961, 1963.

Cucumis melo
Not seen 1961, 1963.

Cucurbita pepo ?
Seen at MATS area 1961,
not seen 1963.

Pemphis acidula
Still abundant 1961, 1963,
especially around lagoon
shores; planted for hedges
in housing area, 1963.

Terminalia catappa
Planted in several places
and thriving 1963, fair sized
tree at JAG compound 1961, 1963.

Eucalyptus citriodora
Not seen 1961, 1963.

Several cacti seen in pots
1961, not seen 1963.

Brassia actinophylla
Seen in 1961, not in 1963.

Polyscias quilfoylei
Seen planted near a house, 1963.

Anethum graveolens
Not seen 1961, 1963.

Apium petroselinum
Not seen 1961, 1963.

Chrysophyllum caimito
Not seen 1961, 1963.

Catharanthus roseus
Seen in many places,
cultivated and established,
1961, 1963.

~~BB~~ *Nerium* sp.
Seen 1961, not 1963.

Plumeria obtusa
Planted around building
1961, 1963.

Ipomoea batatas
Not seen 1961, 1963.

Ipomoea pes-caprae sp. *brasiliensis*
Still common 1961, 1963.

Ipomoea tuba
Generally abundant
except in the most recently
bulldozed areas, 1961, 1963.
Flowers open about dusk,
close mid-morning.

Cordia subcordata

Well distributed, locally common in wooded parts of island, 1961, 1963. Forest of this species and *Pisonia* on Wake Islet destroyed 1963.

Heliotropium anormalum

Common generally, locally abundant, forming pure stands ~~in~~^{in open areas} on south coast near Peacock Point, 1963. No floral dimorphism observed. all plants seen here have deeply lobed white corollas with a tiny yellow eye.

Heliotropium scaberrimum
(var. *depressum* ?)

First collected 1961 near FAA Dock, still common there 1963.

Tournefortia argentea

Generally abundant 1961, 1963.

Coleus scutellarioides

Still seen 1961, not seen 1963.

Stachytarpheta jamaicensis

First collected at FAA Dock in 1961, much more abundant in 1963.

Vitex trifolia

First collected on Peale Islet in 1961. Well established colony in 1963, plants several m tall.

Capsicum annuum

Not seen 1961, 1963.

Capsicum frutescens

Not seen 1961, 1963.

Nicotiana glauca

Seen in 1961, not in 1963, though possibly still persisting.

Solanum lycopersicum

Seen in garden in MATS area 1961, not seen 1963.

Pseuderanthemum canthermii

Seen in 1961, not in 1963.
also var. *atropurpureum*.

Scaevola taccada

Some plants still remain south of the main runway on Wake Islet, less in 1963 than in 1961, because of bulldozing; also seen planted around house on north side of islet.

Conyza bonariensis

Collected in 1961, common
around old DAG compound and
FAA Dock in 1963.

Conyza ~~bonariensis~~ canadensis

First collected south of
runway in 1961. common
around old DAG compound
in 1963.

Lactuca sativa

Not seen, 1961, 1963.

Pluchea odorata

Very common to abundant
in disturbed places ~~generally~~
generally, ~~and~~ seemingly
more so, especially on
Wilkes and Peale Islets, in
1963 than 1961. Dominant
in shrubby vegetation in
various places.

Sonchus oleraceus

Not seen 1961, 1963.

Pisonia forest, with or without an admixture of *Cordia*, was formerly the most stable and mesophytic vegetation type on the island. The only good area of this remaining in 1953 (also seen in 1961) has been completely destroyed recently by overzealous use of the bulldozer, leaving only bare ground. In a few nearby areas clumps of fair sized *Pisonia* and *Cordia* trees remain and if these could be left undisturbed the *Pisonia* forest so characteristic of coral islands might reestablish itself over a long period of years. ~~This seems~~ That this will be permitted to happen seems improbable, however.

