RECORD

48
6/28/85
6798567
200

1948 47.11

18

Collection and Field Note Book

No. 48

(Nov. 18, 1956 - August 5, 1957)

(38663 -- 38813)

Page

Train trip Washington-New York 11/18 1-19
(DC, Maryland, Delaware, New Jersey)

VIRGINIA (Fairfax County)

btwn Herndon-Sunset Hills... 38663-38664 20-21
s. of Centerville 26-27
n. of Oscoquan Creed 38665-38666 ... 28-31
n. of Bull Run 30-33
n.w. of Great Falls 38667-38670 ... 32-33
below Great Falls 26871 34-35
" " " Pot. River.. 38672-38676 ... 36-39
s. Springfield 38697-38703 ... 50-53
e. of Annandale 38704 52-53
Great Falls..... 38705-38724 64-67
Sleepy Hollow 38725 66-67

Trip by auto-Falls Church-High Knob 72-73
High Knob (Norton, Wise Co.) 38730-38732 72-73

Shenandoah National Park

Dickey Ridge 114-115
Compton Mountain..... 38795-38797... 116-117
..... 114-115

Train trip Washington-New York 12/26 22-24

LOUISIANA

Fort Macomb, Chef Menteur, New Orleans
..... 38677 40-41
e. of Rigollettes Bridge,
St. Tammany Parish 38678 42-43
e. of Slidell,
St. Tammany Parish 38679-38687 ... 42-45
Indian Village, St. Tamm. 38688-38689 ... 46-47
Pearl River Village" " 38690-38695 ... 46-49
near Slidell 38696 48-49
Lake Ponchartrain..... 48-49
Air trip Washington-NY..... 54

F R Foshena

Air trip New York-Montreal..... 55

CANADA

Montreal (Quebec), Mount Royal 56-57
Oka..... 58-62

CONNECTICUT

Hemlock Ridge (Litchfield Co.) 38726-38728... 68-69
Dolbia Hill (Middlesex Co.) 38729 70-71

KENTUCKY

Cumberland Nat. Forest 38733-38734... 74-75
Mammoth Cave 38735-38737... 76-79

MISSOURI

w. of Mansfield..... 38738 80-81
e. of Seneca 38339 80-81

OKLAHOMA

Osage Hills State Park 38740-38742... 80-81
Trip Elsinore, Mo.-Osage Hills, Okla..... 82-83
Trip Osage Hills, Okla.-Buffalo, Okla..... 84-86
Trip Buffalo, Okla.-Capulin Mt. NM..... 87
e. of Jet 38742 88-89
Buffalo 38744-38763 88-91

NEW MEXICO

Capulin Mt..... 38764-38767... 87, 92-93

ARIZONA

Trip Taos-Painted Desert..... 94-95
Trip Painted Desert-Grand Canyon..... 96-99
Petrified Forest..... 38768 96-97
s. of Little Colorado River... 38769-38770... 104-105

UTAH

Trip Grand Canyon-Zion Canyon..... 100-108
Zion Canyon 38771-38772... 104-105
St. George..... 38773-38778... 103, 104-107
..... 108-109

NEVADA

Rock Creek 38789-38793... 108-111

CALIFORNIA

Senora Pass..... 38794 112-113
s. of San Francisco 112-113

D.C. - birds on Capitol dome 118-119

MARYLAND (Montgomery County)

Sugar Loaf Mountain..... 120-121

Air trip Washington-Idlewild, NY over
Annapolis, Maryland, N. Jersey, Del.... 122-123

(SEE NEXT PAGE)

No. 48

PUERTO RICO

Air trip NY to San Juan, Puerto Rico	124-125
San Juan airport	125

BRAZIL

Belem	126-127
Air trip Belem-Santarem-Manaos	128-136
edge of airstrip	38798 136
n. of Manaos	38799-38801 142-145
Air trip Manaos-Santarem	146-155
Boat trip Santarem-Maycuru	155
Maycuru	155-158

Para

Belterra	38802-38806 158-159
.....	174-175

Santarem-Belterra	159
Pindobal	160
Air trip-Belterra-Belem	161-171
Uriboca	38805-38806 174-175
.....	172-173
Air trip Belem-Santarem-Manaos	174-182
Santarem	38807-38813 182-183

AMAZONAS

Manaos	183
Air trip Manaos-Taffe	184-197
<u>Acre</u> (from air)	197

47150

191-191 191-191 191-191
 191-191 191-191 191-191

191-191 191-191 191-191
 191-191 191-191 191-191
 191-191 191-191 191-191
 191-191 191-191 191-191
 191-191 191-191 191-191

191-191 191-191 191-191
 191-191 191-191 191-191

191-191 191-191 191-191
 191-191 191-191 191-191
 191-191 191-191 191-191
 191-191 191-191 191-191
 191-191 191-191 191-191

191-191 191-191 191-191
 191-191 191-191 191-191
 191-191 191-191 191-191

F. R. Fosberg
 Collection Book

no. 48

beginning with

38663 and with

38813

Standard
 Miniature Blank
 Book

6 120 Pages Units
 8 200 Pages Units
 300 Pages Units

Following Rulings
 1/2 inch, Double S and Cts.
 and give you
 all the cooling
 problems you
 answers to your
 General Electric
 and Ruling desired

BOOK SPECIFY
 ING DESIRED.
 PRODUCT

38798-

38795

38752

38794

38747

38725
 38697

38776

38773

ATE

FRONT PAGE
All trip NY to San Juan, Puerto Rico
San Juan airport

FRONT PAGE
All trip NY to San Juan, Puerto Rico
San Juan airport

FRONT PAGE
All trip NY to San Juan, Puerto Rico
San Juan airport

FRONT PAGE
All trip NY to San Juan, Puerto Rico
San Juan airport

BUDAPEST, Hungary, May 10 (AP). — Poland's Wladyslaw Gomułka told a select group of Communists today Soviet suppression of the Hungarian revolt in 1956 was correct and necessary.

"In the concrete circumstances of your country at the time it was an international obligation on the part of the USSR in the interests of the Hungarian people, peace and all the Socialist states," the Polish Communist Party boss said.

Mr. Gomułka, here on a four-day visit, spoke in a sweltering indoor sports hall and the 4,000 who heard him were admitted by numbered tickets. A few hundred yards away stands the great People's Stadium, which can hold nearly 100,000 people.

There was speculation that the Hungarian Communist leaders wanted no large and unscreened crowd to hear Mr. Gomułka, who seeks for his

the
the
vie
two
but
hav
He
rem

T
M

The
serve
terda
of A
Tunda
feren
Africa
deput
execu
Neo-L
tary g
Assem
A r
the re
Amba
Branch
signed
and f
on Tu

Book

th

end with

38813

TONIC

on new power
lively channel

5:30

**Michel's
Continental Music**

Enchanting gypsy and
concert music

7:00

**ADVENTURES
NUMBER & SPA**

Bill Baird's marionette
"Stretching the Imagination"

CIFY
IRED.

more

7:30

F. R. Fosberg
Collection Book

no. 48

beginning with

38663 and with

38813

Standard Miniature Blank Book

No. 665 9½ x 6 120 Pages Units

No. 667 9½ x 6 200 Pages Units

No. 668 9½ x 6 300 Pages Units

Made in the Following Rulings

Journals, Day or Cash Books, Double S and Cts.

S. E. Ledgers, S and Cts.

Double Entry Ledgers

Records with Margin Line

When ordering give Number and Ruling desired

Made in U. S. A.

WHEN ORDERING THIS BOOK SPECIFY
STOCK NUMBER AND RULING DESIRED.

A BOORUM & PEASE PRODUCT

Commercial **MALLOREY** Stationery
OFFICE SUPPLY
WASHINGTON 1, D. C.

1954

D.C. - Maryland 1

Nov. 12 - Trip by rail
from Washington to New York.
Description of vegetation
from left side windows
of train (Pennsylvania R.R.)
(Coastal Plain landscape)

Leaving Washington -
weedy embankments
and waste places,
some dominated by
blankets of *Lonicera japonica*,
others by stands of
Andropogon virginicus
and *A. scoparius*, still
others by mixed
perennial pioneer species
eg. *Solidago*, *Panicum*,
Aster etc.

Deciduous thickets
with *Acer rubrum*,
Liquidambar, *Quercus*
spp. etc. rarely a few
Pinus virginiana,
more and more
common. *Acer* is
especially common
in low spots. *Lonicera*
is very conspicuous
climbing in trees.

Outside Washington
the country becomes
generally wooded
except where occupied
by housing developments.

Woods are predominantly oak, with *Platanus* and *Acer rubrum* in low places. Admixtures of pine, mainly *P. virginiana* but some *P. rigida*, are common. Some patches of pure stands of pines. Leaves mostly off the deciduous trees at this time, but a few trees still show some color, some have brown leaves, especially oaks.

Seabrook Sta.

Large sort of mixture, with less housing.

Glenn Dale Sta.

Beyond here are more pure stands of pine, then mixed deciduous woods, largely young second growth, but occasional patches are fairly large.

Bowie Sta.

Much very young second growth, mostly *Quercus*, some stands of pine, 4-8 m tall.

This country is a

occasional low spots of

1956 Md.

Woods are predominantly oak, with Platanus and Acer inbrum in low places. Admixture of pine, mainly P. virginiana but some P. rigida, are common. Some patches of pure stands of Pinus. Leaves mostly off the deciduous trees at this time, but a few trees still show some color, some have brown leaves, especially oaks.

Seabrook Sta.

Large sort of mixture, with less housing.

Glenn Dale Sta.

Beyond here are more pure stands of pine, then mixed deciduous woods, largely young second growth, but occasional patches are fairly large.

Bowie Sta.

Much very young second growth, mostly Quercus, some stands of pine, 4-8 m tall.

ABOUT OUR PEACHES

These peaches are grown on our farm in Fairfax County and are picked the morning of the day you buy them. By picking daily we are able to bring them to you at the peak of their freshness and goodness. Only a tree-ripened peach has these qualities.

The orchard we are picking from this year has eleven varieties, with ripening dates ranging from July to September.

The varieties were chosen because of their high quality for eating fresh. Most of them are also suitable for freezing or canning. You will notice that the Elberta is missing from the list below, but its absence is intentional. The Elberta (often mispronounced Alberta) is an old variety good for canning but definitely inferior for eating fresh or freezing. It is still a popular commercial peach because it ships well and can be handled roughly. But it is not "luscious", as store ads frequently describe it.

Incidentally, we also grow several varieties of Oriental plums -- Satsuma, Methley, Abundance, and Santa Rosa -- which will be available at this stand at times during the summer. All will be sweet and juicy -- again, as in the case of peaches, because they will be left on the tree until ripe.

Following is a list of the varieties of peaches to be sold at this stand throughout the summer. Approximate ripening date is given for each variety. These dates may vary a few days either way, depending on the weather. Each variety is in for about a week after its ripening date.

Variety	Approx. Ripening Date
Early-Red-Fre	July 9
Gold Ray	July 9
Redhaven	July 20
Triogem	July 29
Halehaven	Aug. 7
Georgia Belle	Aug. 13
Summercrest	Aug. 16
Brilliant	Aug. 17
Shippers Red	Aug. 20
Afterglow	Sept. 1
Rio Oso Gem	Sept. 6

Woods are predominantly oak, with *Platanus* and *Acer rubrum* in low places. Admixture of pine, mainly *P. virginiana* but some *P. rigida*, are common. Some patches of pure stands of *Pinus*. Leaves mostly off the deciduous trees at this time, but a few trees still show some color, some have brown leaves, especially oaks.

Seabrook Sta.

Large sort of mixture, with less housing.

Glenn Dale Sta.

Beyond here are more pure stands of pine, then mixed deciduous woods, largely young second growth, but occasional patches are fairly large.

Bowie Sta.

Much very young second growth, mostly *Quercus*, some stands of pine, 4-8 m. tall.

This country is a patchwork of second growth - old field successions - in various stages of development, some pure pine, mostly mixed deciduous.

