RECORD

Tracy Nash

F. R. Fosberg

Field and Collection Note Book

No. 56

(Oct. 28, 1959 -- May 8, 1960)

(40723 - 40839)

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Mongu
30 mi. east
4 1/2 mi.

Senior To ant.
Pankole

Try Nash

Book #56
#56

begin # 40723
40839

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1959 Ivory Coast

1

In the coastal area the most intensive agriculture is in the bottom lands at the mouth of streams, as at mouth of Banks R. Gardening on hilled-up black wet soil.

Banana plantations also, especially on these bottom lands.

The reddish brown sands that make up the terrace are extremely deep - cuts 10 m. deep show nothing but uniform sand, not visibly bedded, but with vertical and slanting cracks, origin of which is obscure, some, but not much slumping even where cuts are almost vertical.

Roads in this sandy area, where not asphalt, are surfaced with red lateritic gravel-sand mixture, or broken up crust material, which packs very firmly, perhaps hardens some.

No vultures seen in Ivory Coast. Very few mosquitoes anywhere at least at this season.

Oct. 28 - flight Abidjan -
Accra - right side of plane.

Around Abidjan airport
Catharanthus is a very
abundant weed. Away
from actual strip is
mostly low open scrub
1-3 m. tall, much tangled
with vines, some grassy
areas, much of area
a closed scrub, probably
because of vines. Sand
showing between bushes
in some areas.

Departed 11:30.

Eastward the savanna
from a rather extensive
system between the
inner lagoon and the
coastal lagoon as far as
Grand Bassam. Between
this and the coastal lagoon
is an extensive belt of
thicket, with ~~extensive~~
considerable *Raphia*,
patches of swamp and
open black water. The
coastal bar, outside the
coastal lagoon is largely
planted to coconuts. It is
rather narrow.

East of Grand Bassam
is thicket and forest with

angular cleared patches,
very sandy, and a
canal paralleling the
coast for a long distance.
Some patches of white
sand in from beach.
Some small grass areas.
Beach sand and much
of interior sand rather
tawny to grayish tan.
Clearing, cultivated and
abandoned some abundant
eastward immediately
back of beach.

11:43

Inland the forest is
degraded, some patches
of grass.

11:44

The canal terminates in
a narrow coastal
lagoon, separated by a
very narrow bar, scarcely
more than a beach-ridge,
from sea. This bar largely
cleared and planted to coconuts,
these very young.

Inland from lagoon
is thicket and some forest,
largely cleared along lagoon.
Back of this a narrow
belt of savanna, some
of it with closed grass,
some very open and
sandy, almost desert-like.
Has a parallel texture, perhaps

of ^{old} beach ridges.

This ends at first river, which is black water. a canal enters lagoon west of river, also black water.

11:56

East of the stream a winding channel to northeast, back of beach ridge extensive thicket and swamp.

with small black water lagoons near beach, larger muddy ones away from coast.

Some clearings here, especially on beach ridge and around lagoons, but greater part of land between beach and main lagoons wooded. Floating grass along edges of lagoons.

Local white sand patches with scrub near beach ridge between black water ponds and lagoons.

11:54

Much of beach ridge land cleared and planted to young coconuts. Back of this sandy land probably old clearing, some small savannas. Forest back of this then lagoon.

Variation eastward of this pattern, but no

lagoon. much forest, villages numerous on beach ridge, very orderly in appearance.

12:04

a black water lagoon.

Eastward considerable savannas just back of beach ridge. Still many villages and palm plantations on beach ridge.

12:08

Course a bit more away from beach. Savannas fewer. Villages fewer, one or two inland.

Vegetation generally a mosaic of small clearings, abandoned clearings in various stages of regrowth, and somewhat larger patches of forest. Continues eastward to where coast turns somewhat southward (perhaps near Axim.)

12:13

12:15

Rather far inland much broken cloudiness but much good forest, few clearings.

12:17

Some clearings along roads, but generally good forest, so far as visible.

12:19

5 large clearing with

1959 Ghana

an establishment in center, apparently a sugar plantation, with clearing operations in progress in eastern part. Around this especially south of it, a mosaic of clearings, regrowth, and forest. Mosaic continues eastward.

12:22 Approach coast again, Sekondi-Takoradi. the mosaic here is mostly clearing and young regrowth, little forest. Many villages. Soil orange-red. Two fairly extensive towns on two eastward pointing hooks of coast. Coast cusped to eastward, cusps pointing eastward.

12:25 Considerable savanna eastward, some forest, fully $\frac{1}{2}$ cleared, perhaps. Large villages on coast.

12:26 We are out over sea. Cloudy inland.

12:30 On right considerable savanna, changing inland to clearings and forest.

12:31 Rather extensive savanna patches extending more

inland. Then a mosaic of cultivation, grass, forest, this extending farther and farther inland. 12:35 A large city.

Then grassy to thinly forested or scrub country, back of beach.

An important road paralleling coast, villages or small towns between it and coast. Soil orange-red. 12:37 Mosaic of cultivation and forest, extending inland. Some roads going inland.

12:39 Impression, with rather poor visibility, is that there is more thicket or forest than clearing.

12:40 Extensive savanna. Little forest. This extends eastward, some cultivation but locally.

12:41 Areas of scrub or thin forest. Some cultivation along roads.

12:43 Country becomes more cultivated, but still with much scrub and savanna. More scrub and scrub-forest eastward, becoming almost continuous thin forest, but with a few

conspicuous savannas,
green clearings.

12:45

An extensive savanna -
probably the Accra
Plain (widely spaced
tufts of scrub - said by
Nye to be on ~~termites~~
dead termite mounds),
matrix green, becoming
paler eastward, with
some patches of forest,
becoming tawny-green.

12:47

River mouth with
considerable system of
lagoons and sand flats
and bars.

12:48

a small city.

Then extensive savanna.

12:49

Many villages.

Gallery forest, open grass,
savanna.

12:50

Thin forest or scrub -
uneven, locally cleared,
locally more dense.

More cleared eastward,
soil red.

12:51

another small city.

Extensive savannas.

Rather tawny in color.

Gallery forest.

All this a strip along
coast, forest inland
in distance.

savanna ~~that~~
drier eastward, but
~~no~~ course more away
from land.

12:55

Forest approaches coast,
but with savanna
areas back of it.

12:56

Then savanna and
lagoons and bars
along coast.

12:57

Some very rectangular
plantations, much
burned cleared land,
much savanna and
cultivation mosaic.

12:58

Large City surrounded
by savanna - cultivation
mosaic. Accra.

An extensive city, not
at all congested. Patches
of savanna, largely
cultivated, extending
into it. Plenty of trees
in town, but not generally
green - trees scattered.
East of town extensive
savanna, considerably
burned but scarcely
cultivated. Doubtless
the termite savanna
mentioned by Nye. Grass
here closed brownish green.
Trees and brush clumps
abundant.

Oct. 28 - Accra - Airport

Cultivated plants seen.

Parhinsonia aculeata

Delonix regia

Hibiscus rosa-sinensis x *schizopetalus*

* *Codiaeum variegatum*

Gomphrena globosa

Tagetes (several forms)

Zebina pendula

Zinnia elegans

Petunia

Bougainvillea sp.

Polyscias guilfoylei

Azadirachta indica

Cassia spectabilis

Mangifera indica

Impatiens balsamea

Kalanchoe pinnata

Chrysolidocarpus lutescens

Salvia grahami?

Canna (ornamental hybrid)

Casuarina equisetifolia

Ageratum houstonianum

Cassia fistula

Thunbergia grandiflora

Thunbergia alata (large white)

Plumeria rubra

Spathodea campanulata

Nerium sp.

Tecoma stans

Cuba pentandra

Duranta repens

Thevetia peruviana

Lindernia angustifolia

This is a rather dry area, apparently because of curvature of coast which produces a sort of rain shadow.

Elaeophorbium juliflorum is a very common tree here, starting especially on termittaries. It looks just like *Hura crepitans*, superficially.

[Prof. Sansome, head of Univ. Coll. Botany Dept]

Coleus scutellarioides

Caladium bicolor

(common red fld. acanth.)

Alternanthera versicolor

Catharanthus roseus

Pilea microphylla

Rhoeo spathacea

Calotropis

Celosia argentea

Cynodon dactylon

Gaillardia pulchella

Hibiscus rosa-sinensis

Jatropha gossypifolia

Brownea

Caesalpinia pulcherrima

Carica papaya

Solanum lycopersicum

Rosa sp.

Jatropha multifida

Lagerstroemia indica

Weeds

Euphorbia prostrata
Portulaca lutea
Eleusine indica
Chloris inflata
Sida acuta
Tridax procumbens
Boerhaavia diffusa (red fl.)
Dactyloctenium aegyptium
Malvastrum cormandelianum
Euphorbia heterophylla
Alternanthera (purulent one)
Portulaca quadrifida?
Panicum maximum
Talinum
Phyllanthus
Cyperus cyperinus?
Euphorbia thymifolia?
Desmodium triflorum
Pennisetum 2 sp.
Mimosa sp.
Eragrostis amabilis
Hedyotis corymbosus
Euphorbia hirta
Cyperus rotundus
Clitoria ternatea
Sporobolus diander
Commelina sp. (cloud spathe, 2 large blue petals)
Hyptis suaveolens
Crotalaria retusa?
Cenchrus echinatus or *bounei*
Vernonia cinerea
Tricholaena roosa
Stachytarpheta off *garnauensis*

Cult. plants (ctd.)

Lawsonia inermis
Pithecellobium dulce
Anthurium (large red spathe)
Hydrangea japonica
Chrysanthemum morifolium
Monstera deliciosa
~~Coff~~ *Pityrogramma calomelanos*
Manihot esculenta
Capricorn pulscum
Ipomoea batatas
Hibiscus esculentus
Acalypha hispida
Acalypha godseffiana?
Spondias sp. (large round fruit)
Allamanda cathartica v. *cathartica*
Bauhinia sp. (5 stamens, long calyx tube)
Guaiacum officinale? (blue fls.)
Peltopphorum ferrugineum
~~Eragrostis ciliaris~~
Sesamum indicum
Arachis hypogaea
Zea mays
Leucaena glauca
Tectona grandis
Cesiba perlantha
Terminalia catappa
Cocos nucifera
Albizia lebbek
Gura capitans
Tamarindus indica
Avacardium occidentale
Solanum melongena
Cordia sebastena?

Oct. 29 - Accra Airport

Gently sloping savanna, with tall *Hyparrhenia* (?) to 3 m. scattered shrubs and tufts of small trees and shrubs, these tufts marking old termitaries.

photos
(14-15)

Mostly with a large *Claoxiphobia*, some *Azadirachta* shrubs, something like an *Allophylus*, and several other shrubs.

Patches of a lower grass resembling *Ctenium*. Open patches of a low (1 m.) shiny *Acaria* (?)

Soil brown to red brown, fine and light to rather heavy and full of buck-shot concretions.

Scattered patches of poor manioc, *Capricum*, sweet potatoes, okra, etc.

Tall irregularly conical termitaries, to 3 m. A few plants established on one. When a pile was broken off, exposing galleries, no termites were seen at first. Then large soldiers with enormous brown heads began to come forth and to run blindly

over the surface of the hill, many falling to the ground and running around on the ground, snapping their mandibles. Soon after workers appeared and began to deposit mud, and in a few minutes some of the smaller holes were walled over and walls were being built over many of the larger ones.

Many soldiers caught in spider webs on outside of hill.

Took half minute ^{to 1 minute} for soldiers to appear.

Weeds observed (etc from p. 12)

Tribulus cistoides

Gomphrena

Emilia sonchifolia

Eragrostis ciliaris

Lantana camara

Passiflora foetida

Cassipoua filiformis

Abytilon indicum?

Schwenkia arvensis

♂

(labels
lost)

Oct. 29 - Accra Airport

weedy ground along paths

40723

Hedyotis corymbosa (L.)

common

24

Gomphrena

common

25

Emilia sonchifolia (L.) DC.occasional in cultivated
places and around buildings

26

Spigelia

common in cultivated places

27

Ctenium?

forming patches in savanna.

28

rare in cultivated places

29

Hedyotis corymbosa

rare in cultivated places

30

Pennisetum

common weed around dwelling

221'

prostrate, flowers white.

prostrate to ascending,
heads white.leaves glaucous,
flowers purple.

flowers pale lavender.

tufted

branched at base.

erect.

loose tufts slightly
spreading at base, culms
erect.

1959 Ghana

Oct. 30 - ~~Accra~~ AirportTall grass savanna
below airport to s. w.Several species of bushes
and small trees are
common -*Azadirachta indica**Bridelia* sp. ?*Grewia* sp. ? yellow fls.~~*Caesalpinia*~~ *Xanthoxylum**Croton* or *Mallotus* 2 spp.*Capparis* sp.*Cordia* sp. ?*Acanth* (rich red fls.) several others.The termitaries are built
right around living
bushes which happen
to be in the way or to have
a branch in the way.The soldier termites that
come out and swarm
over the ~~stems~~ of the hills
when a piece is broken
off may apparently
either go back in or fall
to the ground. After a
short time on the ground
running about, they
die, at least when in the sun.The termitaries are mostly
a dull red (occasionally brown),
so hard that they can scarcely
be broken by the fist.a cordia-like plant but
with lvs. in whorls of 4, cymose
panicles. A heavy-nerved
plant with dense axillary
fascicle of sessile fls.A ferociously spiny
Doryalis or something of
the sort.A tall *Waltheria*.

a foetid compound-leafed.

slender shrub with apocarpous
fruits.*Veronica* sp. (shrub. white fls.
in panicles, yellow prophylls.)A diverse lot of vines
tangling the shrubs into
thickets wherever they
are close together.The grass is dense in
places, open in others.
Where open the ground
is usually eroded
till the surface is a
gravelly mass of concretions
and quartz fragments.*Claoxantha* is a thick
stubby tree with a dense
rounded crown of cespitose
branches with large
fleshy obovate green
leaves.

at the bottom of this long gentle slope is a ditch about 2 m. deep, down through a red brown silt soil filled with fine gravel, top 2-3 dm grayish brown. Then the rather uniform red-brown material differing locally in redness and in amount of gravel.

Lies on a warped light colored phyllitic schist with quartz and light mica.

In manihot patches is a population of *Euphorbia* (*Poinsettia*) showing every leaf shape from narrowly linear to broadly elliptic, ovate, ~~or~~ oblong or obovate, entire to deeply lobed. No color at base of top lvs.

There seem to be no vultures here, but Crows with a white ~~band~~ across the breast and white head are fairly common.

One *Briasson* tree not far below airport in savanna.

Oct. 31. Accra

Hedges of *Thevetia peruviana*, *Azadirachta*, *Spondias*, *Daltonia*, *Mangifera*, *Cassia spectabilis* (or *siamensis*), *Pithecellobium dulce*, are the common street trees.

Hibiscus, and *Bougainvillea* generally common.

A few coconuts in downtown area. A few *Casuarina*.

Coconuts show *Oryctes* damage.

The city is very open and spread out. Even the downtown area is scarcely congested.

Trees are fairly abundant except in the central business district.

Harbor on open roadstead anchorage close in.

"Old Town" around waterfront squalid, crowded with one story shacks. Sidewalk Market everywhere.

Christiansburg castle -
built in 1790 by Danes
as center for slave trade.
Walls 2 m. or so thick.
Windows heavily barred
in slave quarters.

Subsequently used as house
of governor-general. Added to in
1950. Now being renovated for Prime Minister.
Thebesia in castle enclosure.
Coconut groves near castle.

photos

Flat savanna between
Christiansburg and airport

Oct. 31 - flight Accra to Lagos
(left side of plane)

Soil ~~is~~ inland from airport
bright red when bulldozed.