Small areas of *Cordia* scrub near Peacock Point, observed in 1952 have increased in stature somewhat, but are greatly reduced in area.

Pemphis scrub still lines portions of the lagoon shore, but the area is greatly reduced since 1953

by clearing. Some of them have increased in stature to several m, but are not at all comparable to certain patches of *Pemphis* forest seen in 1952. Next to the *Tournefortia* scrub forest, *Pemphis* scrub is the most prevalent reasonably natural vegetation type now remaining on Wake.

A wide-spread vegetation complex on drier atolls in the central Pacific is a scrub of *Sida fallax* with, normally, a strong admixture of *Lepturus* and, where it is a member of the flora, *Heliotropium anomalum*. This was alluded to but not emphasized or described ~~by~~ on Wake by Bryan in 1923 (Christopher 1931) and not noticed at all by Fosberg in 1951-1953 (Fosberg 1959). However, two ~~varieties~~ ^{varieties} of this complex ~~are~~ now occupy small areas. On the cleared area at Kulm Point, on the west end of Wilkes Islet, and in the openings in *Tournefortia* forest nearby, *Sida* or *Sida* and ~~Heliotropium~~ *Heliotropium* form an open to closed scrub, with abundant *Lepturus*, *Portulaca lutea*, and

This scrub in much of the cleared area back of Kuba Point gives way to herbaceous vegetation, locally, patches dominated by *Portulaca*, *Boerhaavia*, *Lepturus*, and in one area *Lepidium*. The whole forms a mosaic that seems more or less random in its pattern.

Boerhaavia where the bushes are ~~seasonably~~ do not form a closed cover. This was doubtless present locally in openings before the clearing which was done prior to 1961. Just west of Peacock Point, back of the south coast of Wake Islet, are openings and thin places in the *Tournefortia* scrub and scrub forest that are occupied by an open to closed dwarf scrub of *Heliotropium anomalum*. This may simply have been missed during earlier visits, or it ~~may~~ may have developed in cleared spots resulting from the 1952 typhoon. This area was not visited in 1953.

Sesuvium flats now occupy perhaps more area than ~~a~~ a decade ago, being still present on wet ~~low~~ muddy or sandy lagoon margins and also ~~coming in~~ coming in where excavation has reached the water table, as in the brackish pond in the triangle of the ~~runways~~ surrounded by runways

and Taxi strips opposite the terminal building. The plants form a succulent bright green mat in low wet places, ~~but~~ but are more scattered in exposed beach ridge areas ~~elsewhere~~ on other parts of the atoll.

Roadsides and other recently cleared areas are mostly covered by a vegetation of annual grasses and other herbs, especially *Cenchrus echinatus*, *Eragrostis amabilis*, *Dactyloctenium aegyptium*, *Cleusine indica*, and several *Euphorbia* species. Such areas, if left ~~without~~ without further disturbance for a while, may change to an open to closed scrub of *Bludaea odorata*. Where traffic is heavy there persists a sparse "lawn" of dwarfed plants of *Dactyloctenium*, *Cleusine*, *Fimbristylis* and ~~other~~ other herbs.

Before ~~the~~ the present visit the weather had been sufficiently dry that much of the herbaceous ^{weedy} vegetation was

practically dry, though by no means as much so as in ~~the~~ May 1952. Many leaves have recently fallen from the *Tournefortia*, but not so many as to give a dry aspect. The leaves of *Cordia* and *Pisonia* are predominantly still green. A few of the *Pisonias* were coming into flower. Fruits and a few flowers were seen on *Cordia*.

Evidence of a recent storm, or, at least, of very high waves, were seen on both north and south coasts in the form of large areas of pale gray to white, presumably recently uncovered beachrock, white stirred up gravel, and dead shrubs at the top of the beach and just back of it. The Airforce officers present said that the period of high waves was in October.