A large patch of swamp forest several miles from Bowie, then several more, with *Betula nigra*, as well as *Acer rubrum* and oaks. Some places, where the construction of railroad or roads have ponded the water, show forests partly dead. *Betula* may be identified by pink bark, very scaly, and darker smaller branches.

After this some rather good pine forests of medium low stature. On rolling hills a mosaic of pine patches and well developed deciduous forest, occasional cultivated patches, occasional low spots of

swamp or bottom-land forest.

after some miles of this open land, either cultivated or grassy becomes more predominant, but still with considerable forest, some park-like landscape. Open land is mostly dominated by *Andropogon virginicus*.

A thicket of *Arundinaria* bet. m.p. 107 & 106.

The country then becomes more generally wooded. *Liriodendron* is very common, also *Platanus* in low places.

Calvert Distillery

Much hawking, with some deciduous woods, this becoming less as Baltimore is approached. In large cemetery trees are largely native deciduous ones, shrubs are mostly planted.
Gwynn Sta.

Entrance to Baltimore has little vegetation except weedy ruderal sites with *Solidago*, *Panicum*, *Eupatorium*, *Aster*, *Tridens*, etc. Scattered tree seedlings of *Ulmus*, *Prunus*, *Platanus*, ~~etc.~~ *Ailanthus*, etc.

Leaving Baltimore weedy vacant lots and ruderal spots. Some marshy, very polluted places, dominated by *Panicum virgatum*. Then some cultivated fields mixed with low patches of deciduous second growth.

A narrow estuarine marsh (more extensive on right side). Then a mosaic of cultivated fields with smaller patches of broad-leaved woods of various heights. Some of these are blanketed by *Lonicera japonica*. Glenn Martin Plant (on it.)

Woods become more dominant, mostly well grown second growth deciduous, but

with more and more
pine admixed, both
P. rigida and *P. virginiana*.
Bengies Sta.

Continues the same,
with some farms
and patches of young
second growth. Some
areas of *Andropogon* near
Chase Sta.

Then some well
developed oak forest,
followed by a mosaic
of younger second growth,
housing, etc.

Then a large estuary
lined by irregular
lobed areas of marsh,
probably largely *Panicum*
virgatum but too
far away to be seen.

Low gravelly ~~knolls~~
with scrubby second
growth, patches of
good deciduous woods,
very few pines. Some
farms.

Quercus phellos fairly
common with various
other oaks.

Edgewood Sta.

Same sort of mosaic,
on flatter ground. Where

it is at all rolling
pine becomes more
prominent for a
short distance, then
almost drops out.

Another large
estuary, with very
little marsh, higher
wooded shore, but
mostly solidly lined
with houses, ^{small} piers, etc.

Uneven deciduous
woods, oak with
some red maple, especially
in low places.

Then some large
cultivated areas with
patches of deciduous
wood, many houses
surrounded by trees,
almost flat. Much
Lonicera japonica especially
in margins of wood
and in hedgerows.

More or less like this
to Aberdeen. Fields
tend to be separated
by hedge-rows and
lanes with scrubby
trees, juniper, *Lonicera*.

Young second-growth
becomes more abundant
especially small
thickets.

Slopes around
Horse-de-Grace are
covered by thin scrubby
second growth, this
being *Lusquehanna* R.
where not occupied by
houses. Small bits
of *Panicum virgatum*
marsh. Island in
river covered by bottom-
land forest.

Beyond Brinkville

patches of deciduous
wood in farm-land.
A long hedge of *Myrica*?
cuts off view for a
mile or so. Gravelly
hills are mostly
wooded, largely oak
and *Liriodendron* with
Platanus prominent in
ravines.

Cut banks along
rail road revegetated
in places by a solid
stand of pines (*P. virginiana*).

From here an irregular
mosaic of patches of
clearing in deciduous
woods, locally mixed
with pines, occasional
small swamps and
wet places with
Betula nigra. Openings

dominated by *Andropogon*
virginicus.
Some larger cultivated
farms.

A mixed shrub layer
becomes more frequent
in the woods. And
patches of *Betula*
nigra on apparently
dry ground are
occasional, a few
patches of pine, either
pure or mixed with
deciduous trees. Pines
are mostly *P. virginiana*,
some *P. rigida*.

Around m.p. 46 are
large open areas, either
covered by *Andropogon*
or cultivated.

Elkton Sta.

Deciduous woods
along streams, on
escarpments and
then a large area on
a low hill. Mostly oak.
Open ground cultivated
or in *Andropogon*.

Mostly open. *Larrea*,
probably *Rhus copallina*,
common in waste spots,
with mixture of
Solidago, *Andropogon*, etc.
Newark, Del.

Rolling land, mostly open fields, some patches of deciduous wood, *Quercus-liriodendron*, some *Acer rubrum*.

Patches of well-grown deciduous woods with an understory of small oaks.

Some abandoned, apparently frequently flooded land with scattered trees in grass, then a ^{small} pine plantation, near m.p. 72, then a small estuarine marsh.

Housing dominant but not excessive around Newport.

Patches of deciduous woods and large fields of *Andropogon*.

Housing, estuarine marshes, city dumps, etc. as Wilmington is approached. In

outskirts a small *Phragmites* marsh.

City has few trees, but some *Ailanthus* to be seen near railroad.

Large London plane trees around cemetery just beyond station.

Ailanthus in alleys, etc. In edge of city, an area of dump is being revegetated.

Scrubby second growth and small patches of estuarine marsh - some with *Typha*, some *Hibiscus moscheutos*, etc.

Beyond this, rolling slopes running down to Delaware river - largely housing, some deciduous second growth.

Bellvue Sta.

Housing with patches of deciduous woods, very irregular and poor, estuarine marsh, and *Andropogon*.

Woods are oak, red maple, *Platanus*, *Liquidambar*, etc.

Just before Claymont Steel Plant at Najaman, *Miscanthus sinensis* has quite a foothold.

Then weedy area being repopulated with tree seedlings, these 1 m. ± tall.

Marcus Hook area largely housing and factories but with patches of marsh, wood,

etc. Housing more and more dominates landscape into Chester.

Between Chester and Philadelphia housing areas largely dominate but many with good growth of trees.

Occasional nice patches of deciduous woods, especially on rough ground. Waste spots and cut banks very weedy, *Rumex japonicus* quite common. Some patches of basswood saplings, also *Rumex* and *Ailanthus*. *Chenopodium*, *Rubus*, *Setaea*, *Solidago*, *Panicum*, *Andropogon*.

Just before ^{Convention Hall} 30th St. Sta. is Woodland Cemetery with many fine old trees.

Little vegetation except weedy banks and *Ailanthus* trees between 30th St. and North Philadelphia. Some London Plane trees just before North Philadelphia. After North Philadelphia, for some distance an industrial area with little except ruderal vegetation.

After Frankford there is a change to a largely residential area, with more trees, but still very little vegetation. Some patches of sparse second-growth brush. Still mostly housing and industry to Holmsburg Jct. Then still more industry but many patches of young second growth wood, ~~also~~ with *Liquidambar*, oaks, etc. in low spots. Some *Liriodendron* - oaks, etc. on higher ground. *Platanus* abundant along stream and ravines.

More open fields, scattered trees, especially along roads and around houses. Cultivation and *Andropogon*. Small marshy spots surrounded by trees.

Young second growth, especially *Liquidambar*, *Sassafras*, etc. before Croydon Sta.

Mosaic of this, cultivated fields, etc. between here and

Bristol and Tacony Bridge.

After Bristol some marshes and open fields of *Andropogon*.

After high level bridge a mixture of fields, young second growth, thickets and housing areas, some small patches of trees.

Levittown - Tullytown Sta.

Marshes and swamps, some higher ground.

A good patch of *Betula nigra*, some *Typha*, etc.

On slopes patches of *Sassafras* saplings.

Thickets and small woods of *Acer rubrum* very common. More

and more woods, but mostly thin second growth.

Much *Lonicera japonica*. *Betula nigra* even on higher ground.

as ~~Easton~~ is off Morrisville is approached.

Some bottom land wood ~~forest~~ with *Liquidambar*, etc. along Delaware River, but rather little.

Mostly built up.

~~Forest~~

Trenton

Outskirts are a large industrial area. Some vacant ground with *Andropogon* and scattered trees, mostly oaks.

Then mosaic of *Andropogon* and patches of second-growth woods around American Standard plant. The second growth sparse²⁴ and with second generation 3 m. tall. A large *Typha* marsh, some shrubby swampy ground.

Then large open cultivated fields and fair sized patches of deciduous wood. Some *Betula nigra* swamps.

More mature patches of oak woods being selectively logged. Lower spots with alternation of *Liquidambar* woods and *Betula* swamps.

~~Some~~ *Betula* here may be *B. populifolia* on higher spots.

Princeton Jct.

Very irregular mixed deciduous woods, much logged out in past, but with some large trees, areas of swamp.

Then large open area with houses and industrial plants near Plainboro.

Farms. Liquidambar - oak - *Betula nigra* woods, some red maple, some bushy swamp with patches of marsh.

Liquidambar the most common tree.

Tangles of similar.

More and more farmland till ~~before~~ Midway mostly open, then more of the same mosaic but with little or no farmland.

Betula populifolia and *Fraxinus*, as well as *Liriodendron* common in higher spots.

Some patches of *Andropogon*. Low wooded country to Johnson & Johnson plants which are in large open area. Then very sparse old field woods.

growth in *Andropogon*. Some housing.

Then a mosaic of open fields and patches of woods, all deciduous.

Industrial area before New Brunswick rather open, with some thickets.

After the town an area of river-bottom wood, rather sparse. Then broken patches of thick, deciduous woods, housing, fields, factories, etc. to Edison.

Then a large area of low deciduous wood, Liquidambar, oaks, *Acer rubrum*. This gives way to sparsely-grown up old field and patches of *Andropogon*, then farms and patches of housing in Ketchikan (?)

Then Liquidambar - *Acer rubrum* woods, rather young and irregular.

Mentis Park Sta.

Patches of housing & woods. Iselin Sta.

Housing scattered in woods. Some *Andropogon*

and a golf course.

Soil in this region is deep hematite red. Housing more and more replaces wood to Rahway, which has many trees, mostly native ones as far as can be seen. Considerable industry with housing and some deciduous second-growth wood. Linden Sta.

Thickly populated but still many trees. Housing becomes denser and trees less into Elizabeth. But Elizabeth generally has fair numbers of trees - oaks, Linden plane, maple, etc.

Industry increases rapidly, as does general density, into Newark. Little except ruderal patches here, occasional *Ailanthus*.

Leaving Newark a dense industrial area gives way abruptly to Phragmites communis marshes, in places being filled in with city waste.

Large areas of Phragmites extend to the first basalt intrusion just beyond a large tidal river in the outskirts of Jersey City.

The basalt hill is covered by Andropogon and a sparse growth of ~~stunted~~ oaks. Then more Phragmites between here and the entrance to the tunnel.

The Phragmites is dense, cause a few cm. apart, 1-2 m. tall. Partly with old inflorescences.

Dec. 22 - between Herndon
and Sunset Hills

low swampy open
woods, mostly oak and
red maple

38663 *Lycopodium obscurum*
abundant

64 *Lycopodium complanatum* L.
~~obscurum~~
common (but more so
on slightly higher ground)

(12 m. ext.)

rhizomes buried,
shoots erect, leaves
somewhat compressed
into subdistichous arrange-
ment.
extensively creeping.
rhizome buried in loose
litter.

Dec. 26 - Trip by rail from Washington toward New York, Pennsylvania R.R., right side windows of train

Waste spots along track, with dry grass, especially *Andropogon virginicus*. Patches of trees, especially clumps of *Ailanthus*, some oaks, red maple.

National Arboretum with low hills covered by deciduous woods in distance. Beyond this broken woods, grass and marsh, swamp forest in Anacostia River bottom land.

Liquidambar, oaks, elm(?) and red maple with *Pinus*, mostly *P. virginiana* scattered and locally in patches - low spots with standing water lack pines.

A few old fields on rolling ground growing up to brush, mostly *Pinus virginiana*.

Banks along tracks largely covered by *Lonicera japonica* - dull purplish green.