Left ground at 3:58 p.m.

Landing field large,
asphalted, being enlarged.

East from Lagos is a
vast area of savanna,
with several small
towns scattered along coast.

Savanna looks badly
overgrazed, with burned
patches, one fire actually
in progress. Several
tidal inlets along coast.

Some coconuts along
coast at towns. Between

the towns the savanna
actually comes to the beach.
Inlets have sandy margins
with ~~no~~ broken grass sod,
no trees, no mangrove.

4:05

A railroad terminal and
an artificial harbor with
breakwaters. New town.

Inland the savanna
is apparently completely
uncultivated. The
tufts of scrub as in
most places very widely
separated. Locally
dense, narrow gallery
scrub follows stream/
beds.

Tidal inlets and small
towns continue eastward.

Several fires seen.

4:13

Large coconut grove along
coast. Patches of rather
denser savanna inland,
with sparse savanna
and large areas of grass
with no trees.

4:15

Large tidal lagoon with
grass coming to its margins.
Inland large patches of
rather denser savanna
or open scrub.

Near coast several patches
of trees with villages in
them. Along inner side

of narrow bar separating lagoon from sea is a slight sparse development of mangrove scrub.

4:20 Coconuts along coast on bar to east. Eastern parts of lagoon change to sparse *Avicennia* (?) then to extensive marshes. These alternate with savanna on sandy patches, extensive network of tidal channels. Then a large estuary with islands, very marshy, swampy areas with palms and some other trees esp. a light green one like a willow.

East of this winding channels and strips of marsh and patches of open palm forest and palm savanna, open swamp, dry savanna.

4:23 Extensive mixture of tidal marsh and swamp with little dry ground.

This seems to have artificial channels or paths in it, with water in them.

4:25 west side of an extensive lagoon system, with tall grass or reed brakes around many of its intricate

Ghana - Togo - mangrove. Surrounded by extensive ~~tidal~~ tidal marsh. Some patches of dry sand with savanna on seaward side.

4:30 Keta. Coastal bar bounding lagoon swing northeast here. The bar is wide, mostly covered by the town. Town appears wooded, as does the bar and beach ridge to northeast.

4:33 East of lagoon the beach ridge is wooded, then a strip of savanna and lagoons, then a strip of forest, and, inland, extensive savanna. The inner forest strip almost pinches out, and the coastal one broadens.

7:00 We are so far at sea now that visibility is poor.

4:36 Savanna strip pinches out. A fair sized town - *Danu aflao*? a probably *Lomé*.

East of this a broad wooded belt along coast, inside this green grassland, a narrow strip, with open forest or dense savanna back of it.

4:40 A large lagoon inland, but visibility now too poor.

4:43

area between lagoon and sea seems wooded.

A large channel from the lagoon extends east to a tidal inlet and a broad estuary inland.

4:47
Dahomey

East of this the country seems more wooded - a mosaic of wood and savanna. Visibility poor. Mangroves along channels of estuary?

4:50

River with narrow estuary. The rivers on this coast have their mouths deflected eastward.

Considerable mangrove at mouth of this one.

A narrow lagoon paralleling coast for a considerable distance eastward. Bar seems rather continuous so it is hard to tell just where the river mouth is. Several other rivers also enter this lagoon, which continues eastward, with some substantial areas of mangrove or perhaps fresh water swamps, much cut by open water channels.

4:54

Area inland seems mostly marsh or wet savanna.

4:56

Area inland seems mostly marsh or wet savanna.

Bar is densely wooded but hard to tell if by mangroves or coconuts, from this distance.

4:56

Very large lagoon far inland. Visibility poor.

4:58

Lagoon continues eastward, now quite complicated.

4:59

Bar broad, covered by coconuts.

5:00

Much broken cloudiness. Considerable mangrove around lagoon. Mixture of swamp and marsh inland.

5:02

Lagoon quite narrow, but still with marshes behind it.

5:03

Apparently country behind it is largely wooded, some savanna. Behind lagoon, now very narrow, with mangroves, is a mosaic of savanna, marsh and forest. Coconut plantations, scrub, and pasture on bar.

5:05

Lagoon is now only a narrow channel lined with mangrove, then ends. Some bits of marsh.

5:06

Then, inland, a very large lagoon, separates from sea by mosaic of

5:03

grass and forest (swamp?).
Cotonou. Large lagoon
back of it connected with
sea by broad channel.
Lagoon surrounded by
marsh and mangrove.

East of town much white
sand with open scrub -
patches of this alternating
with swamp and, eastward
with palm (coconut?)
plantation.

5:10

Large areas of marsh,
some white sand, seaward
of lagoon.

5:11

Another area of sand,
but lagoon becomes
a broad tidal marsh.

5:17

Land forms what
appear to be beach ridges
slanting a bit away from
coast, separated by marshes
and swamps.

5:13

A large area of marsh
with mangrove, then marsh,
then open water inland.

5:14

Porto Novo inland of
large swamps and a wide
arm of lagoon which
winds eastward between
marshes and mangrove
swamps. Seaward
are areas of scrub,
gallery forest, and marsh.

5:16

Villages along coast.
Arm of lagoon, lined
by broad marshes
with tidal channels,
curves nearer sea.

5:18

Land inland a mosaic
of forest and savanna,
predominantly forest,
becoming more so eastward.
A few villages inland.
Forest is dominantly
Elaeis, some patches
natural forest.

5:20

Another black water
lagoon, inland. The
arm or channel from
Porto Novo now closed
sea.

5:21

The black water lagoon
extends far inland.
The other one parallels
coast.

5:22

~~5:21~~

Counse is now well
inland. Country a
mosaic of oil palm
and banana patches
with ~~a~~ broad strips of
semi-deciduous forest.
Some cultivated land.

5:24

Strip of lagoon still
continues along coast,
becoming more complicated.
Inland a mosaic of
patches of cultivation,

regrowth and oil palms, in apparently catena relation to strips of forest, perpendicular to coast. This more and more irregular.

Some trees in forest are apparently in flower. Others bare.

5:27

Strips of swamp winding dendritically into interior, seem quite bare.

5:28

Mostly forest but rather degraded. Patches of what must be Musanga and of palms and bamboo, as we approach Lagos. Villages - remarkably few, however, and even clearings are few.

5:30

Forest rather good, but with lots of palms (Elaeis).

5:31

Several concrete roads going north. Large clearings. We circle to right over outskirts of Lagos. Open woods, thicket and cultivated patches. Very green.

Nov. 1 - Ikeja, Lagos

Cultivated plants seen:

Plumeria rubra

Caesalpinia pulcherrima

Canna sp.

Terminalia catappa

Delonix regia

Asconopus compressus

Euphorbia cyathophora

Pedilanthus tithymaloides

Elaeis guineensis

Bougainvillea spectabilis

Polyscias guilfoylei

Hibiscus (ornamental hybrids)

Hymenocallis littoralis

Xanthosoma sagittifolia

Musa

Carica papaya

Allamanda cathartica v. *hendersonii*

Codiaeum variegatum

Galadium bicolor

Portulaca grandiflora

Thunbergia glauca

Polyscias guilfoylei

Nephrolepis biserrata?

Breynia nurosa

Cassia spectabilis (or *siamea*)

Bauhinia sp.

Coleus scutellarioides

Cordia sebastena

Artocarpus altilis

Acalypha hispida

~~at~~ NW: Ibeja, Lagos

~~at~~ Weed, seen.

Euphorbia hirta

Eleusine indica

Momordica charantia

Synedrella nodiflora

Sporobolus diander

Eragrostis amabilis

Stachytarpheta jamaicensis

Cynodon dactylon

Euphorbia prostrata

Cyperus cyperinus

Dactyloctenium aegyptium

Portulaca quadrifida

Amaranthus viridis?

Hedyotis corymbosa

Peperomia pellucida

In several oil palms near Ibeja Rest House were colonies of weaver birds, with many pouch shaped nests. The birds were working busily and noisily on the nests.

Compound stipules of *Delonix regia*:

The stipules are ^{asymmetrically} bipinnately compound, with the main rachis linear-subulate, slightly arcuate, up to 15 mm. long, pointing in more or less the same direction as the rachis of the leaf, somewhat laterally compressed, tapering to a subulate point, with usually a ventral blunt tooth or umbo, or merely a

3-4 mm. from

The concave side is toward leaf, and side. Along

our ^{pinnae} leaflets, the reduced

endage or 3 in all) absent,

the second not be

well developed

stipules of
Delonix regia
to description.

~~leaflets~~ pinnae, on this side, are elliptic to elliptic-obovate, up to 10 mm. long and 3 mm. wide, conspicuously ^{unculate} mucronate & apiculate. The third one is usually somewhat larger than the second and fourth, and it is rarely

the mucro
slightly
laterally
compressed

Sagor
nigeria

stipules of
Delonix regia
for description.

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the mucro
slightly
laterally
compressed

furnished with 3 subulate curved teeth on the proximal margin. On the convex, outer ~~margin~~ side of the main rachis are five or rarely four pinnae, opposite those on the inner side. The distal ~~two~~ two or three of these are similar to those opposite them. The proximal ~~two~~ or more usually three pinnae are ~~compound~~ pinnately compound, with three or more usually four pairs of lanceolate or oblanceolate cucullate to cucullate mucronate pinnules oppositely or somewhat irregularly arranged along a somewhat swollen to slightly compressed slightly backwardly arcuate rachis. The distal and proximal pairs may be reduced to subulate projections, ^{or to more bristles} the apex is usually subulate but may rarely be expanded and similar to a pinnule but then quite asymmetric. On the ventral side of the rachis and of the secondary rachises, at the base of each pair of pinnules, is

a ~~flat~~ small patch or irregularly transverse line of tiny black to pale brown very short hairs. The pinnae and pinnules are ~~very~~ sparsely pubescent with very minute antersely appressed hairs.

These stipules only occur on fast growing branchlets, and as growth slows down they become progressively reduced with each successive leaf. They are ~~not~~ early caducous, disarticulating, and are not normally present on mature twigs.

1959

Nigeria

labels
written

Nov. 1 -

Ibeja, near Lagos,

in borders of garden

40731
2*Hedyotis corymbosa*

common

1

32

Phyllanthus

common

1

33

Smilax sonchifolia (L.) DC.

occasional

prostrate to erect, corolla white.

erect

somewhat glaucous, flowers purple.

Nov. 1 - trip by auto from
Lagos to Ibadan.

miles
70960

Elaeis abundant, breadfruit
common. Landscape along
road a mixture of gardens
and thickets. *Xanthosoma*
commonly cult. also *Zebr*.

Low places swampy
and filled with *Raphia*.

3-4 km out of town thickets
more abundant than gardens.

65 small river.

Much marshy and
swampy land, semi open.

66 River on left.

Pennisetum purpureum
very common in this
bottom-land, between
thickets, scattered *Elaeis*.

68 Much open marsh.

Crossed river.

Tangled swamp forest.
Pistia & *Najas* in
open ponds.

69 Swamp and *Scirpus* marsh
some degraded tall forest

70 Crossed large river.

More swamp. Then dry

71 ground mostly cleared.

Musa becomes occasional.

72 Mostly low tangled
woody scrub, some cultivation.

73 almost no forest. some *Elaeis*,
village (brown)

74 Open, partly scrub thicket,
partly cult. Bananas,
Citrus, *Zebr*.

Thicket of various ages.
Anthocleista occasional.

76 Thicket with *Elaeis*,
banana patches.

79 village.

High tension line follows
road.

80 Thicket with some patches
of poor forest. *Elaeis* is
abundant.

83 Mixed Thicket *Elaeis* grove,
patches of ~~scrub~~ secondary
forest, a few bamboo clumps.
cultivation

84 village.

Cola plantations. ?

86 Cultivation (manioc), Cola,
Elaeis, Cacao, thicket.

87 Koriogbagbe Sta.

Generally Cola plantation
Rounded trees 6-8 m tall.

Scattered *Elaeis*. Cola
trees touching or almost so.

91 Mostly low thicket.

93 Shagbana.

96 Swampy forest, then
higher ground, mostly
thicket and cultivation.

97 Bananas, *Elaeis*, patches
of forest, cacao plantations.

98 Cola, Cacao.

- 99 Open area and low hill belt.
 fern - fair sized town.
 02 mixed cacao, shifting cult.
 thickets. Elaeis.
 03 open shifting cult. scattered
 Elaeis, some groves.
 06 cacao plantations.
 08 Thicket, patches of forest,
 cultivation, Elaeis groves.
 09 some swamp, Cacao. Thickets
 10 Cacao plantations.
 12 mixed cult. & cacao. scattered
 tall trees. Elaeis.
 14 Degraded forest, some Elaeis.
 15 Shifting cult. with Elaeis
 and scattered tall trees.
 17 Cacao, not much shaded.
 shifting cult. & Elaeis.
 18 Cacao, young Elaeis, mixed
 shifting cult. Maye, manioc,
 Xanthosoma, bananas.
 20 Cacao, not much shaded.
 22 Ala Obadan? (town)
 Mostly cacao
 23 cacao, Cola, some Elaeis.
 24 mixed cult. and thickets.
 25 cacao, mixed cult. Elaeis.
 29 thickets, some ~~shift~~ cult.
 30 Cola + cacao, mixed cult.
 31 Cacao
 32 Elaeis + cacao, cola.
 No more tall trees except
 locally, Elaeis.
 33 Cacao.

- 34 Cacao with some tall trees.
 35 Shifting cult. Thickets,
 scattered tall trees, Elaeis
 & bits of woods. Cacao.
 36 a low hill on right with
 rather degraded high forest.
 37 some deciduous trees,
 bamboo thickets, Elaeis
 groves.
 38 scattered patches of tall
 grass (*Pennisetum*)
 with thickets and Elaeis
 groves.
 39 Country becomes mostly
 open, tall grass savanna
 with Elaeis, other trees,
 cultivation.
 40 } Ibadan.
 A vast sea of rusty galvanized
 iron roofs with an occasional
 fleck of green where a tree
 shows through - and
 swarms of people.

The road from Lagos to
 Ibadan runs through what
 is mostly a mosaic of
 shifting agriculture - small
 patches of cultivation and
 thickets of varying ages,
 tangled with vines - and
 patches of cacao, either
 shaded or not, and of
 cola - small dense rounded trees.

groves of oil palms and scattered individual oil palms, with here and there swampy or marshy areas, either thickly wooded or with grass or sedges, and occasional scraps of poor degraded high forest. *Ceiba* does not seem to be especially common. Scattered tall trees of various species are left throughout the area. *Mussanga* is seen here and there but is nowhere abundant.

From the road perhaps thicket seems to occupy a higher proportion of the land than it actually does as narrow strips of thicket along the road may cut off the view of garden patches and cacao plantations.

Nov. 1 Ibadan -

Cultivated or planted species seen:
Codiaeum variegatum
Breynia nivosa
Cassia sp. virgate shrub with very small leaves and very showy fls.
Thryallis glauca
Axonopus compressus
Canna sp. (purple lft. small fls.)
Clerme spinosa
Lantana camara (orange, non prickly)
Rosa sp.
Alocasia macrorrhiza
Pedilanthus ~~sp.~~ *tithymaloides*
Tectona grandis
Alstonia sp.
Ixora coccinea (semi-lvs. acute cor. lobes)
Caesalpinia pulcherrima
Cynodon dactylon
Albizia lebbek
Polypodium guilfoylei
Solanum lycopersicum
Carica papaya
Nephrolepis "duffii"
Tagetes sp.
Caladium bicolor
Alternanthera versicolor
Acalypha hispida
Zinnia elegans
Glinicidia sepium
~~*Gossypium* sp.~~
Hibiscus mutabilis
Dahlia variabilis
Samanea saman

Nov. 1 Ibadan

Weeds seen

Paspalum dilatatum

Eleusine indica

Desmodium triflorum

Euphorbia prostrata

Sida acuta

Sida rhombifolia

Calopogonium mucunoides

Synedrella nodiflora

Cultivated species (ctd.)

