Collection and Field Note Book

No. 30

(Oct. 10, 1951 - Dec. 22, 1951)

(33607 - 33907)

Also

* Ecological processes seen or inferred on
  JEMO ISLAND
  (ABCD 1 - 56)

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END
When ordering this book specify
stock number and ruling desired.

A Boorum & Pease Product
Oct. 10 — Mt. of Mojave Desert — from air — no vegetation visible until rough country is reached near Cajon Pass. Then shading of brush on north slope.

Orange groves in general Valley region. Pecans, peaches, &c., in very poor condition: dead twigs on almost all trees, some trees more dead than alive — great variation in condition between groves even side by side; some show little as dead wood, others almost gone. Wendell S. says that it is due to lack of care — that owners think land will be subdivided but I don’t think that is the answer except locally.

Santa Ynez Mts. from air — almost entirely chaparral covered except for forest in higher reaches. Crossing scan very prominent dry grass areas here and there. Pines first in a few southern extents.
Oct. 14 - 2 miles south of Hughson, cultivated sandy soil with marshy depression.

33407 - *Paspalum distichum*
  - Gaming sod in marshy depression.

08 - *Polygonum punctatum*
  - In edge of marshy depression.

09 - *Helianthus annuus*
  - Occasional in cultivated, irrigated ground.

10 - *Eragrostis*
  - Rare in irrigated ground.

11 - *Lotus americanus*
  - Common in irrigated ground and on ditch banks.

12 - *Digitaria sanguinalis*
  - Common in irrigated cultivated ground.

13 - *Heliotropium*
  - Occasional in cultivated ground.

Stanselanz Co.

culms ascending from decumbent base, spikes laterally compressed, not eaten readily by cattle, stems ascending, slightly reddish; flowers greenish-white; herb up to 0.8 m tall, branched, all leaves narrow, rays bright yellow, disk very dark brown.

large very bushy, tangled herb, several stems from base, flowers pinkish white, useful in stabilizing ditch, banks, cattle do not eat it green, but will eat hay. culms ascending, eaten reluctantly by cattle.

prostrate, very glaucous, leaves fleshy, flowers purplish white, purple in center, nutlets not at all swollen - fleshy.
Oct. 22 - Brief visit for refueling.
Cassava, squarrosa, has reached at least 2.5 feet in residence area.
Large plants (2-3 m) of Calotropis gigantea, Terminalia catappa, Hibiscus, Tiliacora, Thespesia populnea around base buildings. The Hibiscus, and esp. the Terminalia are slight, somewhat chlorotic.

Many weeds, especially green, euphorbia, hypericifolia, etc., around base of buildings. Pluchea, Arata, common, but not as in 1946. P. indica common. One coconut seedling seen.

Pluchea odorata common locally. Euphorbia nitida, sophylla seen but not collected. Apparently does not compete well with Messera ochridiana.

Vegetation largely a scrub of Mesembryanthemum argentum, not more than 2-3 m tall. Some open area, as pine stands of Timbriistylis; occasionally, Ipomoea tuba, which also climbs over brush. Weeds found around roads and buildings, Convolvulus most common, forming large patches. Helicteres isomeris, common, sophylla not evident, but little time was spent examining it.
Timbriistylis cymosa seems to colonize the most extreme habitat, such as the edges of the airstrips. Some marshy depression, perhaps artificial, along airstrips away from terminal.
One plover seen. Thick scattered hillary cumulus clouds, one light shower at 5 p.m.
No coconut seedlings.
1951 Wake Island

Oct. 29 - around Pan-American Terminal
Disturbed ground around installations, coral gravel.

Ipsmea tuba (Schlecht.) Harv. - climbing under bushes

15 Mesembryanthemum argentae (L.f.) Schlesk.
Dumartin plant, in scrub vegetation

16 Hedeoma frutescens (Mill.) Ktze.
occasional in scrub vegetation

17 Dactyloctenium aegyptium (L.) Rott.
local on roadside

18 Euphorbia
common locally along road side

19 Euphorbia cyphocaulon Benth.
very common in bare ground

20 Antillexs alicer L.
occasional in bare ground

21 Chlorella volvata (L.) Cast.
locally abundant around air strips, rare near terminal

22 Euphorbia
occasional in edges of scrub

23 Elaeocarpus indica (L.) Gaertn.
occasional around buildings

24 Echinops echinatus L.
common, abundant locally

25 Heliotrope anomalum, H.B.K.
23626  Boerhavia  very common
27  Leptinum repens (Fast. f.) R. Br. occasional
28  Euphorbia hirta  local on bare ground

Oct. 23 - two Jimas disturbed ground around airfield installation
29  Chloa inflata  hake abundant
forming mat on bare ground, prostrate, dense tufts
erect, arching at tips.

erect, inflorescence purplish.
Oct. 18. Mountains between Odawara and Hakone. Steep slopes covered by scrub of Diervilla with Plantation of Cryptomeria and Zelkova. Some beech and other broad-leaved trees and pine camping and on slopes. Upland gentler slopes and rolling country near grass-covered, largely uncultivated. Grads rather sparse, some of grassland planted irregularly 6 trees. These uplands not at all thickly populated, while lake

steepler canyons leading up to them are very thickly beech woodland. Along Salaginella of a prickly sort in conspicuous on moist rocks and cliffs. This whole mountain mass is of mixed pyroclastic material—ash & tuff and volcanic breccia and lava flows, a part of the Fujiyama mass. Erosion patterns in narrow vertical walled ravines and canyons. Lake Hakone is result of damming a canyon by a great landslide.

Oct. 19. Coast bet. Itoya and Ashigasaka, Koga-gun. Kanagawa Pref. Dunes of dark gray sand, largely planted & a few pines. These plantations not at all healthy, looking a flat part, stunted and yellowish, but on dune ridges, several times larger and dark green.
Nov. 3 - near Takura, Chiba Peninsula.

Miscanthus abundant in steep road cuts in deep alluvial soil.

Nov. 3 - near Takura, rolling ground, intensively cultivated with truck crops. Surface soil very dark brown, almost black. Examined a profile here, in moist soil along roadside. Typical Ando brown rolling soil. A horizon dark brown, fluffy granular, silt-loam.

Nov. 3 - firing range about 2 1/2 mi. N. of Hodamachi, Chiba Peninsula. Hodamachi, slightly irregular grassland with scattered vines, small scattered shrubs.

Chiba Prefecture

Tangled massae, brown stems decumbent, fruiting calms ascending, about 1 m. deep, underlain, sharply by a B, of yellow-brown silt-clay loam, heavy, but somewhat friable somewhat plastic, this 1 m.

Ando series, but possibly due to dust from road (not too likely); B horizon, sl. more acid.

Ando soil, profile examined with A horizon about 25 cm. thick, as in Takura profile but slightly acid, B horizon as in Takura profile at least to 42 "depth.

1. 22. Rare, local in bare soil in

2. 33. Valeriana communis

34. Cassia local in

55. Ligustrum occasional in

ever, fruits maroon purple

54. flowers yellow, brown outside, shrub 1 m. tall, fruit blue
Queens common shrub in

Nov. 6 — nr. south of Kobe along the seacoast, (seen from train window)

Low coastal hills show rather conspicuous erosion.

Pittosporum tobira growing spontaneously along cuts and eroded places.

Missanthus communis waste spots at low alt.

Rice culture general.

Rice being harvested. Fields, especially from still somewhat green to completely ripe harvested, in some cases even threshed by hand, by dragging a small wooden box containing a pine pole.

Some bamboo is of the common weed species.

A gnarled small pine with an almost black trunk is locally common, mostly on low hills.

The plains are almost entirely in rice, except for some tubi crops.

Chiba Pref. etc.

Shrub 1 m. tall, one dry fruit found on leaf axil (certainly belongs to this plant).

Hills around Kobe & Hinneji brushy and with small forest of pine, eucalyptus, etc. and quarry area common. Only lowest slopes usually cultivated, some indications of terracing above but apparently abandoned. Small villages, with gray-tiled roofs very common, 3-5 in sight at a glance from train window in flat valley bottoms. Transition from hills to flats very abrupt.

South of Hinneji - extensive rice fields. As rice is approached typical landscape is flat valley bottoms surrounded by plants to rice, mostly surrounded by abrupt steep wooded small mountains. The wood pine in places, scrubby deciduous in others.
Taller, near bases of hills and in ravines bamboo abundant; in many places near bases of hills village lining the edges of the valleys against the bases of the hills, in places almost continuously. Roofs generally of gray tile but many with done straw thatch, one, the thatch very compact and 6-12" thick! Diospyros kaki very common around house. Ridge tops and steepest slopes covered by a thin scrub of ground growing through. Erosion scars less common. Some has rock cliffs.

As somewhat greater altitude are reached (300' mean) other conifers begin to appear. That valley becomes smaller and less common. Near Mantoji much nice, but also other crops. What appears to be either mulberry or namic, growing after 1-1.5 m tall, single finger thickness stems. Several other things dried in same manner by hanging

as is rice. Persimmons dried by hanging ties in strings at walls of sunny side of house.

South of

West of Kunashiki the landscape changes somewhat. The hills are more gently sloping and cultivated in places to the tops, though there are patches of woods. Mainly pine. Flat rice-covered. Higher hills more inland steep and wooded. A red-timber pine in more common here than the gray-timber one.

Citrus first noticed west of Furiuniwaken a few miles. Kudzu vine common in garden; silk patches here, too. Citrus on slopes.

Terracing in Amami area done in fashion that merely reduces slope; does not eliminate it. Walls with gentler slopes above them.
Near Yoshino
Robinia pseudoacacia, common orn. cult.
Potatoes commonly cult.
East of here much rice is cultivated apparently without irrigation, a most very little, on small terrace
Palms (archaeocarpus?) occasional all along the coast
Forsythia slopes mainly vine but with some deciduous trees, those just beginning to change color.
Eriobotrya very common.
Terracing intensive from here toward Hiroshima.
Many terraces irrigated by a small ditch on the upper side, at front of wall of next terrace. Terraces mostly somewhat sloping.

The way from here the hills become steeper and rocky. The sides are mostly cliffs. But even here, in residual fragments of soil, are tiny terraces devoted to gardens. The soil is fine and very light colored. Even on this slope this soil is so shallow that the terraces cannot be more than a foot or two wide.

West of Yoshino, bamboo is abundant, but much of it seems to be in a dying condition. Pine dominates the landscape, with bamboo an important minor feature. Somewhat south of Hiroshima near Ino, I thought I saw a slope covered by Ficus carica, but it could not be certain. South of Iwakuni the landscape also seems yellow and dry. But could it be merely deciduous?
Nov. 8 - Tottori

33637 Rhizi

- in fence row under pines in university campus

34 holidays japonica Kitamura under pines on university campus

37 Liraea sieboldii - in wooded sea cliffs

40 Cryptobalanopsis glabra in park

41 Caryatia japonica in small thicket under pines on university campus

Pines are the dominant tree in Tottori, everywhere when there is not solidly built city. Mostly "red pine" "Pinus thunbergi" ("Black pine") and "Pinus densiflora." Branch of red pine may be black or red.
Nov. 9 - RR trip bet. Osaka and Tokyo; train window observation.

Mrs. het. Hakone and mountainous rugged mountains with flat valleys between.

Country around lake Biwa looks like old bed of lake now filled in or slightly elevated. paper

Plains are devoted to rice culture. Harvesting now in full swing. These valleys thickly populated.

Mountains steep and abrupt in the southwestern part of this stretch, slopes becoming more gentle and relief softened northward. Southward these hills are pine-clad. South of the middle Cryptomeria and Sequoia. Common Chamaecyphae obtusifolia appear and soon dominate the scene.

Clearing areas have a deciduous scrub that is changing color. But this is fullest with conifers which soon overtop the broad-leaved trees and shrubs.

Plains around Ogaki vast, flat and rich. East of Ogaki in plain are occasional ponds some of them red with azolla.

Broad sandy river beds confined by dykes have pioneer vegetation, occasional garden plots, scattered in them.

Trees earlier common around dwellings.

Along the coast east of Nagoaya are low hills of alabaster and some dunes. These are mostly planted to pines, but some slopes have a dense scrub. North of Hamamatsu the gare of these hills that cannot be tamed are covered by tea plantations. There are in small patches and the plants are mostly in low, dense, rounded box-like hedges - a low mound piece butter-like simple plants - seemingly kept pressed back to low for comfort in harvesting.
1951 Fahan
The river beds here are very broad, with braided patterns, mostly gravel flat.
Nov. 16-25 - Boat trip on direct course from Tokyo to Tamgi. No living thing seen in the whole trip except a few flying fish after the fifth day.

Nov. 25 - Tamgi Atoll. Inspected western islet through binoculars from ½ mile a.m., approached reef near boat passage at high tide to within 50 yards.

South Islet - no vegetation visible, islet quite rocky, mostly rock rather than sand, large at the north end of the reef a row of large rocks visible from well south of center of west side, through glass.

Pokahon Islet almost completely covered by Messerschmidea in lagoon side.

Frigate birds common, at least 25 seen at one time. Several Fairy terns, Sooty terns, Sooty terns.

Sooty tern (Sooty tern) flew around boat ship. One dusky shearwater swam near terns. Large flock of bottlenose, bulb sp. app. floating ½ mile offshore.

One albatross, 2 black-footed (Diomedea nigripes) flew by ship shortly morning.
Nov. 15 - in late afternoon
followed south and
east coast up to north
end of Kamome Islet.

South Islet absolutely
sterile of vegetation,
but with large boulders
some light gray, others
darker, two largest
black, scattered abundant-
ly. Impossible to tell if
in place or thrown
up by waves.

Kamome Islet vegetation
rather sparse. But
large Massemischmidis
rather covering islet,
apparently some Seaweeds,
but no small bushes.

Entire south and
east coast characterized
by a high seaward
ridge & boulder rampart,
and by almost continuous
beach rocks or raised
reef inlets, appearing
about 6 ft. high, variously
curved away, cut into boulders
here and there, and into
mushroom,veled rocks
or reef flat at bottom
of beach.

Passes het. Two islets
west of het. Libylia
and Libylia itself are
filled till don't think
water would ever go
over except in storms.

These Libylia and
next one north are
well vegetated by a
loose cover of Mesembryanthemums
and Secotola, usually
extending well down
on outer side of seaward
ridge, but in places
this bare to top. A few
large boulders in process
of beach rock on top.
Large Leg. (Dolge fig 2.)
there and there on head.

Birds occasioning
common in trees and
coming in from s.e. as
usually flying fast
and close to shore, (Tosus
and sooty terns). (One white
body with white tail seen
in here, resident.