Pines become more and more abundant, in places dominating landscape. Banks here mostly covered by pine seedlings and saplings.

A few farms and housing development, but country along track mostly wooded. Bowie -

Deciduous woods more and more common, pines scattered except where concentrated in old fields.

Betula nigra, with pinkish trunks, especially in low spots.

Soil very sandy.

Liriodendron common in most sites except lowest. *Fagus sylvatica* but very local.

Pines become very abundant in broken landscape of well grown old fields. Mostly *P. virginiana* but considerable *P. rigida*.

Country very flat. Locally many small ponds.

Then open gently
 rolling land with
 Andropogon, scattered
 small oaks and pines,
 locally gregarious
 and forming thickets.
 Large factory a little
 distance from track.
 Then bushy swamps
 and rolling thinly
 wooded land, some
 areas of small deciduous
 woods, scattered pines.
 Ponds and low woods
 across from Calvert Distillers
 Houses abundant but
 with many trees.
 Some badly cut up
 excavated ground with
 patches of wood.
 High banks - then
 a general electric plant
 and other factories
 and much housing.
 Some small patches
 of deciduous woods
 also ~~some~~ dumps. Housing
 merges into city of
 Baltimore.

Jan. 1 south of
Centerville east of
Bull Run

cutover second-growth
deciduous woods
with scattered patches
of scrub pine.

Flat to gently rolling
ground trees to 20 cm. dbh

- c *Quercus velutina*
- c *Carya* spp.
- c *Quercus alba*.
- la c *Cornus florida*
- o *Viburnum* sp.
- o *Vitis* sp.
- o *Fagus grandifolia* (very small)
- lc, a *Juniperus virginiana*
- ~ *Percis canadensis*
- lc ~ *Fraxinus americana*
- ~ *Prunus americana*
- la *Pinus virginiana*
- lc *Rhus copallina*
- ~ *Acer rubrum*
- ~ *Quercus stellata*
- l *Prunus serotina*
- v.l. *Liriodendron*

Density of large trees
varies from
rather open to very open.

~~aspen~~ sapling
layer dense to open.
Pinus virginiana saplings
quite common locally
abundant

saplings mostly oak,
cornus, a few of ^{each of} most of other
species listed.

Generally but not always
the more open the situation
the commoner the pine
saplings. They are
conspicuous all along the
road. Some patches
of *Hamamelis japonica*
especially along road,
but not very common.

~~Size~~ Maximum size of
trees increases toward
Bull Run, some may
exceed 30 cm. near the
escarpment, though
not many reach such
a size.

Stumps of various
ages are common in
the woods, but none
very recent. Obviously
logging has, in the
past, been rather
severe.

Several exposures
of "trap rock" here.

Jan. 1 north of Occoquan
Creek, w. of mouth of Sandy Run
s.e. of Farris Corner

300-7 ft

Thick wood of
Liriodendron, oak, etc.
on dissected ground.
trees mostly 25 cm. or
less. Some pine, locally
abundant.

Patches of *Kalmia* ^{general}
undergrowth. small
patches of *Epigaea*

Young *Fagus* very
common but no old
trees seen on beginning of ridge.

One *Tsuga* tree 15+ cm dbh
on knoll in ^{small} concentration
of pines. Scattered small
Ilex opaca. Some *Acer rubrum*.

Stumps seen but all
very old.

In a distance beech
become locally abundant.
Here scattered small
hemlock.

Above ~~Bull Run~~ ^{Occoquan Cr.} a large
patch of *Rhododendron maximum*
up to 3 m. tall

This forest is
suggestive of a more
favorable habitat than
that in the Bull Run
area. The soil here is
either coastal plain
alluvium or deeply
weathered schist.

Some quartz fragments
seen. Depth, as indicated
by erosion pattern, is
much greater.

A road runs in,
following a sinuous
ridge. This has been
newly bull-dozed, but
may be an old road.

1957 Virginia
north side

Jan. 1 - Occoquan creek above
Ryan Dam, west of Stillwell Cr.
in mixed woods at top
of escarpment overlooking creek
38669 *Tsuga canadensis*
common, mostly small trees.
66 *Rhododendron maximum*
small colony

Jan. 13 - 2 mi. n. of Bull Run

second growth deciduous
forest with scattered
junipers and a few
small pines.

Trees mostly sapling
and pole size, a few 20 cm.
d.b.h. and a very few
old wolf trees 30-50 cm.

Much of this is open
enough for pine seedling.
Probably was pastured
rather heavily, possibly
for some time after the
forest started to come back.

Mosaic of patches
of varying ages, possibly
reflecting fire history
as well as that of land use.

Small openings in
woods. Patches of mosses
and lichens may
be result of small
ground fires.

60 m.

Fairfax Co.

small tree, 8 m. tall

shrubs 3 m. tall

a few patches of pine, also
patches of rather good
forest. *Juniperus* varies
a good bit in abundance.

Deciduous trees are mostly
oaks of various kinds.

Prunus serotina, *Carya* spp.
Most of largest trees are
Quercus alba.

Some small *Q. cinerea*.

Wolf trees common
in parts, absent elsewhere.
No *Tagus* seen.

Feb. 10 - north-west of
Great Falls, Fairfax Co.

- 38667 *Dryopteris austriaca*
in thick woods, mostly
Liriodendron

March 9 - Benedict, Charles Co.

- 68 *Phragmites communis* L.
dense stand in marsh

March 9 - Battle Creek Cypress
Swamp, Calvert Co. Md.

- 69 *Taxodium distichum*
dominant tree in
swamp forest

- 70 *Campsis radicans*
common in edges of swamp

50 m.

fronds green, mostly
almost prostrate.

1 m.

canes 1.5 m. tall.

3 m.

tree 15 m. tall, leafless at
this season, clusters of
buds pendent.
woody vine climbing
in bushes, leafless at this
season.

March 10 - area below
Great Falls

Elms and red maples
in bloom.

This area marked
"meadow" on a map of
the William Fairfax plat
in 1739 (Aug. 11 by John Warner surveyed
filed at Richmond. The
recd of this survey, by,
Jn. Warner, lists numerous
witness trees. In order of
abundance: (dated Aug. 17, 1739)

White oaks (Jack Durham has
red oaks copy)

black oak

Spanish oak

Water oak

pine oak

Water live oak

Chestnut oak

Chestnut

Birch

There are at least two
elms in bloom - the one
with very corky bark
and one with more platy
bark, probably *Ulmus americana*.
None smaller than 15' have
any flowers, scarcely
any smaller than 25-30'.

36871

Ulmus

common on rocky flat

50 m.

Plants seen in identifiable
condition:

Dryopteris marginalis

Asplenium trichomanes

Asplenium platyneuron

Polypodium vulgare

Botrychium dissectum

Delaginella rupestris

Pinus virginiana

Juniperus virginiana

Hepatica americana (fl.)

Claytonia virginica (fl.)

Celtis occidentalis

Platanus occidentalis

Acer rubrum

Acer negundo

Lindera benzoin

Lonicera japonica

Ludwigia alternifolia

Saxifraga virginica

tree 20 m. tall (fallen twig)
bark corky ridged.

March 17 - Potomac River
just below Great Falls
Wooded river flats

38672

4

Ulmus thomasi?

common in deciduous woods

Plants seen in flower
on flats -

*Ulmus thomasi**Ulmus americana**Claytonia virginica**Pentaria laciniata**Veronica**Arabis**Lindera benzoin* (bud)*Acer rubrum**Asimina triloba* (bud)*Vinca minor*

2

73 *Asimina triloba*

occasional, local

1

74 *Arabis lyrata*

common along paths

1

75 *Veronica*abundant on banks and
along paths

50 m.

small tree, bark with
corky ridges. (Others seen
much larger, to 20 m. tall
and 4 dm. dbh.)

shrub 3-4 m. tall,
buds dark brown
flowers white

flowers lavender.

April 13 ^{Below} Great Falls

Claytonia very abundantly
flowering. also in flower
Muscari

Dentaria laciniata

Dicentra cucullaria

Arabis laevigata

Arabis lyrata

Lindera benzoin

Barbarea vulgaris

Lamium amplexicaule

Veronica sp.

Phlox divaricata

Glechoma hederacea

Ranunculus abortivus

Cardamine (large fl.)

Stellaria media

Viola papilionacea

Mertensia virginica

Vinca minor

Stellaria pubera

Saxifraga virginica

Hedysotis caerulea

Hepatica virginica

Corydalis aurea

Euphorbia peplos

Asarum canadense

Podophyllum peltatum

Dentaria diphylla

Erythronium americanum

Phlox subulata

Arabis helenae caroliniana

38670 Ulmus

common on flood plain

Taraxacum vulgare

Alliaria

Trillium sessile

Cercis canadensis

Cornus canadensis (buds swelling)

Viola (grayish leaf)

Lagotis serpyllifolia

Draba verna

50 m.

(same tree as 38671, 38672)

1957

Louisiana
labels not doneApril 3 Fort Macomb
Chef Menteur

Extensive marshes dominated by *Phragmites communis*, locally by *Baccharis* and *Iva*, but these badly affected by drainage ditching.

Last year's *Phragmites* culms 3-4 m. tall, dry, fruiting, bare or covered by sheaths from which blades have fallen, young leafy culms to 1 m. tall.

Salinity of marsh water said to be 6-7‰ of sea water.

Best references-- Penfound, W. & Hathaway, E.S., Plant Communities in the Marshlands of Southeastern Louisiana, Ecological Monographs 8:1-56, 1938 and O'Neill, T., The Muskrat in the Louisiana coastal marshes. La. Dept. Fisheries, 1949.

Phragmites communis
dominant in marsh

A common vegetation type in these marshes, but not seen in good development is termed locally "chenier" an area slightly higher than the marsh, covered by small oaks, mainly

artificial higher ground around ruins of fort covered by thicket of *Celtis mississippiensis* with some *Gleditsia*, *Juniperus*, *Zanthoxylum*, and dense undergrowth of *Ilex vomitoria* and *Melia azedarach*, both flowering. Trees have abundant *Tillandsia usneoides*. *Lonicera japonica* occasional, flowering. In moat of fort are floating mats of *Alternanthera philoxeroides* (introd. from Tropical America, reproduces vegetatively only). Around thickets is *Smilax bona-nox*, abundant *Allium tricoccum* producing flowers and bulblets, *Scutellaria* and other herbs.

Old canes 3-4 m. tall, bare, new ones to 1 m., leafy.

Quercus virginiana, with other woody species. Slightly higher ground, still is likely to have larger oaks and pines, but is not called "chenier".

1957 Louisiana

April 3 - 1-2 mi. east of
Rigolettes Bridge.

Low wet but solid
ground, with abundant
herbaceous flora and
widely spaced *Pinus*
taeda, *Quercus virginiana*,
Q. stellata, etc. hung
with *Tillandsia usneoides*.

38678

Hedyotis caerulea var. *minima*
rare along very slightly
higher ground near pines.

April 3 - same but to
east and toward Pearl River
Denser pine-oak woods
on flat ground, with
Pinus taeda, *Quercus*
virginiana, *Q. stellata*.

April 3 - 7 mi. e. of Slidell,
so. of Pearl River.

Swamp, dominated by
Nyssa biflora, with some
Quercus nigra, *Acer*
rubrum var. *drummondii*,
and a little *Magnolia*
virginiana in standing
water. On the edges, on
wet silty soil, are *Liquidambar*,
Quercus phellos, *Quercus virginiana*,

St. Tammany Parish

The open character here
seems to be due to fire.
Common genera here - *Panicum*,
Fimbristylis, *Juncus*, *Tradescantia*,
Krigia, *Baptisia*, *Nothoscordum*,
Scutellaria, *Hedyotis*, *Plantago*,
Trachium, etc.

flowers lavender with
reddish centers.

Q. nigra, *Q. falcata*.
Liquidambar, *Nyssa biflora*;
shrubs, as *Ilex vomitoria*,
Myrica cerifera, *Ilex opaca*,
Lymnocyba, some *Smilax*.
The oaks have much more
Tillandsia than do the pines.