Cassia siamea

Cassia spectabilis

Cassia ~~sp.~~ *modosa*

Antigonon leptopus

Xanthosoma violacea?

Lantana camara var. *aculeata*

Tamarindus indicus

Capricorn frutescens

Nov 2 - Idi Anyire 12-13 mi
s. of Ibadan Gumbani Forest.

Along - was - *Cynometra*
and *Brachystegia eurycoma*
very common, and *Cola*
laurifolia & *Pterocarpus*
santalinoides. *Uapaca*
hendelotii (stilt roots),
Ricinodendron,

Back from the river
scattered relict tall trees
and a dense tangle of
climbers and shrubs
and saplings. The
saplings, growing up,
lift the canopy of climbers
leaving open space
between the stems
of the saplings.

East of here a large forest
very irregular, with
considerable number of
tall trees, irregular thin
intermediate and lower
storeys, thick vines on
ground. The intermediate
trees were largely removed
for firewood for a factory and
power plant. Much
climber removal has
been done here, also, recently
but regrowth is fast. Little
regeneration seen.

Andropogon testaceus
is a tall bluish grass,
to 3 m. or more, common &
dominant in the savanna
around Ibadan. *Pennisetum*
purpureum is the other
abundant species. They
do not grow in an intimate
mixture but in patches.

Old field outside Ibadan,
at Lafin Rest House -
irregular open scrub
of *Gliricidia* mostly
about 4 m. tall, tangled
with ~~grass~~ *Panicum maximum*
and vines such as *Clitoria*,
also *Pennisetum polystachyon*? & *Imperata*.
Pennisetum purpureum
(called elephant grass, though
Onochi has never heard of
elephants eating it) is
coarse, erect, to 4 (or 5) m.
tall branched loosely toward
the top. Spikes 15-20 cm
long, perhaps 2 cm. thick,
on long peduncles, exerted
above the top reduced blade
about 7-10 cm.
Habit not tangled.
Blades and sheaths scabrous,
nodes with a ring of stiff
bristles.

Another area of *Glinicidia*, nearby, that was probably similar has grown up to a thick coppice about 5-6 m. tall, the trees pollarded at about 1 m. and masses of wand-like shoots coming up, forming a closed canopy. No vegetation under this.

^{Charles} Onochi says that almost the entire forest belt of Nigeria is a mosaic of shifting agriculture, regrowth, cacao, ~~and~~ cola, and oil palm with some forest reserves that are much altered by man.

[He distinguishes *Cassia siamea* from *C. spectabilis* by the fact that the racemes are erect in *C. siamea*, hanging in *C. spectabilis*.]

Nov 3 - Ibadan airport

3 vultures seen (first seen in Africa). Square or slightly forked tails, dark sooty brown.

Nov. 3 - Ibadan - for a flight 20.2 left side. Weather at Ibadan rather cloudy. small dirt airstrip. left ground.

9.27

Thickets of *Glinicidia*, low tangled scrub, and groves of *Elaeis* near airport. Around town mostly cultivated patches and low scrub. Few trees in town, which is crowded. except on hill which is densely planted to some sort of tree.

Patches of tall grass - mainly *Andropogon tectum* near town, with scrub and cultivated patches east of town.

Small villages numerous, *Elaeis* abundant.

9.31

9.37

9.39

Visibility almost none.

Hole in clouds - mosaic of patches of cultivation and forest. Then no more visibility. Slight hole - green shifting agriculture.

9.41

9.43

9.45

9.46

9.47

Holes in clouds - hilly country, partly cleared, some forest same. perhaps 3/4 cleared.

Elaeis common, in small groves.

Same. some signs of erosion.

Same, forest patches mostly *Elaeis*.

9.46 another hole. - crossed
small ^{muddy} river running at
about 25° to it of course.
Wooded.

9.50 Large hole - some savanna
patches, some clearings
some forest - about equal
amounts, a small ^{muddy} river
perpendicular to course.

9.51 Hills - hilly country, largely
cleared, some patches of
degraded forest, much
regrowth, with scattered
tall trees, occasional
patches not too bad

9.53 A large granite dome,
wooded on top, sides partly
wooded, partly bare
steep dark gray granite.

9.59 Then hilly country
mostly in shifting
agriculture, some patches
of forest mostly rather
degraded; scattered
conspicuous light green
trees, rather abundant,
some Elaeis, but not
very much except locally
Banana patches.

10.01 Almost clear. Hilly now
wooded but generally
shifting agriculture
and regrowth, villages

10.02 photos.

10.03-4 Forest becomes much
less, gradual change
to savanna with Elaeis
patches of pretty good
forest

10.04 a granite exposure.

10.06 a town, and a number
of villages, surrounded
by forest, otherwise
savanna with gallery
forest, Elaeis groves, small
forest patches, roads
lined with Elaeis, many
cultivated patches.

10.07-7 low granite hills,
tops bare.

10.09 Savanna becoming more
prevalent, cultivation
much less, forest much
less.

10.10 Hilly country with many
granite exposures, open
forest to savanna, almost
no cultivation. (photos) little Elaeis.
10.11 Granite hills become very
conspicuous (photos) especially
in middle distance.

10.12 Dense forest almost absent
except for slight gallery
development along streams.
10.13 Some granite, still.

10.14 Vegetation varies from
savanna to open forest.
scattered cultivated patches.

a village.

Savanna becoming dominant, open forest on granite hills except where there are bar patches. Elaeis has disappeared except for some in the narrow gallery strip along stream courses.

10:16

Almost all savanna.

10:17

Hills with open to rather closed forest, gentle slopes savanna, scattered cultivated patches, soil sand, silt & red. Still some granite exposures.

10:18

Hills in middle distance. Hilly but no granite. Hills are grassy with some small trees, savanna densely wooded (photo)

10:19

Savanna with dendritic streams with gallery (photo)

10:20

Granite dome (photo) Small river flowing somewhat to left of course, meandering, muddy.

10:21

Rolling country, mostly savanna, with gallery forest, stream joined by another from north.

10:22

Forest locally denser, dense to open, with patches of savanna, low hilly

10:24

Land. Scattered cultivated patches of cultivation with dead trees.

10:25

Savanna becomes more prevalent as land becomes less hilly.

10:26

Scattered small granite outcrops, not large hills. Gallery forest, savanna, small areas of open forest.

Some small erosion scars. Mosaic of savanna, open forest, closed forest, in small & very irregular patches, with gallery forest along streams, rather open.

10:27

Brassia common in open gallery forest along streams.

10:28

Brassia more common along a stream crossing course, forming groves.

10:29

Close mosaic of savanna, open & closed forest and gallery with some Brassia. Then some Brassia scattered in open forest and savanna, mostly however in gallery.

10:30

No cultivation at all now for some distance. Mostly open forest varying to savanna, gallery open to closed.

- 10:31 country becomes hilly again, savanna on ridges, open to closed forest in ravines. (photos)
- 10:33 Granite exposures.
- 10:34 A very light plug-like butte with a red conical top, ~~etc~~ otherwise black granite exposures.
- Savanna with gallery forest. Morassus less common. a few *Claris* in gallery.
- 10:35 Not so hilly. a few granite patches. Savanna to open forest, well developed gallery along streams.
- 10:36 The streams apparently incised, rather straight,
- 10:37 running into a considerable patch of forest which seems to follow a depression northward, becoming broader where it reaches the Niger in the distance, approaching course almost perpendicularly or at about 70° .
- 10:38 Mosaic of large savanna patches, open scrubby forest patches and dense gallery, all with a trend about parallel with course of Niger.

- 10:40 Ponds and depressions parallel to Niger, course of old channels; in wide bottom land braided pattern but meandering less conspicuous than is usual in big tropical rivers (photos)
- 10:42 Crossed Niger. Bottom land largely savanna, some swamp, some marsh, some ponds, these elongate some channels. (photos) Thatched village.
- 10:44 Eastward a mosaic of rather large savanna patches, patches of open, closed forest, and gallery. Along principal streams some bright green cultivation. A few small patches of clearing a bit away from stream.
- 10:45 Open forest along course, savanna with gallery forest to north.
- 10:48 Savanna with broad gallery along dendritic stream system. (photos)
- 10:49 Savanna thickens to open forest. Some cumulus clouds.

- 10:50 Mostly open forest.
Practically no cultivation.
- 10:51 Forest thins to savanna locally.
- 10:52 Open forest again, thinner in distance, then with gallery forest.
- 10:53 Forest thins to savanna again, with conspicuous gallery forest.
- 10:54 A few tiny villages and some cultivated patches in savanna.
Dendritic stream system trending to southeastward.
Houses in these villages circular.
- 10:55 Low, more cultivation, in middle distance a mosaic of small patches of forest and savanna.
Soil here a sandy color or pale brown.
- 10:57 Crossed a small river coming from about 35-40° left of course, somewhat meandering, joined by a smaller one from about straight ahead. Considerable cleared patches near where they join.
- 10:58 Several more tiny villages.

- Savanna has only few trees, some bushes here. Boiassus along small river and its tributaries gallery not well developed.
Scattered cultivation several villages.
Small hilly patch in middle distance, with some open forest on slopes, tops savanna.
- 10:59 Considerable cultivation in savanna. Patches of open scrub with very thin grass. reddish soil. Soil in cultivated patches tawny. Savanna begins to look overgrazed.
- 11:01 Gallery becomes more conspicuous.
- 11:03 Country hilly, open forest on slopes, savanna on tops and ridges. Range of hills trends north & northeast.
- 11:04 Savanna, overgrazed. small villages.
- 11:05 Mosaic of cultivated patches, overgrazed savanna and open gallery forest.
- 11:06 Flaking granite block and domes in middle distance. Steep side, bare. Top of big one grassy, others either

11:11 grassy bar. On gentler slopes either grass or small thickets.

Small hills and domes close. Savanna with gallery, little cultivation but savanna overgrazed.

11:12 Flatter country, thin savanna and pasture, rather green. Locally reddish.

11:17 Large granite domes along course, with bar slopes, grass, thickets patches of closed forest between the hills. This extends north.

11:18 Less hilly but still hilly country with savanna, bare granite patches, a few patches of closed forest, slight gallery along streams.

11:15 Same, less hilly, a village or two, still plenty of bare granite.

11:16 More exposed granite. Curious circular construction, possibly thorn fortifications or bare granite hills.

11:17 Some open savanna with granite patches. Then large granite hills.

11:19 Savanna with sharply developed gallery forest on dendritic stream system. No granite, topography rolling. Savanna varying to grass without trees locally.

11:20 Some heavy cumulus. A few small cultivated patches and a patch or two of dense forest. Mostly savanna with few trees, some bushes, narrow gallery systems (photo).

11:21 Then a low granite ridge trending northeast with open forest, rather irregular.

11:22 Rather flat savanna. What appears to be a circular hedge around a fairly large area with savanna and cultivated patches.

11:24 Several tiny white granite exposures.

11:25 Parallel very low ridge trending northeast, no rock exposed except slight apparent exposures in beds of small streams. This uncertain.

11:26 More granite domes right along course. Bare except

- for small grass (a sedge) spots on top and slopes (see Richard paper). This patch of hills running somewhat northeast but lowering little granite exposed.
- 11:27 Hills become lower and fade out along course. Then another large low dome just off course, running into a large area of rolling semi-exposed granite eastward and northward.
- 11:29 Then savanna where granite is not exposed, small patches of open forest and thickets. Some tiny white rock exposures on these hills, too. Can't see them well.
- 11:30 Flat to rolling savanna, very open, with thin gallery forest, funny with side ravines.
- 11:31 Main road running about 60° back from course.
- 11:32 Town built on west slope of a large hill, top of which is bare granite. Another similar town and hill in middle distance.
- 11:33 Considerable patch of

- low granite domes, bare or with small grass patches, some wood in ravines, but not much.
- 11:34 Open savanna but with scattered low granite exposures. Considerable cultivation locally. Some patches bright yellow-green.
- 11:35 Savanna without granite, very few trees except in broad open gallery forest. Considerable cultivation. A few Elms in gallery forest.
- 11:37 More granite patches, forming very low hills. Low series of domes running off northeast.
- 11:38 A road running northeast and much cultivation. A little more exposed granite. Course seems to be turning more & east or even south of east.
- Rolling country, open savanna, closely meandering stream, much cultivation.
- 11:40 A town with railroad yard. Much cultivation, some savanna. Gallery forest only very slightly developed if at all.

- 11:41 Course about east
Mosaic of cultivation,
pasture, very narrow
streams
- 11:43 Scattered *Borassus* in
cultivated land.
Low hills with some
granite. Some bad
erosion. Cultivation
on lower flatter areas.
Hills overgrazed, trees
only locally. Small
clumps of houses - farm
sites abundant along
road more or less along
course. Open grassland
with no trees, red
erosion scars, away
from main road.
Another road with no
farms across this.
Cultivated patches scattered
in grassland
- 11:46 More farms and much
cultivated land along
a small very red muddy
river crossing course at
right angles.
- 11:47 Rolling country, partly
cultivated, the rest
badly overgrazed and
eroded.
Some very small granite
exposures.

- 11:48 Savanna on very low
hilly country with
considerable but small
granite exposures running
up to a ridge with an
abrupt scarp on northward
side.
- 11:49 Then a stream valley
crossing course, then
low overgrazed hills
with patches of granite
and patches of cultivation
apparently of soil washed
up into windrows on
bare granite
- 11:50 a large low granite hill.
Then rolling overgrazed
reddish plain, partly
cultivated, small granite
knobs, then becoming
more abundant.
- 11:52 A very muddy, milky
brownish stream ^{joining} ~~crossing~~
course at a narrow
angle from back, then
crossing it.
- 11:53 Bad gully erosion on
rolling overgrazed, partly
cultivated plain.
A braided stream from
60° left of course, then
a low ridge of very
knobby granite hills
running parallel with

11:55

this stream.

Then badly overgrazed
and seriously eroded
country, spotted with
granite patches.

11:56-7

Approaching Jos airstrip.
More rough knobby
exposed granite.

Villages with thatched
steep conical roofs.

Cultivation on high ridges
of soil.

11:58

Loaded.

Nov. 3 - Hill Station, Jos.

Built on a granite ridge
covered by picturesque boulders.
Landscaped, with abundant
ornamentals. Hedges of
Dodonaea viscosa.

Ornamentals seen:

Dodonaea viscosa (hedges)

Pelargonium zonale

Begonia (tall red, fr. very oblique lvs.)

Althaea (hollyhock)

Pilea microphylla

Ficus pumila

Mangifera indica

Acalypha godseffiana?

Zebrina pendula

Kalanchoe pinnata

Salvia splendens

Malvariscus

Tagetes (several forms)

Euphorbia pulcherrima

Dahlia variabilis

Plumbago auriculata

Catharanthus roseus

Plumeria rubra

Portulaca grandiflora

Rosa sp.

Oreocarya repens

Bougainvillea spectabilis

Dianthus caryophyllus

Zinnia elegans

Amelina sp.?

Calathea sp.

Eucalyptus camaldulensis

Cordia alliodora

Mangifera indica

Mar. 3 - Jos

Mango is the commonest tree in the immediate outskirts of the town and

Road to north

open high scrub to shrub savanna

Out a little it is very low shrub savanna, apparently over cut for firewood. Some scattered Eucalyptus camaldulensis

Then pasture with scattered mango and other trees,

patches of sorghum.