Kamome Islet veg. seem
in poor cond. (Light not got)
Islet is the bird rookery
of the l.t. - Millions of birds
here in bushes
like a swarm of bees.
Many birds can fly

we

Mary, kind, can do

Marshall 20
Nov. 28 - Utinike I. - s.w. corner of island.

Boehmania diffusa var tetrandra in sparse coconut grove with clumps of Scaevola.

47 Fimbristylis cymosa R.Br.
common ground cover in sparse coconut grove

43 Mesembryanthemum argenteum component of vegetation in recent sand dunes

Sky largely overcast, scattered showers.

Hoggs. reading 3:40 p.m.

Dry 27°C  Wet 26.5°C

11:20 a.m.  26°C  26°C

Vial #1 - spiders in webs spun between clumps of bushes - not weavers.

Vial #2 - midge, insects caught beating Scaevola

3445 marine algae

on sea anemone colonies just at low tide level in lagoon beach

4 Cacaliautia racemosa (Forsk.) J.Ag. (det. munder) and between broken dead coral rocks in rubble bar in lagoon at low tide mark

35 Utinike Atoll

prostrate to ascending, longer stems, flowers pinkish, leaves stiff, little clumps, culms ascending

"drielj man" a "keelia man" shrub 2 m. tall, leaves flashy, silvery green; flowers white, fragrant.

Risk tradewinds.

About 50 yards out from high tide mark on the lagoon beach is a bar of rubble, cobbles size and smaller, some boulders, evidently stripped from the narrow land strip by a storm and swept into lagoon - very little life except tiny sponges, a few algae, a few echinoderms, and many small crabs.

Taylor 1955) pale green, rhizome Terete, peltate proceeds tending to be hemispherical.
Nov. 29 - Utinik Islet.
Open coconut grove with grass in tacea ground cover. Many coconut and Pandanus trees knocked down by typhoon (said to have deceased March 1951). Vial #3 bottom layer - spotted beetles in fungi (33655) on dead Pandanus trunks, other and spider in same trunks.

Vial #4 bottom layer and any very tiny animals, any ants - in axils of dead lower leaves and green leaves just above them on Pandanus tectinii.

Vial #5 - bottom layer - fly larvae in wet decayed spot under fungus (33447) on fallen coconut trunk. Other animals - isopods, snails, under mat of Thunara at base of standing coconut tree.

Several fungi are conspicuous in the dead and even the living fallen trees.

Vial #3 top layer (Nov. 30) Mix. on ground - insect. Black ant running around (bites rather viciously), Lolenus (?) attracted to food can. Big yellow ant living in thick vegetation in bottom of abandoned tank yet.

Vial #4 top layer (Nov. 30) Coccinellids and long horned grasshopper, two Micrascelidia and tecla in scrubs on outer part of island.
1951 Marshall Is.

33647 frungus on fallen coconut trunks
1 48 on fallen coconut trunks
3 49 on standing coconut tree, upper side of branch leaning trunk
2 lichen
3 50 on coconut trunks, very common.
5 51 lichen on trunk of breadfruit tree
5 52 moss on trunk of coconut tree, rare but fairly common.
5 53 Eragrostis annuus (L.) W.D.A., common around trails and dwellings
5 54 frungus on dead fallen Pandanus trunks and branches
5 55 frungus on dead fallen Pandanus trunks and branches
1 56 Jossypum single plant planted in village, 30 yds from lapa
2 57 Mirabilis jalapa, single plant growing in cemetery
2 58 Asclepias curassavica, several plants in cemetery and around houses

Utiru Atoll.

dark dull green when moist.
dark dull green when moist (looks like water but wet, apothecia slight green, sterile.
loose small tufts, "ujoi" (name for grass)
trilliant vermilion: flat.
variable but seemingly one species.
many-stemmed plant
rattan, heavily fruiting; leaves very chlorotic.
bushy, many-stemmed herb; flowers white, closed when collected, just after noon.
not chlorotic.
red herb; crown orange, corolla red. Not especially chlorotic. "yelo"
33639 Cuscinum sanctum (L.)  

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Profiles #1, #2, #3

#1 in open coconut grove on path just out of village.

#2 in open grassland in middle of trail.

#3 in open coconut grove on relatively high rocky ground just inside outer beach, on trail.

aromatic, flowers purplish, "katarin"
40 1951 Marshall Is.

33659. Oxium sanctum L. 2.
  small patch, near house.

5 60. on trunk of breadfruit tree.

561. Derrisena tubiflora (L.) O. Kuntze. In
  large patch on ground.

562. Euphorbia chamissonis Brot. Common locally, center
  of island.

563. Eleoea indica (L.) Gaertn. Common in trails and recently
  disturbed place.

564. Digitaria microstachys (Benth.) Non. Common around.

Utiru, Atoll.

aromatic, flowers purple.

“Matarin”

Prostrate, extensive.

flowers white (open 10:30 a.m.)

stems ascending. plant

tends to be flat-topped, flat

grasses white. male “lofs”

small tufts, calms

sericea ascending.

“Rofij”

small tufted, bases

decomposed and rootin

Profile #2. Sample 2:1, 2-2, 2-3, 2-4, 2-5, 2-6

A1. brown, coarse. 0-0.1' black (10YR 3/1) thickly

  flecked with light brown.

  Err. - loose granular.

  7ex. - very friable, loose.

A2. brown, coarse. 0.2-0.7' salt-pepper brown (10YR 4/1-8/1)

  becoming lighter downward.

  Err. - loose granular

  7ex. - coarse sand, loose.


Nov 12, 1951

then grassy patch in coconut grove.
41

Utiris atoll

aromatic, flowers puffed, "Katarin"

Prostrate, extensive, flowers white (open 10:30 a.m.)
stems ascending, plant tends to be flat-topped, find
fleshy or white "malatvi"
small tufts, culms erect orascending.
"ajof"
small tufts, bases decumbent and rooting

---

Profile #3 (Characteristics — soil of the upland, will
buried profiles) 3 samples taken from page

Layer 1 - 0 - 1'3" — salt, pepper (5YR-8/2, 7.5/3),
either 6/7, greenish

Layer 2 - 1'3-1'9" —

Layer 3 — 1'9-2',

Layer 4 — 2'1-2'3" —

---

Marshall Is. Utiris atoll. Wind from 300°. Village near ocean beach, great inside
height of land, 11' above beach level.
Nov. 19, 1951 — Open coconut grove, gravel.
33459. Ocinum sanctum L. / small patch near house
5 60 on trunk of Breadfruit tree
5 61 Ipomoea tubera (Schlecht.) DM on large patch on ground
5 62 Euphorbia echinocaulis, common locally, center of island
5 63 Euphorbia indica (L.) Gaertn. common in trail and recently disturbed places
5 64 Digitaria microbaudii (Pohl) Horn. common around

Burried profile - Layer 5
3-4 in., coral fragments, coarse sand and hard-packed that digging became impractical
gray (5 YR 5/1) becoming lighter downward, irregularly mottled or splashed with pink (5 YR 6/1-6/2)
loose, rather hard-packed, crumbly, 75% sandy rubble with irregular coral fragments
large cobbles and even a few boulders scattered through this entire profile.

Utirik atoll.

aromatic, yellow-purplish
prostrate, extensive
flowers white (petal 10-15 mm)
stem ascending, plant tends to be flat-topped, gland white, male obligatory small tufts, culms erect or ascending
"ujjii"
small tufts, bases decumbent and rooting, culms erect, "ujjii"
small tufts, culms ascending, "laleola" green, submerged and floating.

1300 yard diam. circle, open coconut grove, incl.
Profile 53, has 120 standing coconut trees, 47 knocked down by typhoon, all printing and 85 yrs. 70 young trees less than 2 yrs. old.
General level about 11 ft. above edge of beach rock. Trees normally spaced 15-20'. Uneven mat of Seaweed, some Digitaria, some timbistyle, a few Pandanus, most of large ones knocked down by typhoon.
Layer 3: 2.2-2.5' pink (5YR-3/3)
- Fb. finely packed, crumbling
- Tex. very friable, fine sand with some coarse particles

Layer 4: 2.5–3.3' mixed pinkish-gray
- Averaging about 5YR-3/2
- Fb. loose, not well packed
- Tex. gravel with some coarse sand

Wink Atoll

are really horizon of one depositional layer. Bedrock here seems to be indurated loose material rather than reef rock.

In this area are a number of elongate depressions or trenches, about 10 m wide, 7 m deep, that are doubtless long-abandoned sand pits. They are said to have been made by the old people. They are old enough to have coconut trees at the

Soil profile #5 is from toward the center of the island, directly east of center of village, in place of coconut grove, ground covered by grass (Cynodon), Taceas, and abundant Elephas in chamaemelus. Soil here is also shallow, but within two layers perhaps
Layer 3. 2.2-2.5' pink (5YR-9/3)
Str. firmly packed, crumbly.
Tex. very friable, fine sand with some coarse particles.

Layer 4. 2.5-3.3' mixed pinkish gray
averaging about 5YR-7/2
Str. loose, not well packed.
Tex. gravel with some coarse sand

Layer 3 1.5-2.5' pink (7.5YR-8/4)
blushed above with gray
(same blushed in layer 2)
Str. loose granular.
Tex. from sand, with a few coconut roots.
resting on a consolidated small gravel
that is pink, very firm to
pick, but after pieces are
detached they crumble somewhat,
coconut roots penetrate this.

Layer 1. 0.1-1.9' black (10YR-2/1-4/2) tending
somewhat lighter downward, somewhat flecked with pale gray
Str. crumbly-granular
Tex. Muchly blown with some coarse sand, plastic when worked,
roots in place 1/3
Layer 2 1.9-2.5' gray (10YR-4/1)
Thickly flecked with pale brown (10YR-7/3)
Str. sticky granular (wet), firm
Tex. coarse sand with some clay
and much small gravel and
some irregular coral fragments.

Profile #6. 3 layers in bottom of
long-abandoned turtle pit. A-C

east of village on road, 700 m. E of
East Japanese installation.
Nov. 30, 1953. Floukendown thickets in bottom
of old abandoned turtle pit.
Layer 3: 2.2-2.5' pink (5YR-8/3)
- Str. firm, firmly packed, crumbly.
- Tex. very friable, fine sand with some coarse particles.

Layer 4: 2.5-3.0' mixed pinkish gray
- Averaging about 5YR-7/2
- Str. loose, not well packed.
- Tex. gravel with some coarse sand.

Layer 3 (Charcoal): 2.5-3.0' (5 bottom of hole)
- Pale brown (10YR-7/3)
- Str. hard, firmly packed.
- Tex. rubble with some sand, pieces of coral to 3-4" wide.

Encountered water in charcoal, at about 3', very strongly smelling of H2S, peculiar sweet taste, 83°F temp. as it collected in hole.
- Rose to 2.3' in 2 1/2 hours.
- (Below level of bottom of tar pit)

Tar pit bottom perhaps 6 ft, below level of surrounding country

Water sample marked 6-4

Wards Atoll.

are really horizons of one or deposition layers.
Bedrock here seems to be indicated to use material rather than reef-rock.
In this area are a number of elongate depressions or trenches, about 10 m. wide, 7 m. deep, that are doubtless long abandoned taro-pits.
They are said to have been made by the old people. They are old enough to have coconut trees of the general size in the surrounding plantations growing in their bottoms, also fairly sized breadfruit trees.

Profile was dug in the bottom of one of these
now filled with a thick of Chenodendron. The soil was black, and the water table is only 4.3' below the ground. The water smells very strongly of H2S.

Beyond this, to the east, is a large area of open country with taro making up a large part of the ground cover, otherwise grass and, locally, Euphorbia characias.
The eastern part of the islet is open coconut grove with grass. Before the grass is reached, there is a small thicket of Codiae Guettarda, and Pismia, almost smothered by Ipomoea tuba.

On the east end of the islet is an area of broken coral, with no obvious soil. This is mostly covered by a scrub of leaved, dense and tangled, 2-3 m. tall at inner edge, getting lower outward. Boldly battered by the typhoon at outer edge, with, scattered through it, badly beaten, old trees of Messerschmittia, Pismia, Guettarda, etc., about twice as tall as the scrub. In the scrub are many branches of these lying tangled in the scrub. This scrub is so dense that it is laborious to cut a trail through it. It is also tangled with Ipomoea tuba.

On bare broken coral inside this belt of scrub was found a colony of Helmuta crinella, also much Brephid in ditto of the extensive, printed leafed, capitulate inflorescence.

Two species of lizards noted on island - a small slender, brown skink, and a large, swift-like green one, up to 3' long, some of these latter securely and is in jar #1.

In jar #1, also are two specimens of the large red hermit crab; three form of a smaller white and purple banded one; and two specimens of a burrowing land crab in "ghost crab" form of a very pale color, dug out of burrows in the sand flat of the east part of the island. The hermit crabs were eating meat from split young drinking coconut.

Vial #7 - has earthworm from upper layer of profile #6. Lab.

In jar #2 are a number of hermit crabs, one land crab and some skink.
33667 Guettarda speciosa L. common in sparse coconut grove and in scrub along outer edge of islet.

69 Livistona maritima L. common in scrub on outer part of islet, outside coconut grove and debris.

69 Leucaena glauca (L.) Benth. very local, around old Japanese installation, center of west arm of islet.

70 Carica papaya L. common, this from near center of west arm of islet.

71 Croton subcordatus Lam. occasional in sparse coconut grove, sometime forming small thickets.

72 Euphorbia heterophylla L. very local, abundant when seen, around abandoned dwelling sites.

73 Cleovendranum invincum (L.) A. C. green common in center of islet, especially around abandoned houses, forming thickets.

74 Polygodium scopodendricum Fin. in small pit around old Japanese installation, not seen elsewhere.

75 Portulaca oleracea L. f. all common in sparse coconut grove in center of islet on back ground.

Utirik Atoll

shrub 3 m. tall, bushy, flowers white, very fragrant, "mut" flow shrub, spreading, flowers yellow, petals falling easily.

shrub 3-4 m. tall, flowers cream white.

plant 3 m. tall, flowers cream white.

shrub 3 m. tall, all seen sterile, "hano" shoots partly scarlet.

shrub 1-1.5 m. tall, flowers white with maroon-purple stamens and style, "ulij" prostrate, fleshly, root inferior, flowers yellow, closing before mid-day.

27. Drimorhiza tuberculata (Hook.) Don common tangled in inner edge of Scaevola scrub on north end of inlet.

78. Calophyllum officinalis L.

scrawny tree seen near center of island.