Myrica cerifera, *Crataegus* sp.,
as well as the trees seen
to the west (above). This
forest is scarcely definitely
layered. *Polypodium*
polypodioides and *Tillandsia*
are epiphytes; *Smilax*
laurifolia and *S. bona-nox*
are not abundant. The
large trees have been
cut, leaving stumps.

The swamp trees, especially *Nyssa*, have swollen bases. Very little *Taxodium* seen. Spacing of trees in swamp 1-3 m. General height is about 25 m.

- Mixed swamp and slightly higher ground
- 38679 *Acer rubrum* var. *drummondii* common in
- 80 *Drosera brevifolia* Pursh ? common on open wet soil
- 81 *Hedyotis coccinea* var. *minor* very rare on ^{open} wet soil.
- 82 *Symplocos tinctoria* (L.) L'Her. rare on moist slightly higher ground in woods.
- 83 *Krigia* common on wet ground
- 84 *Hedyotis uniflora* (L.) rare on open wet ground
- 85 *Elatin americana* (Pursh) Arn. ? common on open wet ground
- 86 *Lisyrhynchium brownii* Small occasional in open wet ground.
- 87 *Centella repanda* occasional in open wet ground.

Some open ground, disturbed, with herb pioneers, in moist sandy-silty soil.

- small trees 3-4 m. tall (others seen taller); all seen have pubescent leaves, plant reddish; corolla white.
- slender tree 5 m. tall, flowers cream; old leaves reddish.
- flowers yellowish, depressed.
- flowers yellow marked with black inside, segments carinate; ~~base~~ ^{base} of flower uncelate.
- rhizome prostrate, creeping, buried; leaves erect with blades vertical; sterile.

April 3 - Indian Village,
Pearl River, 10 mi. east
of Slidell
Swamp with *Nyssa*
biflora, *Nyssa aquatica*,
Quercus nigra and
Taxodium heavily
covered by *Tillandsia*
39698 *Polypodium polypodioides*
abundant on trunks
and limbs of giant live-oaks.

April 3 - Slidell
Open pine-land on clay
soil with *Andropogon*, etc.
89 *Laracema sledgei* Macf.
occasional in

April 3 - Pearl River Village,
on branch of Pearl River.
Swamp of *Nyssa biflora*, etc.
mixed with higher ground
with Pine-oak-beech forest
and thickets on clay soil.

90 *Illicium floridanum* Ellis
local in low ground, ~~swampy~~
edge of swamp

91 *Asarum*
common locally on low ground.
92 *Vaccinium*
rare on slope

It is abundant in
open spots. *Polypodium*
polypodioides abundant
on trees on higher ground.

rhizome creeping, clinging
tightly to bark.

petals pendent, lemon
yellow.

Quercus nigra, *Q. virginiana*,
Q. alba (southern limit), *Acer*
rubrum var. *drummondii*,
Fagus grandifolia, *Pinus*
taeda, *P. glabra*. *Myrica*
cerifera is very common.
shrub with strong odor;
flowers deep red.

flowers unisexual, fleshy,
greenish pink.
shrub 1 m. tall, flowers
white, pendent; leaves
glaucous beneath.

- 38693 *Fagus grandifolia*
common locally on slopes
~~found~~ above swamp level
- 94 *Pinus glabra*
common on slopes and flat
ground above swamp level.
- 95 *Illicium floridanum* Ellis
local on low ground near swamp

April 3 near Slidell,
east of Covington
"acid bogs" open flat land
covered by *Andropogon*,
sandy clay soil; surface
layers somewhat darkened.

April 3 - Edge of Lake Ponchartrain
s.w. of Slidell, end of causeway.
Narrow strip of marsh
between lake and pine-oak
forest. Between road and
railroad is extensive
marsh.

- 96 *Amorpha fruticosa*
common at edge of marsh
on drier ground.

Apr. 3 - Lake Ponchartrain, n.e. of
Gentilly, New Orleans
Remains of cypress swamp,
trees all dead. Said to have been

Tree 10 m. tall, 20 cm. dbh.
leaves young.

^{slender}
small tree (others seen to
30 m. tall) ~~slender~~; leaves
irregularly spreading;
(cones from fallen branch of
another tree).
sterile shrub 1 m. tall,
trough, strong smelling
when broken.

Said to quake. *Ilex pumila*
is common, young pines
scattered, some *Sphagnum*
along rivulets.

very slight difference
in altitude between
marsh and forest, but
transition quite abrupt.

shrub 2 m. tall; corolla
deep purple, anthers orange.

killed by rise of pH due to
salt water blown in by
hurricane many years ago from
Lake Borgne. Never has recovered.

May 5 - ~~rather~~ south
of Springfield

rather sparse pine woods
mostly *Pinus virginiana*,
a few *P. rigida*.

1-3 dm. dbh, about 20 m. tall,
spaced mostly 2-4 m.

a few *Liriodendron* about
same size, a scattering
of *Nyssa*, *Liriodendron*,
Acer rubrum, etc. from

*Cornus
florida* (L.)

5-10 m. tall, a rather
abundant but scattered
shrub layer mostly
1-2 m. of tree seedlings.

*Viburnum
dentatum*

V. prunifolium

V. acerifolium

*Fraxinus
americana*

Sassafras, *Acer rubrum*,
Fagus, *Liquidambar*,
~~*Acer*~~ *Quercus phellos*,
Vaccinium atrococcum,
Quercus alba

a more abundant
but still scattered
low shrub layer 3-10 dm.
of *Vaccinium vacillans*,
V. stamineum, *Quercus*
phellos, *Q. alba*, *Fagus*,
Acer rubrum, *Smilax hispida*,
Q. glauca, *Ilex opaca*

ground layer still
scattered. *Chimaphila*

maculata, *Mitchella*, *la*
Rhus toxicodendron, *a*
Cypripedium acaule *bc*
Ascyrum hypericifolia (L.)
Potentilla simplex (a)

Polystichum acrostichoides (L.)

- 38697 *Vaccinium vacillans*
very common in
- 3 98 *Vaccinium vacillans*?
one plant seen
- 3 99 *Vaccinium atrococcum*
one plant seen
- 38708 *Hedyotis caerulea* var. *caerulea*
very local in
- 2 01 *Isotria verticillata*
very local in
- 4 02 *Cypripedium acaule*
very common locally in
- 1 03 *Viola primulaefolia*
local in moist depression in

May 5 - 1 km. east of
Annandale

- 2 04 *Lonicera*
in pasture fence-row

- forming loose clones
up to 3-4 dm tall; flowers
reddish green
- ~~forming~~ small bush
4-5 dm. tall, flowers
reddish green.
shrub 1.5 m. tall.
- flowers pale lavender,
center yellow.
lip white, 2 petals pale
green, sepals dark bronze
purple.
- lip rose purple, marked
in front with white;
petals and sepals dark
brownish red.
flowers white.

shrub 1.5 m. tall; flowers
white.

May 11 - Air trip Washington to N. Y.

South of Washington - Baltimore Parkway in vicinity of Greenbelt are areas where the angular pattern of pine forest in a matrix of bright green broad-leaf forest ~~is~~ shows up strikingly well. Outlines of old fields, roads, etc. are very clear. Some of the deciduous forest is variously mixed with pine.

For some distance south of Baltimore the landscape is incredibly butchered. Highways and real-estate "developments" dominate the scene, even obscuring agriculture. Military installations along the bay cover enormous areas, and tank farms are prominent and extensive.

extensive bogs or moors; where cultivated the soil is black.

May 11, Air trip from New York to Montreal.

First part of trip cloudy. The country west of the south end of Lake Champlain is flat or rolling agricultural land with scattered monadnock hills, which are generally wooded, about 90% or more deciduous, with patches of conifers.

North of this hills become more numerous and run together as a complex - higher and more mountainous but still predominantly in deciduous woods, some burned areas, some blue-berry barrens?, lakes. Conifers increase northward. Soil very pale buff-gray, some dark mottling but this inconspicuous.

North end of lake on a broad plain with no hills or only very low ones. Agricultural with patches of mostly poor mixed forest, soil here very black with some buff mottling. This extends north to Montreal, with

May 11 - Montreal

on ~~mountain~~ Mount Royal
(a limestone monadnock)Degraded beech-maple
forest - black mull soil from
^{palaeozoic chert limestone}

- a *Acer nigrum*
- r ~~Fraxinus~~ *Ulmus rubra*?
- o *Filix americana*
- o *Ostrya*
- l *Betula papyrifera*
- o *Acer rubrum*
- o-c *Carya cordiformis*
- c *Fraxinus americana*
- l *Populus grandidentata*
- r *Quercus rubra*
- o *Amelanchier* sp.
- c *Corylus cornutus*
- a *Prunus virginiana*
- a *Cornus rotundifolia*
- c *Sambucus racemosa*
- l-c *Caulophyllum thalict*
- a *Erythronium americanum*
- c *Trillium grandiflorum*
- c *Solidago flexicaulis*
- c *L. callic*
- c *Thalictrum dioicum*
- o *Carex*
- l *Diervilla lonicera*
- r *Lamprocarpa car.*
- l-o *Maianthemum can.*
- l *Polygonatum pubescens*
- r *Actaea*
- l *Rubus odoratus*
- l-c *Viola pennsylvanica*

a very prominent
1-2 m. undergrowth
of *Acer nigrum* & *Cornus
rotundifolia* + *Prunus virginiana*.
This from a certain amount of
long continued disturbance and
some opening up.

- r *Populus deltoides*
- r *P. tremuloides**

- l *Sambucus racemosa*
- r *Acer negundo*
- ~~*Lysichiton*~~ sp. ? * (*Lonicera tatarica*)

* these around an overgrown
small opening, probably
a former house site.

- l *Aster cordifolius*
- r *Trillium erectum*
- l-r *Hydrophyllum virginianum*
- l *Celidonium**
- r *Lanicula* sp.
- r *Aralia nudicaulis*
- r *Circaea quadrangulata*

Large birch colony where
formerly cleared, much sim.
U. americana.

May 12 Oka

Beech maple forest, little altered.

Almost solid stand
of *Acer nigrum* v.
some

- o *Quercus rubra*
- o *Fraxinus americana*
- o *Tilia americana*
- ~ *Alnus americana*
- lo *Fagus grandifolia*
- lo *Carya ovata*
- lo *Carya cordiformis*
- o *Ostrya*
- o *Sambucus racemosa*
- ~ *Prunus virginiana*
- ~ *Aralia nudicaulis*
- c *Amphicarpa bracteata*
- o *Asplenium platyneuron*
- a *Thalictrum divicorne*
- a *Trillium grandiflorum*
- a *Urtica grandiflora*
- o *Lonicera bifoliolata*
- lc *Viola pennsylvanica*
- la *Smilacina racemosa*
- o *Languinaria can.*
- o *Solidago caesia*
- lc *Carlophyllum*
- o *Arabis racemosa*
- c *Polygonatum pubescens*
- o *Brachyelytrum erectum*
- la *Erythronium americanum*
- Prenanthes*

Dark brown mud soil on
Precambrian Laurentian
rocks but these silt-covered.
A rather thin shrub
layer, mostly *Acer* seedlings.

- lc *Botrychium virginianum*
- o *Carex* sp.
- ~ *Solidago flexicaulis*
- ~ *Picentia canadensis*
- l *Allium tricoccum*
- ~~*Picea*~~
- ~ *Carex acutata*
- ~ *Galium* sp.
- ~ *Asarum canadense*
- ~ *Trillium erectum*
- ~~*Pyrola*~~

- fruit somewhat pyriform, stamens
yellow

On north slope
 some *Tsuga*, abundant in ravine
Acer pennsylvanicum
Streptopus virens
Adiantum
Ribes cynosbati
Trillium erectum
Asarum canadense
Viola canadensis
Pentstemon diphyllus
Hepatica acutiloba
Maianthemum can.
Equisetum scirpoides
Carex pedunculata
Mitella diphylla
Thelypteris discolor
Polystichum acrost.
Adiantum filix-foemina
Betula lutea
Picea palustris
Actaea rubra

c
 These species
 added to those
 in the forest
 as it is on other
 slopes.

Patches of pine with
Pteridium, *Vaccinium*, *Gaultheria*
Carex pennsylvanica, *Kalmia angustifolia*
Intenmannia sp.
Lycopodium tristachyum
Arabis sp.
Gaylussacia baccata

On alluvial plain irregular
~~stands~~ stands of *Populus*
hemuloides, *P. grandidentata*
 with scattered *Pinus*
strobus (~~*P. resinosa*~~). *Acer*
rubrum, *Salix* spp.
Quercus alba.

with *Equisetum hyemale*
Rhus typhina
Gaultheria procumbens
Trillium grandiflorum
Oxyporus asperifolius
Hepatica americana
Saxifraga angustifolia
Cornus umbellata
Fragaria virginiana

Open sandy places
Comptonia perennans
Carex spp.

Quercus rubra has
 some coccinea-like leaves.

Solidago nemoralis
Pteridium aquilinum
Arctostaphylos uva-ursi
Danthonia spicata
Vaccinium virgatum
Amelanchier spp.

Along lake margin
are sand flats with
low Salix spp. dense stands ^{1-2 m. tall}
A low sand ridge
with oak forest - Quercus
alba, Q. bicolor and hybrid
Acer rubra, Tilia americana
Alnus crispa
with ~~Pinus strobus~~ ^{Pinus resinosa} racemosa
Pinus strobus
Carya sp. Corylus cornuta?

back of this swampy
ground with Acer
saccharinum,
a little Fraxinus nigra
with Juncus tenuis
Osmunda cin.
Willows here in
disturbed places.

The Acer saccharinum
are dense clusters of
sprouts, appearing
to be from stumps, but
these considered by P. D. to
be natural, not from
cutting.

Higher spots have beech-
maple forest, Trillium, etc.

June 1 - Great Falls of the Potomac
Flood plain stream
with large boulders and
rock outcrops.

- 38705 *Onosmodium virginianum* (L.) Jacq.
common on sandy semi-
shaded spots between rocks.
- 06 *Viburnum recognitum* Fern.
common in undergrowth
- 07 *Viburnum dentatum* L.
common in undergrowth
- 08 *Melica mutica* Walt.
occasional in semi-shade
- 09 *Panicum*
occasional in semi-shade
- 10 *Panicum*
rare in semi-shade
- 11 *Danthonia spicata*
occasional in semi-shade
- 12 *Stipa avenacea* L.
occasional in semi-shade
- 13 *Panicum*
occasional in shade
- 14 *Polygala polygama* Walt.
occasional in semi-shade
- 15 *Euphorbia commutata*
rare on shaded banks
- 16 *Carex grayi* var. *hispidula* Gray
rare in damp shaded place.
- 17 *Arabis laevigata* (Muhl.) Poir.
common in semi-shade
- 18 *Fraxinus caroliniana* Mill. ?
in sparse woods.

50 m.

erect, flowers greenish-white.

shrub 2 m. tall, flowers
white (all seen were
flowering)

shrub 2 m. tall,
fruits immature (all seen
had fruit this age).

almost erect

erect

culms ascending

culms ascending,
spikelets drooping.
Culms nearly erect.

stems erect; flowers

rose pink
flowers greenish-white.
capitula angle very obtuse.
very loose small tufts,
perigynia beaks firm.
slightly glaucous.

slender tree 3 m. tall, sterile;
leaves green beneath.

38719 *Prunus*?

3 rare in woods

1 20 *Arenaria serpyllifolia* L.

rare in semi shade

1 21 *Valerianella*

rare in rocky place in woods

1 22 *Arabis lyrata* L.

common in rocky semi-shaded to shaded places.

1 23 *Panicum*

common in semi-shaded places

1 24 *Ulmus thomasi* Harg.?

common in woods

Gonolobus carolinianus
flowering abundantly
in semi-open places at
top of cliffs.

Chrysogonum in flower
Ilex verticillata in bud.
Liparis in flower, very rare.

May 25 - Sleepy Hollow
stony roadside

1 25 *Stellaria graminea*
local colony

slender shrub 2.5 m. tall.

flowers white.

culms ascending.

small tree (same tree
as #38671, 38672, 38676

decumbent, rooting
at nodes; flowers white.

June 16 - Hemlock Ridge,
east side of Lake Candlewood,
north of Danbury

Low ridge formed
of steeply tilted beds of
gneiss, showing
some small quartz
or pegmatite veins.

Crest of ridge open
because of narrow
powerline right-of-way.
Slopes wooded.

Woods apparently
second-growth after
pasturing? or fire?

Largest trees are
very sparsely scattered
Quercus

with *Betula lenta* next
and ~~as~~ probably tending
to dominate, as they are
rather abundant.

Betula populifolia to 10
m. tall, being overtopped
by the *B. lenta* and *Quercus*.

38726

spontaneous between stones of terrace
lagina

27

spontaneous between stones of terrace

28

Corydalis ophiocarpa

naturalizing itself from
planted specimen, around compost pile.

Juniperus virginiana
common in forest but
clearly suppressed,
except in a narrow
clearing where the
Juniperus is vigorous
and much larger.

Eventual dominance
may probably be by
Carya sp. ^{*fraxinus americana*} as seedlings
or sprouts and saplings
are very common.

Tsuga is common on
top of the ridge, but
trees are small. Due to
medium *Quercus alba*
20 cm. dbh, a small *Q. coccinea*,
larger *Q. velutina*

Acer rubrum fairly
common

flowers creamy or
slightly greenish white.

June 17 - vicinity of
Dolbia Hill, east of
Eightmile River, East
Haddam

Large block of wooded
land with almost no
roads. Small areas are
in pasture. Some areas
are *Quercus ilicifolia*
scrub, with sumac.
Mainly the uplands
are covered by mixed
oak forest. The ravines
and lowlands along
the river are largely
in hemlocks. Here the
undergrowth is largely
young hemlocks.

This land has largely
been cut over, some of it
recently, some long ago.
Said to be not burned
over much.

Between the Dolbia Hill
farm and Burnham's Brook
is an area of brushy
old field, with *Betula*
populifolia, *Vaccinium*
corimbosum.

38729

Cnodela sensibilis?

along trail in hemlock-beech
woods, Burnham's Brook

100 -

450'
alt.

4599

Hamburg
Guadalupe

Along Burnham's Brook
the forest is a mixture of
Tsuga and sugar maple
with much *Kalmia*
latifolia. *Fagus*, *Betula*
lutea a little *Acer rubrum*
and *Quercus rubra*

June 27 - trip ~~out~~ ^{by} auto
from Falls Church to
High Knob near Norton

casual observations -
Albizia julibrissin is
freely naturalized out
to well beyond Fairfax.
It is in full bloom
both wild and cultivated,
shows a color variation
from a pale creamy pink
to a deep old-rose. ^{Cult. abundantly in lower med. mount.}

Along Thornton River road
just inside Shenandoah
Park gate may be a
stand of *Sorghastrum*
nuttans. Also near the
top of the road, just
below Thornton Gap, may
be single tree of *Picea abies*.

June 27 High Knob, just
south of Norton, Wise Co.
common in oak forest
on gently sloping ground

38730 *Hedyotis purpurea* var. *purpurea*

1 31 *Luzula*

2 32 *Thelypteris noveboracensis*
dominant ground cover

I n s. w. Virginia,
in Clinch Valley and
similar limestone
regions pastures
are frequently thickly
beset by small *Juniperus*
or by small *Crataegus*.
Which is dominant
apparently depends
on seed source.

The Allegheny ridge
and Clinch Mountain
are densely wooded.

High Knob has a
well developed oak
forest, with trees to
30 m. tall and up to
40 cm. dbh. In a very
sparse understory (at the
camp ground) is *Amelanchier*
sp., *Nyssa sylvatica*, *Fagus*,
Menziesia, *Rhododendron*.
Considerable *Acer rubrum*.
Conopholis americana, *Monotropa*
uniflora.

small tufts, flowers
very pale lavender.

small tufts

June 28 - by auto from
High Knob to

Along road from High
Knob to Norton and out
of Norton to southwest
dead twigs hanging on
trees, especially oaks,
suggest that a brood of
17 year cicadas has
hatched this year. Some
also in Cumberland Gap
area.

In the Powell River valley
the slopes far up the sides
of the mountains are
pastured, but the
upper slopes and ridges
are wooded.

In Kentucky, between
Middlesboro and Corbin
the terrain is broken
and wooded. Liriodendron
is the most abundant
tree, but seems mostly

June 28 - Cumberland National
Forest ^{near Bernstadt} directly west of
London ^{Laurel Co.}
~~Castleton~~

33733

Coreopsis

common on soft sandstone
in full sun and sand

1

34

Hedysarum?

common along road on sand

rather young. Mixed
forest of tulip and pine
(P. virginiana and P. virginiana)
and some oaks and
other trees seem to be
commonest here, but
there are also many
deciduous forests, largely
tulip.

North of this is a
rolling largely cultivated
area, at least to London.
West of London is a
section of the Cumberland
National Forest lying
on a flat bedded sandstone
formation. This is also
mixed, but pine is
more common than
anything else. Westward
this is considerably
dissected. The woods
do not seem very old.

rays bright yellow

June 28 - Mammoth Cave
"Frozen Niagara" trip.

First descent is through vertically cut fluted tubes in a granular Mississippian limestone.

Water table 360 ft. below surface.

Moss around many of the lights, mostly just protonema, but one light has leafy plants with sporophytes.

Temperature 54°F.

From "Grand Central Station" to "Frozen Niagara" the cave is dry and there is no moss. At the Frozen Niagara area and to the entrance it is more moist. Here are algae, moss protonema, and up to high to see for sure, a number of what appear to be fern prothallia.

Cave crickets are common on the ceilings in lighted fairly moist areas. They are fairly sluggish, hump-backed, and with extremely long antennae.

discovered 1799

150 miles

explored

since 1799.

Park includes 51,000 acres of forest land.

This forest is quite varied, some being in various stages of regrowth from old fields or pastures. Stands of pure *Juniperus virginiana* occur.

Around the picnic area is tall mixed forest of several oaks, hickories, beech, red maple, and *Ulmus americana*, etc. with a well developed under story of *Cornus florida*, *Nyssa sylvatica*, *Ulmus alata*, and what appears to be *U. thomasi*. Some of the oaks are at least 40 m. tall. *Quercus falcata* and *Q. alba* have the leaves with longer, narrower lobes ~~above the~~ on the upper branches than on the lower. *Fagus* is also somewhat dimorphic, with much smaller leaves on the upper branches than on the lower.

✓

June 28 - Mammoth Cave
Edmonson Co.

in deciduous woods on
flat ground

38735

Ulmus thomasi

1

occasional in understory

3

36

Quercus falcata
very common

3

37

Fagus grandifolia
very common

June 29 - from Mammoth
Cave, Ky. via ~~Hickman~~ Columbus
Ky. and Hickman Ferry
to Elsinnore, Mo.

Western Kentucky is
fairly flat, mostly
cultivated but with
patches of woods. No
hills of any size.

In the flood plain of
the Mississippi south
of Columbus, just
west of Oakton, is a
swamp with *Taxodium*
and *Nyssa caroliniana* (!).
2 large cypresses seen,
some smaller ones.

On west side of river
a small grove of cypress

225 m.

small tree 7 m. tall,
bark very corky.

Tall tree, 30 m. tall,
these specimens from
upper branches, leaves
on lower branches broadly
ovate, trilobed, lobes broader.
tree 25 m. tall, fruiting
twigs from upper branches,
sterile ones from lower.

seen east of St. Francis
River near Fish.

Along Mississippi the
sand bars, except the
youngest, are covered
by a dense growth of
willows.

N.W. of Poplar Bluff
the Clark National forest
is mixed *Pinus echinata*
and oaks.

Here we encountered a
terrific rainstorm.

- ✓ June 30 4 mi. west of Mansfield,
central Ozarks, Wright Co.
38738 Galium
3 locally abundant in
weedy pasture

- ✓ June 30 1 mi. east of Seneca,
Newton Co.

- 2 39 Festuca
dominant in level to
sloping fields resembling
tall grass prairie, possibly
planted, obviously used for
hay or pasture.

- ✓ June 30 - Osage Hills State
Park, Oklahoma
very broad ravine, 2
miles or more wide,
with sparse scrub
forest or woodland of
Quercus stellata and
scattered *Carya* sp.

- 1 40 Sedum
rare in open ~~to~~ rocky bed
of ephemeral stream in oak woodland

- 1 41 (comp.)
very common in open rocky
bed of ephemeral stream in
oak woodland

- 1 42 Lablatis
common in open rocky bed
of ephemeral stream in oak woodland

erect but supported by
other plants.

erect, panicle arching.

The largest trees are
8-10 m. tall, with
thick crooked trunks.
Where the trees are widely
spaced an understory
of *Q. stellata* saplings
is prominent. Thick
ground layer of grass and
herbs.

rays white, disk yellow.

flowers bright rose pink.

June 30 - Trip from Elsinore, Mo.
to Osage Hills, Okla.

West of Elsinore the woods
become almost entirely
deciduous, mostly oak.

The rolling somewhat
hilly, generally wooded
country continues to
30 miles or so southwest
of Springfield. After that
the ground becomes more
level and mostly cultivated.

Just east of Seneca
bits of prairie begin
to appear. One piece
looks much like tall
grass prairie but
may be planted (photos),
seems to be largely a
species of *Festuca*, but
on lower ground is an almost
pure stand of *Agropyron* sp.

In Oklahoma extensive
prairies appear and
woods are principally
on slopes and in broad
ravines. This pattern
is more pronounced
westward. The forest
is a scrubby woodland
mostly of oak. Some
areas of this are dead
or almost so. Fire? Disease?

Between ^{and}
Bartlesville about 25
box turtles were seen
crossing the road or dead
~~killed~~ on the road. Few
either east or west of
here.

Inside the road
leading from the highway
to the Osage Hills State Park
5 trapdoor spiders were
seen crossing road. When
molested one of them reacted
violently, jumping and
elevating the abdomen and
extending two ~~a~~ caudal
appendages. It retreated
only with some reluctance.
These spiders were seen
on road both in the evening
at about 7 p.m. and in
the morning at 8:30 a.m.

During the night there
was a violent thunder-
storm, with gusty wind.
Before it the weather was
extremely sultry and hot.
Drizzle continued till about
7:30 a.m.

July 21 Trip from Osage Hill
S.P. to Buffalo

Westward the amount of forest decreases and is more strictly confined to ravine bottoms and stream margins and is less composed of oak and more of cottonwood and other trees. An exception is a considerable patch of well developed oak wood on flat ground some miles east of ~~Lamont~~ ^{Logan City}.

West of ~~Lamont~~ ^{Lamont} *Cucurbita foetida*, rel. aff. suddenly becomes common along the roadside.

Bet. Lamont and Sand Creek is a considerable stand of *Chilopsis linearis* var. *saligna* along a row of trees, but may have been planted. Considerable variation in flower color.

Argemone alba common along road. Some *Artemisia* ^{in pastures well east of Buffalo.}

At Buffalo the roadside park is a tiny bit of prairie that seems rather undisturbed compared with the part across the fence that is grazed

The grazed area is mostly dominated by *Helianthus annuus* with considerable *Euthamia* sp., *Chenopodium* aff. *album* ^(3rd sp.), a fine mat of grass, apparently mostly *Cynodon*, with many other herbs: e.g.

- ~ *Argemone alba*
- vc *Amaranthus gracilis*
- c *Sphaeralcea* aff. *pedata*?
- c *Lium* (?) sp.
- o *Bromus japonicus*?
- c *Specularia* ^{*perfoliata*} *biflora*
- c *legum*
- c *Monarda* sp.
- c *Gaillardia picta*
- ~ c *Rudbeckia* sp.
- ~ *Aplopappus*
- c *Tribulus terrestris*
- o *Cirsium* sp.
- o c *Ambrosia artemisiifolia*
- lc *Kochia*?
- ~ *Mirabilis*
- ~ *Hordeum* sp.
- l *Opuntia phaeacantha*
- lc *Comandra* sp.?
- ~ *Euphorbia* sp.
- ~ *Yucca* sp.
- lc *Plantago spinulosa*
- o *Croton* sp.
- o *Lepidium virginicum*
- ~ *Gaura* sp. ~ *Silene antirrhina*

Solanum elaeagnifolium
Bouteloua sp.

separated from this by a fence is a patch of low ground completely dominated by a mixture of *Helianthus* and *Chenopodium*. Grazed also.

Across the fence in the park there are scattered trees, otherwise where not badly trampled, a medium grassland of *Bouteloua* sp. *Sporobolus* and *Bromus* ~~*canadensis*~~ ^{*japonicus*} rel aff. also with:

- c *Bromus tectorum*
- cla *Kochia* sp.
- r *Solanum elaeagnifolium*
- r *Asclepias aff. syriaca*
- cla *Agropyron*
- c *Galium* sp.
- c *Amaranthus gracilis*
- o *Salsola kali* v. *tenacifolia*
- lc *Hordeum* sp.
- r *Gaillardia picta*
- o *Chenopodium* spp.
- r *Sporobolus asper*?
- la *Euphorbia*
- o *Mirabilis*
- la grass
- r *Arabis*?
- o *Evolvulus*
- r *Sphaeralcea*

July 1 - trip from Buffalo, Okla. to Capulin Mt. New Mexico.

Mainly grain fields, some ranges ^{very best} from Buffalo to Boise City. Most of the ranges badly overgrazed, ^{though now green} and some even dominated by *Artemisia*. Grain partly harvested and some plowing done. Apparently a maize crop being put in.

West of Boise City the land becomes sandy and somewhat irregular with patches of blow sand with yucca. Most of this is range, green looking now, but the yucca and *Artemisia* show past overstocking.

Eastern New Mexico to Clayton is almost all range. *Zinnia grandiflora* common along road.

From Buffalo to New Mexico *Helianthus annuus* is abundant along the roads and even in some fields.

bet. Buffalo and west of Fogan an area covered by a strange low fog, thinning in high spots. ground very wet, air cold.

✓

July 31 - 1 mi. e. of Jet

38743

2 *Chilopsis linearis*
along road, probably
planted as wind-break

✓

July 31 Buffalo
~~in~~ grazed prairie

1 44

leg.

common

2 45

Rudbeckia

occasional

2 46

Monarda~~occ~~ common

1 47

Plantago purshii?

common

1 48

local

1 49

Sphaeralcea

occasional

1 50

Gaura

rare

2 51

Linum?

occasional

1 52

Silene antirrhina

rare

~~same~~ - in ^{ungrazed} (mowed?) prairie

1 53

Bromus japonicus

common

1 54

Euphorbia

very common in disturbed spots

shrub 3 m. tall, ~~fls~~
corolla orchid with
2 yellow ridges in
throat, maroon patches
on limb.

flowers deep purple.

rays yellow, disk brown

bracts mauve distally,
corolla orchid.

- 38755 ~~Pennisetum~~ *Hordeum*
common
- 2 56 *Agropyron*
common & abundant
- 1 57 *Sporobolus*
abundant
- 1 58 *Bouteloua*
abundant
- 1 59 *Evolvulus*
occasional
- 1 60
locally abundant,
forming patches
- 1 61 *Mirabilis*
occasional
- 2 62 *Gaillardia*
common
- 1 63 *Gaura*
common

flowers pale, closing
in evening.

ascending, very glaucous.

rays deep red, yellow
tipped, disk dark brown
petals cream white.

Jubay: Capulin Mt.

top 7900 - 8215 feet
ash slopes covered by
pinyon-juniper with
Quercus gambelii, *Cercocarpus*,
etc.

Some grass inside crater,
some oak scrub, highest
slopes pinyon-juniper.

Opuntia erinacea? with
yellow flowers common,
Echinocereus sp. rare

Many borages, penstemons,
etc. *Oenotheras*, etc. in flower.

Vast broad grassy valley
and high plains used for
stock grazing. Mountain
slopes of small hills
and mountains present
a somewhat drier aspect
than the plains.

The Cimarron Canyon is

✓ July 3 Capulin Camp Ground, canyon
above Taos

38764 *Woodia*?

in *Pseudotsuga*-*Abies* forest

65 *Fallugia*? *Cowania stansburiana*
abundant in open scrub on south facing slope.

66 *Mirabilis*
common in openings in scrub on s.f. sl.

67 *Populus*
dominant in canyon bottom

well wooded with
Pinus ponderosa, *Pseudotsuga*,
etc. some very large.
Some spectacular cliffs
above. At the head
the canyon above Taos
is similar.

of this is a dammed
stream, forming
Eagles Nest Lake. Then
a broad grassy valley.
Going down the canyon
above Taos is similar
but one side heavily forested
the other less so and with
much pinyon-juniper
and scrub of *Chrysothamnus*,
Asterina and *Fallugia*?

The forest on the south
side is *Pseudotsuga*, *Abies*,
lower down a magnificent
solid pinyon forest. In
canyon bottom at upper alt.
Populus tremuloides, lower *P. trichocarpa*.

shrub

erect, somewhat glaucous,
flowers beautiful rose pink, stamens 4.
tree 20 m. tall 80 cm. thick d.b.h.
catkins on ground.

July 3 - trip from Taos to Painted Desert
Below Taos the Rio Grande is in a deep gorge. The mesas have sage while the slopes are covered by pinyon-juniper. A scattering of pinyons and junipers run down into the sage.

A few miles down the valley the terraces on the east side are dissected and covered by pinyon-juniper. Below this the sage disappears and is replaced by *Chrysothamnus*. Some areas are fairly desert-like. Above Santa Fe is a large area of juniper that seems to be affected by a disease. A large proportion of the bushes are yellow, apparently dying, a few dead.

West of Albuquerque, especially in the neighborhood of Grants, the same thing was seen.

The plains west of Albuquerque, into Arizona have become dominated by *Salsola kali* v. *tennifolia*

to the point where they appear to be grassland rather than desert, but most of the green is *Salsola*.

Throughout this area there is some juniper and in places some pinyon. From above Santa Fe to at least Grants a rose flowered *Cylindropuntia*, possibly *C. versicolor*, is in flower. On higher spots the pinyon-juniper is fairly well developed.

In the Painted Desert the lava cap-rock is eroded away, exposing a many-colored clay layer or semi-consolidated clay, which erodes into rounded hills with dendritic ravines. The clay slopes and ridges have either no vegetation or a sparse low grass that, sterile, looks like *Panthus spicata*. The ravines have a dense vegetation of *Hordeum jubatum* and a few dwarf bushes - *Atriplex*, etc.

July 4 - trip from Painted Desert to Grand Canyon, s. rim.

Some good desert grassland inside Petrified Forest National Monument, badly overgrazed outside.

Enormous quantities of short lengths of agatized wood on surface, some in place in "Painted Desert" clay, distribution quite uneven.

Along Little Colorado River Tamarix has become dominant woody vegetation. The *Salsola* vegetation mentioned yesterday apparently forms a belt along the main highway, is not present at in any significant amount along highway in park.

Many of common plants - *Gutierrezia*, *Solanum*, *Zinnia*, etc. much more luxuriant along road shoulder than away from road.

✓ July 4 - just outside Petrified Forest National Monument toward Holbrook
38768 *Comandra pallida*
roadside with *Atriplex* and other shrubs.

Between Winslow and Flagstaff, the highway climbs into a relatively luxuriant mixture of piñon, juniper, and *Pinus ponderosa* on a rolling mesa. Here and there are cleared low spots under cultivation, evidently since prehistoric times. Walnut Canyon is a spectacular gorge cut into this limestone plateau down into the sandstone which underlies it unconformably. On the ledges of the limestone cliffs are numerous tiny cliff dwellings. The south-facing walls have a ~~th~~ sparse scrubby vegetation of *Cercocarpus*, *Berberis*, *Quercus gambelii*, piñon, juniper, etc. The north-facing slopes have *Pseudotsuga* and associated northern species.

very glaucous.

Northward from Flagstaff the pine forest becomes an open parkland or pine savanna with grass and widely spaced large well formed *Pinus ponderosa*, forming part of the Doonans National Forest. Pinyons are scattered through this. Over the rise east of San Francisco Mt. this woodland extends through a region of old cinder cones, the finest of which is sunset crater, with a well formed crater still visible.

Descending from this the vegetation changes to a juniper woodland with a few pinyons.

This gives way to desert grassland and that in places to painted desert, the slopes in which are bare clay.

Around the canyon of the Little Colorado the flat ground has thin grass, the slopes rounded bushes of

Krameria? The mountain slopes have pinyon-juniper.

The canyon of the Little Colorado is in its way as impressive as the Grand Canyon itself. It is a terrific vertical walled meandering chasm with ~~to~~ branched side branches equally deep. The walls are fluted and pillared with towers and buttresses standing out from the sides. The upper third is of horizontally bedded rock, at least the top layers of limestone. The bottom two thirds are apparently granite. At present there are only a few puddles of water in the bottom.

The south rim of Grand Canyon is flat and wooded with pinyon + juniper, and ~~Pinus ponderosa~~ with sagebrush at Desert View.

At higher levels the sage disappears and an open forest of *Pinus ponderosa* with some pinyon, ~~and~~ juniper and oak.

July 5 - trip from Grand Canyon to Zion Canyon

Pinus ponderosa at highest altitudes on the rim. Then pinyon-juniper-oak-sage, then sage, then, below 6000' an almost pure stand of *Krameria* (coll. just west of Dead Indian Wash on slopes s. of Little Colo. R.) (photos & of the gap, n. end of Echo Cliffs).

Washers have *Tamarix* and various shrubs.

At ~~Chaco~~ Cedar Ridge are fields dominated by *Opuntia* of 2 or 3 species, one *Cylindropuntia* with green flowers.

The red Echo cliffs have almost no vegetation except scattered bushes on the talus below.

Before Marble Canyon bridge around a roadside park are *Gleditsia*, cottonwood, Lombardy poplar, *Ulmus angustifolia* and elm (Siberian?). *Gleditsia* are watered.

From Marble Canyon a gradual climb up a wash from desert up through desert grassland, heavily grazed, into pinyon-juniper, and at 6800' *Pinus ponderosa* begins. On the Kaibab Plateau is pure forest of *P. ponderosa*, with little undergrowth, vigorous regeneration where not too thick.

Descent from here to pinyon-juniper, then desert grassland north to Kanab, Utah.

Above Kanab on way to Carmel is a very interesting sand area, with what appears to be a local *Helianthus*, extremely caespitose, almost a cushion-former.

Above Carmel Jct. toward Zion are conifers and cultivated fields. The upper parts of this road into Zion are through a curiously jointed white sandstone - Navajo formation. Below this

is red Chinle sandstone into which most of the canyon is cut. It is massive and not much jointed.

In the bottom of the canyon *Acer negundo* is the most important tree, but with cottonwoods.

Up the canyon toward the Narrows is a loose irregular woody vegetation of *Acer negundo*, *Populus* sp., *Fraxinus* sp., *Acer nigrum* var. *grandidentatum*, *Celtis occidentalis* var.

reticulatum, *Quercus gambelii*, etc.

Vitis sp. is common.

The cottonwood trees are as much as 20 m. tall, the box elder almost as tall, the ash fairly tall, the others small, up to 5 m.

July 6 - St. George

Low hills east of town are of red sandstone with sandy benches mostly of very thin soil on flat bed of sandstone.

Vegetation is a mixed desert scrub *Larrea* - *Franseria* but with *Ephedra nevadensis*, *Krameria*, *Lycium*, *Eriogonum*, *Opuntia*, *Dalea*, etc. in some abundance.

Tridens, *Aristida*, *Hilaria*, *Bromus*?, and several broad leaved herbs common.

Lower slopes, below lowest ledges are very alkaline, with a white crust.

Obviously seepy at times.

Here *Anemopsis*, *Pluchea*, *Atriplex*, *Baccharis*, *Senecio*, and several herbs, *Juncus effusus*, etc. are common.

A number of weedy plants, *Lactuca*, *Salvia*, etc. are common.

Just now this entire slope is very dry and powdery.

Atriplex,
Eurotia

✓ July 5 slopes south of
Little Colorado River, just
west of Dead Indian Wash

38769

Krameria

2

dominant shrub over
large areas of rocky slopes

2

70

Fallugia paradoxa

in small ravine on dry slope

July 5 - Zion Canyon
below Narrows

1

71

Acer nigrum var. *grandidentatum*
very common on talus
at base of cliffs.

1

72

Acer negundo L.

very common in canyon bottom

July 6 - St. George

alluvial hills east of town

1

73

Psathyrotes

on bare ground in full sun

1

74

Eriogonum

common on bare ground in full sun

hills of red ~~sandstone~~ and fine sand

2

75

Tridena pulchella

common on ledges and
thin sandy soil

2

76

Larrea divaricata Cav.

common generally

1

77

Hilaria

common on sandy places

1

78

Mentzelia ~~alt.~~

occasional on sandy soil

6000'

rounded shrub 0.5 m.
tall, grayish, rigid.

shrub 1.5 m. tall, flowers
white, mostly faded.

small shrubby tree,
4 m. tall, sterile.

tree 5 m. tall (others much
taller), racemes pendent.

860 m.

flowers yellow, odor very
strong, sage-like.
flowers white.

tufted

shrub 1 m. tall, with
strong oily odor; flowers yellow.
loose bunches

flowers yellow

- 38779 *Eriogonum*
 1 ~~local~~ local on sandy soil
 2 80 *Baileya multiradiata*
 occasional on sandy soil
 1 81 *Allionia incarnata*
 occasional, mostly
 tangled in bushes, on sandy soil.
 1 82 *Hugelia*
 rare on sandy roadside
 1 83 *Prosopis glandulosa*
 rare on sandy soil
 18
 on gentle slope ~~at~~ of
 very alkaline soil ~~at~~
 below rock ledges
 1 84 *Anemopsis californica*
 locally abundant in
 dried seepy places.
 2 85 *Orthocarpus*
 very local
 1 86 *Pluchea sericea*
 rare
 87 *Prosopis pubescens*
 occasional
 2 88 *Castilleja*
 very local

scapes of larger plants
 inflated; flowers yellow.
 rays bright yellow.

flowers purplish,
 faded in late afternoon.

flowers blue-lavender,
 on most plants faded.
 shrub 2.5 m tall; flowers yellow,
 pods on ground.

flowers white.

low bushy much branched
 brittle herb; flowers
 white with yellow tips;
 bracts green slightly purplish
 distally.
 shrub 1 m. tall.

shrub 3 m. tall,
 flowers yellowish,
 fruit immature.
 erect, up to 1 m. tall,
 older plants sparsely
 branched; bracts scarlet
 distally; flowers yellowish.

July 7 Trip from St. George, Utah
to

Larrea and *Prosopis*
in St. George region of
Virgin Valley and west
of Beaver Dam Range show
absolutely no sign of
the freeze of 1936-7. Stems
of *Larrea* etc.

From the Beaver Dam Mts.
to the top of the range west of
Panamint Valley (Argus - Inyo range)
is *Larrea* - *Franseria* association,
except for some *Atriplex*
flats and ~~the~~ dry lakes
and the salt pan floor of
Death Valley. There are
extensive high sand dunes
east of Stove Pipe Wells.

The *Larrea* is generally
less than 1 m tall except
along roadsides. For
a few yards on either side
of a paved highway
the *Larrea* bushes are
generally 1.5 - 2 m. tall
and much brighter green

✓

July 7 - ^{Lower} Rock Creek, 25 m. n.
of Bishop, Inyo Co., Mono Co.

38789

Gilia (*Linanthus*) *nuttallii*
common in mixed pine
forest among granite boulders

90

Betula
common along stream under pines

than generally. May be
that moisture is trapped
under the pavement
and that the root systems
can get at it, even from
several yards away.
The immediate road
side, for a yard or more,
has an abnormal
luxuriance of herbs
of various sorts.

The top of the pass
between Argus and Inyo
ranges has only
Atriplex and similar
shrubs, also down the
west slope - only a very
few creosote bushes seen
on west slopes till the
relatively level valley
bottom is reached, where
there is an area southeast
of Owens Lake. Otherwise
the uncultivated parts
of Owens Valley is mostly
dominated by *Atriplex* and
Artemisia tridentata, etc.

2500 m.

much branched globose
suffrutescent herbs.

shrubby tree 4 m (others seen to 6 m)
tall.

- 91 *Prunus*
common in open woodland
on great rocks
- 92 *Oryzopsis*
same
- 93 *Eriogonum*

Lower Rock Creek Camp
is on the Rock Creek at
2500-2600 m. in open woodland
of *Pinus monophylla*,
and *P. jeffreyi* (or *P. sabiniana*)
a large 3-needled pine
with leaves $\frac{1}{2}$ 1.5 cm. long
and heavy cones with
spinose scales, & rough
bark), some junipers,
openings filled with
Artemisia tridentata
and *Prunus* sp., *Betula*
and *Populus trichocarpa*
along the creek.

The whole is on the
upper part of an
alluvial fan of
huge granite boulders
and smaller debris.

Grayish chipmunks
common.

Oryzopsis and a tall
stipa and *Eriogonum*
and *Gilia nuttallii*
very common.

shrub 1 m. tall, leaves white
beneath; petals white

dense small tufts.

dwarf shrubs;
flowers bright yellow.

North from Rock Creek
pinyon decreases rather
markedly and *Artemisia*
increases in extent.
The boundary between
forest and sage seems
more abrupt.

Mono Lake appears
rather alkaline. Ducks
are rather abundant. Gulls
common. Piles of pale
clay along edge of lake.

Sonora Pass (9)
is rocky, with sparse
uneven stand of *Pinus*
contorta var. and *P. albi-*
caulis. Country rock is
granite with pegmatite
veins.

The *Pinus contorta* here
has enormously thick and
rapidly tapering trunks,
compared with that in the Rockies.
Maximum 20-25 m. tall 1.5 m. dbh.

✓

July 8 - Sonoma Pass

78794

in open pine woods on granite
Pinus contorta var. *murrayana*
 dominant tree

July 10 - south of San Francisco

Ocean bluffs of
 shale and fine sandstone
 covered by a low littoral
~~semi-scrub~~ or thick herb
 growth, at edges a

Alrovia
maurandiae
maximiliana
spargularia

succulent garden
 of *Echeveria*, *Plantago*,
Erigeron, *Eriophyllum*?,
Helianthemum? *Ficus*??

Yellow *Lupinus*, shrubby,
 common a little farther back.
 Also *Baccharis pilularis*,
Leucophularia, *Rhus*
diversiloba, *Cornus*, *Rubus*,
Artemisia, *Achillea*, etc.

Many of these are mostly
 confined to slightly
 sheltered spots. *Eriophyllum*
 is most conspicuous of
 all, at least at this
 season. *Castilleja* varying
 in color from scarlet to orange.
Mimulus (*Diplacus*) of clear orange
 color, very prismatic calyx.

~~tree~~

tree up to 20 m. tall, with
 thick strongly tapering trunk.

On sand are patches of
 a characteristic low
 assemblage of *Distichlis*?,
Scirpus, *Cochloscolymus*,
Soldanella pauciflora, *carnea*,
~~*Adiantum*~~ *Melilotus indica*?
Amorpha?, *Franseria*
bipinnatifida, *Calcitrans*,
Grindelia, etc.
Alrovia maurandiae has
 a very enlarged root, to
 6 cm. thick, elongate.

July 14 - Dickey Ridge
~~around~~ ^{near} visitor center
 building is a planted
Ilex opaca.

Compton Mt.

Completely wooded,
 some rugged rock outcrops
 near and at top.

Woods quite mixed,
 in places dominated by
Quercus prinus, on top
 by *Q. rubra*, mostly no
 clear dominant.