Small villages of mud hut. A small baobab

Trees become scarce. Most of land cultivated or in poor pasture, this with abundant small bushes or clumps of sprouts.

Granite hill with low open scrub.

Descending gradually. Much sorghum still.

Scrub becomes thicker but still 1 m. or less tall.

Very few trees. Grass very thin. A few shrubby acacia.

Country flattens out, trees become more common, higher. Thin grass. Where there is scrub it is largely acacia.

Trees irregularly spaced, 5-25 m apart. mostly an Albizia-like legume.

Grass badly overgrazed. (pholoto)

Sorghum patches 3-4 m tall.

Bauhinia-like shrub very common. Grass 2-5 dm tall, open.

Back toward foot of grade - open scrub of Eucacoid and several other shrubs 1-1.5 m. tall, thin grass lower or of same height between them.

Principal shrub a papillimate legume with loose terminal panicles of small pink-green flowers, large trifoliate leaves. Several other leathery-leaved shrubs, one quite shiny. The Acacia is like farnesiana but without odor and with flat narrow pods. A number of other legumes. Locally acacia dominant mostly the large leaved ones.

Small very hard rounded termitaria filled with clipped pieces of grass perhaps 1-15 cm long.

Small rocky hill covered by a sclerophyllous open scrub 1-1.5 m tall, large leaved. Thin grass, close cover cow paths.

Adenodolichos

pholoto

end
N.A.

1/2 m
1/2 m

Bouldery hills covered by a large leaved sclerophyll scrub of a number of species, 1-1.5 m. tall. Low paths between shrubs. Great granite boulders, a few scattered twisted trees.

Nov. 3 - north of Narraguta, just north of ~~edge of plateau~~

Labels written

in ~~an~~ open sclerophyllous scrub at foot of hill of granite boulders.

40734

Vernonia

occasional

1

1 35 (Reg.)

common

1

36 *Vernonia*

occasional

2

37 (rub.)

common

Nov. 3 - Hill Station, hills south of Jos

Labels written

in crevices between great granite boulders

1

38

(bamboo) *Oxytenanthera abyssinica* (A. Rich.)
common det McClure

4000'

erect, flowers bright purple.

shrub 0.7 m. tall, grayish.

rays maroon within, cream color without. corollas withered.

4200'

Munro

dense clumps, canes ^{very tough}, arching, 2-4 m. high, a fascicle of branchlets at each node, many small ones, one central one elongating, many imbricate scales at base of these branchlets.

1959 Nigeria

Nov. 7 - Hill Station, south of Jos
Bouldery granite hills
with patches of shrub
savanna between the knobs
of granite, the shrubs
sclerophyllous, mostly
legumes, 0.5 - 1.5 m. tall,
the grasses up to 1 m. tall.

In the crevices between
the boulders on the knobs
are various shrubs, but
especially a slender bamboo
about 2-4 m. tall, canes anchoring
to 2 cm. thick.

The culm sheaths are, at
this stage, somewhat
loosened from the culms
except in the middle
of the base, and tend to curl.
They are buff. Inside one
was a tiny tree toad, about
2 cm. long, elliptic in outline,
about the same shade of
buff as the sheath, but
apparently with some
ability to change color, as
it got slightly darker on
my hand. It seemed to adhere
to the sheath, with its legs
folded very close and under
it. Its feet were orange, with
suction disks. The belly seemed
to form a suction disk also.
When loosened it settled
down on my hand, adheres

Hyperolius
aff. *montanus* Angel

NATURE CONSERVANCY

a society to preserve living museums

Hyperolius
aff. *montanus* Angel.

Kiman Gof Mt.

E. Africa

~~found~~

Bull. Pan. Mus.

30

Mts. 2400 - 3100 m.

Walter Rose

Rept. & Amph. of Southern
Africa.Machere
Mt. Mully, Capetown
1958

NATURE CONSERVANCY

a society to preserve living museums

Hyperolius
aff. montanus Angel.

Kinang'op Mt.
E. Africa

~~*Hyperolius*~~

Bull. Par. Mus.
30

Mts 2400 - 3100 m.

Walter Rose

Rept. + Amph. of Southern
Africa.

Washburn
Washburn, Capetown
1950

Nov. 3 - Hill Station, south of Jos
Bouldery granite hills
with patches of shrub
savanna between the knobs
of granite, the shrubs
sclerophyllous, mostly
legumes, 0.5 - 1.5 m. tall,
the grasses up to 1 m. tall.

In the crevices between
the boulders on the knobs
are various shrubs, but
especially a slender bamboo
about 2-4 m. tall, ^{canes arching}
^{to 2 cm. thick.}

The culm sheaths are, at
this stage, somewhat
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except in the middle
of the base, and tend to curl.
They are buff. Inside one
was a tiny tree toad, about
2 cm. long, elliptic in outline,
about the same shade of
buff as the sheath but
apparently with some
ability to change color, as
it got slightly darker on
my hand. It seemed to adhere
to the sheath, with its legs
folded very close and under
it. Its feet were orange, with
suction disks. The belly seemed
to form a suction disk also.
When loosened it settled
down on my hand, adheres

*Hyperolius
montanus*
off

and seemed to huddle there.
Stayed without moving
while I wrote these notes.
When disturbed it would
spread its feet and hold
on, then settle back, drawing
its legs under it again.
Its eyes were golden with
horizontal black slits. The
insides of its legs,
where they fold against
the body, are orange,
the outside is buff.

When placed on a dark
gray rock it turned
slightly grayer but
remained a dull tan.
Apparently it was not
able to change further.
After it was disturbed
further it became
more active, hopping
about and attempting
to escape. When carried
in the hand it tried
several times to crawl
out, then settled down
and was quiet again.

Placed in an inverted
glass it settled down on
the side and didn't move.

Photos
(Chas. W. 1941)

The vegetation of the rocky knobs is varied. On bare rock faces there are thin crustose lichens, but many patches are bare from exfoliation.

On flat places with very thin soil there is a thin sod of *Bulbostylis*, about 2-5 cm high, spreading.

Various annual grasses and composites are found in crevices. Where there is some soil there are grasses, up to 1-2 m. tall, and a number of "podagracei" plants - what appears to be young *Adansonia*, 1-2 m. tall, and a number of others, several of them without leaves now. A white candalabra-form *Euphorbia*, cylindrical, and a small *Aloe* are uncommon.

Several *Vernonia* species, herbs or shrubs, are found. Most curious of all is a *Nephrolepis* which is common in crevices, seemingly completely dead and brittle at this season.

N. undulata

It is a narrow frond, 3-4 dm tall, very brittle. Digging at its base finally yielded some hard tuberous rhizomes, perhaps 5-8 mm thick and 2-3 cm long. The stems from them are completely dead and brittle, as are the roots. Collected rhizomes and fertile segments to see if they can be grown.

The smaller grasses and *Bulbostylis* are dead, after 3 weeks without rain. The larger ones are flowering. The leguminous shrubs and the composites, as well as a most curious labiate, leafless and with terminal cones with overlapping scale-like bracts, which open up and the corollas protrude.

Vultures are rather common. 12 seen in air at once.

This is just about a month after the beginning of the six months dry season. It is said to be a very strong dry season, October to November through March or April.

Nov. 4 - Trip by auto Jos-Manga
plains south of Jos
between rocky hills
are grassy, trees only
along roads and around
houses.

On rocky hills the white
Euphorbia is abundant.

The plains are largely
cultivated - sorghum &
millet or in pasture
which is overgrazed.

Eucalyptus planted
around towns and here
and there elsewhere.

Area south of Buba
spotted with holes and
great mounds of earth
which are old tin mine.

The hills to the south
are more grassy, though
still with many succulents
and podagraceae. Very
small baobabs local.

Tin mining on both
large scale, involving
large machinery and
on very small scale, by
hand digging and sorting.
Many small villages
dotted over plain.

The tin occurs in a
deep red to yellowish or mottled
blue and red lateritic clay
in form of black sand. The clay

is filled with concretions
and thin crusts of various
materials, mostly, I suppose
iron oxides. It is panned,
using a half gourd.

In the dry season the upper
layers, 6-8 m, are too hard
to dig. Working is done in
a wet layer under a
crust, with water which
seeps out of it. A man
may, if lucky, fill half
a calabash in a week, which
he must sell to the owner
of the mine. He may get 2-3
pounds for it.

Range of rather abrupt
granite hills. More
shrubby vegetation than
usual, incl. a small
palm (*Phoenix*?), caespitose,
stem slender. Cereoid
Euphorbia spp. common.
Trees very rare. Cut for
firewood.

Some flat topped mounds
remnants with sloping
sides and rim rock which
seems to be a laterite crust.

Down a slight slope
no general appearance of

photos

photos

millet
25

the vegetation becomes a bit more luscious and on the slightly lower plain wherever it is not cultivated is Parkia savanna. Some Viter. Both trees protected by law.

Landscape badly eroded. Eroded parts sparsely shrubby.

Mongu Market.

Peanuts. Black cakes from Parkia seed. Brown cakes from peanuts. Taro. sweet potatoes. Cobs. Guinea-corn (toughum) four milks. Pearl millet.

Maize. Cow pea. Okra.

Capicum. tomatoes. leaves of Bombax for making soup. "alligator pepper" imported from high forest area. Potash imported from far north, mixed with tobacco powder and put under lips, as snuff.

Dried Albizia roots, chewed to clean teeth.

Beyond here a few Borassus fruit eaten by children.

Plain becomes bushy with scattered trees, little grass - from overgrazing.

Changes to open scrub forest

Mongu Forest Reserve.

Open forest. trees irregular in height, up to 10 m. or more, very gnarled and twisted, 3-5 m. apart.

photos

Viter. Eugenia. Hamaricora (photo). Tamarindus indica (indigenous). Carapa? (Common ^{fruit} ~~fruit~~ ^{fruit} ~~fruit~~)

Terminalia arvensis, Bridelia, Canthium, Daniellia olivieri, Parkia, Combretum, Gardenia, Anageissus, Acacia seberiana, Acacia sp. Erythrina, Sarcocophalus, Randia.

Randia

Ficus

Bauhinia

A semi-deciduous broad sclerophyll open forest. Burned lightly ^{annually}. Trees lose leaves, but survive.

Loanthus common (at least 2 spp.)

Ground cover is a thin steppe-like grass. Curculigo common. Many other herbs. Elephantopus cf. mollis.

Shrubs are as common as trees or more so, no sharp distinction.

In places this grades to savanna

On the other side of the road is the same sort of land, unprotected

and it is a typical savanna. The larger trees are similar to those in the reserve, and about the same distribution. The smaller ones and shrubs are lacking. *Pennisetum* and other grasses are dominant between the trees. Much of it is cultivated.

The reserve has been protected at most 10-12 years. Lightly burned for protection, in Nov. or early December.

Where the boundary is not a road a strip is cleared about 15' wide as protection, grass is removed.

On one side of this strip is open savanna on the other an open scrub forest. The difference is striking.

The savanna has trees to 15 m. tall, few small ones. Grass up to 1 m.

The trees are protected species *Parishia*, *Vitex*, *Daniellia*, *Tamarindus*

at Mongu are crows with white breast and rafe. ~~several~~ vultures seen, also. Small numbers of each, compared with a similar tropical American or south Asiatic village.

In village are a few trees, but rather few. *Ficus* sp., *Elaeagnus*, *Eucalyptus*, *Gmelina*, *Chlorophora*.

(Mutor) open savanna west of Mongu, with cattle.

Farther west a flat topped hill, capped by a laterite crust, rim rock on side. almost bare on top, except for thin grass, and locally a low scrub of *Lecanodiscus* and *Diospyros mespiliformis*, 0.5-1 m. high. Crust at least 1 m. thick, hard. Fragments down the slope. The hill very badly overgrazed. Soil and rock showing through the thin grass.

Rocky hills, farther west.

Mixture of grass and shrubs. *Adelodanum* sp. is common. *Paspalum* *mespiliformis*, *Lanic*, & cereoid *Euphorbia*, a tall setaria-like grass, an *Andropogon*, many other shrubs. A conspicuous *Apoynacrus* vine with white flowers. *Podagrace* habit not so marked here, but some species have it. No bamboo.

Butyrospermum - from which butter is made. *Phoenix* is common

locally, in small clumps. Slender trunk red spathe about 25 cm. long 4 cm. diam. A wild *Musa*, rare, with it.

At west base a great stand of *Euphorbia*. Formerly a farm, but little more than bare rock. This *Euphorbia* is used for boundary hedges.

23 mi. S. of Jos small villages of conical-cylindrical houses dot the landscape. The vertical mud walls, in addition, to having thatched roofs are protected by grass hanging vertically from a rope stretched around the house.

In the fields around these houses the principal crop is a *Digitaria*. Sesame, roselle, pearl millet and sorghum are also grown. The seeds of the roselle are made into cakes.

~~medium sized~~ small white herons associate with the cattle in small flocks.

Area south of Bukuru with conspicuous close set *Euphorbia* hedges dominating landscape on rather rough ground.

Some areas planted to a tall *Tephrosia* (2m) with large purple flowers.

Granite hills have an abundance of the white cylindrical *Euphorbia* 1-1.5 m tall.

Nov. 4 Naraguta
just beyond, on a
rocky hill is a
stand of bamboo,
partly fruiting.
photos culms closely clumped,
clumps small

label
written

Nov. 4 - Naraguta, just north
of Joz
40739 (bamboo) *Oxytenanthera abyssinica* (L. Rich.)
common on rocky slope in ^{monoculture}
loose thicket

Nov. 4 - on Plateau, 23 mi.
south of Joz
in cultivated fields

- 1 40 *Diotis*
common
1 41 *Borreria*
common
1 42 *Digitaria*
abundant, planted
2 43 *Hedyotis*
very common

Nov. 4 Mongu Forest Reserve
35 mi. s.e. of Joz
in open ^{broad} ~~scrub~~ ^{savanna} forest

- 1 44 (~~Lab.~~) *Farea pusilla* Bak.
common
1 45 *Randia*
occasional
1 46 *Hedyotis*
rare

det. ^{det.} ~~McClure~~
small ^{dense} clump of arching
solid canes 4 m. tall, to
2-2.5 cm. thick. Fruiting clump
dying. Leaves ^{and sheaths} from another clump.

erect; flowers white

erect;
flowers white.

seeds used for food.

erect; flowers white.

flowers white

shrub 2 m. tall; flowers
white.

erect

407417 (lab.)

1

common

Nov. 4 - 25 km. s. of Jos

48

Borreria verticillata L.very common in eroded
overgrazed groundHill Station south of
Jos.Many dozens of vultures
in sky this afternoon
Nov. 5 - same.This vulture is sooty brown
has feathers on back of neck
and top of head, front of
neck and head bare, a dirty
grayish.Chameleon, very slow
moving, in *Callitris* tree.Saw a bustard on rocky hill.
Tried to get away by creeping
through brush, only flew when
followed.Photos of *Euphorbia*, *Aloe*,
bambos, *Adansonia*, etc.In this grassy-brushy
vegetation between boulders
and outcrops many of
the grasses and annual herbs
are past flowering, but
a considerable number
of *Compositae*, *Leguminosae*,
Acanthaceae, *Andropogoneae*.erect, bracts purplish,
white,branched herb or suffrutescent
herb, flowers white.and some other plants
are flowering.Two (?) species of *Asparagus*
here. *Lantana camara*
var. *aculeata*.The rock is a very
coarse grained granite.

Nov. 5 - Hill Station, just south of Jos

40749

Hedyotis

occasional in thin soil on granite hill

Nov. 5 - flight Jos - Kaduna in beam & motor plane.

9:24

Jos Plateau - a deposit of reddish material between knobby granite outcrops & ledges common in places surrounding fields.

Many serious erosion scars and gully systems largely cultivated.

Irregular plateau with scattered granite outcrops, some perhaps a bit gneissic, with joint systems running north and south.

Vegetation of flat part grass and cultivation, practically no trees or shrubs except on granite.

9:30

Country lower and rougher, trees common, scattered. Most of land cultivated except where too rocky. In distance to right a series of abrupt buttes that

erect.

may be old lava plugs. A large volcano(?) mt. to left, plus several small plugs.

9:37

Country smoother out at a lower level - savanna, partly cultivated. The uncultivated parts badly overgrazed, reddish and bushy, some of it an open scrub, some a shrub savanna. Curious gully patterns.

shorter

Meandering streams in rather narrow bottom lands.

9:38

Left a clump of knobby hills, adjoining a rather smooth dome beneath. Less cultivation, mostly open savanna, some areas grass without trees.

9:39

9:40

On right middle distance a roughly circular rough mass of hills forming 2 or 3 more or less

concentric circles, not at all regular and with many small bumps or plugs, some fairly good cones. Possibly an old caldera, but not well marked.

- 9:42 Large rolling plains along a meandering river with dendritic tributary systems entering at right angles. narrow gallery forest along river and tributaries. Vegetation between rivers from open scrub and open scrub forest to shrub savanna or savanna. no cultivation here at all. River roughly follows course, to right, very muddy.

photo

This mosaic continues. Road follows course considerably to left.

- 9:43 Low granite outcrops, rather smooth, terrain rolling. River swings off to right. Vegetation mosaic continues the same, but scattered cultivation appears.

- 9:51 A cluster of low smooth granite domes in middle distance to left.

More cultivation, savanna gets thinner, more shrubby, no more open forest.

9:52

Granite dome ~~more~~ ^{continue}

- 9:54 to left. Same on right.
9:55 a stream system with broad green grassy bottom lands.

Some burned patches in savanna and

- 9:56 open forest. Mosaic of open forest, open scrub, savanna and cultivation.

- 9:57 Considerable burning. Same mosaic.

- 9:58 Approaching Kaduna. Large river makes a bend around the town.

Immediate vicinity of Kaduna largely cultivated but this does not extend more than a mile or two. Spots of savanna and of low open scrub.

Country quite flat for a good distance.

Good shrub savanna near airstrip.

- 10:04 Landed.

Nov. 5 - Kaduna

Cultivated or planted species seen

Dodonaea viscosa (hedges)*Bougainvillea spectabilis*?*Plumeria rubra**Mangifera indica**Carica papaya**Catclanthus roseus**Alternanthera versicolor**Thevetia peruviana* (hedges)*Canna* (hybrids)*Citrus* (rough skinned lemon)*Gibizia labbea*? and one other sp.*Spathodea campanulata**Cassia siamea**Tamarindus indica**Borassus aethiopicum**Delonix regia**Xanthosoma sagittifolia**Ficus* (like *F. prolixa*)*Psidium guajava**Phoenix dactylifera**Casuarina equisetifolia**Ficus* sp.*Citrus sinensis**Zinnia elegans**Plumbago auriculata**Begonia nuda**Jasminum pubescens**Allamanda cathartica**Nerium* sp.*Tecoma stans**Delonix regia**Guacuma*

seeds seen

*Tridax procumbens**Desmodium triplarium**Ageratum conyzoides**Lynedrella nodiflora**Pennisetum* (small)*Correa* (same as 10748)*Amaranthus spinosus**Lida acuta**Chlois inflata**Eragrostis amabilis**Solanum verbascifolium**Caesalpinia pulcherrima**Callitris* sp.*Hibiscus* (hybrid)*Lagerstroemia indica**Tagetes* sp.*Eucalyptus camaldulensis**Azadirachta indica**Aster aff. novae-belgii**Gaillardia**Salvia**Samaranea*

Nov. 5 - Kaduna
near airport

Flat land soil generally gray brown with abundant buckshot concretions, covered by vegetation varying from open scrub with closed grass to ~~scrub~~ shrub savanna, bushes broad sclerophyll 1-2 m. tall, grass 1-2 m. Grasses mainly *Andropogon* mostly in fruit. Most of the shrubs not flowering, or fruiting, except for the abundant *Adenodolichos* which is flowering abundantly. Among shrubs are an aculeate *Randia*, several legumes, *Bauhinia*, *Gardenia*, etc.

Several knoll-like or low mesa-like eminences, 3-4 m. above general ground level are of a red soil, filled with quartzite fragments and iron concretions. These are capped, irregularly, with a brown lateritic cuirass.

Where the cuirass forms the surface there is either no vegetation or a steppe-like grass about 1 m. high or more, with scattered shrubs.

Where it is buried or not evident there is an open scrub about 2 m. tall varying to closed, broad-sclerophyll. Series of brown photos of this whole complex, ending with one of a borrow pit in the red soil and one of the cuirass on top of knoll, one to 2. from top of knoll showing shrub savanna, and one s.e. from same spot showing semi-cultivated savanna landscape.

On formerly cultivated ground near airstrip is a tall grassland of *Pennisetum setosum* or *polystachyon* 1 m. + tall some *Andropogon* sp. about the same stature, with occasional tufts of another *Andropogon* sort 2-2.5 m. tall. (photos)

On other side of strip is an expanse of broad sclerophyll shrub savanna about 2 m. tall, grass 1-2 m. These shrubs have many of them been cut at some time, giving a coppiced effect. There are a number of species of broad-leaved shrubs, no microphyllous ones. An *Adansonia*-like small tree with large leaves and petioles 2-3 dm. long. (several photos)

most of the grasses are Andropogoneae. Some herbs such as Acanthaceae, legumes, etc.

The airstrip is dirt - with a laterite surface. Laterite used on roads also, where not asphalt.

Threat^{tree} with heavy nerved leaves - dipterocarp?

Monotes kerstingii

Kaduna river - now very low, muddy. In rainy season rises about 4-5 m. (acc. high water mark on bridge) floods lowlands along river. No houses in lowland but many cultivated patches manioc, sorghum. Tall grass is cut and tied into mats. Sorghum is 3-5 m. tall.

Dominant tree generally is mangos. Along river are some others. Several medium sized Ceiba. *Spondias*? along road leading to ~~the~~ bridge. 2 bridges, one on the highway. Concrete piers.

Some bananas along river.

Series of photos from bridge

Meadows of tall grass andropogon? sp. in wet ground. reaches 4 m. or more. Sugar plantation.

A bare fig tree loaded with fruit.

"Mahogany" looks like *Spondias* but may be *Khaya*. *Psidium guajava*, Parkia (seeds ~~are~~ rotted, then cooked and dried twice, then ground and used to add to soup "to make it sweet"). "Oshumi" seed used for oil, rotted, pounded, oil used medicinally for boils (I Doma language, Benue Prov. and ~~Igalala~~ Igalala language.)

In river bed are great exposures of rock, much sand. Rocks apparently strike across. Lower banks are silt, are ^{very} planted to Cassava.

rocky stretch ^{bedding of gneiss? or} extensive, above bridge. ^{granite} rather indistinct.

Sesbania sp. a shrub 2 m tall is common on the river banks. The above trees and a great many mangos trees are scattered over the flood plain and adjacent low ground.

NW. 6 - trip by auto
some exposures of laterite
just out of town, on slightly
high ground.

Where not cultivated are
open broad sclerophyll scrub
(from firewood cutting).

Gmelina lines road.

On cult. land scattered
fair sized trees.

Not far west and south
is a vegetation varying
between open forest and savanna,
some trees up to 10m. tall,
mostly much less.

Broad sclerophyll. rather
thin grass 1-2 m. tall.

Soil silty, hard.

Terrain very flat

Considerable coppice
shrubs from firewood
cutting. A few thorny *Acacias*.

Considerable variation
in shrub composition.

Larger trees are *Tamarindus*,
Khaya (?), *Erythrina*, etc.

Tamarindus "samia" used to
make a drink for coughs.

Twigs chewed.

Grass is rather sparse
mostly 2-3 sp. and *Pogonochloa*
and a *Ctenium*. The spike

of *Ctenium* curl in spiral
fashion.

This land is under
Native Administration. Must
have permission to cut firewood.
Apparently the *Khaya* trees
are left, and some others.

Fire road is cut and cleaned.

Tree with large alternate
lvs. no stipules, axillary 3-lobed
fruits, suspended ovules, 3 separate
branched stigmas.

fruit eaten, leaves used
to protect *Cola* nuts from
sun, water from leaves
used for soap, wood
burned, ashes leached to
make soap. "apo" (*Igalq*
pro. language)

Palm wine made here.
Carried in to town in gourds,
from *Parasium* groves to min.
west of Kaduna.

Large trees (*Khaya*) are very
crooked. Perhaps one straight
log in trunk, if any. 3 dm. dbh.

Grasses are flowering, a fruiting,
almost everything else, except
a few legumes, is dry.

Market - Kaduna.

Mats of several styles of plaiting of palm (?) leaves also seen mats of grass stems.

Dried, chili pepper, maize, sorghum, orange, lime, millet, peanuts, cotton, rice in hulls (long grain), Taro, cassava.

East of Kaduna.

Much cultivation - sweet potatoes, sorghum, beans.

Small mesas capped with laterite. Rim rock. Scattered trees.

Broad valley, central part a shallow trough ~~is~~ cut into a concretion filled hard soil, with narrow ravines cut in it. Apparently an incipient locally well formed laterite crust. Broad sclerophyll shrub savanna; grass 1-1.5 m. tall. *Liptocarpus* is abundant.

A few vultures seen around Kaduna. White herons, usually with cattle.

North of Kaduna is a long low strike ridge of fine grained granite gneiss. This is perhaps 15 m. high. rounded. Used as back for target range by army.

Vegetation mostly grass, 1 m. rarely 2 m. tall, some other herbs, now all very dry, in longitudinal depressions with dark gray soil 1-3 dm. deep. On very shallow spots. *Bulbostylis*. very small. Completely dry now.

A very few trees with roots clinging to rocks and entering crevices.

Cattle graze in savanna, owned by Fulani, a nomadic people who have no fixed base but who wander over the whole northern Nigeria grazing their cattle on public lands, selling milk, with their belongings strapped on backs of cows, putting up temporary huts at times.

Nov. 6 - east of Kaduna

(thin in open scrub and ~~grass~~ grass)40750 (dift.?) *Monotes kerstingii*
most abundant shrub3 51 *Hedyotis*
common in cultivated field

Nov. 6 - west of Kaduna

52 (dift.?) *Monotes kerstingii*
occasional in open scrub forest

It seems clear that the difference between open scrub and ~~open~~ open scrub forest in this area is one of human activity. The vegetation will grow to tree size if the plants are not cut for firewood. Thus there ~~is~~ is scrub or shrub savanna in the vicinity of villages on most uncultivated land. In the cultivated land and uncultivated, certain trees reach quite a reasonable size because they are protected or at least not

615 m. (est)

shrub 1.5 m. tall, flowers whitish, fruiting calyx pinkish. flowers white, corolla funnelform.

600 m (est)

shrub 2 m. tall.

cut. Thus the cultivated areas are essentially savanna. The uncultivated areas are either open scrub with scattered trees, or savanna with scattered shrubs and trees. In some areas all trees have been cut, leaving either, cultivated fields, or open scrub or shrub savanna patches.

The two most generally seen trees in the vicinity of towns are mango and "mahogany", which may be Khaya.

Nov. 6 - air trip Kaduna-Kano
Heron plane. rt. side.

5:17

Left ground.

Considerable cultivation.

A great part of the country
has been recently burned.

Small watercourses
with strips of green
cultivation along them.

5:16

serious erosion scars.

Then a mosaic of savanna
and open forest.

Trees much larger near
small streams.

5:18

scattered cultivation.

5:19

A small marsh with
a pond in center.

Probably a third of land
cultivated. Many patches
have been cultivated
but are fallow now.

5:21

Streams with grassy
bottom lands. water.

5:22

serious gully erosion

5:23

Mosaic of large areas of
cultivated patches and
large savanna areas.

5:24

More dendritic gully
system.

5:25

A meandering river with
ox-bows at least 3 times the
width of the present
somewhat incised channel.
Then savanna with

some fairly large cultivated
areas.

A dirty haze or dust
storm makes visibility
rather poor.

5:27

Crossed a surfaced road
at right angles.

Considerable cultivation
some shrub savanna.

a few scattered trees in
both savanna and cultivation.

5:29

Generally a mosaic of
perhaps one fourth cultivation
and three fourths savanna.

5:30

More cultivation as we
go north.

5:32

Strips of gallery forest.

Then a meandering river with
gallery forest along its affluents.

Then a mixture of open
forest in patches.

5:33

Cultivation predominant.

Soil pale grayish ~~tan~~ buff.

Trees become fairly
abundant and large
in the cultivated land.

Probably because they
are not burned.

5:36

Still mostly cultivated

Crossed an important road
at about 45° from course to right.

5:37

Then patches of open
forest, trees fairly large,
with cultivated and abandoned patches.

5:38 Visibility not at all good.
Country mostly cultivated,
the uncultivated areas
look overgrazed.

5:39 Following railroad.

Open forest on west side,
mostly cultivated on east.
Appear to be flat rock
exposures, but this not
certain.

5:41 Some overgrazed savanna,
some cultivation.

5:43 Many small rock
exposures. Much
cultivation.

5:44 Small dry stream beds.
Larger rock exposures.
Following a narrow
river with braided sandy
bed, rather straight.

5:45 Fields separated by hedges.

5:46 Almost solid cultivation except
a few rock exposures and
some badly eroded patches.

5:47 River turns sharply to right.
Almost dry.

Cultivation predominant.
Patches largely marked
by hedges. Many
scattered trees.

5:48 Cultivation becomes less
distinct, much of it
appears to be abandoned
and grazed. Irregular cattle trails.

5:48 Ravines with scrub.
Cultivation pattern but
few patches active, mostly
grazed. Many trees,
so the land is essentially
a savanna.

5:52 Crossed a broad sandy
river with little water.
Patches separated by hedges
but rather few of them
cultivated, mostly grazed.
Fewer trees but still an open
savanna landscape.

5:58 Landing.
Hedges very prominent,
around fields and around
dwellings. Planting in
rows. Mostly sorghum
or maize.

No. 7 - Kano
cultivated or planted plants
Azadirachta indica
Delonix regia
Thevetia peruviana (hedge)
Agave sp.
Jatropha gossypifolia
Tropaeolum majus
Alternanthera versicolor
Portulaca grandiflora
Bougainvillea spectabilis
Caesalpinia pulcherrima
Nodosaen viscosa (hedge)
Albizia lebbek

Khaya?
 Manihot
 Torquum
 Mangifera indica
 Hibiscus (hybrid)
 Ficus? sp.
 Plumeria rubra
 Nerium sp.
 Zinnia elegans
 Gomphrena globosa
 Adansonia digitata
 Tamarindus indicus
 Brassia aethiopum
 Canna (hybrid)
 Rosa sp.
 Duranta repens
 Uncaria granatum
 Zizyphus sp. (spineless, lvs. glabrous)
 apoc. with thick stems,
 alternate lvs. bright rose
 pink campanulate calyx
 fls. spatulate deciduous
 lvs. (photo) fls. pubescent.
 Ficus religiosa vel. aff.
 Phoenix dactylifera
 Pantanum canaria s. aculeata
 Cosmos sulphureus
 Coleus scutellarioides
 Catharanthus roseus
 Nerium indicum
 Euphorbia pulcherrima
 Tabernaemontana pendula
 Tecoma stans
 Caladium bicolor
 Ageratum bonstianum

weeds

Cynodon dactylon
 Tyndar procumbens
 Chloris inflata
 Euphorbia hirta
 Boerhaavia diffusa
 Lymedrella nodiflora
 Eragrostis amabilis
 Eragrostis ciliaris
 Dactyloctenium aegyptium
 Amaranthus spinosus

 Nephrolepis sp.
 Codium variegatum
 Kalanchoe pinnata
 Solanum lycopersicum
 Daucus carota
 Beta vulgaris
 Lactuca sativa
 Citrus sinensis
 Cassia siamea
 Acacia catechu? globular
 Albizzia sp. heads comatose
 Gaillardia sp. sub-moniliform ped.
 Uratypus sp.
 Quercus indica
 Parkinsonia aculeata
 Pelargonium zonale
 Nephrolepis duffii
 Gynandropsis gynandra?
 Ilex microphylla
 Salvia coccinea
 Celosia argentea
 Argemone indica
 Caesalpinia pulcherrima (red + yellow forms)

The principal street trees are *Azadirachta indica*, a species of *Ficus*, 40753, a species (at least) of *Albizia*, *Mangifera indica*, and *Khaya* (?). *Delonix* is common, also, and *Cassia siamea*.

Some vultures, but not many. A dozen seen sitting on a roof.

Nov. 7 - Kano

40753 (leg.)

1 common street tree

1 54 *Hedyotis corymbosa*
rare in parks

1 55
rare in parks

1 56 *Bonneria*
occasional in waste places

1 57
abundant on ^{very} lateritic mesa

1 58
common on slopes of dry
lateritic mesa

1959

184 m (max)

tree 8 m. tall, pods pendent.

erect

erect

erect, flowers white.

520 m. shrub 1 m. tall, branched.

↓

much branched shrub
1 m. tall.

Nov. 7 - out to tip -

Cassava patches near airport. Eroded places show a laterite layer about 0.5 m. below surface of rather fine brown soil.

Roads lined with trees, mostly *Azadirachta*, some *Khaya* (?).

Scattered trees of *Parkia*?, *Prosopis*?

Soil pits show a reddish brown soil gradually more yellow downward, no ironstone. (north of city).

Plantation of coppiced *Albizia* about 15 m. tall.

Plantation, also, of *Cassia siamea* and of 40753.

Huge barbat tree (photos)

Euphorbia spinosa common in weedy places.

Great mud wall around old city and a large area of fields.

Belt of planted coppice outside wall. Sorghum fields outside this, with scattered *Parkia* & *Prosopis* perhaps 5 m. tall, spreading crowns. Occasional *Phoenix dactylifera*.

Not at between wall and coppice. *Pongamia pinnata*

Scattered barbat and a few other trees inside wall. Area inside partly cultivated in sorghum, partly covered by a dense scrub of *Lawsomia inermis* 1.5-2 m. high.

Mud wall thick at base & tapered to top, 4-5 m. high.

Inside wall are two flat topped hills, or mesas, 10-15 m. high, capped with ironstone (sample), inside, when exposed, a pale buff soft weathered rock. Steep sides scrub-covered, some scrub on rim - rock (photos). Grass with scattered shrubs on top. (photos) (photo from top, of Kans and of plain.)

Many grasses on top. Gray shrub (40757). *Waltheria indica*, several legumes, *Heteropogon contortus* on lower slopes.

Phoenix dactylifera common in old mud city.

Moringa oleifera in town. A few date palms, branched,

a few outcrops of granite, some flat, smooth, exfoliating, at ground level, one low smooth dome, and several jointed and bouldery. Little vegetation on the smooth ones, irregular scrub on the bouldery ones. These are being used up as building stone and road metal.

The old town is a sprawling but crowded aggregation of mud huts, mostly built in Arabic style, with rounded roofs and vertical ear-like pinnacles decorating sides and corners on top of the walls. There are almost no trees, except for a scattering of date palms, and the general impression is hot and dusty. The market is like a series of cliff dwellings, with massive mud walls and numerous doors.

The whole old city is inside the great wall, and, sprawling as it is, it occupies only a small portion of the enormous area surrounded by the wall. There are extensive fields, several ponds, the two hills, ~~and~~ the westernmost one of them with the city's water reservoir on its top. Much sorghum, "guinea corn" cultivated, some areas of closed or open *Lantana* scrub.

The general area is a vast plain, mostly cultivated, sorghum and Cassava, with scattered large trees, few small ones. It is savanna, but the herbaceous vegetation is cultivated. The guinea corn, which occupies much of the area, is about 3-4 m. tall, or even 5 m. rarely.

The soil is fine and heavy, laterized and with a crust locally, especially on high spots.

Nov. 8 Barcelona

Principal street tree
seems to be *Platanus* (hybrid).

In Plaza Catalunya the
tree is a *Quercus*, similar
to *Q. virginiana*, with
elliptic acorns 3-3.5 cm. long,
with a small, closely scaled
cup less than 1 cm. deep.
Lvs. dark green above, white
tomentose beneath.

In front of Cathedral -

Casuarina equisetifolia

Cupressus sempervirens

Quercus sp.

a legume like *Robinia* but
spineless and smoother bark.

Inside cathedral enclosure

Phoenix canariensis

Magnolia grandiflora

Livistona chinensis

In Parque de la Ciudadella

Aesculus parva

Tilia cordata

Phoenix canariensis

Chamaecyparis humilis

fine *D. racemosa draco*

Magnolia grandiflora

Erythraea armata

Washingtonia filifera

Phoenix dactylifera

Ligustrum (evergreen)

Juniperus sp.

Cinnus

Casuarina equisetifolia

Cedrus deodara

Cedrus atlantica

Salix molle

Cupressus sp. cf. *macrocarpa*.

Ficus sp.

Robinia pseudo-acacia? spineless

Populus alba? weeping form.

Ulmus sp.

Laurus nobilis

spreading tree with

strongly tinerved leaves like

Cinnamomum but odorless.

Platanus (hybrid)

Celtis sp.

several other unidentified
trees and many shrubs.

On street leading to airport

Salix cf. *babylonica*

Platanus (hybrid)

Leaves are partly shed -
Aesculus, *Tilia* are almost
bare, *Platanus* varies from
leafy to partly bare. *Salix*
still has leaves.

Nov. 8 - flight from
Marcelma to Paris
viscount, left side 15,000.

Weather nearly clear
but quite hazy.

Along sea by airport is
a belt of small compact
green flat-crowned trees,
appearing quite trimmed.

These are only in the
vicinity of the airport.

3:35

Between airport and city
cultivation comes to
the top of the beach.
Clouds.

3:40

Hills with thin maquis
cultivated fields on
flatter ground. Many
villages and towns.

3:43

Some patches of forest
probably planted. On rather
rough ground running
up toward mountains.
Pyrenees in distance
ahead, some snow
on higher peaks.

3:45

Great escarpments
and terraces on several
levels, apparently flat
white sedimentary beds
cut by deep canyons.
Mostly thinly wooded
some pastures, some
cliffs bare, rocky slopes

partly bare. The woods
may be partly a thick
scrub. Mostly dark
green, occasional bright
yellow trees.

3:50

Dissected more marked, steeper
south slopes bare.

3:51

Some terracing, but mostly
rather uninhabited country.
Crossed a winding road.

3:52

A valley, rather rugged, with
a town and some villages.
Some brown deciduous forest
on slopes.

3:53

Spectacular ridges
and valleys, trending
east and west. Valleys
flat bottomed, ridges
terminating in a large
valley along course.

Valley bottoms thickly
populated, ~~the~~ ridges
partly wooded, partly bare.
Pyrenees close by on left.
Upper ridges snow covered.
Upper slopes brown, grassy.
Some traces of forest
or scrub in ravines
and on steepest slopes.

3:56

Along course some very
rocky sparsely vegetated
ridges and slopes.

3:58

East end of Pyrenees -
some forest on lowest steep

- slopes. Upper slopes have some thin scrub. mostly dry grass. a few buildings high on slopes. Lower slope a patchwork of cultivation, forest, scrub, pasture. Occasional tiny villages.
- 4:00 Flat valley with a town, cultivated, with hedges. Slopes partly wooded, partly dry grass.
- 4:02 Slopes become gentler, drier, mostly dry grass or stubble fields. Some eroded ground. Low steeper slopes very rocky, thin scrub with rock showing through.
- 4:03 Then, densely wooded or bushy slopes, some still very rocky.
- 4:07 Strike ridges crossing course. of strikingly bedded rock, dip slopes bushy. Country generally rough, rocky and bushy to thinly wooded.
- 4:09 Less relief, land mostly cultivated. Scattered villages.
- 4:11 crossed a river. Several towns, relatively gentle terrain.
- 4:17 Terrain becomes rougher,

- some of it eroded. steeper slopes and ridges thinly wooded or bushy. Series of high steep ridges about east-west. Wooded except lower slopes, which are cultivated or grazed. become very rough. Precipitous slopes, with very little vegetation. Visibility very poor. Higher and less precipitous slopes wooded. Practically no flat ground. Some flatter land, but visibility very poor.
- 4:14
- 4:16 Country mountainous but so hazy as to obscure all detail.
- 4:20 Over a vast sea of clouds. The upper surface billowy, appearing like gigantic ocean swells. They become more irregular northward.
- 4:20-30
- 4:27 A few peaks above clouds far to left.
- 4:31 Swells end. Relief of top surface of clouds is now rather minute. Still like irregular swells, but on less than a tenth the scale.
- 4:38 Shifted course slightly to east.

11.43

still over clouds. another group of peaks far to left. Now there seems to be a haze layer above the clouds to northward.

Nov. 10 - flight, Paris - London. The woodlots and forests in France and England still have their leaves. Those in France are quite yellow or yellow-brown, in England yellowish green to dull yellow. The fields are brownish green in France, rather green in England.

Nov. 21 - trip by auto Berkeley to Laytonville Mendocino Co. along East Bay Freeway, San Rafael Bridge and rt. 101.

Baccharis pilularis in Berkeley hills in fruit. Some patches of *Artemisia californica*, *Rhotum* with fruit.

San Rafael hills, w. end of bridge - mosaic of open to closed evergreen oak forest (a scrub forest), dry grassland, patches of scrub of *Baccharis pilularis*, some patches of *Artemisia californica*, chaparral.

Farther inland the open forest grades to savanna, some trees are deciduous, mostly broad sclerophyll.

In flats the oaks in the savannas are quite large. On the hills the mosaic is open evergreen broad sclerophyll forest - savanna - ~~of~~ seasonal short grass. Very little scrub.

Near Novato the trees are locally predominantly deciduous, rather yellow now. *Salix* abundant along watercourses.

Some apparently seasonal marshland on flat ground. Northward the proportion of deciduous trees becomes ~~more~~ greater.

The lower hills east of road mostly grass and savanna, higher over west of road ^{semi} deciduous open to closed forest.

Santa Rosa area - hills, a mosaic of dry grass small patches of closed evergreen and closed deciduous forest, some open forest and some savanna.

Orchards in flat ground. Some open fields. Scattered large oaks. Hills in distance to west from Windsor seem to have conifers prominent in forest cover on ridges.

Areas of oak savanna on flat ground. In east in distance the abrupt Mt. St. Helena, wooded but in places thinly so.

Lower hills partly wooded, especially ravines, some savanna.

Gealdsburg - Vineyards and orchards on flat land.

Russian River has some water, not much. Wooded hill to east has a few conifers in evergreen oak forest. Conifers abundant on low hills to west.

North of Healdsburg is a high range - the lower slopes with a mosaic of wooded ravines, patches of wood, grassy slopes, savanna, etc. The upper ridges and peaks are chaparral-covered. The lower wooded slopes are largely deciduous the ravines evergreen.

To west the hills are covered by redwood.

Orchards and vineyards in valley bottoms and lowest slopes. Some olives, oranges.

A few digger pines locally on low hills north of Geyserville. Mostly patches of oaks.

Some olive groves south of Cloverdale. Hills with open forest, mixed deciduous and evergreen oaks, patches of redwood on hill west of road. Higher hills to east covered by chaparral, lower with

closed to open forest.

Hills north of Cloverdale have open to closed mixed forest of digger pine, evergreen and deciduous oaks, patches of chaparral. Some scattered redwoods and patches of redwood, especially in ravines. Deciduous oaks common on west, east and south slopes. Some patches of grass and savanna on west and south slopes.

Deciduous oaks (*Q. douglasii*?) are a fine red-orange to burnt orange to greenish brown. Grass patches very heavily grazed.

Some *Photinia* and *Arbutus*. Some patches of what appears to be *Artemisia californica* on steep south slopes. *Acer macrophylla* bright yellow in canyon along Russian River, also *Populus fremontii*?

Isnea begins to show up on trees.

Mts. to west densely covered with chaparral and some forest. Northward a few mosaic of savanna, open and closed mostly ~~dead~~.

or *Ceanothus*?

deciduous forest; chaparral. grass very heavily grazed. Upper slopes and ridges tend to be predominantly chaparral.

On range east of Ukiah forest is thin, no redwood. On that to west there are patches of redwood, generally thicker forest. Considerable areas of chaparral on high ridges and steep slopes of both, in some parts predominant generally, as immediately west of Ukiah.

North of Ukiah on low hills the forest becomes dense and quite mixed. Some open areas, grass or savanna. To north and higher, mostly savanna. Higher up more forest than chaparral. Distribution of patches of conifer forest very irregular - probably remnants from logging.

North, toward Willits much conifer timber, mainly *Pseudotsuga*. Lower down mainly deciduous oaks, much *Phoradendron*. Some *Pinus ponderosa*.

North of Willits an irregular mixture of deciduous oaks and conifers.

Bad burns several miles north.

Some fairly big conifer forest. Patches of *Arbutus*. *Arbutus* in fruit. *Cornus nuttallii* turned reddish. Yellow *Salix* in creek beds. Oaks are brown but have not lost many leaves.

Country gets quite young near Longvale. Predominantly coniferous forest, some deciduous oaks. There has been logging in many areas here and the forest is rather ragged.

Becomes very brushy open forest, some conifers.

Laytonville is in a flat valley. Deciduous trees and open fields in bottom. Coniferous forest, and deciduous oak on sides.

No. North Coast Range
Preserve

Lower slopes and ravines densely wooded with Douglas Fir. Some redwoods in Shunk Creek and El River but none in Elder Creek.

Upper slope covered by a thick chaparral of *Ceanothus*, *Arctostaphylos*, *Quercus vaccinifolia*, *Arbutus*, etc. The broad sclerophyll is of forest size in the ravines and lower slopes, but is shaded out by the *Pseudotsuga*.

Chungnapin Point

large Douglas firs,
large *Castanopsis semp.*
large *Lithocarpus densiflorus*
much *Chimaphila umbellata*

Douglas fir reproduction in semi-open.

Driftwood "Meadows"

A patch of glaucous *Arctostaphylos* on a flat ridge top, with some bare spaces, a few dwarfed *Castanopsis*. No herbaceous growth at all. Surrounded by rather small *Castanopsis* of varying height.

A few scattered Douglas fir. No reproduction. Ridge top forest on this side is ~~*Castanopsis*~~ *Lithocarpus* small trees, crowded, perhaps 5-8 m. tall. a little *Arctostaphylos*.

Lower down a ~~mixture of~~ remarkable forest of *Lithocarpus* perhaps 3 dm ~~dbh~~ dbh, 15-20 m. tall. No Douglas fir reproduction.

Lower a mixture of *Arbutus* and *Lithocarpus*, small forest. 10-12 m. tall. Then almost pure stand of *Arbutus*.

Serious logging in 1950s after, in Misery Creek drainage on BFM land - timber theft.

Some seedling Douglas fir on scars. Bad erosion in canyon bottom.

There is a road cut in the slopes along the ridge south of Elder Creek, mostly on the Elder Creek side just below the crest, and down into Misery Creek. The lower end, in Misery Creek is badly eroded. One or two other spots on the steeper slopes are also giving trouble.

No. 22 - Coast near Westport
southward.

Coastal bluffs grassy
or brushy, grazed by
sheep. Redwood forest
immediately back
of coast, but not on
exposed parts. In
canyon bottoms alder
thickets and forests.

No. 22 - Northern California
Coast Range Preserve, north
of Branscomb, west of
Laytonville, Mendocino Co.

40799

Quercus wislizenii var. *pratensis* Eng.
dominant in scrub ^{forest} on high
sandstone slopes.

shrub 3 m. tall.

Dec. 12, 1959 - Hogback Mt.
 Low forest, principally
 oak, mostly *Quercus*
rubra, of low trees,
 6-10 m. tall, flat topped
 and with very thick
 trunks for the size of
 the trees otherwise.

A thin shrub layer,
 mostly of *Kalmia*
latifolia, locally of
 other shrubs.

Ground very rocky

40760 collection of lichens (& mosses)
Parmelia
 on dead log.

61

62

63

64

65

on tree trunks

66

67

68 *Umbilicaria*

69

70

71 *Umbilicaria*

72 (moss)

73 (moss)

on rocks

with rocks protruding
 abundantly from ground.
 Soil thin and usually
 full of stones. In places
 a tufted ground layer
 of *Deschampsia*.

Lichens abundant
 on trunks of older trees
 and on rocks.

Flock of 3 ravens
 south of here. Herd of
 6 deer plus one alone,
 north of here.

1040 m

134

1959 Virginia

Dec. 17 - Elk Wallow Shelter

Rather thin mixed
forest on gentle rocky
slope - *Quercus alba*,
Q. prinus, *Q. rubra*,
Pinus strobus, *Pinus* sp., *Acer rubrum*,
Tsuga canadensis, etc.
very little undergrowth.

740 m.

40774 (liche.)

75 (liche.)

76 ..

77 ..

78 ..

79 ..

80 ~~liche.~~ on rocks.

81 ..

82 ..

83 ..

84 .. *Parmelia*85 ~~on~~ tree trunk

86 ..

87 ..

88 ..

on rock

89 (liche.)

90 (moss)

on base of tree

91 lichen on tree trunk

92 lichen

93 ..

94 .. on trunk of *Acer rubrum*

Shenandoah Nat. Park 135

Dec. 13 - M. p. 27,
4 mi. s. of Elk Wallows
Colony of *Betula papyrifera*
in mixed forest on
n.e. slope, at head of
south branch of North
Fork of Thimble R.

Dec. 13 Whiteside Canyon trail
Mixed forest of oaks;
red maple, a few pines and
hemlocks; understory 2 m. tall
of *Kalmia latifolia*.
Mosses and lichens on rocky
ground.

40795 (lichen)

96 "

97 "

98 "

on broken rock.

99 (lichen)

40900 moss

01 "

02 "

03 "

on earth

Dec. 13. Whiterah Canyon
Trail, Limberlost
Forest of young Tsuga,
a few old Tsuga, scattered
old *Quercus alba*, some
small *Betula alleghaniensis*
Mosses & lichens on
rocks, earth, and
fallen branches of broad
leaf trees.

Almost no lichens
on Tsuga, but conspicuous
Protococcus?

(40304 (lichen)

05 (*Protococcus*?)

on bark of large Tsuga.

06 *Lycopodium obscurum*
under Tsuga.

07 moss

08 lichen

09 "

10 "

11 "

on fallen branches of
broad-leaf trees

12 (moss)

13 "

14 "

15 (lichen)

16 *Cladonia*

17 moss

18 lichen

408 19

(moss) Bartramia

20

(moss) Thuidium

on earth in small opening

21

(lichen)

22

..

23

..

on rock

Dec. 13 Skyline Drive
below Mary's Rock.

24

Cladonia

by small ~~scattered~~ seep
on road cut in rock

Dec. 20 - 1 mi. n. of Centerville
Fairfax Co.

25

Cladonia

common on ground in
Pinus virginiana forest.

26

Cladonia

same

27

(lich).

same

28

Cladonia

~~in heavily grazed~~
in open grassland being
invaded by small pines.

Jan. 1 - between Gallows Rd.
and Pine Springs on
Arlington Blvd. Fairfax Co.
Thick *Pinus virginiana*
forest, trees 10-15 m. tall,
1-4 m. apart, 5-20 cm. apart.
some *Cornus florida* of
fair size, deciduous
saplings.

Count of plants along
Adum series:

10 - 7

20 = 9

100 - 19

300

700

1000

Pinus virginiana

Acer rubrum

Lonicera japonica

Heterotheca mariana

Chimaphila maculata

Cornus florida

V. indet.

Mitchella repens

Liriodendron

Liquidambar

Vitis sp.

Sassafras

Amilax sp.

Feb 7 - about 2 mi. s.e.
of Sunset Hills

Rather dissected.
wooded area perhaps
20 m. relief. mixed
oak, tulip, *Pinus*
virginiana + *P. rigida*
nothing over 2 dm.
dbh. or the average,
mostly much smaller.
Has been cut but not
too recently, strong
evidence of fire &
charred stumps &
bases of trees.

Unusual amount
of *Ilex opaca* in
low parts of valleys.
The understory is
actually green.
Scattered *I. holley*
elsewhere.

No great amount
of honeysuckle. Some
greenbrier.

Some areas with only
saplings.

Feb. 12 - 4501 Kirby

Fairfax Co.

Somewhat dissected edge
of Potomac ravine

Property of M. Deven

17 acres - large house
about 1 acre orchard and
2-3 acres open on one hill,
small patches of *Pinus*
virginiana

Opposite hill has 6-8 acres
pasture. Ravine between
has mixed woods largely
mixed conifers, esp. *Pinus*
strobus planted, some
tulip poplar, etc. 3 small
ponds in bottom of ravine
(lower one does not hold water),
spring in head of ravine,
wild flowers & bulbs
planted on terraces
around ponds. One
solid grove of young pines.
Lomaxylon planted.

30 years ago the entire
area was completely denuded.
Many trees planted, but
tulip, *Pinus virginiana*,
oaks etc. have come in.

Some semi-open slopes
with *Andropogon*,
Lonicera japonica, etc.

Fence across middle,
the part on other side
is being grazed (incl. the
pasture mentioned above)

Pin oak, shingle oak, sweet gum,
Tilia, *Fagus* brought in.
Cornus florida, *Magnolia glauca*,
Rhod. viscosum, *Clethra alnifolia*,
Fraxinus, *Tilia cordata*, *Acer negundo*.

The *Platanus* is native,
also a big white oak and a couple
of large *Acer rubrum*, also *Juniperus* virg.

Betula lenta, *Picea abies*, *Picea* sp.
Abies balsamea, *Pinus austriaca*
Betula nigra, *Taxodium arborescens*
Prunus pennsylvanica, *Lyrus* oak, *Platanus*.
Soil seems to be a residual
soil on rotten gneiss & schist.

Two large old *Picea abies* by
house which are very old.

Saw 2 sun dogs at 4:45 p.m.
(semi overcast & sky is west)

Feb. 20 - Ball's Bluff
Potomac R. Loudoun Co.

Woods on narrow flood plain and bluffs are fairly old-growth, entirely deciduous.

On flat or rolling land back of edge of bluffs most of the woods have been cut over, regrowth of varying age. All deciduous except for a scattered *Pinus virginiana* right near old cemetery.

Some areas very low growth, largely *Cornus florida*, rather sparse. Scattered *Juniperus* seedlings scattered in sparser parts of woods on flats.

Not all trees on the flat are mostly oaks, some hickory. On bluffs, in ravines and on flood plain *Platanus* is common, some *Celtis*.

One pileated woodpecker seen, several heard.

Flock of Canada geese seen flying from open fields toward river, about 150.

Small opossum in open at edge of woods,

seemed very sluggish, snarled but did not attempt to leave, mouth dripped a bit. When picked up by tail did not seem much disturbed. When put down ran off to ravine with logs and rocks.

Tree sparrows feeding in pasture. Downy and red-bellied woodpeckers in edge of woods.

Gr. Blue heron flying toward river.

Some snow on ground, especially on north-facing slopes, hard smooth crust on surface.

Said to be a fair deer population in the area, increasing. Some stray cattle wander from pasture in woods.

A very thorny *Rubus* on ravine edges around edges of forest.

1960 New York Ulster Co
March 24 - Lake Mohawk

~~Am.~~ ^{Am.} ~~granite~~ in quartz
conglomerate, with lake
in a graben.

Well wooded with
a mixture of hemlock,
white, pitch pine, paper
birch, chestnut oak

Abundant yellow birch
~~red striped maple~~ etc. with a shrub
layer of Salvia, etc. and
abundant Vaccinium

Was burned over in the
1860's very thoroughly,
then ~~was~~ largely grew up
to chestnut, which
was eliminated by
blight, when the
present composition
followed.

Upper parts have
dwarped pitch pine
and birch in sparse
stand with abundant
scrub but much bare
rock also.

leaves
typed

40829

April 2 - Skyline Drive just
south of Pocosin Cabin, m.p. 60.

Hammamelis virginiana
common in thickets on flat

April 2 Skyline Drive just
north of Baldface Mt. Overlook.

30 *Hammamelis virginiana*
common in thin woods
on moderate slope

April 2 Swift Run Gap,
west slope.

Woods of *Fagus*, *Quercus*,
Magnolia, *Betula* etc.
in valley along small
stream

31 ~~*Tipularia discolor*~~ *Aplectrum hyemale*
occasional

3 32 *Epipagus virginiana*
very local, under
Fagus grandifolia

April 17 - Hunter Valley, 2 1/2 mi.
n. of Oakton (near Hunter Valley
Swimming Pool.)

Gentle slope, facing north,
with ~~sage~~ old field vegetation
varying from mixed shrub
savanna to ~~open~~ mixed open
scrub of young *Prunus*
serotina saplings (2-5 m.),
Juniperus virginiana (2-3(4) m.),

shrub 1.5 m. tall, wood
greenish yellow.

shrub 2.5 m. tall,
wood greenish yellow.

leaves green with
strong white nerves,
plicate.

some *Pinus virginiana* (2-4 m.),
Acer rubrum (2-4 m.), tangles
of *Rubus argutus*, and
closed mixed grass,
some *Andropogon* and
Tridens dried from last year.

April 17 - Small affluent
of Difficult Run

White oak, black oak, tulip,
in bottom of valley
with considerable
patches of *Kalmia*
Lycopodium obscurum
& *L. complanatum*,
some fair sized trees.

Belt of thin scrub pine
around north slopes
and headwaters.

In this pine belt is an
area of some acres
in which most of
pines have been blown
down, toward east,
some years back leaving
a thicket of saplings,
both pine and broad leaf,
some flex of space 4-8 m tall.

A little cutting some
years back, judging
by a few pine stumps of
fair size.

Much *Vaccinium* in
undergrowth, both
high & low bush.

Chimaphila maculata
Mitchella common, *Pyrola*

rotundifolia occasional
considerable *Cornus florida*
locally
Colony of *Chimaphila umbellata*.

In upper part of
stream valley quite
a few pines blown down.

Lycopodium very abundant
upstream.

On south side of upper
part pine woods are
thicker, less undergrowth
but some red maple,
nyssa, *Cornus*, etc.

Lower south side
is purely deciduous,
the boundary between
them sharp and almost
at right angles to stream.

April 17 - Bowman Place,
Snaheden Br.

Young rather thick
second growth of oaks,
hickories, a few tall
Populus ^{+mink} = 20 ± m. tall, up to 10-15 cm dbh.

In shallow valleys
patches of *Ilex opaca*
understory 2-4 m. tall,
stems up to about 4 cm.
thick. In places dense
enough to touch, generally
not so close. *Cornus*
florida with it.
Some *Smilax*.

A dry ravine ~~through~~
~~it~~, originating in patch.
Polystichum common
on banks.

Ilex thins out headward.
Here *Lycopodium*
complanatum Mitchell's
Viola rotundifolia.

April 23 - Great Falls
(road to quarry)

plants ~~in fl.~~ seen

Ranunculus abortivus (fl.)

Hedysotis caerulea (fl.)

Panicum japonica

Acer rubrum

Taraxacum vulgare (fl.)

Antennaria plantaginifolia

Claytonia virginica

Kalmia latifolia

Lycopodium obscurum

Fagus grandifolia

Smilax rotundifolia

Luzula sp. (fl.)

Viola sp. (fl.)

Vaccinium atrococcum (fl.)

Amelanchier sp. (fl.)

Saxifraga virginiana (fl.)

Hieracium venosum

Cornus florida (b.)

Symphlocarpus foetidus

Prunus serotina

Anemone thalictroides

Quercus alba

(many seedlings, more
on roadside than in woods
under other side of tree,
but here many in relatively
open area, very few in thicket)

Vicia sp. (fl.)

Polystichum acrostichoides

Smilax glauca

Silene caroliniana (glandular) (fl.)

^{laev.}
Arabis virginica? (fl.)
Podophyllum peltatum (fl.) (b.)
Populus deltoides
Ilex opaca
Rhododendron sp. (b.)
Rhus toxicodendron
Dentaria laciniata (fl.)
Cercis canadensis (fl.)
Glesoma hederacea (fl.)
Pinus virginiana
Parthenocissus quinquefolia
Vaccinium stamineum (b.)
Viburnum bruniifolium
Vaccinium vacillans
~~fab~~

Leaves of trees from just showing to $\frac{1}{3}$ or even half expanded.

April 24 - Sleepy Hollow

5 purple finches. 3 male, 2 female, seen eating grit from sand pile on terrace.

April 24 - north of Centreville

small patch of *Pinus virginiana* woods.

Trees 1-3 m. apart, up to 15 (20) cm. dbh. 10-12 m. tall.

Thin *Lonicera japonica* over much of ground.

Considerable *Juniperus virginiana* up to half the height of the pine.

Shrubs scarce, a few

ec *Cornus florida* to 1 m. tall,

✓ ec *Sassafras* to 1.5 m.

very small (c) *Ulmus* sp.

✓ c *Prunus serotina* (c) *Quercus* sp.

✓ n *Acer rubrum*, *Viburnum prunifolium*

Herbs & dwarf shrubs:

✓ ec *Chimaphila maculata*

✓ ec *Veronica officinalis*

✓ c *Potentilla* (canadensis?)

✓ c *Vaccinium vacillans*

✓ c *Hedysotis caerulea* (fl.)

✓ c *Achillea millefolium*

o *Daucus carota*

c *Galium*

o *Geranium vulgare* (fl.)

✓ n *Podophyllum peltatum*

la *Rosa carolina*

✓ n *Smilax glauca*

Oxalis sp.

o *Antennaria*

✓ c *Antennaria plantaginifolia*

- ✓ (la) *Allium vineale*
- ~ *Asplenium platyneuron*
- ✓ o *Rhus toxicodendron*
- ✓ c (la) *Rubus* sp. (*hispidus*?)
- ✓ lc *Danthonia spicata*
- ~ *Lycopodium complanatum*
- ✓ c *Solidago* sp. (*juncea*?)

Label
typed

40833

Antennaria

occasional in *Pinus virginiana*
woods.

varied on broken ground
to pure *Juniperus virginiana*
1-2 m. apart, up to 10 cm. dbh.
8 m. tall. Here *Rhus toxicodendron*
is much more abundant.

Open field with *Andropogon*
nearby - invaded by *Pinus*
virginiana and *Juniperus*.
Underlined herbs from
pine forest also seen here.

Another similar but
denser patch of pine,
with much less *Lonicera*
and seeming less disturbed.
Species seen here in list on
p. 157-9 marked ✓. *Juniperus*
much less abundant and
smaller

Ranunculus abortivus (fl)*Prunella vulgaris**Ascyrum hypericoides**Agrostis**Potentilla simplex* (fl)

April 29 - Pennsylvania
Railroad Washington
to Philadelphia

At Washington the trees
are practically fully
leafed out, ~~but~~ except
for the oaks, but are
still a light bright
fresh green. The leaves
of the oaks still hang
down, are still dull
and woolly in appear-
ance, and perhaps
half developed or less
in size. *Cornus florida*
is in full bloom.
Paulownia in bloom.

State of leafing out
in Philadelphia not
perceptibly different from
that in Washington.

May 7 - Everglades Nat. Park.
 "Marl" soil -
 Distichlis flats.
 Batis flats.

Mangrove which came in after 1935 hurricane -
 Rhizophora about 8 m. tall and 10 cm. diam.
 closed, trunks rather clumped, 1-3 m apart, seedlings abundant near edges. roots not quite contiguous.

Stand of Conocarpus rather open, with herb layers of Batis, Salicornia, Borreria etc. Trees about 6 m. tall. Large blowdowns common.

Other stands of Rhizophora very dense, small poles 6 m. tall.

~~These~~ Conocarpus stands with dense Borreria ground layers, even through canopy almost closed, but thin.

Tillandsia common on trunks.

Small meadows of Borreria, Batis, etc.

Everglades

National Park, Florida

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Everglades

National Park, Florida

Everglades

NATIONAL PARK

OPEN ALL YEAR

This southernmost tip of the Florida mainland was established as Everglades National Park on June 20, 1947, thus assuring the preservation of its unique biological features in their natural state for all time. Many people had contributed their time and efforts to accomplish this goal.

The park boundaries encompass more than 2,100 square miles of land and water. This vast wilderness, blending sea and sky in the distance, dips imperceptibly to the shallow waters of Florida Bay on the south and to the Gulf of Mexico on the west.

Threshold to the Tropics

In effect, Everglades is a mosaic of many interesting things, each strongly influenced by the tropical climate. Plants of the Temperate Zone meet plants of the Torrid Zone; fresh water meets salt water; and land meets sea. The grasslands of the true Everglades stretch across the horizon. Clusters of trees, called hammocks, resemble islands in the open Everglades and among the pines. Following the shorelines and growing upon keys (islands) in open water, mangrove forests form almost impenetrable thickets.

Warmed by the sun and nourished by the waters, the area is biologically fertile, supporting many interrelated forms of plant and animal life under natural conditions. Outstanding among the features of the park are the rookeries of birds.

Park rangers will assist you and give you information on what to see and do during your visit. The park naturalist staff conducts programs and walks designed to give you a better understanding of the wildlife, geology, plants, and history of the Everglades country. Schedules of these interpretive services are available at all ranger stations.

The National Park System, of which this park is a unit, is dedicated to conserving the scenic, scientific, and historic heritage of the United States for the benefit and enjoyment of its people.

The Winter Season

Weather is normally pleasant and clear, with very little rainfall. Temperatures are often described as "about like June up north," and people dress accordingly. However, brief cold snaps do occur occasionally, sometimes bringing strong northerly winds and possibly frost.

This dry season is the best time to see the abundant wildlife, which tends to concentrate in sloughs, lakes, and other water areas. Many of the large, spectacular wading birds—egrets, ibis, herons, and roseate spoonbills—nest in their rookeries during midwinter and early spring. Waterfowl and other bird migrants from the north are in the park area.

Practically all trees, shrubs, and other plants stay green all winter, although the grasses and sedges of the Everglades take on brownish hues. Fishing is good, as a rule, but it is variable. Boating is generally good, but waters may become rough during this season.

The Summer Season

The majestic clouds of summer, though they may produce brief torrential showers, give a beauty to the landscape that you would miss in the winter. Wildlife is distributed over wide areas and is not so easily seen. Fishing is at its best, and the

waters of the park are usually calmer than in winter. In the summer, you should bring insect repellent with you, for the pests can become bothersome.

Overnight Accommodations, Picnicking, and Camping

Overnight accommodations in the park are limited; therefore, you should make reservations well ahead of your visit in order to insure having a place to stay. You may reserve your accommodations by writing to Everglades Park Co., Inc., either at Flamingo, Fla., or at 3660 Coral Way, Miami 45, Fla. Also, you may telephone this company at either Miami or Everglades, Fla.

You may picnic at Flamingo, where drinking fountains, tables, charcoal burners, and restrooms are available; in the Long Pine Key area, where there are tables and toilets; and at Nine Mile Pond, where only picnic tables are provided.

You may enjoy camping at an improved campground at Flamingo; or you may prefer the less developed surroundings at Long Pine Key. Camping space is obtained on a first-come first-served basis and cannot be reserved. You may camp in the back country, but you must first get a campfire permit at park headquarters or at any ranger station.

Housetrailer permits are permitted in the campgrounds; however, electric, water, and sewer hookups are not available.

The labyrinth at the mouth of Shark River.

Roseate spoonbills. Courtesy, F.S.N.B.

If you plan an extended boat trip into park waters, you should obtain the necessary charts before starting. It is well to consult a park ranger and indicate your proposed route. You may purchase U.S. Coast and Geodetic Survey charts from authorized dealers in Homestead, Miami, and Everglades.

Boats for sightseeing and charter boats for fishing go out from Flamingo and Everglades. These are carefully inspected for safety by both Coast Guard personnel and park rangers. Reservations are usually necessary during the peak of the winter season. Names and addresses of authorized operators of charter boats may be obtained at park headquarters.

Food Service, Gasoline, and Miscellaneous Items

At Flamingo, you will find modern dining facilities and service stations for boats and cars. Also available at this newly developed area are boat rentals, bait, store supplies, and souvenirs.

A general-delivery post office is operated at Flamingo.

Help Us Protect the Park

To accomplish our objectives of protecting and preserving the wilderness, and to leave Everglades undisturbed for the enjoyment of our own and future generations, we must have park rules and regulations.

Everglades National Park is a sanctuary for all wildlife. Recent years of protection have made the wild creatures lose much of their fear of man. Therefore, we ask that you please not throw rocks or in any way attempt to disturb the birds, alligators, or any form of wildlife. Hunting or the use of firearms is strictly prohibited. Fishing is permitted in accordance with State laws.

Trees, shrubs, airplants, orchids, and other plants must not be removed or disturbed—other visitors wish to see them, too.

Speed Limit

For your safety and for the safety of the wild creatures, the speed limit in the park is 45 miles per hour. You'll find that the more leisurely you drive, the more you will enjoy the Everglades scene.

Mission 66

MISSION 66 is a program designed to be completed by 1966 which will assure the maximum protection of the scenic, scientific, wilderness, and historic resources of the National Park System in such ways and by such means as will make them available for the use and enjoyment of present and future generations. Tangible evidences of the progress being made under the program here at Everglades include the new road, camping facilities, and the development at Flamingo.

Self-guiding Trails, Exhibits, and Facilities Along the Park Road

[Trails do not exceed 20 minutes walking time]

Miles from entrance to turnoff	
2	Royal Palm area: Royal Palm Visitor Center—exhibits, naturalist programs, restrooms. Anhinga Trail—a wildlife trail. Gumbo Limbo Trail—a jungle trail through tropical hardwood hammock.
4	Long Pine Key area: Campground—limited facilities. Picnic area—limited facilities, picnic tables, toilets.
6.5	Pinelands Trail—a pinewoods community trail.
12.5	Pa-Hay-Okee—boardwalk and tower for panoramic view.
19.5	Mahogany Hammock—elevated boardwalk into mahogany forest.
24.5	Paurotis Pond—parking for view of rare palms.
26.5	Nine Mile Pond—limited picnicking facilities.
30.5	West Lake area: Mangrove Trail—an elevated boardwalk into dense, tropical, mangrove swamp. West Lake Pond—Cuthbert rookery boat trip (Feb.-May), waterfowl.
38	Flamingo area: Exhibits, naturalist programs, marina, sightseeing boats, restaurant, motel, service station, picnic area, campground.

Administration

Everglades National Park is administered by the National Park Service, U.S. Department of the Interior, with headquarters at 203 North Krome Avenue in the business district of Homestead, Fla. For further information, call in person or telephone or write the Superintendent, Box 275, Homestead, Fla.

UNITED STATES
DEPARTMENT OF THE INTERIOR

Fred A. Seaton, *Secretary*

NATIONAL PARK SERVICE

Conrad L. Wirth, *Director*

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Everglades

National Park, Florida

May 7 - Everglades Nat. Park.
 "Marl" soil -
 Distichlis flats.
 Batis flats.

Mangrove which came in after 1935 hurricane -
 Rhizophora about 8 m. tall and 10 cm. diam.
 closed, trunks rather clumped, 1-2 m apart, seedlings abundant near edges. roots not quite contiguous.

Stand of Conocarpus rather open, with herb layers of Batis, halimolobos, Borreria etc. Trees about 6 m. tall. Large blowdowns common.

Other stands of Rhizophora very dense, small poles 6 m. tall.

~~Stand~~ Conocarpus stands with dense Borreria ground layers, even through canopy almost closed, but thin. Tillandsia common as trunks.

Small meadows of Borreria, Batis, etc.

Mangrove trail board trail in dense stand of Rhizophora 6-10 m. tall with scattered Avicennia. Root tangles dense (photos) Acrostichum common.

Some low mixtures of Cladium and shrubby mangroves.

Saw grass marsh patches. Along road embankment Bidens pilosa var. Cynodon dactylon, etc.

Much low mangrove scrub - Rhizophora with open water between clumps.

Paurotus clumps on islands (photo.) Marsh with scattered tiny mangroves. (photo)

~~Forest~~ Large areas of Cladium - drab green. Scattered small Taxodium up to 7 m. tall. Scattered small hammocks or patches of shrubs, with dense undergrowth of small fan palms (Lycopersia)

Sparse pine-land with saw-grass and palms.

Pine hammocks
are small patches of
this with brush and palms.

Mahogany Hammock -
Patch of dense low
forest, very mixed,
with scattered fair
sized Swietenia trees,
tall Sabal metopium,

Coccoloba
Chrysophyllum
Calyptranthes

Eugenia, Ardisia, ~~Metopium~~, ~~Pinus~~, ~~Bursera~~.

Acrostichum and
Blechnum (2) on ground.

Epiphytic Tillandsia,
Polypodium, polypodioides,
Inclids, Nephrolepis.

Striking strangling
figs (F. aurea)
Exothea.

Open ^{scrub or scrub-shrub} forest or ^{shrub} savanna
of small cypresses 2-5 m. tall
over considerable area.

Areas of open pine-lands
more and more common
northward. Pines mostly
small, widely spaced.
Low scrub layer dense.

All the palms seem to
be in flower.

Anhinga Trail -
Patches of thicket of
^{cordillera} Salix, patches of reed,
and areas of open water
with luxuriant ~~Marpha~~
Cephalanthus, Annona
glabra occasional.
Anhinga, redwing
blackbird, alligator,
bull frog, and gar-fish

May 8 - ~~Marine~~ Coconut Grove - boat landing on shore near Mathieson Hammock.

An irregular maze of filled land, open water and mangrove swamp.

The swamps are dominated by *Rhizophora mangle*, small trees 2-10 cm dbh, 2-8 m. tall, crowded, spacing 0.3-3 m. arching aerial roots forming a tangle about 1 m. high, some roots higher, some trees also sending down vertical roots from the branches as high as 3 m.

In these swamps are scattered trees of *Avicennia* and *Laguncularia*, both sending up numerous vertical finger-like "knees" a few inches high all over the ground around their bases. Nothing else seems to grow in the actual swamps. In the margins *Conocarpus erectus* trees or shrubs of 2 forms, a glabrous green one and a sericeous one, ~~and~~ *Coccoloba uvifera*, and *Thespesia populnea* (one tree seen) are found, in places prominently.

Also in the margins are *Lycium* sp., *Borrichia fruticosa*, *Sesuvium portulacastrum*, ~~*Thunbergia alata* (?)~~ and in small open spots, *Batis*, *Salicornia*, *Paspalum distichum* (?), *Euphorbia* spp., *Portulaca oleracea* (large fls.), etc.

Around park hq. *Pandanus tectorius*, *Achras elliptica*, *Ficus* sp., *Lehinus terebinthifolius*, ~~and~~ *Coccoloba uvifera*, *Myrsine* sp. & *Stenotaphrum secundatum* are planted. also *Zoysia tenuifolia*.

In mangrove swamp the trees are somewhat irregularly dumped. Many seedlings. Many old wind thrown trunks tangled in the aerial root layer.

Landward along the road the mangroves become smaller and the vegetation changes to a scrub, still principally *Rhizophora*, 1-3 m. tall. Still farther toward the land this thins out. ~~*Laguncularia*~~ *Juncus* (*drummondii*?) becomes abundant with the mangroves. Then the *Rhizophora* becomes less abundant and the

Laguncularia become abundant. The *juncus* drops out and the scrub becomes more irregular and sparser.

Then there is an area cleared for picnicing.

Then the hammock begins and extends to the highway.

This is on slightly higher ground where the surface is a moderately irregular one of a sponge-like oolitic lime-sandstone.

Here the vegetation is a gnarled, twisted low forest, 6-8 m. tall, with a mixture of broad-leaf trees up to 3 dm. dbh but mostly 6-12 cm. or smaller, spaced 1-2 m. apart, with a conspicuous surface layer of roots.

The undergrowth is moderate, of saplings and shrubs (*Psychotria*, *Leuena*, *Nectandra*?, *Eugenia* etc.) 1-2 m. tall, scarcely any herb layer, (only a few seedlings of larger plants), thin moss ^{lichen} and algal colon on the rocks. A few epiphytes

(*Tillandsia*, mosses) in the trees. *Liaves* common.

Bursera is a common and conspicuous tree.

The aspect is of a dense tangled thicket, but one may walk freely through it in most places where *Smilax* is not abundant.

A small *Zamia* is occasional. Patches of *Oplismenus*, occasional *Panicum*.

Labal, *Coccoloba heterophylla*?, *Ardisia*, common, also *Quercus virginiana* at least in edges.

On slightly higher ground to north of this are areas of open to closed scrub of *Lantana*, *Rhus copallina*, ^{palm}, and various other shrubs with scattered *Quercus virginiana* and *Pinus*.

This grades to open pinelands - grass with scattered shrubs, palms, and pine trees, and to open pine forest with ^{herb + grass}.

All of this oak pine complex appears to be on a very broad beach ridge, this at least locally consolidated.

Labels
typed

May 8 - Mattheson Hammock
Coral Gables, south of Miami
~~The mesophytic evergreen forest~~

40834

Psychotria

1

common in mesophytic
evergreen forest

1

35

Euphorbia supina?

common on fill of crushed
oolitic limestone.

1

36

Conocarpus erectus

common, edges of mangrove
vegetation.

1

37

Phragmites

occasional in limestone fill

1

38

Randia

common in open pine forest.

1

39

Hedyotis

open sandy pine forest

shrub 1 m. tall; flowers white.

shrub 2 m. tall, silvery-silky.

clump 2 m. tall.

shrub 1 m. tall; flowers
fragrant, white.