29. Flevaya undulata Gaud. local on bare broken coral just inside belt of Scaevola scrub on north end of island.

30. Psychotria diffusa L.

common in bare broken coral just inside belt of Scaevola scrub on north end of island.

Dec. 1 - same.

31. Setaria repens (Forsk.) R.Br.

one of first colonists on bare coal sand (also dominant ground cover under coconut tree, in outer parts of coconut grove).

53. Pemphranthus cordifolius F.Muell.

in mixed scrub on sand spit (small lagoon).

37. Antherospermum utilissimum (Park.) F.B.B. planted in village.
37 64 Morinda citrifolia L.
very common in open coconut grove
planted in village
38 35 Nerium
abundantly planted in village
39 36 Citron

2 87 Lida fallax Walp.
single plant planted in village
3 88 Phyllanthus niger L.
common locally in village
4 89 Plumeria rubra L.
planted in village
5 90 Pseuderanthemum carnuthum (Gean.) Bull.
planted in village

91 Acrocarpus altic (Park. F.) clad.
planted in open coconut grove
92 Thunera involuta (Fret.) R. & S.
common locally in coconut grove
93 Trumpetella procumbens Frit.
abundantly in coconut grove
94 Cassytha filiformis L.
common, generally parasitizing herbs, shrubs

Shrub 3 m tall, leaves
slender; flowers white.

tall; neck up to 3 dm. high.
1-1.5 dm. thick, plant
up to 2 m tall; peduncle
red, somewhat compressed;
flowers white with
amantle & stamens;
very fragrant. Pedicels
thick, 2-2.5 cm. long. "Hery"
shrub 1 m tall; leaves
green; flowers orange.

two-wounded shrub or small
tree 5.5 m tall, flowers
white with yellow center;
fragrant. Small trees 3 m tall, leaves
wounded; flowers white with
salvageum corolla white
with red-purple center,
lobes erect, one down, two
lateral ones below horizontal.
Tree 5 m tall, sterile at this
season, said to be seeded variety "Mà"
prostrate, forming long,
mat. "Majap" (small green)
prostrate, extensive creeper.
Branches ascending, flower yellow.
Stems green (yellow in
some places), flower white, fruit...
Tecna leontopetaloides (L.) O.K. locally dominant in ground cover in sharp coconut grove. Seedling abundant.

96 Premna obtusifolia R. Br. Two trees seen, near village on lagoon side of inlet.

97 Pandanus texturatus F. R. Common generally.

Took samples of water flowing from beach in small spring just above low tide mark. This is salty. Also took water samples from two pit wells, one about 100 m. from beach, other about 50 m. on lagoon side of island.

Two samples marked UW-6 and UW-7 are from beach, UW-6 taken at low tide, UW-7 1/2 hour later. UW-8 from 100 m. back of beach at this point; UW-9 from 50 m. back, but much further west.

Vials 6 - bottom layer has damsel fly, from around pit well, horse flies that everywhere.

Vial #10 - miscellaneous. Cladaria flying to light at night - Utinib Island. Pseudocarpus and isopod in litter samples from Echulei.
Dec. 2 - Pigawale Islet, south part of islet planted to coconuts. This part has sandy, gravelly soil, upper layer black at least five material black. Ground cover mostly lepturus.

Just east off the south point is a small mangrove depression with Bruguiera, conjugata, water rather muddy, because stilted up by pigs. Water sample UW-10 taken here.

No weeds or cultivated plants noted on this islet.

Outer part of island of sharp broken coral, pieces small on inner side, came on outer. Along concave passage beach is a very well developed ridge of sharp broken rocks, not at all vegetated on the outer slope and on the broad (5-10 m) tip. Only are two plants of Trumirmita have gained a foothold on the outer part of this beach in a few places. Lepturus where sand has accumulated on outer reef there is evidence of a former reef. (75.50)

Utirii Atoll

Exclud Islet - Coconuts sparsely planted on inner edge of islet, with considerable Pandanus. Open ground under trees with lepturus soil have relatively fine, but with considerable gravel sized material. Remainder of islet covered with mixed scrub with Pisonia and Lecera predominant, outer beach fringed with considerable Pandanus, growing to cobbie ridge. Small openings with Achyranthes abundant. Butterflies very common here, visiting Achyranthes flowers.

Inside this is mixed scrub with considerable Pisonia. Between scrub and coconut grove is many open strips, grassy. Much Pisonia in scrub at inner edge.
most of which has been cut away; but which still exists, to a height of 3-4 feet, just under the boulder rampart.

The inner end, 40 1/2 of the concave passage, is of sand, and here is beach which parallels with beach, dipping toward passage. The beach above this is of fine calcareous sand (Sample 7). It is being blown away exposing heath and roots. The only plants growing on the actual beach slope are scattered tripetes procomberns.

In this sand are occasional small pebbles of granite, these in most cases completely enveloped in a casing of small heath roots.

The general broken rock surface is covered by mixed scree, largely heath, Messerschmidtia, Ericia, and Terminalia samoensis. The secondary components become more abundant toward the outer end, but on the actual outer beach is a broad fringe of mostly heath, this only about 1 m. tall or less, while the general scree is from 2 to 4 m. tall, with occasional trees, mostly Pisonia, but some Messerschmidtia, and some Guettardia 5-8 m. tall.

Vial #8 - Misc. insects taken sweeping, mostly on Pigawah Islet (Eurytus leucos sp.) (Teraphritis sp.) (Lygeid on Pigawah, on Allophylus)

Vial #9 - Misc. animals collected in leaf litter on ground on Edubie Islet.

Screening samples: Edubie Islet:
#8 - from approx. 1 sq. yard of litter under Pandanus.
#9 - from approx. 1 sq. yard of surface in heptane grass under sparse coconut.
#10 - from approx. 1 sq. yard under Pisonia. Living snails in vial from decaying Pisonia twig, organic
Dec. 1 - Eelute Islet

I saw a distinct patch of Eelute Islet. It was located near the mouth of the valve, and it was very abundant in the south passage, beach, marl, and climbing over scrub.

1. Portulaca oleracea 57d.
   Small colony on bare coral near inner beach.

Dec. 2 - on reef flat in passage bet. Eelute and Pajamah Islets.

2. 05 Neomisranboeaeae. Howe (det. Taylor 1955)
   Rare at about low tide level

3. Liagora valida Harvey (det. Taylor 1955)
   Rare at about low tide level

   Rare at low tide level

5. Flora of Camephoa serrulata (Forsk.) T. Ag. (det. Taylor 1955)
   Very common on bare rock at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

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   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

27. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

32. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

34. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

35. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

38. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

41. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

42. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

43. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

44. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

45. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

47. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

49. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

52. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

57. Flora of C. serrulatae. (det. Taylor 1955)
   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level

   Very common on tufts of Camephoa at extreme low tide level
Date: Dec. 2

**Bigarade**

- **Plectranthus labellatus**
  - colony in fallen Pisoni

- **Allspreeus tenninsis** (Eh.) B1.
  - colony in mixed scrub
  - on broken coral

- **Pennia obtusifolia** R. Br.
  - me plant seen in coconut grove

- **Brugonia conjugata** (L.) Herb.
  - small colony in low spot near south point
  - not seen elsewhere

- **Terminalia zampana** B1.
  - occasional in mixed scrub

- **Aphannanthus velutinus** H. A.
  - two small colonies seen, much more abundant on Echela point, in openings in scrub, in edges of scrub, on broken coral

**Utirel Atoll**

- shrub 1 m. tall (other 5-7 m.) diffusely branched
  - flowers white
  - diffusely branched
  - shrub 1 m. tall, branches to ground
  - flowers pale green
  - aromatic leaves
  - varying in size
  - small leaves 2-3 cm. tall
  - flowers red calyx red, petals tan
  - "chong"

- shrub 1 m. tall (taller plants seen also on edge of beach, very depressed one)
  - fruit green
  - spreading, sprawling plant, repeatedly branched
  - horizontal branches purple
1951

Dec. 3. Utiruk Atoll
sand spit with
4.5m. low tide

33.75

Xanthophyllum fruticosum (Krauss)

2. 16. under lower 4/5th part of dead stub of living Mesureschmidii

3. 17. Laurencia sp. (det. Taylor 1955)

4. 18. algal layer in surface layers of beach rock

5. 19. algal crust on coral sand

Several lines of beach rock dipping toward sea, then flat reef rock, this quite limpety and hard except when cracked. Then one line dipping toward lagoon then sand bar a short 4 feet or two high than reef rock. The rock apparently exposed during 1951 hurricanes, which almost completely denuded this part of the island.

Utiruk Atoll
shrub x m. tall, brachy and spreading flowers, disty white; fruit white, fleshly, "hannut" white, fleshly

red.

green layer.
black, broken into small blocks.

Vial #11 - larvae of a moth eating flowers and, to a less extent, leaves of Mesureschmidii.

Vial #12 - Miscellaneous insects collected on Mesureschmidia argentea.

The proximal part of this denuded rock flat has scattered clumps of Hemiphris, some very dense with scatter of tuft of Lepturus between.
some Lasythya and a few other plants. Additionally, there are dead bushes of Sesuvium with their enormous root systems exposed are common in the proximate part, toward the sea, apparently killed by the March 17, 1951, typhoon, which swept much of the area clean of soil. Distal to a break in the beach-ridges, where the sea comes in at high tide, there is a large pool, there is almost no vegetation on the rock-flat, but a line of Seacole scrub (with some Mesemachlididia) runs out along the crest of the sand spit. The bushes are well grown, 3-7 m. tall, and small trees of Mesemachlididia may be 4 m.
The exposed beach rock has a green algal layer a few mm. below the surface, esp. where the rock is gray rather than white.

Dec. 4 - foggy - saw white-tailed tropic bird flying above boat.

Golden Plow was seen generally at all inlets. Very tame here, run with chickens, only fly up on close approach of a person. "kolej"

The corals in general are very small there, varying but averaging small.

Utrilea atoll.

Dec. 7 - Beluch I. - a great crowd of fairy terns in air when I was in brushy part of islet. The eggs of one of them was seen lying on a dead stub of a branch of a Mesembryanthemum tree, balanced in a slight irregularity. It was 2 mm. long, mm. wide, ground color pale brownish gray, irregularly mottled with black, gray, brown, and very dark brown.

Hypsolimnas bolina (C) very common here, two main color forms, and some variation in the visiting Achatypantes, relating forms.

Native name for fairy tern is "mejo 'k"

Large animals
Man "kamo"
Dog "dogo"
Pig "pig" eat "qal"
Chicken "pau" and "pau" eat - referred to usually not seen.
Dec. 5 Tabia II.

Lagoonward half in coconut, more densely planted toward lagoon
shores toward center of island (E. W.).

Surface soil in part covered by coconut, sandy, mostly not very dark in color
except at extreme

Profile #1 in small
grassy opening in this
section.

Central part of island scrub with
a few scattered coconuts, and, in southern
half, with open Pizza

Profile #12 in scrub, #13 in leaevol
in mixed Messua/leaevol/leaevol/Quelatana.

In coconut plantation scattered
clumps and patches of
leaevol/leaevol/muck/mesh mix

young coconut, scattered

Pandanus, ground cover of
Triumfetta, Polyspondylus,
Cassytha, Leptosporum, very

evanact, the Triumfetta

sending up erect branches.

Profile #13 0-4.5' three layers.

Layer 1 - A, brown - 0-0.7' dark brown
(7.5YR 2.5/1), loamy, organic
portion light as 7.5YR 5.5/1, at 0.7'
becoming gradually darker. 
Silt: coarse sand-mud, slightly fluffy up
to loamy sand-mud again
material toward 3.5'.

Changes gradually to
Layer 2 - A2 brown, pinkish gray (7.5YR 4.5)
0.7-1.5'
Silt: fairly compact but easily crumbled.
Tec. sand mixed with fine silt.

Changes gradually to
(0.5).

Dec. 5, 1951 grassy opening in
mixed scrub.

From the prostrate stems
abundantly flowering
flowers opening late in
afternoon. Cassytha
forms large dense

Well in this section - water

temps. 81° at 10:35 a.m.

Outer third of island
mixed scrub, with
grassy openings in middle part,
then in south part, may
fallen trees.
Layer 3 C horizon 1.5-4.3' pink (7.5 YR 7/4)

1st. Loose varying to compact granular.

2nd. Sand to small gravel with occasional fragments, 2-4" across

 resting on a smooth, very hard flat, indurated lime sand or beach rock (looks when struck with pick and sends shower of spark

a few scattered coconuts, and, in southern half, with open ensuing forest. Profiles 12-13

in scrub, 13 in geocole, 14 in mixed Messerschmidt, geocole, guettarda.

In coconut plantation, scattered clumps and patches of geocole, brush, masses of young coconut, scattered Pandanus, ground cover of Triumphets, Polysoleum, Cassytha, lipeclus, very luminant the Triumphets, sending up erect branches

Profile 11 of three layers, total

1st. 0-0.5' whitish pink (7.5 YR 8/3), slightly stained with organic matter, in upper 0.15"

2nd. Loose granular, very

3rd. abrupt change to

Layer 2. 0.3-1.5' salt, pepper mixture of dark brown (7.5 YR 3/2) and pinkish gray (7.5 YR 5/3)

4th. Loose granular, many coconut roots, very sandy from this is certainly a buried layer.

Transitions of 11-12 (eg)

Marshall Dr. Taha Atoll, Taha 5

100 yards in from lagoon, beach near center of island.

Dec 5, 1931

from the prostate stems, abundantly flowering flowers, opening late in afternoon. Cassytha forms large dense mat.

Well in this section - water temp. 81' at 10:35 a.m.

Outer 3rd of island uneven mixed scrub, with grassy opening, in north part dense in south part, many fallen trees.
Layer 13-14

2.5-4.4', very pale brown
(10 YR 8/4)
granular, loose,
crave sand with some
gravel, changing to sand
and large fragments in
colored soil.

Reclining on consolidated fine gravel.

Vial #13 - orb weaving spider,
from Taba Islet.

Vial #14 - animals from
around base of coconut
trees in pile of old leaves,
etc.

Vial #15 - ants and termites
from retting Messnermidia
larvae in tube
from outside of sheaths
of living coconut tree.
Other things, miscellaneous.

From the protrate stems
abundantly floriferous
flowers opening late in
afternoon. Cassytha
forms large dense
masses.

Well in this section - water
temp. 81° at 10:35 a.m.

One-third of island
uncover mixed scrub with
grassy opening in north part,
dense in south part, many
fallen trees.
Dec. 5 - Takua Islet
Open coconut grove on coral sand soil.