Species seen:

Lilium americanum v. *neglectum*
Juglans cinerea
Parthenocissus quinquefolia (mostly)
Polypodium vulgare
Acer pensylvanicum
Acer spicatum
Heuchera americana
Robinia pseudo-acacia
Ledum telephium
Rubus odoratus
Rubus occidentalis
Prunus virginiana
Quercus rubra
Quercus alba
Amelanchier canadensis?
Solidago caesia
Silene stellata
Eupatorium purpureum
Aralia racemosa

2940'

Dryopteris marginalis
Monotropa uniflora
Monotropa hypopitys
Ostrya virginiana
Cornus sp.
Arisaema atrorubens
Scutellaria ovata
Ribes (*spineless* var. *gracillimum*)
~~*A. racemosa*~~
Amianthium musciclorum
Hamamelis virginica
Aster cf. *macrophyllus*
Menziesia pilosa
Rhododendron sp.
Dioscorea quaternata v. *glauca*
Vaccinium vacillans
Gillenia trifoliata
Aralia nudiflora
Smilacina racemosa
Monarda
Galium latifolium
Phaspium atropurpureum
Rosa carolina
Hedysotis purpurea v. *ternatifolia*
Spiraea betulaeifolia
Castanea dentata
Circaea quadrangulata
Hydrangea arborescens
Thalictrum dioicum
Aquilegia canadensis

Galium oblongifolium
 Eupatorium ulmifolium
 Danthonia spicata
 Apocynum androsaemifolium
 Rhus toxicodendron
 Crataegus macrocarpa
 Smilax hispida
 Corylus cornuta?
 Carya
 Deschampsia caespitosa

below
 200
 300 m.

Achillea millefolium
 Tirositerum
 Solanum elaeagnifolium
 Cirsium lanceolatum

July 14 - Compton Mountain
 wooded rocky summit

- 38795 (grass) *Oxyopsis racemosa*
 rare on great rocks in crevices of
- 96 *Cornus rugosa* Lam.
 between great rocks
- 97 *Monotropa hypopitys*
 rare in open

Habitats that should be
 described in G.N.P.

Roadside
 Roadside edges of woods
 Rocky road cuts
 Talus road cuts
 Talus below roads
 Exposed rock cliffs
 Shaded rock cliffs

Gaylussacia baccata
 Amelanchier laevis?
~~Corydalis~~ *Taxodiopsis*?
 Aster (Leucotricha)
 Penstemon hillebrandii
 Antennaria plantaginifolia
 Prunella vulgaris
 Cimicifuga
 Anemone virginica
 Rubus argutus
 Fragaria virginiana
 Erigeron strigosus
 Lassafras albidus
 Rhus glabra
 Carya cordiformis

904 m.

erect

shrub 2 m. tall, leaves
 grayish beneath
 erect, somewhat reddish.

shaded rock outcrops
 springy places
 meadows on broad ridge tops
 open slopes
 Dry hemlock woods
 Wet hemlock cover
 Quartzite ridges
 Shale or quartzite talus
 Rock-filled valley heads

Lower deciduous woods

Broad leaf cover.

Chestnut oak woods on steep slope

Chestnut oak woods on broad flat ridge tops.

Quercus ilicifolia scrub.

Grass ridges and flats.

Scrub forest on steep

dry west slopes.

Quercus coccinea forests.

Pinus virginiana forests

Pinus rigida forests

Clearings growing up to thickets.

Swamps.

Wet ravine bottoms

Quercus rubra forests

on high ridges.

July 20 - Washington D.C.
9:40 p.m.

In the flood-lights trained on the Capitol dome were a number of birds, perhaps a half dozen or dozen, flying around and round, apparently feeding on the insects attracted by the lights. They were probably night-hawks (as white-throats). They had long, somewhat

back-swept wings, the ultimate joints slender and with a conspicuous white patch.

1957 Maryland
July 21 - Sugar Loaf
Mountain

The mountain is
a knob of pinkish
quartzite, with
cliffs and large
boulders near the
top.

The whole mass
is well wooded
with mostly
deciduous trees.

The top dome is
covered by a mixture
of *Quercus prinus*, ^{large}
Betula lenta, *Quercus*
nubra?, *Acer rubrum*,
and a few pines.

There are *Pinus pungens*
and *P. virginiana*
with a few that
look rather intermediate.
The trees up here are
rather small
mostly under
30 cm. dbh. and not
very tall. Many
dead chestnuts.

The understory, 2-3
m. tall, is mostly
Hamamelis, *Cornus*
florida, young *Carya*,
Betula and *Quercus*, etc.

Diospyros,

On the ground *Linnaea*
quadrisulcata is
abundant, some
Phytolacca, *Rubus*,
Spiraea betulaceifolia,
Rhus toxicodendron,
etc. Scattered *Kalmia latifolia*
and considerable *Vaccinium vacillans*.

On the lower slopes
the forest becomes taller
but thinner, more
logged over (not
recently), includes
much *Robinia*, *Quercus*
prinus, *Q. acuticarpa*?,
Carya spp.

Undergrowth is
sparse - some *Acer rubrum*,
young oaks, locust,
hackberry, much *Phytolacca*.
Considerable *Vitis* and *Paederia*.

At this time everything
is obviously drooping
from lack of water.

July 25 - Air trip Washington
to Folleywild, N.Y. over Annapolis
7000' alt.

The Anacostia river,
up to where it abruptly
narrows to a small stream,
is the color of tomato cream
soup. Above this, dark green.
Apparently this is the
result of large scale
cutting into the clay
subsoil on areas being
developed as residential
sites, on park-way
interchanges, and
factory sites.

From Washington to
Annapolis the ratio of
forest to cleared land
is estimated at about 3:1
at least to the north of
the line of flight. This
forest land is a mosaic
of all stages of old field
successions and mature
broad-leaf, ~~or~~ pine, and
mixed forests.

East of Chesapeake Bay
the ratio about reverses
itself, or may even be
1:4. Here cultivation is
intensive, even though the
land looks sandy.

On the coast are large

areas of tidal marsh,
especially along Delaware
Bay on both sides.

The northern edge of
the Pine Barrens is being
considerably cut into
by cultivation. The
streams and estuaries
here stand out as very
black, against the
dark green vegetation.

The New Jersey soil is
generally light colored
along the line of flight,
roughly along the Pine
Barren border, but is
mottled with darker
areas, somewhat as
the northern Middle Western
soils in glaciated areas are.

Northward the Plains
area stands out clearly
and the stream pattern
in it seems to bear
some relation to its
distinction from the
surrounding tree-covered
areas. Should be looked
into. East of this are
considerable attempts
at reclamation for
agriculture. They make
plains, but without distinctive
drainage pattern. Also many
old bar areas with white sand showing.

Some new black fir scars, with stream courses outlined by brown dead trees, killed but not burned by the fire. Subdivided areas and industrial(?) areas near Lakehurst.

This (7000') is about an ideal altitude for reconnaissance observations.

July 25 - Enroute N.Y. to San Juan, Puerto Rico

7100'

About 1/2 hour out of San Juan 4 superimposed cloud layers were observed - a low layer of puffy cumulus. Then a thin layer of stratus-cumulus at perhaps 15000-17000', a layer of large very high cumulus from 15000 to 30000' or so. Then a layer of alto-stratus at 30001-40000' seemingly radiating from a center far to the west.

The second layer became rapidly thicker toward San Juan (the sun illuminated the bottoms of the clouds with beautiful effect) then

it disappeared almost completely.

San Juan, Puerto Rico
Airport
plants seen:

Asparagus sprengeri.
Cestrum nocturnum
Codiaeum variegatum.
Philodendron oxycardium.
Acalypha amentacea v. *wilkesiana* ^{KES}
Polyscias guilfoylei ^{KES}
Melaleuca leucodendron?
Heindaphus aversa
Philodendron with hastate lvs.
Dieffenbachia with gray spots
Dieffenbachia maculata
Polyscias tricochleata
Coccoloba uvifera ^{OK}
tall green stemmed bamboo
Sansevieria (broad leaf, variegated)
Peperomia obtusifolia
thick leaved *Zebrina*? (drawing, purple)
Areca sp.? (pebble like)
Alpinia purpurata
Phoenix roebelinii?
Pandanus sp.
Gnaphalium sp.
Pedilanthus tithymaloides
Burkea burkei?
Colea scutellarioides
Pseuderanthemum sp.?
Liriodendron ^{OK}
Liriodendron ^{OK}

July 26 - Belém do Pará

most
main
street

The main downtown street is lined with large mango trees, one or two of them with unripe fruit. The trunks are white-washed to about head height. On the main branches epiphytes, mostly several kinds of orchids, are abundant.

In a small square are two large trees of *Cassia grandis* (or perhaps a hybrid involving it, as the flowers have a yellowish tinge). up the whitewashed trunk of ~~each~~ these is a termite gallery. This branches and a gallery runs up each branch, rebranching even on ~~some~~ of the smaller limbs, down even to rather small twigs. When this is broken swarms of fast-moving soldiers run out and search the vicinity, vibrating their heads frequently. This gradually subsides over a few minutes. After 70 minutes or so the commotion had quieted and rows of soldiers were quietly standing guard along both sides of each broken part of a tunnel.

Common street trees and shrubs are

Mangifera indica
Cassia grandis
Rhapis flabelliformis
Leviston chinensis
Roystonia olivacea (or regia)
Ficus retusa?
Plumeria rubra
Calharranthus roseus
Pedilanthus tithymaloides
Ixora coccinea
Xanthosoma violaceo
Alocasia macrorrhiza
Yucca sp.
Cordyline terminalis
Heliconia sp.?
Cassia fistula?
Sansevieria roxburghii
Cassia spectabilis?
Hibiscus rosa-sinensis
Crimum sp.
Rhoeo discolor
Tabernaemontana sp. ? (pink)
Bougainvillea spectabilis
Leindorpus aureus?
Randia formosa
Allamanda cathartica
Turnera ulmifolia
Calathea (white lined lvs.)
Hemigraphis? (purple beneath)
Axonopus compressus (lawn grass)
Euphorbia "splendens"
Polyscias guilfoylei

Ornamentals in outskirts
Jatropha gossypifolia
Gossypium barbadense?
 (tree 3-4 m.)
~~Attalea~~ *Euterpe* sp.
Lagerstroemia indica
Mulvanisana
 a few coconuts.

July 26 - trip by air Belém -
 Santarém - Manaus #
 L. Manaus 13:40 C-46

Near and around airport
 at Belém considerable forest,
 mostly ragged second growth
 but several patches look
 relatively good. The second
 growth has scattered
 trees from the original
 forest emerging far above
 the general level.

The islands near
 Belém have swamp forest
 with the top story open
 but a complete second story
 mostly of palms. Patches
 of *Montscharidia* around
 the edges. The composition
 of the ~~main~~ top layer
 seems quite diverse, and
 the

On the way to the airport
 are a number of swampy
 waste areas covered by
 a tangle of *Montscharidia*,
Cassia alata (?), *Cecropia* sp.,
 and other trees, incl. the
 graceful caespitose palm (~~Attalea~~ *Euterpe*?)
 and tangled with vines
 several sp. of palms. Canopy to 5 m. tall,
 trees to 10-15 m.
 Some areas of this type
 have been recently cleared.

A 1:25

~~Attalea~~
~~Montscharidia~~
 Santa
 Barbara
 Marajo?

Letters
 refer
 to green
 letters
 marked
 on July
 re count
 on table
 chart.

broken grassland and forest,
 forest especially near streams.
 Stream very muddy.
 Then mainly forest with
 tidal streams. A few small
 clearings.

When there is considerable
 distance between streams
 there is grassland, rather
 dark brown in color, probably
 marshy, with patches of
 wood. Very smooth in
 appearance from about 5000'.
 Small clearings become
 more abundant, especially
 near streams.

Paths across grassland
 stand out as though soil were
 light colored sand, but soil
 in clearing is reddish.
 Grassland patches much
 smaller, to very small.

B 1:35
 San Miguel
 de Paraituba
 Marajo?

C 1410
n. of
Pirajá
~~Barra~~
Marajó

Practically no grass now except obvious clearings.

1. