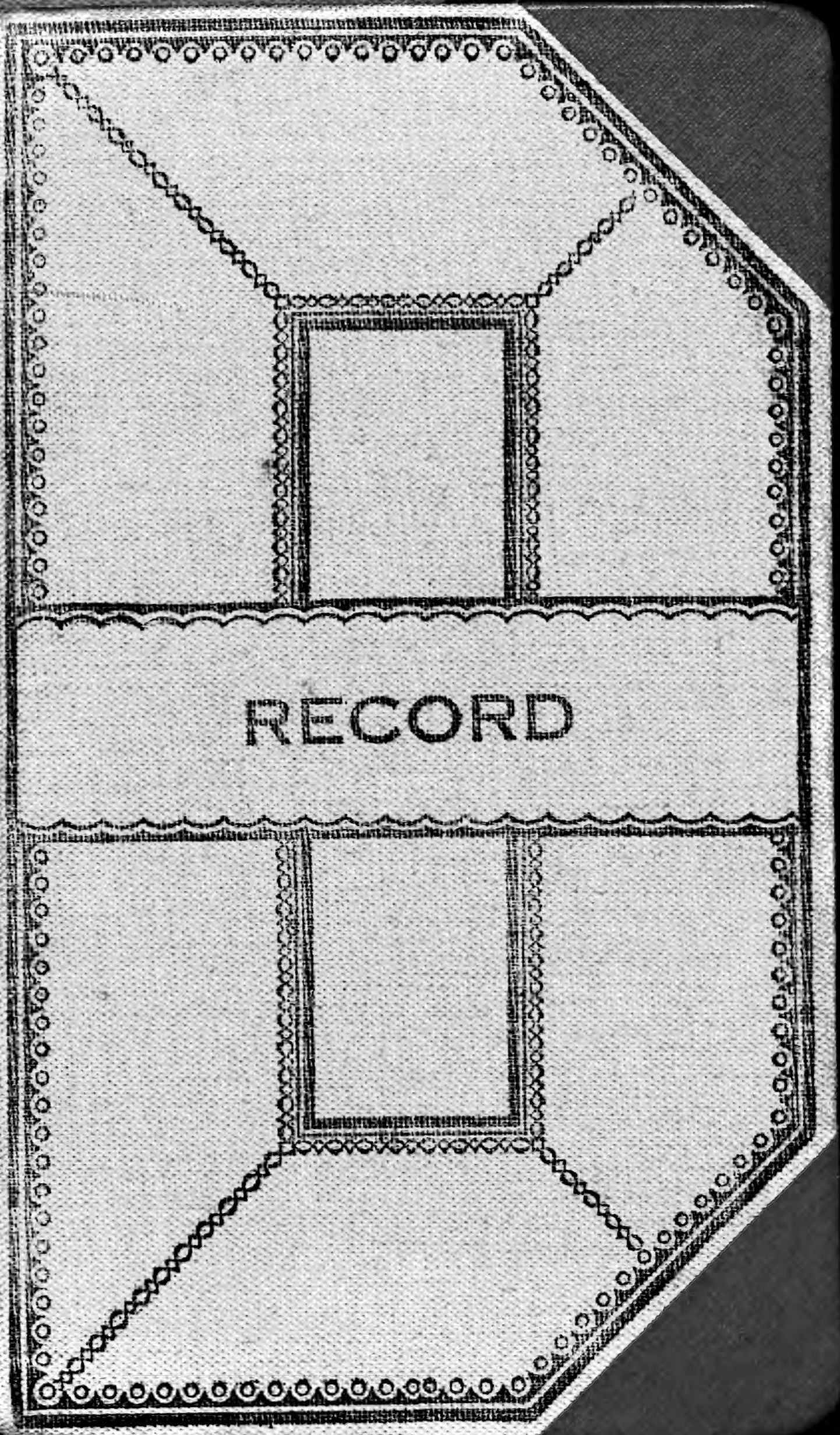


RECORD

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F. O. Labels - 1/2

First Series film
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All labels typed

Collection and Field Note Book

No. 72

(Feb. 22, 1964 - May 3, 1964)

(45121 -- 45214)

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101 Katak tyra

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USAF Operations
Navigator Chart

Andaman Sea

ONE-K-9

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Aeronautical Chart

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AGE-ND 48-11

USAF Operational
Navigation Chart

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1964

Italy

1

Feb. 22 - Italian coast north of Rome.

A couple of coastal lagoons, rather rectangular in outline. A definitely volcanic mountain a bit in from the coast.

Higher peaks of Apennines to south strikingly snow-covered.

A large circular lake in from the coast. General landscape drab.

Two more lakes inland. Some of the Apennine peaks are extremely rugged.

One of the lakes is also almost circular. Are they caldera lakes?

From lower altitude, the coastal areas are greenish. A few dark patches of forest or brush, mostly very thin grass. Some thorny brushy hills as we approach Rome.

Somewhat north of Rome an area where the farmhouses are small, white, uniform and uniformly distributed.

Just north of airport they are large and bright red. Rows of trees along many roads and between farms.

The several Italian rivers seen have great plumes of silt out from their mouths.

Ganges just below
junction with Brahmaputra
delta or flood-plain pattern
but very dry.

Feb. 23. Dacca.
Severe thunderstorm in
late afternoon.

from p. 3.
Lawsonia inermis
Livistona chinensis (hook.)
Rondeletia odorata
Murraya paniculata (hook.)
Clerodendrum infortunatum
Congea tomentosa
Cynodon dactylon
Tectona grandis

Rathyrus odoratus
Chlor
Verbena
Calistephus chinensis
Codiaeum variegatum
Euphorbia pulcherrima
Zinnia sepium
Previllea robusta
Pithecia chinensis
Salmelia malabarica
Tamarindus indica
Mangifera indica
Albizia lebbek
Cyrtosperma
Bougainvillea glabra
Vicia
Ipomoea chinensis
Croton
Jacaranda mimosaeifolia
Carica papaya
Sida acuta heterophyllus
Persea americana
Zinnia elegans
Lobularia maritima
Saccharum officinarum
Cassia spectabilis
Dianthus barbata
Samanea saman
Calendula
Ficus religiosa
F. benghalensis
Delonix regia
Ipomoea fistulosa
Helianthus annuus

Feb. 24 - road between
Dacca and Narayanangang

Here the landscape is
one of polders, mostly fallow
at this time. In many
them clay is being dug for
brick making. There are
many brick kilns and
fields where piles of brick
are stored. Brick seems to
be used for everything here
even pounded up for concrete
aggregate and road
material.

Left Narayanangang
at just before 6 p.m.
and went down river.
After the thickly settled
polder area was passed,
we passed, first rather
narrow sloping terraces,
which are muddy and
slightly grassy. These
rapidly expand from a
few m. wide to several
hundred m. and become
very flat, and thinly
green. ~~Several~~ Back of
this is woody vegetation
low forest in appearance
but probably trees around
dwellings. Then, a short
distance down, a small in-

channel comes in from each
side. Then the tidal terraces
become narrow again and
the river becomes 1 km or
more wide. This seems to
be more in the nature of a
lake, but rather elongate.

Several sharp thunder-storms
before and after dark.

Feb 20 - Lower Cactus Run, etc.
 Some flooded areas with
 what appears to be *Panicum*
 cordellifolium, mostly between
 between them. Much of them,
 emergent, have some *Phoenix*
 and perhaps other palms. There
 is a slightly higher patch
 an *Arca* grove.

Several miles down we
 struck a large *Arca*
 area protected by an artificial
 levee. Higher parts is not
 mostly back of the levee
 abundant *Arca* but
 with other trees, and dwelling.

In places there is a sand
 platform ~~with a few~~
 surface a few inches above
 normal high tide. *Arca*
Phoenix paludosa is very
 common. A few *Coccoloba*,
 a few *Borassus*, some other trees,
 plantings of bananas and
 a few temporary dwellings.
 Locally there is what
 appears to be a small *Arca*
 Considerable areas are
 bare except for very low lying
 grass.

Photos of the *Arca*
 patches of *Arca* *Arca*.

A small break in the levee
 shows that there are *Arca*
 rice fields behind it.

The wooded and settled
 areas are dominated by
 palms -

Coccoloba
Phoenix paludosa
Arca catarin
Borassus flabellifera
 Bananas are abundant
 some *Arca* and other
Arca *Arca* *Arca*

Abruptly the landscape
 changes. *Arca* *Arca*
 at just about high tide
 level are covered by a
 forest - almost closed to closed
Arca forest *Arca* *Arca*
 of *Arca* *Arca*
 Photos *Arca*

Arca *Arca* *Arca* *Arca*

Where there has been
 stumping *Arca* the mud
 flat is not as high
 as generally there are
 patches of *Arca* and
 of other *Arca* mostly *Arca*
Arca *Arca*.

Some *Arca* *Arca* *Arca*
 but no way of telling
 what is away from *Arca*
 down there is an extensive *Arca* flat.

Then we cross to the east bank. There is there an open forest on ground that is submerged at high tide. Scattered bushes rather than trees.

Back of this extensive plot that may be garden in season and dry months many cattle graze on the slightly higher area. Palm trees, *Borassus*, and various other trees. Some dwellings.

Generally a sand - one bushy strip separates rice fields from extensive rice fields. Some betelnut crops. Large areas of wetland with palms, bamboo, other trees. Locally there appears to be the remains of an old artificial levee some broken, then not.

Below this there appears to be a narrow strip of very slightly higher ground between the rice fields and the river, doubtless a natural levee. There are low tangles of Pandanus, scattered *Borassus* and other shrubs, some occasional dwellings with

more vegetation around them.

Then an artificial levee obviously - modern with a narrow strip of slightly submerged mud flat in front, mostly bare & grassy but with occasional scattered patches of ^{and patches} *Masson* and *Borassus*, a few dwellings on it.

This levee extends for some miles north to the town in front of it is very low with and almost no vegetation, until we are in the "reach" of the Hanigale River.

A turn is made to the right and we start up the ~~delta~~ levee.

Immediately the banks are lined to some extent by *Nipa*.

There is a tendency here for *Avicennia* to be scattered as emergent in a dense forest of *Periterna nana* with some admixture of other species. This continuous layer may

be of varying height, but in a few places it tends to be uniform in place. The *Heritiera* emergents are passing out the *Heritiera* from the *Myrsine* layer. The *Myrsine* layer shows a local subsidence of the due to weight of vegetation and lack of branching strength in layer - should be a matter of comparison.

Occasional dead and dying large trees seem to lack some support to the idea, but lack of any "deciduous forest" appearance is apparent.

Much of the young *Heritiera* of forest to form a rather narrow belt along the river bank in places a strip of *Nyssa* in front of this, usually not so only scattered. Along eroding banks an occasional fallen tree, but this seems only to be almost banks with many such, even very small trees.

A few of oldest trees are covered with epiphytes. Scattered small reddish trees, some *Myrsine* in photos of *Nyssa*, *Heritiera*.

Entered a small stream where the forest seems now mixed.

Heritiera

Cerbera

Rhizophora

Avicennia

Hibiscus

Calamus

Nyssa

Adroscia

Myrsine

Phoenix

Acanthaceae

Along much of this stream there is a strip of much lower forest, quite dense, backed by taller forest. Occasional areas slumped into the stream, with leaning trees. In some places the mature forest comes to the shore and usually is being eroded. In places, esp where forest is mostly *Heritiera*, erosion exposes a dense mat of platform of roots held up by vertical components in a stilt-like manner.

Banker is low the ...
fringes of ... are very ...
and ... the ...
is ... extensive ...
swampy, only ... along
the edges.

Locally in the forest
there is a definite layer of
Phymos paludosa, usually
where the forest is older
young and rather sparse.

Frequently on roads up
channel as lined with *Thypha*
- canals both, hardly prepared
neither *Pandanus* - more
always a very low canopy over.

The general level of the
ground here is a few meters
above normal *Thypha* level.

Rarely a little higher.

Nyctea near slightly low.

One spot seen with
a temporary dwelling, today
firewood boat tied up, and
around it a thin place
in the forest where a lot of
trees are cut out and the small
one left.

Suddenly when next
forest is fairly ...
epiphytes, orchids, ...
general, though not abundant
a cloud of ... on each tree.

locally *Hibiscus*, *Urena* ...

is common in edges of forest.

Firewood boats are very
common here. This wood,
in Choudhury, a few ...
purposes: fuel, fuel wood,
construction, matches, etc.

Many species are ...

Certainly, no ...
of the vegetation of this area
can be very sound without
taking into account this
contamination, or ... of wood.

Thypha ...
just below ... the
forest on the east ...
been ... and ...
The west ... almost
up to ... is still
wooded.

Mungla is an important
port, with a number of ...
large ... and ...
Also a great many smaller ...
(photos - leaf)

Passer lives from Mungla to
Chalna

C. ... + *Hibiscus*, *Urena*,
several other trees, ...
dwellings dominate landscape
between ...
fields. Very slight natural
river along ... fields, being
eroded away, with ...
up. *Hibiscus* *Urena*.

These rice fields, and
 very extensive, with
 brushy levees at intervals
 and small clumps of
 dwellings, extend at least
 several miles from the river,
 on both sides. Coconuts, mangoes,
 Phoenix around houses, as
 well as other trees. This
 Phoenix is much taller
 and with larger cones than
 the Palau variety of the same
 forest. West bank is much
 more densely wooded, with
 a ~~wide~~ broad ~~leaves~~ or rather
 as many ~~and~~ ~~leaves~~ ~~as~~ ~~the~~
 general assortment of trees
 some areas. The dwelling
 are, in general, scattered
 families of the same kind
 difference between the west
 bank, with as much ~~as~~
 and ~~more~~ ~~more~~ ~~more~~ ~~more~~
 the east bank, with ~~some~~
 brush ^{some} ~~along~~ ~~the~~ ~~river~~ ~~and~~
 dwellings are mostly ~~on~~
 inland.

Then an area on the west
 bank where trees are ~~more~~
~~more~~ ~~more~~ ~~more~~
 still standing but ~~are~~
 systems exposed, in ~~the~~
~~with~~ ~~the~~ ~~low~~ ~~land~~ ~~about~~

has. The two banks
 almost identical.

At Chalva turned west
 into a narrow winding
 channel through extensive
 rice fields, with small
 clumps of dwellings,
 single dwellings, and
 villages ~~with~~ surrounded
 by trees - Arecas, Coconuts,
 (see photos)

Phoenix, Phoenix, Musa
 Hibiscus tiliaceus, palauella
 and a number of broadleaf
 trees ~~Samanea?~~ Terminalia
 catappa, ~~are~~ mostly not
 identified. A few Bravais.
 Rice fields protected by
 low mud levees.

Most houses are thatch
 roofed mud huts. Occasional
 brick building.

~~West~~ South bank
 is almost a continuous
 village. North bank
 has bushes, locally trees.
 Houses here are away from
 channel banks.

Then both banks
 more or less bare, for a
 distance, then for a good
 distance almost a continuous

village on south bank.

New levee on north.

Then bunderbans forest again on south bank.

Mainly *Heritiera*. On more recent sediments a thicket of a bright green small tree with scattered larger *Avicennia*.

The small tree may be ~~*Avicennia*~~ *Bruguiera cylindrica*? The forest varies from closed to somewhat open.

On other bank a solid band of *Nypa*. Rice fields behind it.

In the forest there is considerable of a sedge and some *Acanthus* on the ground, at least near edge.

Many photos showing undercutting, root platform *Acanthus* layer, etc.

In places the forest becomes open and here may be a dense layer of young *Bruguiera*. That appears to be *Excoecaria* has leaves turning yellow or reddish, becoming bare.

Recently deposited mud on convex side of curves have

thickets of young *Avicennia* some *Bruguiera*. Flopping mud banks with sedge. Very little *Nypa*.

Excoecaria seems to be very abundant near banks, where forest is lower and more open than back a few tens or hundreds of m.

This may be due to opening by wood cutters. The stature and openness both suggest much cutting of larger trees.

Then large stretches of almost pure *Heritiera*. Locally with some epiphytes.

Entered broad ~~*Sibsa*~~ ^{*Sibsa*} river. Now there is forest on both sides. Up to here on the left has been forest, on right rice fields.

Dense *Heritiera* forest with little variation except where there is a band of *Nypa* along the shore. Where the shore is low and sloping there is *Nypa*, where there is undercutting, no *Nypa*.

Feb. 26 - Sibsa River - to

On a low shore a dense luxuriant forest of *Sonneratia*. Most of the shore of the broad part of the river is rather high, at least at or above high tide, and is being eroded away, exposing the root systems so that they appear to be stilt roots.

Excoecaria and *Buquiersia cylindrica* (?) and probably some *Sonneratia*, as well as a light green tree with white trunks seem to make up this rather low forest.

On right bank the forest is very young and mixed, rather open, with locally a thick stand of *Acrostichum aureum*. *Buquiersia* & *Sonneratia* and probably young *Heritiera* are abundant. *Rhizophora* local. *Excoecaria* (?) common. The ground is probably a little below high tide level.

On left bank an extensive stand of *Nipa*. The most seen yet, at one place.

Then on rt. bank a tall ragged, rather open forest of *Sonneratia*.

Entered a narrower channel. On left a rather young

stand of mostly *Heritiera* with occasional much larger *Avicennia*.

Same on right. Then on left an area of low scrub, components not identified, mostly not over 2 m. tall, tangled. Back of it tall scattered *Avicennia*.

On other side young *Heritiera* forest, occasional larger *Avicennia* trees.

Then on left a large cleared area of rice field, between crops (brown). This is many hundreds of acres, protected by a small levee. Rather small *Heritiera* forest on right bank.

Cattle grazing on rice stubble.

On rt. bank the *Heritiera* forest is very young, only a few m tall. Back of it a few hundred m. are taller trees.

This strip of young forest becomes narrower and much smaller. The ground at about high tide level is below. Much *Acrostichum* and a number of shrubs.

A few areas are devoid of any undergrowth, with rather few trees and numerous

stumps - laid by chowdhuri
to be areas subsided and
trees cut off by "wave action".
Nearby areas, equally low
have undergrowth and dense
forest.

Most of forest along this
channel is young *Heritiera*
several hundred m. wide,
backed by somewhat taller
Heritiera.

A low stretch seems
to be entirely occupied by
a belt of dense, rather
tall *Avicennia*. Where
there is fresh deposition
here it is colonized entirely
by a thick growth of young
Avicennia 1-2 m. tall. (photos)

The left bank for this
entire distance is cleared
and in rice fields.

Some areas on rt. bank
show a scattering of large
old *Avicennia* in a thicket
of young trees, mostly *Heritiera*.
Also some slumping of
edges down into channel
with trees still standing
but dead.

Then forest again on left
bank. Rather small
Heritiera, fairly dense,
with, at least along river,

considerable undergrowth
Acrosticum, shrubs, young
trees, *Phoenix* (local). Considerable
Excoecaria in most of
these forests.

Long stretches of medium
size dense forest of
Heritiera with some
admixture of *Excoecaria*
and other trees, with
considerable undergrowth
of *Acrosticum*, *Acanthus*,
and some unidentified
shrubs, occasional *Nipa*,
locally no undergrowth.

Stout conical pneumatophore
are entirely too abundant
to be accounted for by the
occasional *Bruguiera* - must
belong to *Heritiera*.

Epiphytes locally common
appear to be a lanceolate
leaved *Polypodium* and a
Hoya or *Dichidia*.

Many photos of this (low)
and 1964-12 • begin 1964-13.

Entered a much larger
river, undoubtedly *Sibira*
lined on both sides by rather
old dense *Heritiera* forest.

Seems that what we
have been taking for *Heritiera*
is really a mixture of that
and *Sonneratia*, with the

latter much more abundant along the shores. The prevalence of thick corical pneumatophores which should indicate Sonneratia suggests this.

Along the river, especially in portions where it narrows there is much evidence of deposition - strips of *Nipa* and grassy low banks (photos).

In wide parts the banks are low - the forest rather open. Large clumps of *Acrostichum* and a large grass, sedge.

A small creek completely lined with *Phoebe paludosa*.

Turned left to right in a smaller channel, with rice cultivation on left. Low bank with much slumping on right, small *Sonneratia* forest. Epiphytes common.

After a short distance we doubled back along a channel on the other side of the rice lands (photos *Wood. a, b, c*). On the right bank a very mixed forest, much *Excoecaria*, *Bruquierea*, etc. In a large depositional

area a solid stand of young *Avicennia* 2-5 m tall. Locally predominantly *Heritiera*, *Sonneratia*, more predominantly very mixed locally with a prominent shrub layer of possibly *Cerise* or *Kandelia*, locally a mixed undergrowth of shrubs and *Acrostichum*, patches of a grass-like plant - possibly a sedge or *Sphagnum*.

Where *Cerise* is dominant in understory the larger trees seem to be dying back from tips, some already dead.

On convex banks a thick fringe of young *Avicennia*.

In most of the forest here *Bruquierea* is quite abundant at least very near the river, probably not so back in forest.

Very locally a low thicket forming pandanus with narrow leads.

Local patches of *Bruquierea* extending well away from river banks.

Then rice on both banks back to Chalua.

From Chalna upstream
 the landscape is an entirely
 artificial one, of wide
 rice fields, enclosed by
 very low levees. Scattered
 bushes in them, especially
 along levees. Local villages
 and occasional isolated
 dwellings appearing as
 patches of woods. Coconuts,
 Phacelia, Brassica, Anaca.
 Musa, Ficus of numerous
 Terminalia, ~~and~~ Erythrina,
 and several other road-side
 trees are planted around
 the dwellings (Photos in book)

Hibiscus
 Cassia
 Tamarindus

Part of the scattered shrubs
 in the paddy fields are Pandanus.
 The rice land here is
 scarcely above high tide
 level.

In Chalna rice are
 abundant, also Coconuts
 Ficus religiosa, Mangifera
 Indica, Musa, and some
 food trees, as well as bamboo
 from Brassica, Litchi, Artocarpus, etc.

Taper pulp mill used
 'Java' ~~is a~~ ~~not~~ ~~from~~ ~~hand~~ ~~made~~ ~~bam-~~
 plantation in large rafts in
 front of mill. Log from 10 to 2000 lbs

Plant in the
 Portulaca grandiflora
 Alternanthera versicolor
 Helianthus, sp.
 Cosmos tricolor
 Hibiscus of white - maculata
 Ipomoea pes-caprae
 Solanum malabaricum
 Corchorus sulphureus
 Calceolaria argentea
 Rosa sp.
 Gallardia picta
 Tagetes
 Citrus grandis
 Muntingia calabura
 Alcea rosea
 Bougainvillea spectabilis
 Clodendrum fragrans
 Uapaca macrocarpa
 Ficus religiosa
 Erythrina
 Centrosema pubescens
 Bauhinia sp.
 Ficus religiosa
 Ipomoea
 Passiflora
 Acacia
 Acacia
 Chrysanthemum
 Solanum
 Hibiscus
 Ipomoea
 Ficus
 Mangifera

Coccoloba *puberula*
Leucaena *leucocarpa*
Fabaceae *sp.*
Psychotria *sp.*
Dianthus *sp.*
Manis
Panicum *sp.*
Utricularia *sp.*
Utricularia *sp.*

Feb. 27. Lequa River below
 Chandpur - vast plains
 not protected by levees -
 with thin grass, many
 cattle, a few scattered
 houses with no trees around
 them. In distance on left,
 going upstream, the normal
 landscape with palms,
 etc. around dwellings.
 On right for a distance
 nothing but low green
 fields then dwellings
 surrounded by banana
 plants ^{and} no trees as far as
 one can see.

Several fish viers -
 bamboo fences with
 nets, extending across
 river from both banks
 leaving an opening in
 center for ships, the
 ends of the fence curled
 back and hooked toward
 downstream direction.

Above this dwellings again
 approach the banks
 and are surrounded by
 trees and bamboo, and
 bananas much as seen
 yesterday, except that the
 trees seem to be younger.

No levees here, at all, but
 a flat terrace. (photos - hot)

A few small patches of green rice, mostly hollow, a little stubble here and there. Hard to be planted to plots of various crops - pulses, mustard, sesame etc. Rice planted to grow during flood season - floating rice.

This special landscape may be adapted to the flooding. The more established houses are on low mounds, up to 10 ft.

This is at the confluence of the Ganges and Megna.

Now on right is a vast plain ~~is~~ grass-covered, with shelving beaches rather than the vertical banks seen below, and with no houses or human works of any obvious kind whatever. The grass is tall and has some fruiting panicles - appears to be *Imperata* or *Saccharum* or something similar. It is being gathered and carried in large bundles to small boats tied along the shore. Grass is *Saccharum*, but habit not bushy as in *S. spontaneum*. Infl. is typically *Saccharum*. seem to be various other grasses and grasslike plants with

it, but not a single woody plant visible. Not a tree to be seen. This is in the angle formed by the Megna with the combined rivers. Where there is an eroded bank here, the soil profile shows a dark surface layer a few inches thick, sharply separated from a white clay extending down to water level or below.

Above the river coming in from the right the land is a little higher, still not enclosed by levees, very thickly scattered with houses, and with an abundance of trees, esp. *Acacia*, and quite a few *Borassus* & *Shorea*. Considerable bamboo. The houses are typically on mounds of earth. (photos - led)

a few
woods
mound houses

The number of boats on this river is enormous. (photos - led.) Many tiny fishing shiffs. Larger boats with sails and oars apparently carrying cargo. Lines of floats indicating submerged nets are frequent.

Large groves of *Acacia*. This must be an area of supply for *Acacia* and other cities.

Chandpur has far less trees than other towns and most of them rather low. Surrounded by a ~~to~~ bank or levee of cobbles & boulders, doubtless imported.

Island or peninsula opposite is even more treeless and desolate. Very low, a few bananas and tallest vegetation some sort of vine, trained on trellises, is very prominent.

This island and its dwellings, and perhaps even parts of the town itself, are completely submerged in flood season.

It seems probable that anywhere here that there are no trees is subject to annual flooding of major importance. The fact that houses and trees are on mounds on this land that lacks levees supports this idea.

On up toward Dacca on the east bank of the enormously broad delta there is a broad flat plain with no trees and almost no grass. Some goats and cattle grazing in it. Houses with abundant trees

in the distance, and as we go up the river, closer and closer to shore, until immediately at shore all on mounds.

Opposite an island, largely bare except for grass, but with small areas of houses and trees.

Here the trees surrounding the dwellings are not dominantly palms, as down stream, but dominantly mangos and several other broadleaf trees, a few acacia and Phoenix.

On new sediments deposited last year sweet potatoes are grown.

Dwelling areas look like mangroves forests. Very few palms, no coconuts. Area of beautiful halamella on low bank to east. West bank much higher eroding and with a curious terraced appearance.

Above this on east bank wide open very low area with miscellaneous cultivation in strips.

A clump of houses and 2 brick mosques are being undermined by erosion and partly falling into the river. Much floating Eichornia.

Large areas here are very low, scarcely above river level. On east bank there are grass covered, on west considerable stretches of bare sand - large areas of newly deposited silt, one or 2 years old, already planted to paddy, watered by tide.

26. 28 - From Dacca to Madafun

~~Low~~ ^{low} ~~low~~ ^{low} ~~low~~ ^{low}
 north over cultivated to rice,
 with terraces around. Rice
 Paddy strip.

Mango trees, Salweenia,
 (P. neri), Phoenix bamboo.
 Rice cut, 200 to 1000.

In low areas along river with
 winter rice, some other crops.

On better drained soil
 botanical and road side marked
 by palm fruit.

Higher more dissected area
 greatly uncultivated, small
 patches of wood. (partly soil
 10 mi from Madafun). Coppiced
 lower spots in rice.
 All apparently not allowed
 to reach more than about 200 ft.
 on a varied impervious clay
 winding lower channels
 are in rice. A little of it
 is winter rice, more green,
 on lower spots. High spots
 soil.

Then lower, recent
 P. neri after the settlement.
 All in winter rice, but it green
 will be harvested in April or May.
 Then more dissected higher
 land - bamboo thickets, rice
 on low spots.

Then flat land with wheat,

suaga, can, etc

Mangrove

Flat landscape with

houses, trees on mounds

Requires a dry season, yet
wheat rice

Ponds here and more common

much bamboo, mangroves, many

holdings. Many palms, etc.

color from red to orange. A few

Thun, Liana, Urena, Hibiscus,

Karatis

Large landscape - flat
fields, rice, or tobacco, etc.

These fields harvested in July, then
rice

Tanqail

These gardens near town

Mangroves, bamboo, etc. some common

tree. Some things like

ferried across river

Ponds with Eichhornia

Patches of Eucalyptus

A few shallow flat areas
divided into patches. Misc. with

A few trees, agave, and a few palms.

Kalibati - ferns, etc. etc.

near end of road with Eichhornia,

small papayas, a large mounded

in 2-4 ft. low

Road through all of this
country is on a high embankment.
Ditches & ponds along side have
provided the material.

Rocks of rice straw scattered
about fields - to be burnt
for fertilizer

In distance or night the low
+ sharp of reddish hill to see
to see above recent Braunspota
movement.

Area more common

Terrace scarp of mill scarp!

much closer

Aug 23

Small agricultural and irriga-
tion system

Up in rice, reddish soil
patches of soil, woods, here
to 20-30 in. dbh. but the open
mixed with other trees
has doubtless been selectively
cut.

Small savanna patches

Madagascar fanga tree,

etc. Madagascar

A few palms, canopies, very
inconspicuous trees to 20-30 in.
undergrowth very sparse,
and Pandanus or Pinellia

Yams abundant, nearly for
size. Parkia, etc. etc. etc. etc.
Larger palms on most trees

or completely dead. ^{supra} ground
Large bromeliads ^{ground}

A species of tree with
galleries all the way up and

in narrow, of a block, under
the ground etc.

The soil is very fine
dune sand, mostly
a thin surface layer of
yellowish sand
in each of the gaps
lower top of mound.

Nearly perfectly of
fine, except about 10% of
the soil is very large
pieces of pebbles
on edge of mound.

But the soil is
mostly white
full of small
Hesperis matronalis

Much of the forest has
been recently cut down to
almost nothing, being allowed
to sprout - 1/2' sprouts - but
the trees are about 10' tall.

Weeds near ferns

Amaranthus spinosus
Tigernone mexicana
Eichornia crassipes
Cyperus distachyos
Lippia nodiflora
Solanum elaeagnifolium

11/1/49 Outside on Jigjig
12/1/49 7 m in Muzapin

11/1/49 Exposure of layers
red above, gradually to
light red & blue mottling
within a few ft, then
to blue clay.

11/1/49 Top of mound
of cutting has intersecting
layers, well into the earth
shows a small pin below the
vertical intersecting line
to conduct off the sap. Repeated
cuttings, alternate on one, then
the other side give the mound
a curious zigzag appearance.
Top of mound, says it is sugar

Feb. 28 - Kalipati Ferry
com. n. w. of Dacca, Tangail Distr.
on banks of silt

45121 Ranunculus scleratus
rare

erect; petals yellow.

22 Croton sparsiflorus

much-branched herb.

common roadside weed

23 ~~Passiflora~~ Clinogyne dichotoma
cultivated locally

much branched from base,
to 2.5 m. tall; sterile; stems

23a Alternanthera

said to be used for ~~wickerwork~~
matting.

Feb. 28 - 7 mi. w. of Muzaffarpur, Tangail Distr.
on steep road embankment

24 ~~occasional~~ Emilia sonchifolia DC.

flowers purple, not
much exceeding involucre.

occasional on bare soil

25 Cuscuta reflexa

stems greenish yellow;
flowers white, on thickened
inflorescences, coiled around
stems of host.

parasitic on Zizyphus

Feb. 28 - Madapur jungle tract,
s. w. of Madapur, Tangail Distr.
in rather open disturbed
forest on hard clay soil.

26 (acanth.) Lepidagathis incurva
occasional var. acuminata

erect; flowers yellowish.

27 Blumea

erect; heads yellow.

occasional

28 (~~Blumea~~) Ventilago madraspatanus var. calyculata ?
occasional in understory.

small tree; flowers greenish.

29 Entada purpurea

extensive liana, with tendrils.

common

30 ~~Rivina~~ ~~ambigua~~ ~~?~~ Randia of dumetorum
rare

scandent shrub; sterile.

- 45131 *Lygodium flexuosum*
common
- 32 *Pilea pentagyna*
common
- 33 *Bridelia retusa*
common
- 34 *Randia*:
occasional
- 35 *Shorea robusta*
dominant tree in forest
- 36 *Randia*
common
- 37 same - in grassy savanna
very common

- wine climbing in bushes
- tree to 15 m. tall, sterile.
- small understory tree,
- ripe fruit black.
shrub 2 m. tall.
- tree 15 m. tall, sterile.
- heavily exploited for poles.
shrub, 1.5 m. tall, sterile.
- sterile shrub up to 1.5 m. tall
main branches with large leaves,
small spiny branches with
small leaves.

Mar. 5 - Dacca

Common street trees are

Tectona grandis

Lamanea samar

Tamarindus indica

Ficus religiosa

Glinicidia sepium

Mangifera indica

Annona sp.

Litchi chinensis

Delonix regia

Mar. 6 - Lalcutta - English

road along side of ...

around Dum Dum airport - rather

dry, cultivated land, small plots,

partly with hedge-rows.

Villages wooded. Many plots

have large areas without

houses or buildings. Much

water in distance to south.

scattered villages ...

water eastward (photo - 11)

Then the delta proper (photo

10:00). Flying along the

boundary bet. the cleared rice

area, tawny brown at this season

and the hundred-acre (photo).

All streams seem rounded.

Wooded dwelling near rice

fields follow small channels,

photo - 12. Most area of this

isolation, or along channels plus

scattered dwelling, between @

Larvae, muddy
 south, and more scattered now.
 Then less so, and the entire
 dwelling pattern is less
 dense, and a great many
 of what seem to be secondary
 or deserted plots, pale
 against the brown of the
 rice fields. Then the
 mouth, of the great
 river, a complex pattern
 of islands, the over-cast
 of the sea with beaches.
 Some striking crescent-shape
 areas in sea. Most of these

are cleared and in rice,
 but a few still have areas
 of mangrove, apparently
 indicating low spots,
 relative to tide.

10:11 They open sea, even here is
 muddy. just no taking

11:09 ~~from~~ from ~~the~~ ~~area~~ ~~the~~ ~~area~~
 beach ridge. Course is
 about parallel. Two small
 islands. A bit of mangrove
 back of beach ridge generally
 very brown landscape.

This landscape is a long
 narrow strip, sharp, somewhat
 peninsula. Harshly
 wooded in south end, with
 deep water between it and

another small island of
 similar formation with
 a few trees and
 one small ridge sticking
 off a point. Very little beach
 on either of these ~~islands~~ found
 except on the small island
 to the southeast. Nothing
 visible on any of these
 except water. (Should the
 two peninsulas be the mainland?
 or probably two islands.)

11:16
 11:13

Another island or projecting
 part of mainland:
 separated from mainland
 by a large estuary. Delta
 pattern on most of the southern
 part (photos - see end.)

The area all the
 way south is uncultivated
 a very intricate ~~network~~
 mosaic of brown grassland
 with small tidal channels
 and brownish to greenish
 forest, also with channels

wood
 the main

off shore a ~~small island~~
 fairly large island, mostly
 grass (and). This is
 south of Peninsular and
 smaller ~~island~~ not much
 wooded islands.

There is a coast built up of
 successive beach ridges, with
 channels and mangrove

behind them. Then some
 small deltas and the
 entire area irregular
 soil with an intricate
 mosaic of grassland and
 wood with tidal channels
 (photos). Some of inland from
 coast. Little indication of
 settlement or human activity.

11:24

The area is very dense
 forest, very little grass
 except immediately back
 of coast and along some of
 tidal stream banks.

11:26

Then hills with wood but
 mostly denuded in steep
 agriculture and various
 stages of regrowth. The
 country more and more
 hilly as course goes further
 from coast. Still mostly
 secondary. Some large
 fine trees, quite extensive.

11:28

Then inland to hills even
 higher but steep north slopes.

That is large, almost
 completely denuded drainage
 basin, with dry grassland
 with some gallery forest in
 lowlands. Along coast
 some slightly green and
 mostly denuded low
 plains, with samples of
 flood plain pattern. (Photos)

11:32

This is really quite different
 a couple of small canals
 between the distributaries
 water channels, a few
 ponds, etc. greenish mud
 11:35 I rather than in some places
 by big rice with sand on
 newly? Much green
 cultivation in big blocks
 over. A field into some
 distributaries (plots over)
 more brown plain with
 very low greenish areas
 with dark water ponds a
 patches of dark vegetation (visibility
 not good)

11:39 A large very muddy canal
 crossing brown plain and
 course, empty and a large
 distributary that follows course
 in middle distance. More
 feeling of distributaries
 in distance.

12:03 An one paralleling course
 further east and enters a
 very muddy sea. All the
 country here is brown
 rice plain with apparently
 almost no dwellers or
 some mangrove along
 shores of mouth of the
 distributaries.

Sea quite muddy but
 blue channels in distance.

11:50

crossed canal at 45° left of course
 wooded with a small
 medium sized short stems
 much branched a bit upstream
 some coastal lowlands,
 then wooded mountains
 with apparently very
 little shifting agriculture.
 Complex country. Locally
 rice on a few ridges.

11:55

Middle distance a small
 complex of erosion with
 muddy stream. Altitude too
 great and too much haze to
 make out detail.

12:00

Shifting agriculture.
 What appears to be some
 straight west facing escarpment
 course, course of about 25° east of
 course.

12:05

Lower ground, shifting
 agriculture, meandering
 stream with light colored
 sand bar.

12:10

Visibility poorer & poorer
 some meandering stream
 if possibly rather than
 forest. Much haze.

12:15

Descending to survey
 Rectangular pattern cut
 horizontally by canal.
 Kettles or dissecting pools.
 Some of the rectangular plots
 look as though mechanically farmed.

17.33 Pools of brown water abundant,
and some so.

17.34 Intensely cultivated
center with ~~tree~~ rolling
and tree along canal.

17.34 Crossed river, with swampy
of low.

Intensely cultivated land
formerly most arroyos cut
then arroyos with rectangular
plots & rolling surrounded
by hedgerows along
canal. Hedgerows pale
green - bamboo?

17.37 Rice fields largely dead -
burned over stubble &
yes, few seen.

17.39 Arrived Bangkok airport
(Rooftop)

Mar. 7 Bangkok
street trees

Samanea saman

Terminalia catappa

Cocos nucifera

Casuarina equisetifolia

Delonix regia

Ficus microcarpa

Mangifera indica

Plants seen

Tecoma stans
Cordyline fruticosa
Passiflora ligularis
Chloris inopata
Plumaria obtusifolia
Zingiber purpureum
Albizia julibrissin
Hibiscus schizopetalus
Mandevilla esculenta
Mimosa catalinae
Cleome spinosa
Heliconia sp.
Passiflora ligularis
Cassipouira guianensis
Muntingia calabura
Cordia alliodora
Adesmia
Pithecolobium bicolor
Croton sulphureus
Arundo donax
Rhoeo spathulata
Mimosa catalinae

May 9 - Trip to small
 bog at Thurston's house, body
 along water very muddy
 Heliconia, Heliconia
 Bromelia cultrata
 Tamarindus
 Cissampelos
 a large tree-leaf / *Psychotria*
 Psychotria
 Pandanus
 Canna red
 Heliotropium and sun
 Mum
 Canna
Psychotria *argalloche*
Psychotria
~~*Psychotria*~~
 Euphorbia *toxa* in 2
 Canna (yellow)
 Heliotropium & *Psychotria*
Psychotria
Pithecolobium dulce
 Leucaena sp.
Psychotria *argalloche*
Arca *caerulea*
Psychotria

Mixed with the house
 and thickets of bamboo
Psychotria, *Pandanus*
 with *Psychotria* of *toxa*,
 banana, *Psychotria*,
 remaining *Psychotria*
 or *Psychotria* *toxa*, *Psychotria*
 in front, along the water's edge
 masses of grass, bamboo,
Psychotria sp., *Pandanus*,
 right in the water.
 Many potted plants -
Psychotria, *Psychotria*,
 etc. in house.

The entire klonga lined on
 both sides with banana
 and apparently temple.
 All nestled in the thickets.
 One patch of *Psychotria*
 a small red *Psychotria*.
 Six aquatics

Psychotria *argalloche*
 leafy *Psychotria*
 Thailand

Mar. 10 - air reconnaissance n.e. of
 of Bangkok. left side of
 Down 20. takeoff 8:22 am. n.
 rice fields brown to black,
 stubble burned. Canals lined
 with dwellings with trees - ~~bank~~
 none between in this area.
 Canals very muddy.
 Low spots with some water
 or desiccating scattered
 over field. Scattered area
 of truck gardens, mostly
 rice. No seed bed, no growing
 field at this season. Mostly
 burned stubble. Scores of
 water buffalos. Not all
 canals ~~are~~ are lined
 with dwellings. Some
 Dracum, some Casuarina
 (branches trimmed off high up,
 growing back), mostly bamboo.
 Some concentration in villages,
 esp. well east. Some canals
 lined with trees with few
 houses. Vast areas of rice
 with no dwelling, but major
 canals. Many fields plowed.
 Change from bare field to
 field with scattered termite
 mounds with trees.
 Limestone hills with tangled
 thickets both on slope and
 base. Patches of reeds? in
 flower. Much small

bamboo on slopes. Very
 soon, degraded forest,
 open, tall trees with
 clear trunks, umbrella tops,
 large patches of bamboo.
 Some small flat valley
 bottoms with brown
 rice fields. Some small
 banana patches on slope,
 but rather few.
 Large areas mainly bamboo
 thicket with scattered
 trees, large areas open
 tall forest with closed
 understory. Bamboo
 patches are light to
 yellowish green, scattered
 trees in forest leafless, but
 mainly either green or
 just leafing out.
 Then good hill diplocaea
 forest on strong relief
 photos scattered through
 all of these types.
 This forest now relatively
 good but canopy only
 about 40%.
 Many patches of
 grassland or meadows in
 rolling areas in this
 forest.
 Full canopy forest
 fairly large areas

then more disturbed
 but - trees logged out
 some clearings. Forest
 with 50-75% canopy
 then much better. Very
 mixed composition.
 liana abundant in
 canopy.

Patches of bamboo, drying
 apparently flowering.
 then more or less level,
 rolling area, secondary
 forest, very tangled
 with lianas and bamboo.
 scattered Lagerstroemia
 in flower (blue). Forest
 becoming much drier
 and almost a quite
 deciduous on hill tops.
 then hills as rocks, forest
 more level area between
 are green, tangled. Much
 slash + burn agriculture,
 probably responsible for
 the tangled small forest.
 cycle must be very long.
 Canopy here is continuous
 but much of it lianas.
 Large plateau ^{valley} area
 mostly continuous forest.
 Locally deciduous, locally
 green, mostly semi-deciduous.

then, where terrain is
 rough again, forest mostly
~~deciduous~~ evergreen,
 locally much logged
 out, tangled.

then flatter country
 with deciduous rather
 open forest, locally
 cleared. Here hills
 have green forest, flat
 rocky areas with
 open deciduous forest
 with a more closed
 understory, result of
 logging. then damp
 flat area, locally
 rice field, locally
 area of open wood,
 locally areas of savanna
 obviously much burning.
 dry or deciduous bamboo
 patches, some very
 considerable.

This is Kerat Plateau.
 More and more savanna
 and shrub savanna.
 Rice local, in strips and
 patches.

Appr. Nahon Ratchasing.
 Very eroded areas
 between rice. Really
 abused country.
 New road - 6900.

Back from Korat
 Burned over country,
 little left but scrub
 and occasional cult. patches.
 scattered large trees.
 Scattered small rice
 patches and areas of
 rice in lower spots. Then
 a rather considerable area
 of rice and termite mounds.
 Scattered areas of bamboo.
 Mostly rice.

Coconut plantations. Some
 areas of scrubby semi-
 forest, semi-savanna, very
 heavily burned. few trees
 of any size. Rice only
 local. Scattered larger
 trees in rice areas. Few
 on areas of slightly higher
 semi-wooded, semi-cleared
 areas. Large areas of very
 open forest to savanna. Some
 patches of sugar cane.

As country becomes rolling
 forest and savanna mosaic,
 then mostly forest as
 relief gets greater. But
 much shifting agriculture
 Villagers. Forest is of very
 open canopy layer because
 of trees left in clearing
 very tangled second story

then better and better
 forest. Then open valley
~~land~~ with deciduous
 woods, ~~then~~ on slope
 mostly bamboo,
 apparently flowering
 over considerable area,
 both on slopes and on
 fairly level ground.
 Patches of forest, patches
 of clearing. Sachau
 spontaneous takes over
 clearings. Many trees
 left in some clearing,
 few in others. Patches of
 slender palms.

Then rougher country,
 mixture of patches of
 forest and of bamboo.
 Patches of what appears to
 be ~~Burmesian forest~~!
 Corypha in forest.

Then more flat valley
 land with deciduous
 forest, some clearing,
 semi-rice. Semi-deciduous,
 rather than deciduous.
 Much Corypha, esp. on
 lower slopes. Patches
 deciduous and evergreen.
 Then rougher country,
 more evergreen forest
 but rather degraded,
 very ~~Murray~~ clearing

Many clearings, since we are following road. Some wet spots. More slender fan palms. Patches of *Saccharum*, small rice areas. Forest very beaten up. Open to semi-open forest of large trees, result of clearing without removal of large trees.

Mosaic of shifting agriculture, flatter land more completely cleared, some rice, some *Saccharum spontaneum* patches of thicket.

Now out of mountains. Areas of scrubby, regenerating *Dipterocarpus*. Areas of rice. Mostly regenerating *Dipterocarpus* forest. Some bamboo. Then more and more rice, with bamboo. Then open larger forest with *Saccharum*, varying to savanna. More and more savanna. Rice & bamboo scattered, patches of savanna and forest. Then more of these and less rice.

Then better forest except in low stream valley. Then large areas of savanna to open forest

resulting from logging & grazing. Large areas of open to closed forest, all rather flat ground. Patches of *Saccharum spontaneum*. Some clearing being farmed, but *Saccharum* seems to take over rapidly. Much burning. Then better forest with scattered clearings. *Pterocarpus tinctorum*, almost ^{all} white crown, very common.

Much of this forest very young and secondary. Then no more clearings but forest very irregular, possibly from logging. Semi-deciduous. Patches open or semi-open, mostly closed or almost so.

Crown of upper layer separated, but lower layers closed. All of deciduous trees, a sort of them in emergent layer. Here lianas are in lower layers. No bamboo. *Lagerströmia* here. Lowest layer has ~~with~~ many palms, but no tall ones. This is a ~~...~~

really vast area of
subtropical forest, mts
on horizon except a little
to left of course. Country
fairly level to rolling.

More and more deciduous
as we go along, but
lower layers still green.
Country becomes hilly,
forest on hills tends to
be more evergreen.

This is directly south
of Karat. Halfway to see.

Country more hilly
now, semi-deciduous
to more or less evergreen
(on hills). Valleys more
deciduous.

Mountainous area
mostly evergreen. Very
but large trees. Vines
in some emergents, but
mostly in lower layers.

In valleys the deciduous
trees (*Lagerstroemia*?) are
leafing out. Hills are
evergreen, dense canopy.

Valleys - emergent layers
deciduous, mostly, ~~and~~
~~the~~ canopy dense,
open.

On mts. emergent layers
and canopy green. Many
Pterolobium in flatter land.

but now this area is
partially evergreen.
Still considerable
Lagerstroemia in emergent
layers.

Large mts in distance
to right, very rugged.
Course ~~is~~ over relatively
level to rolling country
varying locally from
deciduous to apparently
evergreen.

Now more evergreen,
few bare trees or recently
leafed out.

Country now between
rugged mts. Large
cleared areas. *Lagerstroemia*
black-burn.

Limestone range on
it, partly bare.
Sharp wooded ridge
on left. Valley a
mass of clearings,
regrowth, and some good
forest. Large areas of
manor. Some young
rubber.

Landscapes now more
open. Some *no.* Patches of
Melaleuca, and of thicket
rubber that is fairly well
grown. Rubber now and
more common.

Mangrove along streams.
 Then extensive *Sonneratia*
 swamp. Thickets of
 small palm. The ocean
 to left small sharp
 hills, covered by thicket
 or poor forest, patches of
 clearing. Large rice
 areas and lagoons back
 of them. Small patches
 of coconut.

Low sharp ridges
 separating

S.E. of Pan Wang

Rice areas, bordered on
 sea side by a broad strip
 of mangrove. Some
Melaleuca swamp at base
 of hills. Mangrove
 lines meandering streams.

Sonneratia and *Rhizophora*
 contrast well from air.

Burpinera dense, common.
 Large flats with no
 vegetation but these bet.
Melaleuca and water.

Mangrove very small
 because cut for firewood.

Rice against foot of
 hills. Nipa in low spots.
 Areas of *Avicennia* - *grayi*.

Abrupt little hills
 with thickets + bamboo
 some patches with ridges

Reach ridge with
Pandanus, forming a
 continuous strip.

Flooded land, some
 dikes for rice, much of
 this in nipa, *Bumelia*,
 etc.

Large areas of nipa
 near streams, rice away
 from them.

Large rice areas.
 High mts. to left.
 In foot slopes, some
 rubber. Villages with
 trees, areas, mangosteen
 orchards, some coconuts,
 all in a small mosaic.
 Muz. Rubber is apparently
 planted by farmer in small
 patches. Some pepper.

Rubber on low hills.
 More and more rubber
 as foot of mts. is followed
 north.

Then, away from mts.
 a mosaic of rice and forest.
 Then forest becomes
 dwellings with bamboo
 and trees.

Large rice areas.
 Marshes with *Sonneratia*

+ *Rhynchospora*.
 Large *Melaleuca* swamps.
 Rubber on slightly higher ground

Forest on hills
rubber & pepper between,
mostly rubber, but
small patches of pebble.
Then mixed rubber,
fruit orchards, thicket,
pepper, grass, village,
etc. More and more
of it rubber, but still
same mosaic. Bamboo
thickets and rice mosaic
near stream.

Logging operation.

grass, regrowth of
forest bananas, manihot,
rubber, felled forest, mosaic,
much *Saccharum spontaneum*
Low sharp ridge with
thin woods with lower
story of bamboo.

Then open land with
thickets, patches of thicket,
scattered trees, scattered
cult. patches. Mosaic of
rubber, thicket, cult. field
limestone ridge to left.

Many cut & burned patches.
A few patches of standing
forest remaining, but
going fast.

Must have been
country like the country
about half way south
from Korat. Now being

rapidly converted to fruits
and rubber
Some of it rather too
sandy.

Scattered tall umbrella
shaped trees left in clearing.
Forest on small hills,
but even this being
cleared.

Beyond hilly area a long
tract of rather degraded
semi-deciduous forest.
Some clearings. Lower
layers very wiry.

More and more evergreen
as we go n.w. Rolling
land, scattered hills.
Forest rather continuous
for some distance. Locally
more deciduous in emergent
layer. Very good emergent
layer generally, crowns
separated to locally
touching.

Then hills have
deciduous forest, ^{flat} valley
evergreen to semi-deciduous.

Slender fan palms locally
common. A small palm
is very abundant locally
in lower story & small
opening - possibly a
Engesornia or a large
Catamnia. lfts. not in our plants.

Then large area where clearing is going on very rapidly. slash + burn. but over 60% of land, then more, and more much poor sugar cane in various stages. Stumps still in fields.

Then somewhat better forest locally, then predominantly cleared, planted to sugar and manihot. No forest left, but scattered tall trees.

Patches of bananas and coconuts, mostly manihot and cane. Gradual change to rice in low spots. Mts still on left ^{side} (termite savanna).

Mixture of rice + manihot fields. Bamboos along river. Still some patches of cane. Village with trees.

Some patches of deciduous wood on slightly higher area. Soil here looks generally gray and sandy.

Bamboos along river. Coconuts, bamboos, some mangos, etc around homes.

Extensive open rice area. Then extensive mangrove

and river swamps, with coconuts, etc. on higher ground. Mangroves mostly small. Mosaic of kinds.

Large river. Extensive river swamps in meanders. Then vast rice fields. Local villages and coconut patches along canals.

Rice is all stubble now, being grazed by herds of carabao. Apparently not burned here. Ground cracked.

One patch of green rice to left. Many cattle egrets with carabao.

This expanse of rice with either winding or straight canals, partly lined with dwellings, + straw stacks, with bamboos and trees, coconuts + bananas, is characteristic of the Bangkok plain.

Here form an irregular gridiron pattern.

More and more scattered dwellings as we approach airport.

Arrived 11:55.

Mar. 11. Hono Kona

Hills of mainland are brown at this season, except for small proportion covered by woody vegetation, which is dark green. Grasses and shrubs are generally brown.

Tanawa - fringed with snow, covered almost completely with clouds. But the central mountain range and on the north and south of it projects above the clouds. The high central peak is covered with snow, extending on considerable down the ridge and slope. A little snow on the northern peak.

March 14 - Kilauea, caldera
floor of Halemaumau Pit
on lava covered by layers
of small pumice fragments

3090'

930

45138

Crocosmia
locally common in
madow-like patches of
vegetation

much branched at
base, ~~into~~ forming
clumps, flowers deep yellow.

39 *Peltaria geniculata* (Lam.) Beauv.
common

leaves erect, glaucous
- on ~~low~~ surface.

40 *Chenopodium ambrosioides* L.
very local

stems spreading,
slightly ascending,
strongly aromatic.

41 *Rumex giganteus* Ait. ex Maxim.
locally common

much branched
bush up to ~~0.7~~ 0.7 m tall,
flowers pale green.

42 *Bidens pilosa* var. *pilosa*
locally common

stems elongate, sprawling,
heads orange, completely dried.

43 *Pennisetum ruppellii* Steud.
locally common

dense clumps up to
1 m. tall, panicles purple.

5-44

Mar. 14 - Volcano Observatory
Kilauea

4090'

45 *Lepidium*
locally common

1247

erect, stems thicker
toward base, petals white,
conspicuous

March 14 - Kilauea,
upper end of Bird Park Road
along roadside

4050'

4050

46 *Oenothera*
common

1235

branched at base, not much
above, old plants to 1 m. tall;
flowers bright yellow, with
slight, rather unpleasant fragrance.

- 45147 *Asplenium adiantum-nigrum* L.
under bushes, rhizome
deep in lava cracks
- 48 *Desmodium triflorum* (L.) DC.
common
- 49 *Hypericum degeneri* Fock
common
- 50 *Graphalium*
locally common
- 51 *Coryza canadensis* var. *viridula*
common
- 52 *Desmodium ^{rotatum Mill.} ~~macranatum~~*
common
- 53 *Cyperus*
local
- 54 *Chloris gayana* Kunth
rare

March 15 - Kilauea,
National Park Residence Area
around houses

- 55 *Oenothera*
probably planted
- 56 *Eschscholzia californica*
planted

March 15 - Kilauea, just
above Kilauea Military Camp

- 57 *Lupinus*
established along road

sterile

forming a thin mat;
flowers yellow.
plants pale green

(Kunt) Long. fls. bright green

(Jacq.) DC. clumps, branched at
base, stems decumbent
to ascending; flowers
dull purple.

3950'

1205m

decumbent branched stem.
flowers yellow, stigmas 4.
large much branched
herb, petals orange,
paler distally.

4000'

1220m

flowers light blue,
standard with white
patch in center.

Mar. 15 Chain of Craters Rd.
bet. 1 + 2 mi. above Kokoalan Crater.

Transect counting 100 oak
trees over 19m tall. of these
7% were dead or dead brown
dead parts - 11% were
only partially dead
about 10 dead - mostly

Another 100 tree transect
same area had 15 trees
affected 5 of them dead
or nearly so.

This is an open to semi-open
lehua forest. Trees up to
20 m tall. (4 photos - 6 x 4)

A few small acacia here
these with *Trentepohlia*
conspicuous on bark.

Along road bet
Kokoalan Crater and
Aloi Hot spot there
are usually dead or
dying trees in
sight at any time.

Aloi Hot spot has
so much steam that
usually there is almost
no visibility beyond
a few m. although
this shifts a good deal.
Heavy rain is
falling intermittently.

Yapan trail -
Just below Pulu Factory
an area of young sparse
Metrosideros - Now the
leaves that were unfolding
in Nov. are mature, but
still the foliage looks
sparse. All *Lycopodium*
cernuum ~~stem~~ present at
thick times, ~~is~~ dead at
top, at least, but new
vigorous sprouts are
abundant.

Just below this are
many dead fronds of
Gleichenia, but vigorous
newer, immature to
fully mature ~~ones~~ ones
are abundant.

A bit further the *Machraea*
has many dead or partly
dead leaves, but also
many young healthy
ones. Some of it is flowering.
Damage to lehua rapidly
becomes more striking -
seems more so than I remember
from Nov.

Machraea colpodes
shows about as much
damage as *M. angustifolia*.
More and more dead
Gleichenia fronds, but
just above the first

1964

May 15 - Chain of Craters
Rd. just above Kobovlan
Crater.

In open *Metrosideros* forest.

- 45158 *Gahnia*
very common
- 59 *Tricholaena rosea* Nees
rare in open place.
- 60 *Centropogon*
on banks of Acacia bog,
but not seen on
Metrosideros.

May 15 - Chain of Craters Road,
Aloi Hot Spot, near
Aloi Crater
on Hot ground with steam
cracks.

- 61 *Ageratum conyzoides* L.
occasional
- 62 *Psilotum nudum* (L.) Beauv.
occasional
- 63 *Digitaria*
rare
- 64 *Euphorbia thymifolia* L.
very common
- 65 *Fimbristylis*
rare

May 15 - west edge of
Napau Crater

- 66 ~~Peperomia~~
in gulch running down into
crater.

(to 2.88)

3650'
1115 m

small tufts

bright orange color.

3175'

980 m

discs purplish.

almost dead, rhizome
rotted away.

very prostrate

culms prostrate

2700'

825 m

stems erect, dark red;
leaves fleshy

steeper place in the
trail about half the
fronds are dead, half
green.

Arundinaria here is 0.15.
Beginning here the
recovery of Lycopodium
is now started. There
is open structure of
grass, sedges, & Lycopodium
Glechoma, Machaeranthera
angustifolia, Dryopteris
Arundinaria, Lycopodium.

→ Lycopodium
leaves are mostly dead.
Cystopteris polytheca
has leaves not dead.

The flat ground at the
bottom of the slope shows
much less damage to
the Glechoma than the slope
itself.

Saxifraga quadrata
apparently not much
injured.

Below the fork in the trail
the forest is much taller and
for a short distance, some-
thing shows much less
damage. Some dead part
on Lycopodium and Glechoma
little else. Then
Metrodora is above
many leaves broken

and quite a few almost
leafless trees. There have
dead bark. Many of
them in an area to the
left of the trail.

Then a stretch of tall
forest showing very
little effect.

Then the area with
tall Lachna and an
understory of Lycopodium,
extending to the crater.
The trees here all have
1-2 very healthy full
size fronds.

Lycopodium here shows
no sprouts near the
crater.

Polypodium

Epiphyllum - Hymenophyllum
Elaphoglossum ~~reticulatum~~,
lucidum, Parlatium compl.,
grammitis texanum, all
dead. Elaphoglossum
reticulatum healthy and
unaffected, except very
near crater, where some
fronds dead. Mooses
& hepatics dead.
Polypodium pettucidum
healthy.

Coprosma gouldii,
Alysicarpus unaffected.
Broussaisia putting out

new sprouts grow
dead-looking trunks.
Vaccinium cuneiforme
healthy.

Patridia hypericaria,
young & sterile
broad-leaved hairy grass
all abundant & healthy
Laurolepis healthy but
less abundant. *Parapholium*
obscure less abundant
still, but healthy.

Isachne distichophylla
damaged but starting
to grow again even the
ends of the apparently
dead culms.

In crater edge *Styphelia*
that looked pretty dead
is sending out some
healthy sprouts from some
of the branches. *Coprosma*
enodioides on edge somewhat
damaged but recovering well.
Rubraea scabra flowering
abundantly.

Cyrtus polystachyus
& *Cherophyllum* damaged
but well covered.

Leuca on cliff shows
only rather new leaves
but is not much injured.
Well over into forest &
right most epiphytes

are dead, but small
plants of *Belagimella*
mercurialis, several cm. tall
are appearing in abundance
on some tree trunks & on
ground.

Even near to edge of gulch
mosses & hepatics are
all dead, as well as
most other epiphytes,
except *Cladonia*.

Thelypteris steptogon-
oides is injured ~~in~~ in
that old fronds are dead
and edges of pinnae of
younger ones are dead.

In gulch most but
not all epiphytic
growth of bryophytes
dead. Wet ferns have
fronds that are partly
brown but not dead.
Belagimella not dead
but partly brownish.
Of seed plants *Isachne*
shows some injury but
is recovering.

Coprosma, *Gouldia*, etc.
not flowering but healthy.

On new lava or water
flows not a single sign
of new plants. Leaves
of *Metrosideros* blown
over surface and lodged
in depressions in some numbers.

Small *Kipuka* that should
no life in ~~the~~ Nov.

now has seedlings of

- 9 *Erechtites valerianifolia*
many small *Brachne distachylophylla*, 10cm
many, tiny some 2.4cm *Machraera angustifolia*
1 *Gnaphalium sandwicense*
8 *Rubus rooseaeifolius*
1 *Andropogon virginicus*
~~Cyperus~~
1 *Corypha bonariensis?*
1 *Senecio sylvaticus*
4 *Pipturus* (red veined)
1 *Cyperus* cf. *polytachyos*
1 accident (opp smooth, obtuse, fine
lus to 1.5 cm. l.)
1 *Pluchea odorata*
many ~~7~~ *Dubautia* cf. *scabra*
(very tiny, ~~in shallow spot~~)

All, except 2 or 3 *Erechtites*
are on old pretty soil
lying on older lava.

Tiny satellite *Kipuka*
just w. of large one.

One *Metrosideros* barely
apparently dead but showing
a few tiny sprouts at base.
Another shows no life at all.

3 *Erechtites* seedlings, one
budling 25 cm tall.

1 *Pluchea odorata*, 10 cm.

many *Machraera angustifolia*
up to 6 cm.

a few very tiny *Hypericum* (?)

In very sheltered places
on lava, tiny fern sporophytes
and gametophytes.

A few patches with sparse
tiny moss plants.

Kipuka itself - looks
perhaps a bit drier than
before, but most plants
showing recovery except
Lycopodium complanatum. No
sprouts or living stems seen.
Machraera alive but
not flowering.

Vaccinium reticulatum
flowering.

Dubautia scabra flowering
abundantly.

Glycyphelia mostly sending
out some new sprouts.

Around scorched periphery

on n. side many seedlings
 of *Deschampsia valerianaefolia*
1-2 *Deschampsia*
4-5 *Phragmites*
 many thin *Andropogon*
 seedlings of *Andropogon*.

across flow of water
 north of *Deschampsia*
 vents with much
 sulphur crystallized
 on rocks.

at top of cliffs this
 continues across flat
 into an area of sparse
 dwarf *Salvinia*, mostly
 dead or nearly so.
 The *Gleichenia*, *Opuntia*
 etc. are brown and
 dead in a spotted
 pattern. *Andropogon*
 and *Gleichenia* form a
 dense mass. Clumps of
Macraera are mostly
 still alive. Locally *Gleichenia*
 also, but most of the
 vegetation in a space of
 several acres is dead. It is
 recently enough dead so
 it has not yet disintegrated.
Fumaria are numerous
 in the area, some of them

producing jets of
 steam that is uncom-
 fortably hot. The
Lycopodium here is
 all dead in the hottest
 areas but in those
 where some green
 vegetation remains
 the older stalks are
 dead but there are
 green new sprouts.
 The gas smells a
 bit sulphurous but
 not strongly so. What
 must have happened
 is that the concentra-
 tion of SO_2 here was
 never as high as it is
 in the most affected area
 just to the south. Where
 the temperature was
 very high, the roots
 were killed. Where not
 new shoots were
 produced.

On Napau Trail, about 300 m
 below Makaropuki lookout
 very near Makaropuki gate
 is a spot where the air seems
 warm. The *Gleichenia*, here about
 3 m. deep, is dead over an
 area of perhaps 50 sq. m.

March 15 - Napau Crater Trail
 about half way from
 Mahaopuhi Crater to Napau
 in Metrosideros forest

- 45167 *Coprosma*
 common in gully
 68 *Coprosma*
 common in forest on flat

March 15 Napau Crater
 Trail, about 0.75 km
 above crater.

- 69 moss
 on bare old lava rock.

March 15 about half way
 between Mahaopuhi and
 Napau Crater, on Napau
 Crater trail

~~70 *Lycopodium*~~

in small Metrosideros forest

- 70 *Lycopodium*
Phlegmarium (L.) (= Hypnum) det. S. P. Oakes
 rare, epiphytic on tree trunk
 71 *Psilotum*
Psilotum det. S. P. Oakes
 occasional, on tree trunks
 72 *Psilotum*
 rare, on mossy tree trunk.

March 16 - Puhi-man Crater,
 Chain of Craters Road

- 73 *Astelia*
 occasional in open
 Metrosideros forest on lava.

- 2700 shrub 3 m. tall, sterile.
 825m unaffected by sulphur fumes.
 shrub 3 m. tall, sterile;
 unaffected by sulphur fumes

2895'
 860 m

2350'

870 m

erect

7000
 1097 m

10,000

large rosette, several
 rhizome ~~along~~ several
 dm. long, leaves spirally
 arranged, 3-ranked; fruit orange, fleshy

Mar. 15-16 Chain of Crater Rd. Dead trees very few near Crater Rim Rd. becoming more common down chain of Crater Rd. Many at Puhimau, some all the way to Makiaopuhi.

Mar. 15 Napau Crater trail - some dead or injured by *Aspidium* back to and beyond Pulu factory, but the number becoming less in proportion to total till impossible to distinguish from normal occasional dead shoot.

Pig damage very conspicuous almost everywhere along trail

At Puhimau - much pig ~~to~~ rooting across road from Crater

Much *Aspidium* specimens here, quite recently

Of 3 trees 1 m or more tall along crater rim in parking overlooks, 3 are dead. Others OK.

Mar. 16 - Puhimau Crater
Around west side of crater more dead than living *Metrosideros*.

Check on 10 numbered trees looked at Nov. 24, 1963.

#3. Certainly far less than 1/5 of twigs still leafy. Prob. more nearly 1/10. Leaves more brownish red than green. A few small new sprouts several cm long. The leaves on these pale yellowish green

#2. Essentially same as in Nov. but many twigs show up to 5 or even 8 cm. of new growth. This rather pale green.

#4. About as in Nov. but almost all twigs have put out a few cm of new growth. Galls on leaves very numerous, even some on new growth.

#7 Essentially as in Nov. but most branches have put on new growth, some as much as 10 cm. This tending to be pale and reddish, but not so on all twigs.

#6 About as in Nov. perhaps more leaves reddish or brownish, a few cm young growth. ~~at~~ many twigs, buds or some other rather large, galls

abundant even on new growth

#5 Essentially as in Nov. but generally a bit less healthy, leaves tending to be splashed with ~~old~~ old ones turning red. Young growth on ~~main~~ twigs but but tending to be red, dwarfed, distorted, galled.

#8. A considerable number of leaves have turned brown, or reddish, esp. on lower and middle branches. Some twigs have young growth up to 5-6 cm. or more long, some of them a bit pale, but mostly healthy. Many branches with well grown flower buds, several inflo. just starting to flower.

#9. All leaves now dead, some still persisting on tree.

#10. Still rather healthy looking, fruiting, one or 2 inflo. still flowering; abundant new growth, rather pale but on upper branches healthy looking, on lower ~~branches~~ branches reddish, on one basal shoot about 3m tall, the young growth very dwarfed, also galled. This shoot has leaves a bit brownish, not as healthy

looking as upper parts of tree. ~~Lowest~~ ^{the} shoot from base is reddish-yellow green and has little new growth. Looks unhealthy. Another, smaller, has a rather reddish appearance, but has young growth, this reddish leaves of lower branches of this shoot turning red on lower parts of twigs, and even somewhat on upper parts. Extreme upper twig ^{one} seem not too healthy, leaves rather small, not much young growth.

No. 1 seems to have had tag stolen. The tree that is most likely it (large one nearest lookout) looks about as described in Nov. Has one of large lower branches completely dead. Most twigs have 3-5 cm. young growth, leaves on this tend to be small, somewhat pale, tendency to be reddish.

Two transects of 100 trees each, roughly parallel, across road from Pubiman Crater perpendicular to road, had of trees to 5 m. or more tall 32 + 28 dead or badly diseased trees.

Mar. 16 - Alos Hot Area

List of plants seen in active steaming part.

- n *Andropogon virginicus*
 la *Euphorbia thymifolia*
 la *Euphorbia thymifolia*
 c *Waltheria indica*
 c, bor *Cyperus polystachyos*
 c *Fimbristylis*
 c, la *Neptrolepis*
 lc *Digitaria*
 c *Sacciolepis contracta*
 o, lc *Ageratum conyzoides*
 c *Psilotum nudum*
 o *Veronica cinerea*
 lc *Pityrogramma colorata*
 o *Glechoma linearis*
 c *Arundina*
 la *Glechoma linearis*
 var *tormentosa*
 c *Metrosideros collina*
 lc *Paspalum orbiculare*
 o *Euphorbia hirta*
 la *Claphoglossum reticulatum*
 la *Psidium guajava*
 la *Styphelia tameaensis*
 lc *Psidium cattleianum*
 o *Stachytarpheta dichotoma*
 n *Conyza condensata* var *pusilla*
 o *Cuphea carthagenensis*
 o *Lycopodium complanatum*
 la, *Sphenomenis*
 n *Pteris*

- ~~*Andropogon virginicus*~~
 n *Spathoglottis plicata*
 o *Machaelina angustifolia* (per.)
 n *Graphalium purpureum*?

Much of ground bare or with scattered fimbri-stylis + cyperus. Around steam vents *Euphorbia thymifolia* tends to be abundant, except the hottest ones, which have no plants close to them. *Sphenomenis* is abundant near some vents, but always very dwarfed.

Patches of *Glechoma* mostly partly dead, except in peripheral areas. *Metrosideros* 1-2 m tall, mostly dead or partly dead. Other shrubs only in peripheral areas.

Lycopodium complanatum when found, although tending to be dwarfed and sterile, shows no tendency to be killed as by sulphur fumes.

The hot area has obviously been extended recently, as there are areas of well developed vegetation that are cooked and dead, esp. along some long recently opened cracks on right (south) side of area.

Lammoneus checked temperatures and found 85° - 86° C in two vents. Soil almost as hot immediately adjacent.

Cladonia cf. *randiferina* locally abundant in otherwise bare zone. Basal parts appear cooked in some places.

The central areas are largely bare, or with very depauperate vegetation. Peripherally ~~that~~ are large patches of *Gleichenia*, *Nephrolepis*, clumps of *Machaerina*, *Psidium cattleianum* etc. Around new vents this may be brown and dead or mostly so. Near the steam vents *Euphorbia thymifolia* and *Sphenocnemis* are locally abundant. *Fimbristylis*, *Cyperus*, *Sarcocolla*, *Digitaria*, *Veronica*, *Ageratum*, *Conyza*, *Cuphea*, *Paspalum* tend to be pioneers in bare areas.

March 16 - Aloi Hot Area
Chain of Craters Road
in open ground, hot
from numerous steam
cracks and fumaroles

3175'

9800'

45174 *Sacciolepis contracta* (W. A.) Hitchc.
common

X1

X3 75 *Waltheria indica*
common

X2

76 *Pteris*

rare, near fumarole

X3

77 *Cladonia*

locally abundant

X3

78 *Cladonia*

very local

X1

79 (alga) *Stigonema*

abundant on bare areas

X2

80 *Nephrolepis hirsutula* Forst. f.
abundant

X2

81 *Paspalum orbiculare*
common locally

X1

82 *Phenomenis chinensis* Maxim. ex Kuhn
abundant locally

prostrate shrub, over
1 m. long, flowers yellow.

fronds erect

culms erect or ascending.

all seen were dwarfed.

March 7 - Hayward

Terrestrial plants with
 leafy stems, some with
 growth on one side, the
 growth extending
 between the nodes of
 the stem. The growth is about
 1 cm, the growth at the
 point of attachment is about
 1 cm wide, on the top
 some extent of the
 growth on top of it. At
 one end of the growth at
 the point of attachment of
 secondary growth is secondary
 growth at 1/2 of the base
 with 2 stems to about 5 cm
 below secondary growth
 secondary head. The head
 much smaller than the
 but otherwise somewhat
 an appearance and flow in
 the primary head was
 growth of the head of a
 flower than secondary head
 coming from the secondary
 stem passed a more the
 flower are 11 secondary
 peduncle grows about 5 mm
 2-3 cm long, each bearing 1 to
 2 small heads, these

on the one with 3 heads
 arranged in a spiral
 order, the secondary head
 smaller - these 2 heads
 was smaller than the other
 also. The stem length of
 about a few centimeters.
 The ligules in these
 as well as in the secondary
 obviously at another
 secondary head. The secondary
 head with 2 heads, as
 the secondary peduncle below
 the heads, these at one
 with a secondary head
 in their own. On the
 main peduncle at
 the base of the secondary
 the extension of the growth
 through the stem was
 several centimeters above
 in case of leaf-like bracts,
 one stem up is about 15 cm
 2, strongly curved.
 Each secondary head with
 of a leaf-like bract, as in
 in middle of secondary
 also each has a secondary
 and each secondary head
 in case of a small leaf-like
 head.

airing of land etc

Mar 19 - San Jacinto delta
 at end of head of river
 low water channel
 has been cut a 1000 ft
 straight line but
 there still exist some
 fairly large meanders
 and a few in the
 end even along some
 small meander channels
 channels there are still
 patches of meander
 land. They must have
 gradually eroded. It
 should be noted that
 which is not true.

~~The~~ River is a
 stream down to
 the town of San Jacinto.

High hills have
 considerable amount of
 further part of year, rather
 sandy. In fact high
 hills, generally sandy
 seem to be of
 eroded granite patches
 of rather sparse growth
 but a great part of it
 is rather low.

Southward there is a
 good view of the delta
 valleys and even higher
 slopes of mountains.

Passed directly over
 lake - shows signs of
 air - erosion. To east
 is a large desert area
 with about 100 ft of
 concentration of
 up a substantial distance
 from present shore.

Slopes gradually
 up into a vast
 area of hills, with
 juniper, yucca, wood
 extends a considerable
 distance to east before
 there is evidence of
 appearance and
 about 1000 ft high
 large small basins.

Course follows a
 north of the area of
 size depth area of
 hills. However, very soon
 a highway comes in from
 north, then one from south.
 Have crosses vast all
 at base of desert mountains
 complex. Internally it
 seems to have little disturbance
 a small dry lake bed.

Then an enormous
 flat, but cut by
 roads. A small town with
 an airfield. To the
 this a strip of adobe.

They ~~are~~ desert cut.
 of the ~~with~~ ~~with~~ ~~with~~
 hills. Then a desert valley
 a more higher cut.
 Then a great flat, no very
 narrow it. Then a
 high part with some
 forest and ~~some~~ ~~some~~ ~~some~~
 some more ~~some~~ ~~some~~ ~~some~~
 high, very flat, no
 road. Complete of low
 cut. Then a large
 road to a desert valley
 flat and ~~some~~ ~~some~~ ~~some~~
 some hills, with south
 and north of straight
 higher up.
 Then a more to large
 mountain areas with
 considerable open part
 and then some
 This is a great area
 some roads, part of
 is a, trending ~~some~~ ~~some~~ ~~some~~
 getting higher, and, then
 some. Valley and
 it has a main road
 and some smaller ones.
 S. of this is a more
 large area of low desert
 hills, with a flat
 then a more, some, some
 patches of woods, a
 small creek, dam, etc.

are and along it, but
 two roads in ~~some~~ ~~some~~ ~~some~~
 S. of it.
 Area of ~~some~~ ~~some~~ ~~some~~
 surrounding a dry basin
 a road, about 2.5, S. of
 basin.
 Next valley basin a
 craggy road, but a
 gentle undisturbed.
 Then small ~~some~~ ~~some~~ ~~some~~
 traces of some, some
 thin part.
 Then a main one ~~some~~ ~~some~~ ~~some~~
 road, a little agricultural
 large desert part, but
 a narrow ~~some~~ ~~some~~ ~~some~~
 well extensive forest.
 a parallel ~~some~~ ~~some~~ ~~some~~
 industrial to north.
 The ~~some~~ ~~some~~ ~~some~~
 the north ~~some~~ ~~some~~ ~~some~~
 far, S. of ~~some~~ ~~some~~ ~~some~~
 visibility.
 A large basin surrounded
 a more ~~some~~ ~~some~~ ~~some~~
 some more, ~~some~~ ~~some~~ ~~some~~
 road. Then a ~~some~~ ~~some~~ ~~some~~
 desert basin but with
 a number of roads.
 Then a more ~~some~~ ~~some~~ ~~some~~
 with some ~~some~~ ~~some~~ ~~some~~
 narrow, extending down to
 S. E. large valley with some

at the point of view and
 expanding towards it
 at 1000 ft. - 1000 ft.
 through cloud - a great
 amount of light

1000

A large rather colored
 forest basin with little
 evidence of water - but
 much of snow - the
 cloud - forest.

1050

At 1050 ft. the forest is
 with a few woods.
 - remains in streambed
 with some vegetation
 nearby. There is no water
 visible and sandstone
 is very common here -
 in a large place with
 water - a good indication
 (following it.)

1070

Very agricultural country
 a large one at 1070 ft.
 1070 ft. - 1070 ft.

1070

March 25 - Bull Run
 Many colonies from the
 same place as above. In one
 colony the stamens were
 all yellow. In another
 colony the stamens were
 all maroon. In a third
 colony the stamens were
 all yellow. In a fourth
 colony the stamens were
 all maroon. In a fifth
 colony the stamens were
 all yellow. In a sixth
 colony the stamens were
 all maroon. In a seventh
 colony the stamens were
 all yellow. In an eighth
 colony the stamens were
 all maroon. In a ninth
 colony the stamens were
 all yellow. In a tenth
 colony the stamens were
 all maroon.

March 26 - Bull Run
 Many colonies from the
 same place as above. In one
 colony the stamens were
 all yellow. In another
 colony the stamens were
 all maroon. In a third
 colony the stamens were
 all yellow. In a fourth
 colony the stamens were
 all maroon. In a fifth
 colony the stamens were
 all yellow. In a sixth
 colony the stamens were
 all maroon. In a seventh
 colony the stamens were
 all yellow. In an eighth
 colony the stamens were
 all maroon. In a ninth
 colony the stamens were
 all yellow. In a tenth
 colony the stamens were
 all maroon.

April 15 - Bull Run found
 small colony of *Erythronium*
americanum on flood
 plain
 perhaps 100 fls. petals yellow,
 annulate at base, sepals
 not, both sl. marked
 with maroon near base,
 stamens all yellow,
 3 slightly shorter and
 smaller, but irregularly
 so. Colony uniform
 (45183)

In same small flood plain,
 but away from river bank
 another, smaller colony
 of 30-40 plants, similar but
 all stamens maroon
 somewhat more differentiated
 in length. (45184)

On the steep slope above
 both clones are present
 stamens yellow 31-1-13-6-2-3
 stamens maroon 30-1-1-1-10-5-20-18
 but here there may be several
 clones involved, as some
 with maroon stamens have
 maroon blotches at bases of
 sepals - petals. Some of both
 have larger and much
 more differentiated stamens.
 One clone has different shaped perianth -
 ovate acute (45186) others mixed (45185)

Apr. 15 - along west bank of
Bull Run at Leonard
~~on plain~~

45183

Erythronium americanum
locally plentiful ~~on~~ on
flood plain

89

Erythronium americanum
locally common on flood plain

85

Erythronium americanum
common on steep slope
above flood plain

86

Erythronium americanum
very local on steep
slope above flood plain
(with # 45185)

Apr. 17 Bull Run, west bank,
where Rt. 66 (Interstate) crosses
flat wet area in
thin woods.

87

Erythronium americanum
local in

88

Hedyotis corymbosa (L.)
local along old road in

89

Erythronium americanum
local in

leaves mottled, flowers yellow,
slightly marked with
maroon in center, anthers yellow.

leaves mottled, flowers
yellow, slightly marked
with maroon in center,
anthers maroon.

mixed clones, more or
less maroon at bases of
perianth parts, anthers all
yellow or all maroon.

perianth parts ovate-
lanceolate, anthers

perianth old rose without,
anthers deep maroon.

limb of corolla lavender,
eye yellow.

perianth old rose without
anthers yellow.

April... west side of
Bull Run just where
Interstate Rt. 66 crosses
Wet flat, second
growth woods.

Erythronium common
but not abundant.
2 clones, but not growing
together, one with mauve
stamens (45187) the
other with yellow.
neither strongly
differentiated.

Dentaria laciniata
abundant.

Cystopteris fragilis
in patches, sterile.

No flowers seen

Claytonia virginiana

Dicentra eximia

Dicentra cucullaria

Dicentra spectabilis ? (on cliffs)

Corydalis flavida

Nepeta hatteriana

Viola roemeriana

various sterile purple & white *Viola*

& smooth stemmed yellow *Viola*

Lindera benzoin

Cercis canadensis (just opening)

Taraxacum vulgare

Corallorhiza innata

Lanquarum canadensis (almost past)

April 24 - C & O Canal between
Paw Paw and Little Orleans.
Except for tunnel and
cut through mountain
at Paw Paw the canal
runs along the ~~inner~~^{outer}
edge of the flood plain of
the Potomac, at the foot of
the shaly bluffs and
slopes of the Appalachians
where the river cuts
through them.

The forests down on the
flood plain are from
second-growth deciduous
bottom-land forest,
mostly rather
recently abandoned
from cultivation.

Amelanchier cf. umbrosa
is very common, in full
bloom. *Acer negundo* is
also in bloom. No trees
are very far along in
leafing out.

Great masses of *Mertensia*
on alluvial land make
a wonderful show. An
occasional plant is pink.

Erythronium locally
abundant but not a
single one in bloom.

Alliaria common the whole
distance, young buds only.

On the bluffs the forest is largely pine (long. *P. strobus*, *P. echinata*) some *Juniperus virginiana*. Lower slopes largely deciduous.

Cornus florida not observed along this stretch, but two plants seen, not yet out.

A patch of *Rhus canadensis* near tunnel.

On steeper slopes *Acer nigrum* s.l. is common, in conspicuous flower, the flowers pendant, bright pale yellow.

April 26 - 2 mi. from Stony Point
Albemarle Co.

Paschal Preserve

Mixed second-growth hardwoods at upper end

Ostrya virginiana (fl.)

Quercus alba

Liriodendron

Carpinus caroliniana

Acer rubrum

Cornus florida

Pinus echinata

Pinus strobus

Podophyllum peltatum (fl.)

Aplectrum bremale

Tipularia discolor

Utricularia perfoliata (fl.)

Viburnum acerifolium

Lonicera glauca

Rhus toxicodendron

Allium vineale

Galium triflorum

Amelanchier

Lonicera japonica

Prunella vulgaris

Viola (fl.)

Galium oblongifolium

Kalmia latifolia

Corylus (hairs)

Hedysotiscaerulea (fl.)

Dianthus spicata

Chimaphila maculata

Polystichum acrostichoides

Stellaria pubera (fl.)

Cercis canadensis (fl.)
Lindera benzoin
Galium aparine
Asplenium platyneuron
Ranunculus abortivus (fl.)
Cimicifuga racemosa
Botrychium virginicum
Oxoclea sensivilla
Cynoglossum virginicum
Dentaria laciniata (fl.)
Polygonatum biflorum
Antennaria parvifolia (fl.)
Fragaria virginiana (fl.)
Euonymus
Pyrola rot. var. apex
Vaccinium vacillans
Cyclopodium complanatum
Alnus serrulata
Belamcanda
Pinus virginiana
Sassafras albidum
Geothlyps pubescens
Senecio aureus (fl.)
Smilax rotundifolia
Orchis spectabilis (fl.)
Viburnum prunifolium
Fagus grandifolia
Smilax glauca
Quercus falcata
Senecio sp. pauciflorus
Parthenocissus quinquefolia
Achillea millefolium
Rubus sp. argutus
Rubus idaeus

Fraxinus americana
Prunus serotina
Lernia officinalis
Agrimonia
Vitis
Hypericum hypericoides
Viola pubescens

White pine is on a gentle
 west slope - several
 scattered large trees
 with a large number
 of seedlings and saplings
 around. some scattered
 rather far into the
 surrounding forest.
 one of largest is over 2' dbh.
 these large ones are scattered
 along a small gully.

April 26 Fernbrook Natural Area
2 mi. Stony Point,
Rivanna River
Mixed deciduous
second-growth woods

- 45190 Carex
occasional
- 91 Ranunculus
rare
- 92 Luzula
occasional
- 93 Hedysotis caerulea
locally common
- 94 Utricularia perfoliata
common, occasional
large colonies
- 95 Viola papilionacea Pursh.
common
- 96 Tipularia discolor
rare
- 97 Aplectrum bryernae
occasional, locally common
- 98 Ostrya virginiana L.
rare

- small tufts
- flowers yellow
- small tufts
- representing a colony in
which 5-merous flowers
~~are~~ and 3-merous flowers
are occasional, usually
on same plants with 4-merous ones
rhizomes slender, white;
flowers yellow, pendent.
- flowers purple
- leaves deep purple beneath,
plicate.
- leaves purplish green
with conspicuous white
nerves.
- small tree about 10 m. tall.
bark shreddy-flaky.

May 3. Miami to Homestead
 via Old Cutler Rd. adjacent to
 several patches of
 pine-lands have been
 burned. The young
 seedlings look dead
 but apparently survive
 fire frequently in a year
 or so seedlings must be
 killed and then as very
 fire resistant - stand out
 leaves only a few days
 after burning - in
 area burned a year or so
 ago has an almost complete
 stand large of slender
 palms. The fire is needed
 to preserve the character
 of the pine-lands.

Best s. of jet. with *Discothryx*
 apparently *Platanus indica* and
P. odorata - both along roadside.
 Not certain, probably *Baccharis*
Albizia lebbekii - seem to
 be naturalized.

Bulldozed pine-lands
 followed after cultivation
 given up to a solid wood growth -
Chorizanthe sp. alb.
Arundinaria
Sporobolus
Bidens radiata
Eupatorium spp.
Ambrosia

Some needed
 for
Paralobocarpus

Pinelands - stock of fuel
 has been raised
 controlled increases - rate
 of wells for the water supply
 ground pumped for 3 years
 followed for 2-3 years

~~Two years~~
 Florida pine-lands
 that have been burned
 are regrowing - have not
 been burned recently -
 stands appearing.
 When it burning for
 10-15 years a thick growth
 of *Conocarpus* and *Metopium*
Scorpaenopsis, *Chorizanthe*

Ground is pitted limestone
 with interstices filled
 with peat. If fire occurs
 when water table is down
 the peat burns out.

Pine seedlings have very
 thick bark toward base.
 stem appears conical. Fire
 does not kill them unless
 too strong. Volcanic is
 surrounded by dead grass.
 resists fire. Probably the
 amount of water absorbed
 in something to do with

The survival.
 "Guti", holes, are water
 depressions in limestone
 filled with water -
 sometimes 2 deep. May
 be open, surrounded
 by Thalassia, or wooded
 with Salix and other
 wet-land hardwoods.

Where surface of
 filled limestone is
 substantially higher,
 they are hammocks of
 different hardwoods -
 Lythrum, Podocarpus, etc.
 Phoradendron, Myrica.
 Beyond "Rock Reef"
 is low grassy area with
 scattered dwarf cypress
 1-2 m tall, apparently
 same as in clumps of
 much taller ones. These
 never seem to get much
 farther from practically
 sea-level. The taller
 patches are, where there
 are not filled with
 water.

Where land rises to
 2.5 m. ab. tropical hardwood
 -hammock takes over
 a few small biven

The obvious difference
 bet. where in pin-land
 and hammock.

Vegetation pattern
 strongly affected slight
 differences in elevation.

Many Rhizophora scattered
 over wide area about 1 m
 tall. Here there is about 1 m
 of mud on ~~the~~ rocks.

Where there is a dense
 clump of Rhizophora 2-3 m
 tall, the mud, with
 some peat, is 1.5-2 m deep.
 Low peat under thin mud.
 Where the mud is very
 shallow, it is in mangrove.

There are a few clumps
 of mangrove that is a
 depression north of that.

Question is whether holes
 are necessary for survival
 of mangrove seedlings
 or whether mangroves
 develop out the rocks.

The entire area is covered
 in a mat of mud encrusted
 filamentous algae - this
 dry hard and fragmented
 into 5-10 cm pieces.

On right side of road
 1 m. mangrove almost

continuous, on left,
very scattered.

~~Small~~
little on the whole
they are more abundant
even on left

"Bay head" a ~~of~~ ~~the~~ ~~marsh~~
without rock - patches
of wood about 1/2 m tall
with no depression
in the rock beneath
but with a mound
of peat up to 70⁷⁰ cm
above surface of road.

Najas saururus, *Pecunia*,
Cladophora ~~sp.~~ *sp.*
Codium, *Cladophora*,
Ulva, *Myrica*,
Metopium ~~sp.~~ *sp.*
Volventifolia.

Blackburnia serrulata (little
or no ~~abundance~~ ~~in~~
young ponds.)

Epiphytic
Cladophora
Ulva

Epiphytic *Porphyra*,
Codium and several
Filandria ~~sp.~~ *sp.*, *T. barbicans*.
The whole surrounded
by a fringe of mangroves
that are much taller
up to 4 m. than the dwarf
ones on the marsh. This fringe
is on the edge of the peat.

Around this is a depression
in the marsh, perhaps
excavated out in acid seepage
from the great accumulation.

Time - *Altila* head - old
barrow pit filled with
water. In water is
Ruppia ~~maritima~~ *maritima*
Ulva, ~~maritima~~ *maritima*.
Ulva ~~sp.~~ *sp.* *maritima*.
Ulva ~~sp.~~ *sp.* *maritima*.
Ulva ~~sp.~~ *sp.* *maritima*.
Blue head, etc.

Beyond this there is
marsh, thick ~~with~~ ~~grass~~
scrub & small
On left, many patches
of saw grass ~~patches~~ on
right practically none.
There a ridge of peat
covered by *Conocarpus*
trichet, perpendicular
to road.

The area where
mangrove ~~is~~ ~~is~~ ~~is~~
Rhizophora and *Conocarpus*
is replacing it.
Pond filled with
jelly like peat, ~~is~~ ~~is~~ ~~is~~
by marsh. No mangroves
started yet.

Red, black & white mangroves killed, a heavy mud layer deposited on substratum by the waves. Survives along road - mangrove, an Indian mound etc. *Conocarpus* survived except in lower spot where they were killed, too. Cayhead says that in November the mangrove root were rotted off to level of mud.

In areas where everything was killed a scattering of seedlings have now established themselves. After hurricane the seedlings were abundant but several dry years caused death of most of them. Locally some surviving. A lawn of *Pistia* covers the entire area where the mangroves were destroyed.

It is said that the areas are open areas, caused by charcoal burning, farming, etc. Hurricane Hanna covered these with mud, *Conocarpus* coming up in quantity,

with *Salicornia*, *Spartina*, etc.

In Florida Bay on some shore birds & herons on the mud flats. Laughing gulls, red-wing blackbird, tern.

Strand plants on flat back of beach -
Heliotropium curassavicum
Sporobolus domingensis
Bidens pulchra
Sesuvium portulacastrum
Suaeda
Alternanthera
Ipomoea sp.
Salicornia

Florida Bay - boat trip to Key. Merganser, flocks of pelican in channel. *Avicennia* along channel. Grass *Spartina*. Passed Joe Kerk Key - most of woody vegetation dead, some trees alive on periphery.

Palm Key

Avicennia on beach ridge on south end. A *Spartina* ridge with grass thrown up on beach ridge. In ridge of shell sand - most mud than 20-50cm above water. Auger probe 4' 3" without turning,

List of plants on
Palmyra Key

- Borrichia gracilis*
- Batis maritima*
- Sesuvium portulacastrum*
- Salicornia virginica*
- Waltersia siliqua*
- Zosterisiphonia*
- Grassmannia*
- Peruviastrum*
- Alternanthera*
- Borrichia frutescens*
- Portulaca oleracea*
- Randia acutata*
- Melanthera*
- Phloxanthera*
- Peruviastrum*
- Salicornia linearis*
- Solanum elaeagnifolium*
- Chenopodium*
- Grassmannia*
- Alternanthera*
- Portulaca*
- Grassmannia*
- Spartina*
- Lythrum*
- Distichlis*
- Maytenus*
- Salicornia*
- Peruviastrum*
- Grassmannia*
- Peruviastrum*
- Salicornia*

On beach edge well
-not -woody plants.
Top 2 ft of firm black
soil, then soft soupy
gray mud with some shells

Some flat with *Suaeda*
Salicornia etc. with
spots of bare mud with
no vegetation.

Here the top 2-3 ft. is very
stiff mud, then soupy mud,
at bottom (8 1/2 - 9 ft) a thin
layer of peat, then rock.
A few scattered small
Borrichia on outer belt
of this flat.

On most of this flat
there is a thin layer of mud
deposited by H. Donna.

In some areas, near
periphery of flat, are stands
of *Borrichia* with scattered
small stiff bushes of *Randia*
& *Maytenus*

Locally stands of *Spartina*
canals of *Borrichia* and
Batis do hard to go through.

The interior is normally
a shallow lake, now dry
because of abnormally dry
year. Then no veg. in
submerged part. Now
closed scrub dwarf scrub or
dwarf scrub.

frankly they
 surrounded by a
 belt of mangrove -
 mostly dead

Ground is rather slight
 to *Conocarpus* *peruvia*
 + other *Conocarpus* growth
 a broad belt of this,
 rather open, much of
 it dead. A carpet of
Portulaca, *Salsola*, *Peruvia*
 etc.

Then a bare sand
 flat with *Salsola*
 there a few scattered
Salsola *peruvia* *Portulaca*
peruvia
 in upper half of *Portulaca*
 with *Salsola*
 dead or dying small
Conocarpus 2-3 in.

On the s.e. side the
 entire belt of trees
 seems dead.

On s.w. end mangrove
 are dead except the row
 living the outer beach.
 Here pelicans, roseate spoonbills,
 cormorants and white ibis
 are nesting.

Ariceunia germinans
Rhizophora *maritima*
Conocarpus erectus
Portulaca maritima
Leucosiphon *peruvia*
Peltandra peruviana
Maytenus phyllanthoides
Borreria frutescens
Quercus laevis
Peltandra (Chrysalidaceae)
Sporobolus
Cyperus
Atriplex
Cenchrus caryocarpoides
Pirina
Metopium
Alternanthera
Tanaisia
Salsola patmatis (dead)
Euphorbia heterophylla
Caesalpinia bonduca (dead)
Laguncularia
Salsola peruvia
Cyperus biplex
Euphorbia heterophylla
Spartina
Sporobolus virginicus

Ambrosia -
 I found new buildings
 and a stone wall around
 the pond at end of road.
 A new boardwalk has
 been built, surrounding
 the place where the
 ambrosias used to
 grow. New ones
 are still left. In the
 ponds Nuphar sp. is
 abundant. Papyrus
 haematocarpus and Scirpus
 (Clavatus) sp. (through out by
 edge of lake to its mouth), in
 fairly deep water, at least.
 Callitriche, Sagittaria,
 and other plants.

Small 1/2.

Vegetation and Insects on the
 Everglades Key

Sci. Mo. 32: 33-43 1932

Gumbury, D. T. & Lowenstein, H. G.
 The influence of organic
 bottom communities on the
 depositional environment
 of sediments.

See Geol. 46: 310-318, 1958.

May 3. Hammock on
 Jennings Estate
 on Miami white
 breaks of scrubby and
 thick mangrove extend
 seaward.

Celtis laevigata
 Dalbergia strobilifera
 Cissampelos acuminata
 Annona glabra
 Psychotria nervosa
 Passiflora circumscissura
 Xanthoxylum fagara
 Pelinaria alliaea
 Brugodendron fensholtii
 Pouteria foetidissima
 Picramnia
 Coccoloba diversifolia
 Eriosema
 Nephrolepis exaltata
 Ardisia racemosa
 Myrsine

An old spring or creek mouth,
 now dried up by lowered
 water table shows the
 best example of cross-bedding
 I have ever seen in
 Miami white.

May 2 - about 12 mi. n. of
Flamingo

45199

In "bay head" a tangle
of hammock with deep peat.
Psilotum nudum (L.) Beauv.
rare, on fallen tree trunks

May 2 - Nine Mile Bend,

7 mi. n. of Flamingo
in small lake in borrow
pit dug in limestone,
perhaps slightly brackish

45200

Najas marina L.

occasional, washed up

2

01 *Ruppia maritima* L.

common, washed up and
also rooted in shallow water

1

02 *Bacopa monnieri*

common on shores of

May 2 Royal Palm

Anhinga Trail

3

03 *Panicum haematodes*

common in ponds to 1 m. or
more deep, rooted on bottom emergent

May 2 Flamingo

1

04 *Sporobolus domingensis*

common on sand flat
back of beach

prostrate, forming a
loose mat, flowers lavender.

rhizome hollow; ~~erect~~
panicle erect, branches
closely appressed.

Tufts, culms ascending.

May 2 - Palm Key, Florida Bay
 on fine compact marl soil
 in full sun

- 45205) *Randia aculeata* L.
 locally common
 06)
 07 *Maytenus phyllanthoides*
 occasional

May 2 - Frank Key

- 08 *Halophila*
 floating in shallow water.
 09 *Euphorbia* cf. *cyathophora*
 occasional in open
 area dominated by *Batis*
 on marl soil in interior
 10 *Capraia biflora*
 rare
 11 *Sporobolus virginicus*?
 very local
 12 (one year)
 abundant on bare bottom of
 desiccated marl pond

May 3 - Miami, Key Biscayne

- 13 *Genipa clusiaefolia*
 rare in strand scrub
 on sand flat
 14 *Amburystylis cynosu*
 occasional on sand flat

shrub 1 m. tall; flowers
 white, fragrant.
 shrub 1 m. tall; seeds
 with red fleshy aril,
 erect on capsule.

erect, lactiferous, bracts
 scarlet at base.

stems

shrub 1.8 m tall, flowers
 white, fragrant, ~~and~~ corolla
 strongly salverform, fruit
 green.

"bamboo rock" - a platform, at least horizontal top layer - a mat of roots, up to several centimeters, entangling themselves with them - a 3 dimensional, it would be roots casting forming a layer a few ~~centimeters~~ to several cm thick. Said to be in places, several such layers.

In places an apparently homogeneous ~~mass~~ slightly perceptible difference in hardness. When exposed to gentle waves comes out as thin reticulum which then apparently ~~is~~ becomes increasingly ~~as the lines~~ sets of ~~bagular~~ roots exposed by wave washing show under less the same pattern though - *care anectomazina*

University (2)
Agriculture Dept.

Forest Dept.
Forest Res. Inst.
Mining Forest Prod. Div.

CSFR
Natural Products Res

To: 300 sheets
CSIR 600 sheets
US 300-1000 sheets

Colleges where botany is taught

Interested people

Industries using
plant materials

Indigenous drug users

No of staff
equipment

University (2) 300 sheets
 Agriculture Dept. 600 sheets
 Forest Dept. 300 sheets
 Forest Res. Inst. 512 sheets
 Min. Forest Prod. Div. 800-1000 sheets
 CSIR
 Natural Products Lab

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plant material

Indigenous drug users

No of staff
equipment



THE
 NATIONAL
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 BOTANICAL RESEARCH



[Faint, illegible handwritten text, possibly bleed-through from the reverse side of the page]

INTERCONTINENTAL HOTELS



HI O P K L
Indonesia
AN INTERCONTINENTAL HOTEL

DIJAKARTA, INDONESIA
CABLE, INHOTELCOR
TELEPHONE
OTOMAT 61821-6201 62731