At the base of Flipper Point, opening westward toward the mouth of the lagoon, is a shallow, narrowly triangular inlet, dry at low tide. The landward side of this is lined by a somewhat irregular but not rough erosion ramp, the other side by a gravel and sand beach. The reef platform in which the erosion ramp is cut extends at about high tide level across the head of the inlet, ~~and~~ to and along the other shore of the point. The general level of the surrounding dry land is 1.5 to 2 m. above low tide level.

On the north side of the lower part of the inlet, at the top of the erosion ramp, is a narrow thin beach of sand and shells lying on the upper part of the ramp. At the top of this a small cliff, about 70 cm. high is cut into the bank. This ~~bank~~ cliff exposes a layer, about 50-60 cm. thick of ~~about~~ closely packed *Tridacna* shells, overlain

by a 10-20 cm. layer of ^{coral} sand and ~~coral~~ gravel, containing a few shells. The lower part of the inlet is completely covered by similar shells, these much blackened. At the extreme head of the inlet is a similar but much thicker tract of shells, not so much blackened. This extends, with some interruption, almost to the opposite shore of the point, and is at least 30 cm. thick in places. Up on top of the bank on the south side of the inlet is another similar tract of *Tridacna* shells. In the material of this bank are also scattered shells.

Nothing similar to this deposit of *Tridacna* was seen anywhere else on the island. The concentration of shells is much greater than occur anywhere ~~seen~~ living on the reefs. The occurrence suggests ~~deposits~~ ^{deposits} seen in the *Tudamotus* where the clams are an important item of food and the shells accumulate on the lagoon bottom in

shallow water, except that here the layer is at least a meter above low tide level. Wake ~~has~~ never had aboriginal inhabitants, so far as known. The suggestion that the shells may have been from clams eaten by the Japanese soldiers during the war is made less likely by the presence of the layer of sand and gravel overlying the *Tridacna* layer where it is clearly in place.

No artifacts either of aboriginal or Japanese culture were found, and no systematic mode of breakage of the shells, as might ~~have~~ be expected if they had been pried open. However, this species of *Tridacna* is easily opened by cutting the muscle through the hole at the end of the hinge. Since we are not trained archaeologists it is very possible that significant artifacts or other indications may have been overlooked. It would be of great interest to have the locality examined by an archaeologist.

before it is lost to the
bulldozers.

Maui West Molokai - south coast shallow water is red with mud.

Shallow water along East Molokai coast is slightly muddy, but not red and not nearly as muddy as the west part.

Kanai is still red and bar. Kanepure forest is surrounded by wind breakers.

Wooded area on mountain extends well down the slopes into the upper part of the gulches. Shallow water around north coast is red.

Very little mud along West Maui coast. South end grass covered but is rather green, more so than usual. Scattered bachel or Prosopis trees well up the slope.

Pond on S coast of Ithomas has considerable water.

West Maui - Ias Valley

On trail up ridge above lookout is a very good stand of *Rhus javanica*, mostly tall shrubs but reaching 6-8 m. ht. and 10 cm dbh.

Upward a few *Metrosideros* and *Psychotria* (perhaps close to *P. hawaiiensis* as ~~peduncles~~ petioles are several cm. long. Lvs strongly obovate cuneate. But thyrse not complex enough for *P. hawaiiensis*. Forest on ridge top becomes less dominated by *Rhus* and more by *Metrosideros mauiensis*.

Ground is covered by a dense layer of *Nephrolepis*, *Microlepia*, occasional *Adiantum*, *Sphenomorus*, *Oplismenus* covers ground in ~~long~~ small openings. Seedlings of *Rhus* common.

No shrub layer except occasional guava and young *Rhus*.

Cordyline common on slopes, rare on ridge.

Only exotic guava, *Commelina diffusa*, *Aspalathus conjugata*, *Isatis glandulosa*.

Psychotria
mauiensis

Psychotria
at young forest
at 7. *Psychotria*

Many good patches of native forest across canyons on lower slopes. Upper slopes and cliffs with thin shrubby vegetation or grass. Some vertical cliffs and vertical valleys really bare.

Beautiful "amphitheater breasted valleys". Waterfalls but mostly dry in fine weather.

No wings whatever on rachis of *Rhus* leaves. Leaves minutely pubescent, young growth red.

Road past Waieae to Kahakuloa - mostly guava scrub and grass. Photos of Pali Kahakuloa, of Pun Koae, and Kahakuloa.

Artemisia cf. australis or *manuensis* on cliff across the bay from Pun Koae. Photo of boulder beach at Kahakuloa.

Kaleakala - Patch of *Lepechinia hastata* still in good shape, flowering.

Pine planting just below entrance to park has been seriously damaged, apparently by a windstorm, as, in area examined, about $\frac{1}{3}$ of trees have been ~~about~~ tipped in one direction, about $\frac{1}{4}$ completely ~~lost~~ fallen. Of these, some, broken off at root crown, are completely dead, others, partly still rooted, are still green.

n.e. of Ulumalu.
Coastal slopes n.e. of Makua
Open abandoned fields covered by a dense growth of *Rycopteris cernuum*, *Paspalum orbiculare*, *Nephrolepis exaltata*, some *Sphenomenum*, and in thinner places *Centella*, *Pityrogramma*, *Phathoglottis*, *Cassia leschenaultiana*, *Cyperus*.

Stipagrostis purpurascens
On ravine edges some *parahani*.
In ravine wood of *Psidium cattleianum*, *P. guajana*, with a little *Eugenia curvirostris*, *butleri*, & *pandanus*.

March 10 - Iao Valley

43542

Digitaria pruriens

common in thin scrub forest

March 10 - ~~on~~ southeast of
Kahakuloa on ~~coastal~~ coastal bluffs.

2 43

*Grevillea banksii*forming a small forest,
evidently naturalizedMarch 10 - $2\frac{1}{2}$ miles east of
Kihei

4 44

*Pistia stratiotes*covering the surface of
water in roadside ditch.March 11 - 2 mi. n. e. Lower
Paia, Hookipa Park

2 45

Heliotropium anchusaefolium

common on low coastal bluffs

5 46

*Lycium carolinianum*locally common on terrace
above high tide level,
probably wet by sprayWaihee Valley seems to be one
of the finest and least disturbed
on west Maui. Ridges west
of Waihee show dead trees
and signs of bog development.Coral reefs developed along
s. coast of S. Molokai - very irregular

500 m.

near Puu Olai

300 m.

small tree or shrub 4 m. tall,
flowers coral red.

1 m.

lower parts of leaves
thick and spongy.

10 m.

decumbent; flowers purple.

3 m.

arching dwarf shrub;
leaves fleshy; flowers
lavender, corolla limb
patent; fruit scarlet, fleshy.

broad fringing reef.

Lower slopes of all ridges
grassy with some brush -
perhaps lower $\frac{2}{3}$. Ravine
bottoms wooded. Kiawe forest
extends some distance inland
back of Kaunahakai. Mangrove
fringe coast for several miles west
from Kaunahakai.green forest
along coast
area of mangrove
forest?

Ideas for investigation
of revegetation on volcanic
materials:

Long term program of
observation - cooperative bet.
NPS, Jap. Amer. Corp., USGS & PSB,
and Univ. of Haw.

To be initiated on Jap. Amer.
Corp. funds, with under-
standing that, if these fail,
continuing observations will
be carried on by NPS & UofH.

Personnel - Prim. Inv.

autecologist

synecologist

2 assistants

ecologist-geomorphologist-volcan-
ologist

Areas of investigation -

Hawaii Volcanoes Nat. Park & vic.

Haleakala Nat Park

Lassen Nat Park

Crater Lake Nat Park

Craters of the Moon Nat Park

Katmai Volcano.

Investigations to be initiated
in fields of autecology,
synecology, dynamics.
All of these to be related
to geomorphology.

Autecology - marked
plants to be ~~ex~~ examined,
measured, and measurements
repeated at intervals to get

rates of growth and
annual or seasonal increments.
Ratios of shoot & root
dry weight for principal
species to be determined.
Using growth increments
and this ratio, rough
net productivity to be
determined.

~~Phytosociological~~
Phytosociological investi-
gation - apply B-B or similar
system using complete
floristic relevés.

Measurements of environ-
mental factors - soil moisture,
insolation, drainage,
depth & texture of soil,
organic matter, exchangeable
bases, pH, etc.

Dynamics - permanent
plots and transects to be
established, photo point
to be established, observation
made seasonally and
at regular intervals.

Population dynamics of
complex genera.
Invasion behavior of exotics

Mar. 13 - Honolulu

University Campus

43547 *Wedelia trilobata*
 2 planted as ornamental
 ground cover

2 48 *Jatropha cf. hastata* *integerrima* Jacq.
 plant as an ornamental

Mar. 19 - 2 miles north of
 Turlock, Stanislaus Co. Calif.
 in weedy area in orchard

3 49 *Claytonia perfoliata*
 common

1 50 *Lamium amplexicaule*
 occasional

~~51 *Fonnicera japonica*~~

6 51 *Amsinckia*
 abundant; has in
 recent years become one
 of the most abundant
 weeds in the region, formerly
 common only locally.

3 52 (Comp.)
 very abundant in old barnyard.

1 53 *Fonnicera japonica*
 planted many years
 ago in yard, has not
 spread but is a healthy plant.

prostrate, flowers yellow,
 mostly not flowering
 at this season.

shrub 2.5 m. tall;
 flowers bright rose-
 crimson. latex almost
 clear, not abundant.

35 m.

flowers pinkish white.
 (probably not native here
 but naturalized from
 plants brought into
 garden many years ago
 from coastal California)
 corollas purple.

erect, corollas orange

tangled climber, sterile
 at this season.

Mar. 19 - 10 miles ~~south~~ ^{west} of
Modesto, on Mafes Ranch,
east of San Joaquin River.
in shallow very alkaline
depression in pasture.

- 43554 *Erodium*
4 abundant around edges of
2 55 *Plantago*
locally abundant
3 56 *Allocaarya*
locally abundant
1 57 *Orthocarpus*
occasional, more
abundant in slightly
higher spots.
1 58 *Allium?*
occasional
1 59 *Brodiaea capitata*
occasional
1 60 *Senecio*
occasional in edges of
3 61 *Lepidium*
locally abundant
5 62 *Baeria*
abundant, forming
masses of color.
1 63 (cich.)
rare

25 mi.

flowers purple; fruit
conspicuously erect.
rather fleshy

prostrate, flowers
white to bluish white.
corolla tube white, galea
reddish, lower lip, sulphur
yellow.

crushed stems have a
rather disgusting odor,
not quite like garlic;
flowers white.
flowers violet

dish yellow.

flowers bright deep chrome
yellow.

Mar. 19 - ~~2 1/2~~ 1 mile n.w. of ^{25 m.}
 Vernalis, west of San Joaquin River
 in weedy railroad
 right-of-way

43564 *Amsinckia*
 common

2 65 *Allocazys?*
 occasional

5 66 *Lepidium*
 common to abundant

6 67 (bry.)
 locally abundant

Mar. 19 - 3 1/2 miles n.w. of
 Vernalis, west of San Joaquin River ^{25 m.}
 in weedy railroad right-of-way.

6 68 *Amsinckia*
 locally abundant

5 69 *Amsinckia*
 locally abundant

5 70 *Amsinckia*
 locally common, with
 nos. 43568 and 43569

flowers orange

stems spreading,
 almost prostrate,
 flowers white.

erect, flowers white.

flowers showy, orange.

flowers yellow &

flowers orange

March 19 - Maper Ranch, 10 miles west of Modesto -

An alkaline depression or vernal pool in a pasture is marked, at this season, by masses of *Bacris* that show up as solid leafy, chrome yellow irregular patches. The vegetation of the pasture surrounding the depression is dominated by *Erodium* sp. but has considerable grass and various other species.

The depression, itself, is a mosaic of vegetation with patches of bare soil encrusted with white alkali. *Bacris*, *Plantago*, *Allocarya*, and *Lepidium* form pure or almost pure patches, as well as mixtures. The plants collected were only the obvious species - The ichoriaceous plant ~~was~~ is a rare one that was collected by accident mixed with the *Bacris*. *Suaeda* is common.

This area is north of and immediately adjacent to the Maze Road, just east of Maper Ranch Gate No. 2. Its area must be at least 4-5 acres, possibly more. It is quite irregular and

in the time available could not be thoroughly looked over - some extension westward was noted and doubtless there are other such areas.

For conservancy purposes someone should go down there and look it over at leisure - preferably now while the plants are still in flower. A wide survey of the general area should be made or possibly there are much better sites than this.

The area is presently grazed, but apparently not too heavily, at least at the moment.

Later

Land near the River on both sides and to Tracy has fine black soil. Is doubtless drained this marsh.

Could it be that this is more subject to alkalization by irrigation than sandy areas farther away from rivers?

Could it be that "black alkali" ~~(Na₂SO₄)~~ is result of reaction with H₂S by NaCO₃ ~~and~~ in these marsh soils & subsequent oxidation?

Mar. 10 - flight S.F. to Wash.

The Sierras south of Mono Lake present a tremendous rugged field of peaks, much more impressive than to the north. Mono Lake is still a large lake, but Owens Lake is much smaller. Mt. Shasta is visible in the far distance, very white. The higher peaks of the Sierras, esp. those to the south, have considerable snow, but at middle to fairly high it appears to be very light.

The Nevada ~~and~~ mountain ranges, especially southern Nevada, have snow down almost to the bases, even the small clumps of hills. This becomes a less eastward, where only the higher ranges show any snow.

Several dry lakes in eastern Nevada and perhaps western Utah - one at least has considerable water right now. Could be a permanent lake - Carson Sink ?? (~~last year~~

45 min. out of S.F.)

Several black spots may be low flows.

Snow becomes more abundant eastward, but at higher altitudes only. Many snow-covered ranges visible to north, not many to south. Just north & northwest of Grand Junction, Colo. is an extraordinary arrangement of canyons, tributary to the Upper Colorado River. This is cut, like a maze, into a sedimentary bluish and all of the canyons finally converge and the outlet is through a narrow portal. Reserves further exploration - first on topo-maps, then on the ground.

The country west of the Mississippi, from 33000' looks generally a dull brown. Little green shows except rarely where there is an irrigated field in the desert.

As the Mississippi is approached, a black color becomes more prevalent, representing forested or brushy areas.

198

200

IO-6

Wake Island 3/9/63 1962

STATEMENT OF SUBSISTENCE, QUARTERS
AND LAUNDRY SERVICE FEES DUE

TO: DR. F. R. JOSEBERG

ORG: CONSTITUTIONAL Federal Aviation Agency
Domestic Services Section, Wake Island

For meals and lodging furnished on the dates specified below:

March 6, 1963	:	Dinner	\$ 2.00
March 7 thru 9, 1963:	3 days @ \$6.50		19.50
March 10, 1963	:	Brkfst	<u>1.00</u>
			\$22.50

ONE DAY'S CHARGES CONSISTS OF THE FOLLO:

BRKFST	\$1.00
LUNCH	1.25
DINNER	2.00
LODGING	<u>2.25</u>
	\$6.50

*Pd
3.9.63*

Payable in cash or by check to order of FEDERAL AVIATION AGENCY.
Make payment at Island Manager's Office, Second Floor, Terminal Building.

*22.50
3.9.63
15*

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