33730 Scenola pterocera (Mill. ex. Kri.)
common under coconuts.

21 Trumpetia procumbens Fast. very common, forming large tuft stands under coconuts.

22 Messerschmidtia gantea (Gr.) v. very common in scrub and under coconut trees.

23 Polygodium acroptilum abundant everywhere under coconut trees.

24 Cassytha Californica L. very abundant everywhere on low growing plants.

25 Pandanum tectilis V. common under coconut.

26 Lida fallax Wall. occasional to common under coconuts.

27 Albugo platensis common parasitic on Monbahia diffusa.

28 fungi on dead coconut trunks.

Takua Atoll

about 2 in. tall, forming rounded masses, leathery bright green flowers dull white inside; tube yellowish, edges of split sepals; fruit white.

main stems prostrate, flowering branches erect; flowers yellow, closed during middle of day, open in late afternoon. shrub 3 m. tall, other seen taller; leaves short, green, flowers white, fragrant.

shiny prostrate, branches erect.

green to orange; flowers white; fruit immature.

small tree 6 m. tall.

shrubby up to 6 m. tall, flowers orange.

causes branches of host to assume erect habit.

variable in outline.
1951 Marshall Is.

5 331279 Ashypanthera velutina H. & A.
common in openings

5 30 Polyporus on dead Pandanus tree
fungus

5 31 Polyporus on dead Pandanus tree
fungus

5 32 Kepuia repens (Ferr. R. Br.) dominant in many
places in openings, under
trees, and under sand.

5 33 Blue ginger in edge of coconut grove
on coral sand.

Dec. 6 sam.

4 34 Merinda citrifolia L.
occasional in Pisonia
grove, center of island.

2 35 Pisonia grandis R. Br.
occasional all over island;
grove of large
trees in center, with
innumerable root sprout.

7 36 Canica papaya L.
occasional in Pisonia
grove in center of island.

5 37 Timistothelis cymosa R. Br.
only a small colony seen
on s.w. corner of island.

Taba Atoll

spreading herb up
to 1.5 m. across; flower
rose purple;
fruit orange vermilion
scent tufts
black crust on surface of sand.

shrub 3 m. tall; leaves
glossy dark green;
flowers white; fruit
smooth, fleshy;
trees 5 to 20 m. tall,
large soft white
tunics; all seen
were sterile.
single stemmed
tree; leaves in a
rosette at top, axis
somewhat elongate;
2 flowers white;
small tuft, leaves
stiff.
1951 Marshall Is.

74

Lauria maritima L. very rare, few plants on top of coral beach.

2. 77 Terminalia samanensis B. & W. single plant on exposed beach.

5. 40 Guettarda speciosa L. very common in scrub and occasional in coconut grove.

5. 41 Allbugs platensis common, infecting Brechinia.

5. 42 Potulaca lutea L. occasional on top of stiffly flat facing rock on bare sand.

5. 43 Brechinia diffusa L. in space coconut grove near north end on broken coral.

6. 44 Fleurya asperula L. abundant in space coconut grove on broken coral (also on sand).

5. 45 Mairuds citrifolia L. on broken coral in north end of coconut grove.

5. 46 Brechinia at edge of scrub at north end of island, exposed situation.

Tana Atoll

low shrub, 3 dm. tall, all seen sterile.

shrub 1 m. tall, sterile.

small tree 3 m. tall, flowers white, very fragrant.

produce erect habit.

shrub with habit in infected branch of normally prostrate host.

fleshy much branched spreading to ascending habit, stems red, flowers yellow.

stamens most of flowers extensive, mat from thick vertical root, flowers pink, stamens erect, stem fleshy, flower bushes.

shrub 2 m. tall, with seedlings beneath.

prostrate, from thickened roots, flowers pink, 2-4 stamens.
1951 Marshall Is.

Pemphigus acidula fight. beach-nest stripped of loose material by typhoon.

48

Beveravia

in edge of scrub at north end of island.

49

nothing coconut wood

in rotting wood.

Vial #16 - animals from under loose bark of rotting Pandanus twigs.

Vial #17 - animals from axils of Pandanus leaves.

Vial #18 - snails from old coniferous log cast up about high tide mark on seaward beach.

Vial #19 - insects from leaf mold, etc. on ground.

Take atoll

old stubs, left by typhoon, sending out clumps of sprout. leaves thick, astringent, when chewed; petals white, top of fruit manioc. fruitative, forming large loose mat; flowers pink, stamina 2-3. whitish in color, including galls.

Ian color with somewhat darker galls.
Dec. 7 - 4 zams

33 751

Digitaria micrantha (Hand.) Hara
small colony on broken coral in north end of coconut grove.

The greater part of the island is characterized by sandy soil, resting on almost unaltered sand at the surface of which and filled with humus. The surface is generally covered by small coral fragments and occasional cobbles and boulders. The soils are deep and profiles vary, they being usually buried profiles. In the center of the north end of the island, about 100-150 m. in from all three sides is an area planted to coconut of broken coral blocks, varying locally in size from 4-4 cm. with coralized and even small boulders.

In the Picinia group in the center the soil is black, boulders fairly numerous. Here are a few plants of Cæcuc papaya. Many Picinia trees have been knocked down by the typhoon, and the grove is open, but choked with seedling and shrubs 1-3 m. tall. The trees are 60 ft. high, now quite scraggy and with leaves badly eaten by larvae.
Dec. 7 - Raajeman Island

Luciana maritima L. scattered brushes on sand bar, the one specimen came from growing on exposed beach rocks.

Soil sample #14 - tough peat forming a compact layer 2.5 - 3" thick underlain by loose coral gravel with very little sand. Color dark brown. pH 5.5 - 6.0. Pisonia gravel.

Soil sample #15 - black to dark brown layer with some fragments and coral gravel, 3" thick overlying loose coral gravel in Pisonia gravel. pH 8.0 much crumbly than #14.

Screening sample #16 - material scraped from surface under dead leaves in Pisonia gravel, on layer from which soil sample #15 was taken, run through screens, caught in fourth.

On the reef flat on the north side, exposed at medium & low tide, the reef-rock surface is flat with microsolution features, pointed enough to preclude these being extensive abrasion in progress at present. Tiny solution basins stained white in places with precipitated chalk. No photo. On this flat there is horizontal exploitation taking place, right through corals and other irregular material, giving smooth flat surfaces, which then start to be pitted again. Several stages of pitting visible in adjacent segments, showing relative times of exploitation [photo]. The material is a hard, very much consolidated debris conglomerate material.
1951

Marshall Dr.

Vidal #20 insects caught beating lids falle


Temp. of very small pond at 9:10 a.m. is 84°F of dry wind adjacent 85°F.

The inner beach is cined with tall Leucaena scrub with some Mesembryanthem. The north passage lead with strong wind beaten Leucaena with Terminalia guttaba. The outer beach has an extensive bare striped area, then, an area of Leucaena with Ptilocarpus more abundant on the outer edge. In extreme outer edge many Ptilocarpus scattered, only inner part with scattered shrub.

Taka atiff.

of Leucaena and Mesembryanthem. Then a belt of low Pisonia scrub (gradually merging around passage beating into Leucaena result of inner beach)

This belt giving way to Pisonia grove which occupies center of belt. This is an acre or two in extent. Trees wind-swept to about 6-7 m., trunks 3-4 dm. a less thick top forming a fairly complete canopy, still green but beginning to lose leaves in places. Tracing aren't 3-4 m., no undergrowth except occasional Pisonia seedlings a sprout, except in openings left by fallen trees, which are choked with spouts. Ground in grove covered by decayed twigs, soil black, in some places gum tough peat (sample #4), pH 5.5-6.5-7 Cm. thick in other places with admixture of pebbles, sand, etc. (sample #5), pH 8, always shallow, sand-lain by coarse coal gravel, pebbles, boulders scattered on surface. Pisonia root systems spreading just under surface, m (4.85)
Dec. 7 - Passage bet. Raujinn and Taka lilats.
At low tide there is a current of water a few inches deep flowing into the lagoon. The noble surface is dotted with solution basins, each with a handful of gravel in it, which has evidently partially filled the basins to a more or less hemispherical shape. The rims are elevated a fraction of an inch above the surrounding flatish surface.

33753 Dictyosphaeria cavernosa (tensor) Berg on boulder on reef flat
1 54 Cladophora or Spermatozoon (det. Taylor) lining interior of solution basins
2 55 ? Valoniopsis pachynea (Mart.) Berg in depressions in reef
1 56 Microdictyon okamarai Setch (det. Taylor) on pebbles and cobbles on reef flat
2 57 on reef flat outside of inlet

Taka atoll
Feb. 17
pronounced tap-root. A few trees tipped over by typhoon.
Openings around edges have fields and arches, separately, each forming low mound locally, in them, but openings mainly kept
by

Temperatures at noon in grave in m.a.l.t. 86° F., close to boulders 84.5° F., ground level 83° F.

Terms abundant, esp. 
Fairy terns - nesting
Noddies + fork-tails also present.
One white-thighed tern seen.

33753
1 54
2 55
1 56
2 57

(det. Taylor 1955) green.
1955) yellow felt, binding fine sand.
(det. Taylor 1955) pale green, very coarse

1955) green, in one plane.
holding fine sand in silt
in a fluffy, white mass,
reddish-pink on surface,

pink, thin coating
on rocks.

platic pot-hole.
Dec. 9 - Clute Islet

Bag sample contains screenings from surface layers of Meserschmidtia, Pachydiscus, and perhaps other snails, also sub-fossil marine shells.

Vial 13 - insects secured sweeping Leptus opens.

Vial 23 - animals secured around roots of Leptus.

Vial 24 - insects secured sweeping Hemia simun.

Vial 25 - animals from under Meserschmidtia bars.

Vial 26 - earthworms from under rotting coconut log.

Vial 27 - grasshoppers from grassy openings, common, spiders, larvae, etc., from under Pisonia.

Red filament, giving surface a slimy feel.

Jar #3 contains hermit crabs found up between stilt roots of Pandanus and a shrub, from Taka Islet, Taka atoll, a land crab found under a boulder on Raajewun Islet in Pisonia grove, shrub (mapped in 524) from same place; hermit crab from Lambie shell on reef between Taka and Raajewun Islets below low tide level; land crab found under coconut log, and gecko found under loose bark of dead Meserschmidtia tree on Clute Islet.

The land crab from Raajewun was generally dark purple, the one from Clute gray, brown, apparently stamended with light gray.
Sparse *Mesembryanthemia*

3741 Boerhavia in broken coral rock, in opening in coral reef sediments, red, stems red, flowers pink, plant infected with albugo.

52 Boerhavia x?

62 Boerhavia in broken coral rock, in opening in coral rock, also in coral gravel.

53 Albugo platensis infecting Boerhavia 33762

54 Fleurya undulata

55 Boerhavia

65 Boerhavia

Prostrate, leaves thick, white beneath, stems scarcely reddish, flowers pink. Plant infected with albugo.

Prostrate, leaves thick, stems white beneath, stems reddish. Plant infected with albugo, altering habit, elongate, prostrate, short, erect, stems flesh green, as red color.

Glen, dominant color on this islet, very little trace of red d'orange seen.

Prostrate, stems reddish, leaves scarcely thick, white beneath, flowers pink, not infected by albugo.
on seaward reef on south west corner of inlet.

1. cleat of Pyrolithus, down in crack in outer edge of reef flat, back of Lithothamnion ridge.

2. Cameraria aurillaeformis (det. Taylor 1935)
   - same

3. Pyrolithus
   - same

4. Growing on Pyrolithus

5. Saccophyaca includ. Ceramium, forming thin film on rock on inner half of reef flat between tides, holding fine sand

6. Pyrolithus gardineri (Fule) Fule & Gardiner

7. Saccophyaca includ. Ceramium, forming thin film on rock on inner half of reef flat between tides

8. Pyrolithus
   - same

9. Growing on taut with Pyrolithus

10. Lichen on bark of Mesereumidae, inside
Clock Inlet is about three-quarters covered with rather sparse Mesembryanthemum scrub, with some heath, especially along outer beach, scattered low, straggly Cushion, in interior, the scrub is places quite dense and tangled with fallen trees, in places open and with irregular openings. The southwest half was stripped bare by a typhoon, leaving in most places a thin gravel, with rock exposed in many places (see diagram). This gravel being colonized by feathers and hulodes.

The wooded part of the inlet is several feet higher than the denuded part. The southeast part is broken rock surrounded by a low ridge or rampart, the rock varying in size from small boulders 3-5 cm thick to cobbles, more a lean uniform locally, boulders scattered here and there, incl. large slabs of beach rock for inward.
Elude Inlet is about three fourths covered with rather sparse Messchneider scrub, with some seagrass, especially along outer beach, scattered low scrubby Pinus in interior, no scrub in places quite dense and tangled with fallen trees, in places open and with irregular openings. The southern side was finished bare.

Noted:

3 geckos and 2 eggs seen, under a bank of dead Messchneider, but not caught. Drains seen but not caught.

No honeybee and one bluebottle fly seen but not caught.

Otherwise no flies (or other insects) seen.
Taka Atoll

The Messerschmidt is mostly 2-3 m tall with scattered trees to 5-6 m. The Pisania is mostly in the central and eastern parts, the Beavera mostly in the western, sandy part.

The openings in the gravelly part have

Lepturus, Portulaea, and

Flevyna, the latter forming dense clumps
and patches, with

Beavera mats.

The openings in the rocky

part have principally

Flevyna stands,

some Beavera mats,

occasional Portulaea,

no Lepturus except very
locally in sand spots.

much bare rock.

The inner beach opposite

the gravelly part backed by

a low gravel ridge. The

losgon side of island

has much damaged by typhoon

with many fallen

a broken tree, all pointing

south. Many open places

some in center very sandy;

these openings in various

beach rock almost sand and

this inlet - gravel away. small

clumps of medium tall under hard with

beach rock both inward and

westward and dipping in gegen opposite

Rubble beach in gegen opposite

the east extending north

eastward.

Eastern Passage coast backed

with corals, drier half with

along seaward cast 1/2 &

north to my west.

Bays & lagoons beach back beach rock

has a gravel ridge with sand.

very mild but not caught

seen but not caught

mostly and no bluebottle

so not caught

grass mos here

on Taka atoll

many and those in grizzle

miller and filled with corals

Beavera, plenty.
1951 Marshall Is.

Stages of colonization by Lepturus and Patulasia, from abundant seedling in almost closed bunch grass. Many fallen trees in south mostly fallen to southwestward.

Total flora (as far as observed)
Messerichmia argentea
Lepturus repens
Fleurya nudaialis
Leucrrba frutescens
Patulasia lutea
Borehavia diffusa
Borehavia tetrandra
Albuca platensis
Piranta grandis
Coccus melleus (4 plants)
Triumpheta procumbens (1 plant)
(also lagoon beach)

Most of day thinly overcast, occasional clouds, gentle trade wind breeze.

Noon temperature:
Ground level in shade 93° F. x 91° F.
1 m. high in shade 86° F.
1 m. high in sun 88° 89° F.
Varies with brightness of sun and change of strength of wind.
Clouded over at about 4 P.M. breeze fresher, showers in distance.

Tabua Atoll

Oct 5-15 p.m. temperature
1 m. from ground 72.5° F.
on ground 73.5° F.
During a light shower, temp. dropped to 72.5° F. after, shower wore to 79° F. dropped to 78.5° then wore to 81°.

At 7:10 a.m. it was 81° F.
At 7 a.m. (Dec. 10) it was 81° F.

This islet is one vast term rookery, with thousand of sooty terns. Many Brodies (prob both species) and great numbers of fairy terns all nesting.

Ny is also lays egg

Noddies make nests

Of sticks and leaves, in trees and on ground on top of pebble flats, on end of island, in trees generally over island, young in various stages.

A. T. Wilson

A. Wilson
Taka atoll.
Taka - general.
No fish, seen here (except on cliffs which may have gone with us.)
One mosquito (Aedes sp.) seen on Taka island.
No flying birds, no flocks.
Plants sparse - no
Viharea, no Vunamaka, no
Upright, no Upore, no
Upright, no Upore, no
Upore, no Upore, no
Viral 66 - material collected
by teroscope funnel from
leaf-mold from under
Cenoria (CD, CD
Watercock, 9
Dec. 11 - Anchored in Lagoon
11 p.m. wet bulb 23°C, dry 28.5°C. (this wet bulb figure may be unreliable)
Dec. 12 - Anchored in Lagoon
9 a.m. wet bulb 26°C, dry 27.5°C. sunny with moderate cumulus clouds, moderate trade wind breeze.

Dec. 12 - Lady Islet
4 p.m. wet bulb 27°C, dry 29°C. sunny, clean blue sky except for clouds around horizon (up to 30°) moderate trade wind breeze.

11:50 a.m. almost clear sky, light breeze.
4 p.m. wet bulb 25.3°C, dry 24.5°C.

and passage seaward beached lined with dense seaweed composed mainly of becaurals, terribilis, and quattuor.

Dec. 13 - 8:50 a.m. almost clear sky, light breeze.
wet bulb 25.3°C, dry 27°C.
12:05 p.m. slightly more cloudy but still mainly blue sky, breeze slightly stronger.

same Pandanus and Orchizis.
Cohim passage beach.

7:10 p.m. same
wet bulb 26°C, dry 28°C.
10:05 p.m. sky almost cloudless.
breeze very slight.
wet bulb 25.3°C, dry 24.5°C.
Dec. 12 Libies, islet
cocoanut plantation, west
of village

on ground in path.
on base of cocoanut tree
in wet earth in small trap.

Dec. 12 Libies islet
scrub on passage, area, beach

Ochnasia oppositifolia
rare, in interior of scrub.

Terminalia saman, Rech.
common on edge of scrub

Cordia subcordata lam.,
once in a while passage beach

Baringtonia acinacea (L.) King,
fruit picked up on
outer beach, trees seen.

Cladophora sp. + Polysiphonia (det. Taylor)
abundant in drift, black, drift
at high tide, many
3378
Polygonaauus cinnabarinus

1
1
5 88
Dead pandanus trunk
Sauanu maritima
One plant in edge of beach sand
Outer Beach

Dec. 12 - Lodoi islet, south end
Open coconut grove, with
Grassy ground cover

5 90
Digitaria microstachys (Presl) Herr.
Common, dominant locally

5 91
Eragrostis australis (L.) Weh.
Very common locally

10 92
Hedyspor boleos (L.) Lam.
Local patches

5 93
Euphorbia characias Born.
One large colony seen

5 94
Fleurya nudiflora Gaud. et
Common, especially on
patches of rocks and rock

Vinal Point, Capoverts for coastal
Salt water at edge of passage
Beach at extreme low tide
(in separate box, for C. White)

Fibers atop

Bright vermilion

much branched
Large bush, 2.5 m. tall
Wet with salt spray
Flowers yellow

Rhizome horizontal
Usually buried; stems erect, sterile, of intermediate
from fertile to sterile; pods, culms weak but ascending
Shredding tufts

Prostrate, somewhat
dilated, when broken;
flower white, calyx tube
Globose, lobes little, spreading
Stems ascending
Milky; floral
Gland in gynoecium
Stems fleshy, red
December 13 - Lado Islet, south end.

Inner third of south, both of inlet extremely barren in appearance, lumps of petrified, feathery, flinty minerals, Triumpha, etc. Only luxuriance seen underhands some green grass and tree, whose seedlings very abundant. Largely mats here very sparse and yellow.

Soil profile #17 taken here, also with sample LW-1.

This hole is 175' south of passage beach, and 771' east of lagoon beach. At 1:30 p.m. water was struck at 5.5'. The hole was dug perhaps 6.5' deeper, in same material. Profile has 3 layers. Layer 1 - 0-0.6', is of fine reddish gray (5YR-5/3) sand under a pebble surface, with much pebble/coral in it, structure friable fairly compact, texture - fine sand with pebble. Layers 2 and 3, grass roots and some coconut roots. Sample 17-1

Layer 2 - 0.6-3.0', pinkish white to pink (5YR-8/2-8/3), some lames stained slightly grayish.

Layer 3 - white to pink (5YR-8/1-8/2-8/3) in a granular mixture. Structure loose, fine gravel with pebbles up to several inches across. Sample 17-3

Water at 5.5' (at 1:30 p.m.)

Sample LW-2,

84°F temperature, pH 0.9992-11, milky in appearance, taste perfectly good.

By 5:30 p.m. water level had risen to 3.9'

By 10:30 p.m. it had disappeared completely.

8:00 next morning 4.7'

Vial #29 - animals from surface of ground in this area. Two sp. ants, several shells that the ants were carrying.
The center third is a transition to the outer third. The outer third is also coconut plantation but not so sparse. Perhaps crown cover 40-50%. Ground cover is mostly complete except in local areas of broken coral rock (small pieces) with no sand, where foxtail becomes abundant, though mostly quite dwarfed. Otherwise the background is a mixture of heightum digitatum and jupurea, locally varying in proportions. The soil here is black, less archy.

There are large colonies of Wedelia and of euphorbia characias, smaller ones of Ericaric, amabilis, and especially of Polythyonium aspleniflorum. Small patches of Hedypodium very dense.

Vidal 30 - insects caught sweeping the grassy ground cover.

Libeck, Atoll

Water sample LW-1 is from a abandoned well in this area, with little water but at least 1' of soft mud in bottom, old coconut, leaves, etc. Strong odor of H2S.

Sample taken at 8:45 a.m.

79°F. hydrometer 0.9982

Well increased, at lowest point in general land surface but no depression to speak of.

This type of vegetation makes up almost entire main body of the atoll, with scrub forest belt along entire seaward beach, with belt of Wedelia just back of it, this ravishing greatly in width, apparently due to want of suitable soil, cleaning it out. Much burning.

Low mounds of broken coral scattered along entire seaward side of inlet in coconut grove. Foxtail grows on them. Apparently in such places only do it compete successfully with general ground cover.
Dec. 14  Sands Islet
6:10 p.m. wet 24.7°C dry 26°F
Calm scattered clouds.

Vial 31 - beetles in ripe
ead of sand dune fruit.
Brownish larvae but not larval
Vial 32 - bees - leaf cutter,
entering and leaving
holes in old drift wood
drag on outer beach.

Grasshoppers - common
in grassy ground
cover in coconut grove.

Mid south half of island
and longitudinal depression
perhaps 1-1 1/2 m. below general
level of island. Grass
fairly luxuriant here.
One just back of seaward ridge.
Soil profile #13 taken here.
Layer 1 - A horizon - 0-1.5" black
to dark reddish brown or
dark gray (5YR 4/1 - 2 2/8 3/1)
str. loose granular
texture coarse sand and silt (17)
with much coarse gravel.
Grass roots at top of coconut
roots in bottom. Sample 12-1.
gradual transition over
several inches to layer 2.

Layer 2 - 1.3' - 2.5' pink (7.5YR-9/1)
str. loose granular
texture coarse granular
sand with embedded
coarse fragments up
to several inches.
few coconut roots.

Abrupt transition to layer 3.

Layer 3 - 2.5 - 3.9' (4 hole not
dug deeper) water at 3.5'
str. loose
texture fine gravel
little included sand
material. Practically
no roots.

Water sample LW-2.
taste very fresh.
Taken at 1:13 p.m. 86°F (had
stood an hour or so after
digging finished).

Sp. gr. hydrometers .9977
at 87°F.
Air temp. 91.5°F in shade.
Dec. 14 - Fads Islet

Seaward reef, near south end of islet.

Reef flat of solution pitted rock sloping very gradually from foot of seaward dipping beach rock beds. Rock covered almost everywhere with a belt of algae, rather loose collecting and holding sand. 

One half of this has circular mushroom-like corals alive around edges (Ptites?), these becoming abundant near edge. Whole reef possibly 150-220 m. wide.

Reef flat, seaward reef.

33795 Cantergry, urrilliana Mont. (det. Taylor 1955)

Fairly common, in full sun.

1 96 Jania Cladophora sp. (det. Taylor 1955)
    tangled with other green reds.

    tangled with other algae on south flat.

1 98 Udotea indica A. and E. Stepp (det. Taylor 1955)
    with other small algae tangled with Cantergry.

Liberty atoll

Outer 10-15 m. is a ridge, up to 1.5 m. higher than bottom of flat behind it. Of several species of coralline algae, mainly of compactly branching head-like types, bright rose-purple color; ridge very irregular, cut by deep surge channels. Just behind this are jagged remnants of a higher reef surface, up to 1 m. in even more above flat.

Green, turning yellowish, creeping, adhering closely to rock bottom.

Outer part green, cells very large.

Green, opaque.
1951 Marshall Jr.

Laurencia? perforata (Beyg) Mont.
common on outermost part of reef
(oc. Taylor 1955)
occasional or middle part of reef
(oc. Taylor 1955)
Flats of Laurencia, Caulerpa, etc., near outer edge of reef
(F. Taylor 1955)
forming dense felt or meek flat, holding sand.
on Lithothamnion ridges

Dickiosphaerion sp. (F. Taylor 1955)
in interstices of Parolithon

Cavernose
on clumps of Parolithon

Laurencia? perforata (Beyg) Mont.
on clumps of Parolithon

Porolithella variegata Lips.
on clumps of Parolithon

middle part of reef flat
forming felt on loose cobbles, collecting sand

Flickr Atoll

small pink tufts.
(Taylor 1955)
flattened, curved, often nest-like, green.
(Taylor 1955)
reddish tufts. (prob. more than one species involved).
possibly not growing mixed, but mixed in collecting trail.

bluish green

juveniles?, green cells large, turgid.
dark red, tene.

forming yellow-brown, ahin green, Parolithon, closely coherent, like paint.
116  Marshall Is.

central part of island, grassy ground cover
under coconut trees
prama obtusifolia (Rox.) Bux.
a few trees in central depression
vigna maria (Bon.) Merr.
large patch near lagoon
hibiscus tiliaceus
single tree near center of island in depression

24  more
on lower side of leaning
coconut trunk

25  cleocharis obesa (Wtld.) Schult.
on bare desiccating
mud of long-abandoned
two pits.

26  drying crust on bare
muddy bottom of
long-abandoned two pits

27  on side of well depression

28  on vertical side of well
in small bushy trees
wetlandia capensis
around edge of well near lagoon

centella asiatica (L.) Urban
local, near lagoon beach

30  grass

31  in well on gravel
and floating in well in use

117  Library at G.

small bushy trees
5 m tall aromatic
when broken
prostrate peduncles
fruit flowers yellow
spreading stripe 8 m tall branches reaching
ground; flowers yellow
with maroon tents,
tufted

yellow-green before

drying

prostrate, purplish

prostrate.

moisture.
Phyllanthus minor L. 5

common locally around well

22 Ephyration

in water of well

Leaf sample 19 - great...from upper 6" in bottom of old long-abandoned well pit, tough, dark brown, root-filled.

Two old coconut trees growing in bottom.

Bottom bare of vegetation except for a few bits of Eleocharis and an algal skin, desiccating.

Side slopes with Fimbristylis, etc.

Soil beneath peat 5-6" gray.

This from north central part of island. A number of such pits more or less identical.

A few show some recent digging and these show signs of hog-swallowing.

Vegetation open coconut grove with thick grass ground cover, mainly Digitaria, with scattered Taca (some tubers seen

Libelula atoll.

Erect.

green, very slimy

Harvested here, scattered patches of Polyodium, large areas of solid Ephedra chamissonis, occasional trumpets, Pandanus scattered in grove.

- Clelandia

Wedelia belt along inner side of seaward ridge, inside scrub belt, in places much wider, tangled with young. Some areas show results of burning grass. Fire apparently originating in burned fields of coconut rubbish are burned.

Central depression in southern central part has Frumus, Hibiscus, breadfruit trees.

Breadfruit and Calophyllum around region of dwellings in south central part, lagoon half.
Dec. 15
4 p.m. almost clear sky
gentle breeze
wet bulb 25.3° C dry 28°C.
6 p.m. almost clear sky,
almost calm.

Central part of inlet
several water holes
some mosquitos container
Vial #33, and many
Cyclotis from a well with
togo coconuts and
leaves in it - Vial #34.

North end of inlet
A old barn still in
from passage beach - with
recently cleaned, then
apparently abandoned.
again coconut seedlings
in well in it. - Eleocharis
and Cyperus abundant.

Lithi atoll
1.5' deep sample from
to 10". pH 8. (3 tests, bung.)
This depression is
much more extensive
than the recently cleaned
part. The rest is a
ridge of Pemania and
Clusia rhedendron.

North tip drawn out
into a finger like pro-
gression, quite narrow.
Presidential wall, very open
coconut grove. ground-
cover, much Eugenia.
Distal half with kore
undergrowth of Weeds
becoming denser toward
tip, beach flanks complete
on seaward facing side,
leading around perhaps
1/2 the way on the lagoon
side, sparse here.
Beach rock dipping
outward lines beach
on both sides. Near
distal end of lagoon
side is an outwardly
curved curve, following
for a short distance the
inward-projecting sand
spit extending from the
point.
Dec. 15 - Islet nr. of lads, surrounded by sea-girt scrub with some bushes, etc. Sparse coconut grove, inland, with sparse ground cover of Fimbriastylis, much bare ground showing, with algal crust.

Coconut with almost no influence, some of them very slender, and abnormal, mostly healthy looking but just not producing nuts.

Soil sample #21 from grove soil, at least 11'-deeps.

Coconut stems, leaves stiff.

Passage between islet and lads has reef rock eroded away seaward from lagoon in an irregularly scalloped manner, with an under-foot shelf on inner side, mushroom rocks. Surface mostly very deeply pitted, tall rims around solution pits. Part near lads has some loose detritus and has sharp edges abraded off.

Brown, firmly gelatinous, solution-eroded & with cross-section. Origin not evident.
Dec. 15 - Lads Islet

37. Halimeda
   - bottom of lagoon end of south passage

38. Halimeda
   - bottom of lagoon end of south passage

39. Tacca leontopetaloides (L.) K. Sch.
   - open coconut plantation

40. Artocarpus altifolius (Pak.) Forb.
   - scattered near dwelling, seedlings numerous under parent tree.

41. Thunera pavolata (Font.) R. & S.
    - occasional in grass ground cover

42. Encephalina heterophylla L.
    - common very locally, near cemetery

43. Catharanthus roseus (L.) Don
    - in cemetery

44. Fida fallax with one plant seen, in coconut grove

45. Cyperus odoratus L.
    - small colony in sandy soil in old taro pit

46. Clerodendrum inerme (L.) Gaudin
    - thicket in old taro pit also along inner edge of beach stumps

47. Pemphis acidula fast.
    - one till on extreme west point of island on sand-swept beach rock

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Loloe, Atoll

38. May-green, rooted in sand
   - flowers green, filiform
   - tree 8 m. tall, sap milky


40. Erect; hairs partly red.
   - flowers white.

41. Tangled, spreading shrub, forming masses up to 3 m. tall.
   - flowers white, with maroon stamens, style
   - flowered old tree, 7 m.
   - leaves, elliptic, opposite, flowers white.
1951

3.898

1. Portulaca sandwicensis

common in thin spots in ground cover on

sand dune soil.

2. 49 Premna distylica R.Br.

Local around old
taro pits and depressions
in center of island.

3. 50 Bryophyllum pinnatum

Local around
depressions in

center of island.

Dec. 16 Lihuep Islet

4. 51 on surface of met soil
in old taro pit.

5. 52 Pisonia grandis R.Br.

a few scattered trees
in beach scrub forest

6. 53 Guadua

two plant seen in taro pit

7. 54 Paragala viviparum

abundant in and around
taro pits

55 on dead part of Pisonia
in beach scrub forest

56 on banks of dead part of Pisonia
tree in beach scrub forest.

57 Canna subg. Microcyclus

in inner edge of beach

scrub forest.
Russellia equisetiformis. Occasionally cultivated around houses.

Cyperus javanicus. Have are around buildings, lagoon side of island.

Dec. 15. Laths Islet.

Barteringonia acutifolia (L.) Korth. at top of beach possibly from drift seed.

no nothing coconut petals.

Vial 35 - insects picked up around camp. Termites had collected on bottom of a wooden box but had made no burrows.

Dec. 16. Libriy Islet.

Vial 36 - animals found under bank of dead part of Frangipani tree in beach scrub forest - lower layer. Upper layer - cylindrical scales found on scarola leaves.

Libriy Islet

plant callistepus, stems arching - procumbent. flowered small tufts.

seedling c. 5 m. tall.

Vial 37 - orb weaving spiders.
181

130

Marshall Is.

Dec. 13 - Islet just inside passage - sand piled with few coconuts. Further...

Islet to right of passage - sand dune on inner curve next to passage. Little beach scrub except in front of passage beach, some along leeward beach. Islet is left. Passage beach well lined with laeversa. Leeward beach has laeversa pinge. Over of Messenoiotinia just inside it. Cocos close to beach.

Low cliff of rock below seaward beach at mid-tide (?). (1:45 a.m.)

Measured height pieces of Russelia aquataifolia, Calanchea rosea + Euphorbia heterophylla from Eniwetok.

and reputed a mangrove depression, apparently with Bruguiera, on Jeltenot Islet.

Libouchet atoll.

Viewed from sea as ship went by.

→ south end is low scrub for about 1/4 the length of islet, scattered coconuts on distal half.

→ 1/2 small islets between this and Libouchet - well wooded with a few coconuts. The second and fifth only have low scrub.

Libouchet Islet - Leeward beach, with scrub lining the whole length except for a short stretch near W. end. The 1/2 on the east side, the village is low and sparse, seen from the sea.
Dec. 16 - Liber, Wet.

East passage beach has areas of shingle with no vegetation. Masses of Pandanus forest backed by Pandanus forest between shingle and coconut plantation.

Cocnut Plantation at this end of island has very rocky soil - mostly broken coral. This becomes a shallow blanching soil further north then varies to broken coral with sand that has not much organic matter. The north end of the island has partly this and partly blanching soil.

The coconut are at a moderate distance apart. The ground cover is generally grassy-lepturus, Digitaria, and Timonstylis, ranging in proportions, one other dominant. Locally but sometimes in large areas Euglyphite, chamosis become dominant almost pure stands.

Fihie, Atoll

Polypodium scolopendria forms colonies especially under trees. Wedelia forms patches locally, as does Liana macra and Carvalia minor. Trumpet flower occasional especially near lagoon. Taccia is occasional, especially inland. Cassytha forms mats here and the Pandanus is scattered in this plantation, as...
Dec. 16 - Libeau, Inlet
east passage beach
has areas of shingle
with no vegetation
Mesemachypsis forest
backed by Pandanus
forest between shingle
and coconut plantation
Coconut plantation
on this end of inlet
has very rocky soil-
mostly barren and
this becomes a shallow
blackish soil further.
belonging to Anton de Bruin, who says that several years ago there was a revival of interest in taro cults, but that it has died down now and all kids have been abandoned but this.

Further west, where the soil is poorer, the ground cover becomes very thin. Intulacca santeri, becomes common, as does Chamaecrista lanceolata, and Oenopordi; amabilis. There is a colony of Rhus discolor established.

Near east passage, bank of village, is a large open grassy space. Here, there is better soil, not deep (clay?), but black. Used at one time as a baseball diamond.

Along seaward beach, directly back of village, for at least 50% of length of this coast (east) there is a sparse mixed scrubby forest belt at least up to 30-40 m. wide. This has grassy

...
about 200-300 m. from end of east point, coastal shore and vegetation is mixed forest of Quettinda, Mesembryanthemum, a few Pandanus, a few large Lecandolia undergrowth, tangled with weed.

Theget, lower shalow, and lizards become Lecandolia scrub, then disappears about 50-75 m. from point, except as Lecandolia somewhat follows the cobble ridge around vicinity of tide area. This line from point is illustrated with its complicated series of beach rock in the accompanying drawing.

1951 Marshall In.

January 14: Lizards from Lake, 5.

1951 Marshall In.

Chief At C

Chief - general: birds seen.

Common molly, tain teens (occasional), Golden Plover (occasional)

(Dec. 15) flock of 4 m. near flat at first

(Dec. 16) Linnets (several small flocks seen, one of 7 birds in chief).

(Dec. 17) One white seel-hern (led)

(Dec. 14) One New Zealand Tuhoro (Chief seaward beach)

Rats (? R. exulans) on both sides and Chief.

Lizards - shink:

geckos (not caught)
big green
large geckos (not seen but reported by Father McCarthy)
large black shink (not seen, reported by Father McCarthy)

Pigs, chickens, dogs, cats, humans seen on Chief.
1951

Dec. 18 - at home
2:35 p.m. sky mostly
overcast, gentle breeze
wet bulb 27°C, dry 28°C.
3:45 p.m. bright, partly
cloudy, wet bulb 25.5°C, dry 26.5°C.

Flock of 15 frigate birds
seen (breast white) midair.
1 hula, 1 dodo, 21 hula hawks
seen near islet.

Common noddy occasional.

Fairy tern occasional.

Bird, obviously common,
judging from staining of trees, leaves, and ground by guano.

Vial 98 - scorpion found in
same place, injected caught
around light.

Jar #5 - snails found
upside down, light
level crab found
in same place. Hermit
crab found at top
of beach. At least two
species of land crabs,
the flat ones not found.

Land filled quite
high on east side. One
there is much fine
gray to black pumice,
in pebbles from minute
to several inches thick
(sample #11), several
of which (sample #21)
are covered partly by
a mat of roots - not possible
to say what kind.

Two large cabbages of
a coarse black scoria
pumice, very moist -
also found (sample #24).

In box of jews insects
- molting that came to
light. Also snail
shells found at edge
of terrace spring at
top of beach.

Far from beach, the
thick purple men found
anywhere on island.
Lizards, shrimps, very
common, especially
around house, mostly
on ground.
Undisturbed beach showed 44 turtle tracks fresh enough to still show footprints, indicating that at least 22 turtles had come up to the top of the beach to lay eggs. Depression in the ground indicated where eggs had been deposited. (Photo of tracks)

Went out at 7 a.m. Found only two new tracks; found the turtle that made them heading back toward the sea. Turned him over to be photographed in the morning. He was very large and heavy, measured over 30" across and 4' from nose to tip of tail (head withdrawn in). No new tracks in the morning.

Dec. 19 -
Vial #4 - Larvae with cases were on decaying coconut leaves forming side wall of bank of house common ants in Rhizophora. mimic plants (same as in Vial 29). Crab-eating spiders between young coconut seedlings. F. Pisoc; seedlings, etc.
Dec. 19. - mostly cloudy, frequent showers and for short periods almost calm, wet bulb 27.3°, dry 28.3°

higher cloud, moderate breezy
wet bulb 26°C dry 27°C

Pisonia grove - extends in a narrow belt along the west side of the island on the high ridge back of the beach. Taller 60-70' tall, up to 13' circumference, breast high (large branches below the one measured), 8-20' apart, canopy almost complete, no undergrowth except Pisonia root sprouts. Ground well stained with guano.

Soil profile: '25 (pasted paper)
3 layers - 2', not dug deeper.
Layer 1 - dark reddish brown (5YR-3/2-2/1) 5'-0.5'
structure - tough, but very friable when crushed.

Texture - very fine, great but with many voids, pH 6.5. Sample 25-1.
Layer 2 - matrix, very dark gray-brown (10YR-3/2)
grains white (10YR-3/2)
structure - weakly cemented, some parts can be crushed by strong pressure from fingers.

Texture - cemented coarse sand, forming a soft rock, pH 7.

Layer 3 - 0.8-2' (60% not dug deeper), very dark brown (10YR-3/2) with tiny white grains.
structure - loose.

Texture - sandy loam, with gravel, becoming more mucky downward, pH 8.

Another partial profile, '26
Layer 1 - 0.1' dark reddish brown grey (5YR-3/2-2/1)
structure fine and texture fine powdery with many roots.
PH 4.5 (sterilized)
Sample 26-1

Underlain by a coarse cemented muffle of fragments of cemented material.
1951 Marshall Is.

with a very dark brown (10YR 2/2) matrix and white grains. Sample 76-2 located not far from #25.

The material in the second layer, these samples may well be cemented by phosphate. It seems characteristic in and immediately around the Pisonia grove.

At the north end the Pisonia grove has a grass ground cover.

Vial 29 - around roots and in depression @ in base of Pisonia - ants had nest in this depression about 0.9 m. above ground. Cotting and bite vicariously. Insects in same depression and in litter on forest floor. Pupillid mostly in piece of rock that seems to be the phosphate cemented matrix of samples 25-2 & 26-2. Thaumatocnemis, on dead Pisonia leaves and twigs in depression on trunk. Orbita on ground.

Jems Island

Coconut grove - rather closely planted but with some sparser spots. Ground cover of lepifera, grumiflora, etc.

Soil profile 27 (partial profile) 0-3+ four layers:
Layer 1 - black (10YR 2/1)
0-10.7 cm pH 3.4 (true)
Structure - crumbly
Texture - fine "silty" or with some gravel, grass roots, some coconut roots. Sample 27-1.
Layer 2 - black (10YR 2/1) with conspicuous white grains. 0.7-1.1 cm
Layer 3 - salt pepper mixture of dark gray (10YR 4/1) and light brown gray (10YR 5/2) 1.1-2.4 cm
Structure - loamy sand
Texture - loamy sand
Layer 4 - very dark brown (10YR 2/2) 2.4-3 cm dark peat with lake bottom. Structure - loose. Texture - very coarse sand.
Corrug grave on west side, adjoining
bignis grave also
where house is situated,
has a great many
Carica papaya in second
story, along with a few
pandanus. Tapsi is
common; Canavalia
local; weeds such as
Eragrotis, Cenchrus,
Euphorbia prostrata, etc.
local. Most of second
story (n an intermediate
story be t, a second and
ground floor, is a
great number of coconut
seedlings about 7 m.
tall (5 t if of leave). A
few trees of several years
ago, most rather tall.
Many mut, or tall ones.
About the house is a
veritable weed - patch
Cenchrus abundant. Digitaria
also, Euphorbia hirta, Carica
Physalac, Phylanthus
minor, and various
obviously planted species,
ind. Anthericum, Clusia,
Clusodendron incum,
Pseudanthemum, agave.

Jenio Island

Many common birds,
seen flying overhead.
Dove Galiniers, are a
tu birds, and in
evening several frigate bird.

Vial 41 - ants on morning
leaves, lava albimis
Tree. Spider on beach.
Platted on ground in opening, mud

Vial 42 - insect, on
small staminate
Carica papaya
influencees.

Bumalooidea on laccola
leaves - these with
leaves very seriously
eaten away in spots.
Coccinellids also on leaves.

Ants, blue chrysomelis
in fungi under bank of
standing dead coconut tree.
Dec. 19 - in coconut grove around house.

2. Aloe sisalana Prm. a few plants around house.

3. Triumphaea procumbens Fr. & F. very common in ground cover.

6. Lepturus repens v. very common in ground cover, pure stands locally.

8. Plumeria rubra L. planted around house centered var.


11. Clerodendrum indicum (L.) G. Don planted (2) near house.

12. Cenchrus echinatus L. abundant, especially near house.

19. Phyllanthus niruri L. abundant, especially near house.

20. Digitalis microbacea (Poir.) H. "abundant in ground cover.

21. Calopitys pinnata pinnatifida planted around house. (also seen as germinating beach drift).

57. Physalis angulata L. common weed, especially near house.

Juno Island

sterile rosette; leaves green, very fleshy;
main stem prostrate; branches ascending;
flowers yellow, opening at about 4 p.m.
tangled mats from prostrate rhizomes on erect branches.
small tree; flowers cream, white with yellow inside, fragrant;
small tree up to 1 m. tall;
leaves purple beneath, dark green above; sterile small thicket; sterile ascending to erect;
fruits, up to 1 m. tall;

quarrel cut back small tree; sterile;

extensive sprawling herb; flowers pale yellow, slightly reddish in throat.
39 73 Euphorbia linta L.  common around house
5 74 Euphorbia petaloides Hook. very local in sparse places
6 75 Euphorbia amabilis L. occasional patches in ground cover, especially in interior
5 76 Elymus occasional clumps in openings
Dec. 20 - sam.
2 77 Tacca leontopetaloides (20k) common in plantation, coconut grove
5 78 Morinda citrifolia L. common in grove
5 79 Goechharia common generally
5 80 Flerunia violacea gard. common locally in rocky areas in center of island
5 81 Goechharia very local in openings
2 82 Canele papaya L. very common on west side of island in coconut grove.

Fern Island
sprouting at base, erect at tip, prostrate, purplish, spreading tufts, clumps, almost erect, aculeolate, leaves and scales erect, island 3 - 4 m. tall, leaves glossy, flowers white, fragrant, fruit white, forming large mats, flowers pink, erect, stems green, fleshy, prostrate, green, flowers pink, erect, single-stemmed, erect with great rosette of leaves, flowers cream-white.
Sisamia grove along west side — in queen
parts towards south
and Lepturus in
place forms a ground
cover. Small colony
of Cordia near beach.
In south part Messenschmid
becomes common, some
of trees almost as tall
as the Sisamia.

One Sisamia has several
booby nests in it and
quite an accumulation
of guano under it.

Utile profile 28 taken here.
Layer 1 - 0.0 - 0.1
- very dark
brown (10 YR - 3/2) pH 5.0 (25% water)
slightly friable, slight
workable
light fibrous, not filled.
Sample 28-1

Layer 2 - 0.4 - 0.7
- color variable
light and brown granular,
averaging yellowish-brown
(10 YR - 6/4) pH 8
structure — weakly consolidated
remaining under strong
pressure from fingers
Texture — coarse sand, cemented
Layer 3 - 0.7 - 2
- very dark
gray-brown (10 YR - 2/2) pH 8
with light grains
structure — granular

James Island
texture — cramy sand.
sample 28-3
Eucalypta subcordata Lam.  

Small colony in at seaward edge of grove, not seen elsewhere.

On bank of Pisania.

On bank of Pisania.

Messerschmittia argentea (T.)  
At top of beach at edge of Pisania forest, fairly common in forest especially toward south end.

Leucadendron scrubs on south end of island.  
Leucadendron cristatum (Mill.) dominant in.

Low forest 3-5 m tall, principally Leucadendron, but with occasional much larger Messerschmittia trees.  
Ground cover: Sphagnum scattered with pebbles.  
Soil profile B9 - 5 to 0.5'

Layer #1: Salt + pebbles, averaging pale brown (YR-4) becoming lighter downward.  
Structure - very loose texture - sand, some silt.  
Sample 75-1.  Gradually changing to

Layer #2: 0.5 - 1' (layer becomes so abundant at 1' as to obstruct digging)  
Structure - very loose texture - sand with pebbles and cobbles.

This area about 1 m above

Jens Island

tree 6 m tall; dry fruits
only.

tree 5 m tall (others up to 15 m); fleshy leaves; flowers white.

Small tree, leaves light green; flowers and fruit white.

Layer #1: Salt + pebbles, averaging pale brown (YR-4) becoming lighter downward.
Structure - very loose texture - sand, some silt.  
Sample 75-1.  Gradually changing to

Layer #2: 0.5 - 1' (layer becomes so abundant at 1' as to obstruct digging)  
Structure - very loose texture - sand with pebbles and cobbles.

Below level of sampling.
1951 Marshall Is.

Coconut grove, just inside pisonia grove.

Cassavia microcarpa (Dictaphyllum)

Common locally.

Open ground toward east part of island, openings covered by triumfetta and Bocconia mats, broken by large scattered brush, some patches of lepturus.

6. 69 Cassavia filifera, l. H. x

Rain, fringing mat, parasite on lepturus.

2. 90 Ipomoea tuba (Schiede) Don

Common in openings and on bushes surrounding.

This area is of sand, apparently blown with the top of the east coast dunes ridge. Soil profile # 30-

Layer 1. 0 - 0.6' fine sand, almost achenes, grains very dark gray brown (10YR - 3/2), light brown pale brown.

Jenis Is.

Small areas where phosphate cemented rock forms surface must have been site of trees with many bird nests, before clearing, which have lost great layer. (Sample 31-32)

Vine climbing over shrubs and spreading over ground; flowers purple with very strong fragrance.

This area, formerly covered by coconuts, a rotted trunk and some standing dead as common. Small clumps of young trees.

Stem, green; fruit, pale green, not quite ripe.

Vine, trailing on ground; flowers white.

(10YR - 6/2)

Texture very loose.

Lepturus, sandy sand

Sample 30-1 changes gradually to

Layer 2. 0.4 - 1.4' very pale brown (10YR - 7/3 - 8/3). Structure very loose.
1951

rather abruptly 5
layer 3 1.4 - 3' (evidently
aborted A horizon) very
dark gray brown (10YR-3/1)
with mixture of variously
lighter grains, general
effect (10YR - 4/1).
structure compact but
very crumbly Granular;
texture creamy coarse sand
texture becoming somewhat
coarser, structure coarse,
and color lights below the
top 0.5'. Sample 30-3

layer 4 - 3? 3' un
soil (7.5YR - 2/4)
structure very loose
Texture coarse sand
with some gravel.
(Value dug no deeper)

Messerscandida - Iaevola
forest or east side -
thick forest little or no
ground cover - filled
with dead or living
leafless branches & sticks
in open places some
tall growth. Terminalia common

3797 Terminalia samanensis Beck.
common, especially in
open places.

Jens D.

Dec. 20 - to 10:45 p.m.
half clouds, moderate
breezes, slight shower
in progress
wet bulb 25.5°, dry 25.5°.

Dec. 21 - 2:45 p.m.
slightly mostly cloudy,
occasional periods of
sunshine, fresh breeze.
wet bulb 27.3°, dry 28°.

Vial 43 - animals found
in leaf mold in mixed
forest on sandy soil.

Vial 44 animals found
associated with
Messerscandida, caterpillars
eating leaves & flowers,
cotton or bark (obviously
same as caterpillar), small
ants in complex galleries
in dead stub of large tree.

Remains on surface of
felled living tree, in decaying
depression filled with dead leaves
shrub 1 m. tall (others to
3 m.); all seen sterile.
Dec. 11 - Mixed forest on north side of island, on dune sand.

1. **392**
   - dead *Messerschmidia* stick

2. **933**
   - Trentepohlia
   - *Messerschmidia* bark, expansive exposed to spray-laden wind, spreading herb, up to 0.8 m. tall, several m. across; flowers rose-purple.

3. **94**
   - *Achyanthera* relative to H. A.
   - in undergrowth inside beach ridge

4. **95**
   - *Pisonia grandis* R. Br.
   - common component inside beach ridge

5. **96**
   - dead *Messerschmidia* twig, scrub on s. point of island

6. **97**
   - Guettarda species b. very few plants

7. **98**
   - *Pisonia grandis* R. Br.
   - dominant in forest on ridge back of beach

8. **99**
   - *Coccoloba armata* L.
   - planted over most of island

---

Jems 3.

orange color.

spread herb, up to 5
0.8 m. tall, several m.
across; flowers rose-purple.
tree 18 m. tall, bark cream-
white, leaves light green;
flowers green.

shrub 2.5 m. tall, flowers
white, fragrant, Diaz
fruit white, sweet
but with bitter after-taste.

tree 12 m. tall, fruiting
corne dry, mostly
attached.

young tree, trunk 2 m. tall.
leaf 17" long, specimen
taken from center, concave
side of leaflets down.
Dec. 22 - 12:15 p.m.

Broken cloud, fresh breezy, wet bulb 28°C, dry 30°C.
11:00 a.m. clear except for occasional small cumulus clouds. Wet bulb 27°C, dry 30°C.

3790 P. tectinus Pp. 2
  near house (probably planted)
  01 P. tectinus altillus (Pp.) Feb. 01
  one plant planted near house

02 fungous
  on base of dead coconut tree

03 Acantharia
  common under and protruding from bank of old standing dead coconut trunks.

Vial 50 - larvae, isopods, spider
  under side of phosphatize, whole
  in coconut plantation (note single different snail - bright orange color)

Vial 45 - all weaver in fruit and scrub generally; moth in ab weaver's web;
  aphids and cricket on Abvernon schmidtii, under dead bails. Grasshoppers
  caught around lights.

Vial 49 - Thrips (t) inside tracts of P. tectinus inflorescence.

1951 Marshall J.

June 7

tier 5 m. tall,
  sapling 7.5 m. tall.

tan - color, fragile,
  no definite form.

dull pinkish purple or mauve, when young and fresh, protruding
  partially; crumpled appearance.

Vial 46 - Caterpillar on
  Phyllanthus minori
  (also seen on bread)!
  small insect, on September,
  from wearing.

Vial 47 - on phosphate
  rock in Vician forest -
  snails, etc. eaten by butterfly.

Vial 48 - Caterpillar on
  ground in open, under
  small grasshopper, on decaying paper
  Overhaya species, large, black, and light.
Sample #33 - phosphatic rock, with large pieces exposed on surface in coconut grove, in various stages of weathering - some seemingly very hard.

Sample #34 - surface screeing from under dead leaves under tall rainforest scrub in open area on east side of island.

Sample #35 - screenings from under Pandanus tree in coconut grove.

Sample #36 - screenings from under Pisonia tree in mixed Pisonia - Messerschmidt forest on east side of island.

Vial #52 - orb weaver spider, both in same web, 38 between two coconut seedlings, flies around fallen Pandanus fruit, near house. Not numerous enough to be annoying.

greenish black

tue & m. tall, fruit still hanging in tree, but dry; flowers surround ed by green tipped white halts.

tue & m. tall, fruit ripe, yellow at base, edit 6, sweet, fragrant.
Jens is egg-shaped, about 3/4 mile long from Par. 240.

The reef flat is narrow, perhaps 50 m wide, on the west side wide, on the north-west and south-west, east extending 3 miles a mere as a long reef of irregular width, on the south-east about same width as in north-west, on south projecting almost the length of the island as shallow water. (observed from color of water, also from aerial photo.)

The long reef extending east shows most peculiar cross-channels on the photograph, possibly a reticulate arrangement of surge channels.

During the time of our visit there was a heavy surf all along the north side of this reef, more at all on the east side.

The island, proper, is almost completely surrounded by a beach-rocks a calcareous sandstone, in all places dipping seaward, and where the contact could be seen, resting on, and pinching out, the reef-rock. One exposure shows a wedge-shaped bed of conglomerate with small water-washed pebbles between the sandstone and the conglomerate, as accretion-like reef-rock. This section was thus:

---

Only on the south end of the south-east coast does this rock protrude at all above high-tide. Here the cuesta is possibly a foot or two above high-tide, with a trough behind.
it toward the island.

The weathering of this rock is apparently a combination of solution and abrasion by the load of pebbles and coal fragments that is washed back and forth by the waves. The resulting pattern is a combination of pits that have become small pockets and channels that have rather rounded bottoms, the sharp edges of natural pitching and in most places worn down by abrasion. Possibly the texture of the rocks a little coarse as coal sandstone, may contribute to this effect.

The diagram shows the arrangement of the beach-rock indicating strike and dip nearly as it was possible to determine them with one station point, located on a base map.
it toward the island.

The weathering of this rock is apparently a combination of solution and abrasion by the load of pebbles and cobble fragments that is washed back and forth by the waves. The resulting pattern is a combination of pits that have become small potholes and channels that have rather rounded bottoms; the sharp edges of normal pitting and in most places worn down by abrasion. Briefly, the texture of the rock, a blue sandstone, may contribute to this effect.

The diagram shows the arrangement of the beach-rock, indicating strike and dip. It was helpful to determine them with as few as possible, located in a beach map.
The beach around most parts of the island is of fine white sand, with a rather steep slope between beach-nod and high-tide mark. At high tide, it usually forms a terrace of varying width, widest on the west side. Above this, it slopes up to the dune ridge. Roughly, this profile is as follows (with variations in width).

Around the south-east point the slope above the beach-nod is a cobble beach, extending up to the general level of the end of the island, about 2 m. above high tide. No noticeable ridge here, only a slight one toward west end of cobble beach. These cobbles are very much water-worn. Among them in the east beach, slightly north of the middle, is a light deposit of pebbles and cobbles extending for a short distance on the upper slope of the sand beach. Here we found two cobbles of black pebbles or heavy pumice, very coarse-grained, but doubtless light enough to float. Much fine-grained pumice is almost black, giving the sand here, tiny bits to pebbles the size of a fist.

Around the entire remainder of the island is a low ridge varying from 4 to 5 m. in elevation above high-tide mark. On the east and north coasts this ridge is of dune sand, falling away as much as 7 to 8 ft. The flat within. On the west side it is probably fundamentally dune sand, but has been greatly modified (see next note). On this side, it is being very slowly cut away by wind and wave in the windward side it seems.
This is underlain by a cemented layer of coarse sand and a fine silt, the Matrix being dark brown, probably phosphate lode, from the guans. This is underlain by dark gray or black sandy loam. The phosphatic and loam layers are pH 8. This belt of forest is 30-40 m. wide. Forward from this, to the center of the island, is coconut, plantations, very healthy and luxuriant, with a discontinuous layer of the same phosphatic rock just below on the surface, in places concentrated on the surface in low mound-like accumulations. This area probably marks the former extent of the Pisonia forest.

This coconut grove has a ground cover of leucaena, thin in rocky places (see above), in these "eleucaena" is common, also Behnia, which occur here and there, locally trumpets procumbens dominates also fair-sized areas of
Digitaria microcarpa, smaller patches of Cenchrus echinatus (especially near house) and Physalis angulata. There is a story of seedling coconuts, about 1-5 m. tall, in places very dense. Apparently one coffee has been made here recently. A discontinuous third story 3-5 m. tall is made up of Carica papaya with some Morinda citrifolia and occasional Pandanus. Large patches of this undergrowth are tangled with Chavila mangle, forming a loose mat on the ground and covering limbs and low trees.

Around the house, which is in a tiny clearing in the grove, is a collection of weeds, mostly (but not all) alternating in all directions from the house. Euphorbia hierta, Cenchrus echinatus, Physalis mirabilis, and Physalis angulata are very common. Fragrant amabilis is here but becomes common farther away from the house, in an

fallen one. The ground is mostly covered by a thick mat, three feet, of
Jeltomat

C. aegyptiaca mabili

A way of life

Mangrove in depression
Digitaria microstachya, smaller patches of Cenchrus echinatus (especially near house) and Physalis angulata. There is a row of seedling coconuts, about 1-5 m. tall, in places very dense. Apparently no coffee has been made here recently. A discontinuous third story, 3-5 m. tall, is made up of Canica papaya, with some Morinda citrifolia and occasional Pandanus. Large patches of this undergrowth are tangled with Chamaedorea micromyxa, forming a loose mat on the ground and covering palm and low trees.

Around the house, which is in a time clearing in this grove, is a collection of weeds, mostly (but not all) attenuating in all directions from the house. Euphorbia lathyris, Cenchrus echinatus, Festuca plantha, and Physalis angulata are very common. Fragritos amabilis is here but becomes common away from the house, in the coconut grove, while Euphorbia lathyris and Ecliptica indica (a gigantic form, reaching 4-5 m. tall) are only found occasionally away from the house in the interior. Trees is common 1-2 occasional, generally. Around the house Plumeria rosea, Pandanus atrophureus, Aruncus, inodora, Antidruea altelis (or sapling), and Clerodendrum inerme are planted.

To the eastward the coconut grove seems to be in much less healthy condition. East of the middle of the island the majority of mature coconut trees are dead; the trunks, mostly still standing, young trees with trunks 3-6 ft. tall are locally common, often a ring of them standing sunshading a standing dead trunk or a fallen one. The ground is mostly covered by a thick mat, thorny succulents of
Triumphetta procumbens, a. locally, Marchantia. This area is much more extensive than the almost bare areas showing in the 1944-45 photos. Leucaena frutescens is coming in very vigorously, and locally, especially in the region bare in 1944, there are large, spreading low domed shaped clumps of Mesembryanthemum. Most of Marchantia are occasional but one of Cassychea was seen (mostly parasitic on Leucaena). A very definite succession seems to be taking place here. When the old coconuts die, Leucaena is left as a ground cover. It is rapidly crowded out by Triumphetta which becomes dominant and much more frequent than I have seen it elsewhere. Locally, mat of Marchantia manages to hold that zone. Leucaena frutescens is rapidly invading and spreading, forming a sort of confluent mound-shaped plants, up to 3 ft. or more high. The branching is of a horizontal terminal type with long upright.
schmidias and Pisonia, the former alone in the outer edges, the latter becoming important inward and down off the dune ridge for some meters inward on the flat. Where this forest is tall it is open beneath, and where really dense it lacks ground cover and undergrowth.

Toward the beach side it becomes tangled with low Messerschmidia branches and plants. Terminalia cambrae, and Rhizophora splendens and Leucodendron occur here. In the inner edge of the belt, on the western half, there is a dense belt of young coconut trees, at present 3-4 m tall, to top of leaves. Eastward this is replaced by dense Leucodendron scrub with some Messerschmidia.

Toward the south Leucodendron becomes most important in the mixed forest, the belt becomes wider and of lower stature. Within the curve of the cobbled-beach there is sand entirely up a wind sink, principally

feaciae, but with many Messerschmidia and few Guettarda plants. The Messerschmidia extend above the level of the scrub. The edge of this takes off to the top of the cobbled-beach, where there is some fine sand with Peptansea and Trinquettes. The outer edges of the mixed forest on the dune ridge, also have Trinquettes and an irregular turf of Peptansea in open places.

This is shown by large trees standing up or still like rosettes, with small ones growing on the beach flat between them, some of the large ones in tipped outward positions, and by protruding and under-cut beds of phosphates rock.

In the scrub on the south end, cobbles and boulders are abundant, becoming
less so inward. On the southeast the inner edge of the swale is marked by a rounded change in level of about 6-3', upward to the coconut grove, the trend being slightly north of east. This seems to disappear inland. Along it, on the coconut grove side, 75 m. max. from the beach are boulders, including a couple of slabs of beach rock, fully 12 sq. in area and a foot or so thick.

Salt spray was observed to be blowing inward in noticeable amounts from the windward (east) side. Chloris was only noted in weeds such as Cuphea, burs, Phyllanthus minor, and Cnemps; papaya, and this only around the house in the open; generally in Clidemia, also slightly in Aristolochium.

Jems 1.

Some chickens exist on the island, their scratching being quite evident. They are not many. No rats, evidence of rats; none seen. Snails are common, especially around the house, but no other lizards were seen.

Birds noted were

Red-footed booby - nesting in numbers
Brown booby - one seen flying for certain
Frigate birds (Fregata minor) - at least 15 seen flying at one time
Fairy tern - quite common
Common noddy - quite common
White crowned noddy - several seen but identity not absolutely certain
Golden plover - one seen positively, one doubtfully (at a different time, may have been same)
What looked like two owl pellets were being chewed on by hermit crabs.
Turtles apparently visit the island at low tide when the moon is practically full. Tracks of at least 13 individuals were found, comparatively fresh, leading directly up across the beach to the edge of the vegetation, usually ending in a hole several feet across, either at the edge of or inside the vegetation, scorched in the sand. The one turtle found was caught at 2 a.m., tide very low, moon bright. It was a powerful animal, dragging itself across the rough rocks quite rapidly, heading back toward the sea. When turned over it struggled for a little, then calmed down, emitting a sighing "ahh" sound and tears running from its eyes (my companion's description). Next morning it was sagging quietly but struggled violently when disturbed. After being photographed, it was released and cost little time in reaching deep water. It was mottled dark olive-dub above, yellowish below. Its mouth was sharp triangular beak with sharp jagged edges. It did not attempt to bite. Its front flippers were long and broadly rounded, the hind ones short and broadly spatulate, tail short, triangular.

Digging for eggs in a number of fresh holes was completely unsuccessful. Always undisturbed nests were found a little below the bottom of the hole. The eggs were finally found in a small hole about 4 inches and a foot in less than 3 inches, under the broad brim of sand thrown out of the large hole. There were 10 eg of them, closely packed. They were round, white, about the size of
golf balls, with smooth, still surface, a transparent shot on one side where the golf rested. The shells were only slightly calcified denting in contact with other eggs a great distance. All whites were completely non-viscous and did not coagulate on cooking. The yolks were yellow and soft. When cooked, they resembled a cheese mousse or raw egg yolk, rabbit in both taste and consistency.

The ground and the lichen-turf at the edges of the forest were considerably disturbed by the shelly slug, the slugs.

Other than birds, crabs are the most evident animals. The burrows of the common purple land crab are found all over the island. The crabs are seldom seen during the day. Burrows of the broad flat gray olive shore crab and common olive high tide mark and at the edge of the forest. The common olive shore crab burrows above high tide mark. Two species of hermit crabs are very common inland. The arthritus

on with purple bands across its legs is common. It seems to range principally on the ground, and a group of them will be found around anything even possibly edible. The larger red species, usually inhabiting Turbo shells, while shoring the habitat and diet of its neighbor also climbs after shucks at least to a height of 1 m. It was often seen in bushes but it was not evident what it was after. A favorite food for both kinds seems to be Pandanus fruit, the pulp of which is rather soft after the fruit falls.
Insects are quite evident, but not very abundant. The common stoll butterfly (*Hyperion estrella*?) is common in two color phases, the speckled day-flying moth *Drepana* is very common in openings. Smaller moths are commonly seen up when walking through openings, also attracted to light. Three large flies are common around the house, including the common housefly. At least one species of *Drosophila* is found around orange trees, with a large black fly resembling *Drosophila* is common around the house, including the common housefly. At least one species of *Drosophila* is found around orange trees, with a large black fly resembling *Drosophila* is common around the house, including the common housefly. At least one species of *Drosophila* is found around orange trees, with a large black fly resembling *Drosophila* is common around the house, including the common housefly. At least one species of *Drosophila* is found around orange trees, with a large black fly resembling *Drosophila* is common around the house, including the common housefly. At least one species of *Drosophila* is found around orange trees, with a large black fly resembling *Drosophila* is common around the house, including the common housefly. At least one species of *Drosophila* is found around orange trees, with a large black fly resembling *Drosophila* is common around the house, including the common housefly. At least one species of *Drosophila* is found around orange trees, with a large black fly resembling *Drosophila* is common around the house, including the common housefly.
occasional on leaves.

A lepidopterous larva which builds cylindrical paper-like cases up to 7-8 mm long is very common on dead coconut leaves, bark of trees, etc.

A very active earthworm is occasionally found in humus, even in thick of logs, also seen in soil in coconut plantations.

Colo-wearing spiders of perhaps two species are very common, spinning webs between bushes, coconut seedlings, etc. How they all get enough to eat is hard to see. Several other spiders inhabit crannies in the ground and rocks, including a couple of species of hunting spiders.

At least 5, possibly 10 species of true land snails are found in the humus layers at the soil surface. The pulped is found in number on rocks in Pinus forest and mixed forest. The teratellids on decaying twigs, etc. The elongate yellowish one in humus and on rocks. The spirally twisted one in humus. The elongate orange one, one individual only, found under a stone.

Two species of operculate littoral snails are found on rocks, logs, etc. above high tide. At least two mites and one millipede found in humus.

The weather was variable during the visit. From clear and almost cloudless to completely cloudy and rainy, sometimes scattered showers, wind from gentle to stiff breeze. Temperature from 25.5° to 30° C.
ecological processes seen or inferred on James Island.

A Basic, pre-colonization process (but continuing after colonization).
1 Rise in sea-level after glacial period, possibly drowning all land life, permitting reef surface to reach a high uniform level during post-glacial xenothermic period.

2 Possible emergence of land by bar formation.

3 Fall of sea-level after post-glacial xenothermic period.

4 Climate becomes more humid after post-glacial xenothermic period.

5 Emergence of reef surface resulting from fall in sea-level.

(1-5) Completely inferred from knowledge gained elsewhere.

6 Building, destruction, and change of land surfaces by typhoons, storm waves, tsunami, etc. (Inferred from evidence here.

7 Cementation of "beach-rock" and "reef-rock" (Process, time, situation, unknown process inferred only from existence of these rocks).

8 Addition of CaCO₃ from various marine sources as sand blown up from beaches, gravel, pebbles, cobbles, boulders thrown up by storm waves (sand blowing seas rest inferred from presence of material in places of deposition).

9 Accumulation of body of brackish or fresh ground water resulting from excess of rain accumulation over diffusion and mixing process. (Inferred from existence on other islands and from existence of moist soil here).

10 Salt accretion from spray blown inland.

11 Diffusion inward of salt water from peripheral and
from below, aided by tidal mixing action. (inferred).

11. Washing outward and downward of salt by rain water.

13. Solution of small amounts of CaCO₃ by rain water. (inferred)

14. Removal of dissolved CaCO₃ by diffusion and tidal action. (inferred)

15. Fluctuation of salinity with wet and dry seasons. (inferred).


18. Colonization by crabs from free-swimming pelagic larvae.

19. Breeding, establishment, and possibly triunally brought by birds, established as pioneer plant species.

20. Haeckel, Mesenchima, Portulaca, Cordia, Ipomoea tuba, Pandanus, and Guettarda seeds arrive by ocean drift, become established as pioneer species.

21. Seeds of blue-green algae, protozoa, seeds of light-weights, arrive by wind, become established as pioneer species.

22. Introduction, principally by wind, of insects, land snails, land arthropods of various sorts.


24. Limitation of establishment of species by salinity.

25. Limitation of establishment of species by lack of proper habitat.
20. Introduction and establishment of non-pioneer species as more mesophytic habitats develop.

21. Introduction of parasitic and predaceous species, as well as saprophytic and saprophagous species after establishment of proper hosts, prey, a source of organic matter.

22. Production of more mesophytic habitat by action of plants established.

23. Successional process.
   (Inferred from observation of stages in processes.)
   (All processes in B also properly belong here)

24. Destruction of vegetation by storms, etc. (inferred)

Successions observed:

30. Lepidium and Triumphetta on beach; T. Messerechmidia
    (mixed Messerechmidia and Pisania, to Pisania)

31. Lepidium and Triumphetta on beach to Lasiodora scrub; T. Messerechmidia, scrub

32. Carbon cycle.

33. Nitrogen cycle.

34. Production of root, leaf, fruit, and twig organic matter by plants.

35. Breaking down of this organic matter into humus by bacteria, fungi, insects, crabs, and other plant-eating organisms, both those that eat living and dead plants.
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37. Predation of soil faun by crabs, spiders, etc.
38. Predation of insects by lizards, spiders, crabs, etc.
39. Deposition of crevices by purely land-dwelling animals.
40. Addition of phosphatic and nitrogenous matter brought from sea birds in form of guano, feathers, body, etc.
41. Leaching out of these same materials by rain water (lignite).
42. Cementation of calcium, material by phosphatic cement in forests and as rotheres and roasting places by sea birds.
43. Catching of sand blown from beaches by vegetation resulting in formation of dune ridges around periphery of island. (4.199)
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44. Slow undercutting of westly flanks of ridge, apparently by storm waves.

45. Mixing of humus and other layers of soil by burrowing of crabs and digging of turtles.

46. Enrichment of soil by floating panic processes following and dependent upon human activity. (Other processes, of course, continue.)

47. Reduction of numbers of turtles by hunting. (Theresa)

48. Reduction of numbers of birds by disturbance and hunting, and offspring (infant)

49. Replacement of greater part of vegetation by coconut plantation.

50. Removal of phosphatic, nitrogenous and carbonaceous material in copra (inferred but quite certain).

51. Death of introduction of weeds and cultivated plants, and establishment of some of them.
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5 132-7.

52. Death of large number of coconut trees, especially in eastern half of island.

57. Occupation of some available habitat by weeds - i.e. Pap

59. Succession after death of number of coconut, leaving open area - Lepturus, Triumphanta, to Reaevera, to coconut.

55. Establishment of dense understory of coconut seedlings in plantation after neglect of copra making.

56. Clearing of this, probably burning of trash. (inferred)
OHV ASTRO STATION

1  -  2.04
2  -  2.26
3  -  3.26

R(HV)  -  0.337
5  -  0.92
6  -  0.44
7  -  7.128
8  -  5.39

R(HV)  -  2.65
9  -  6.20
10 -  6.04

HV = Bench marks
figures are all
below the astro
station.

On ship get close of
radio the above scale
also pictures photo
for loc. of

SOUTH

EAST

WEST

NORTH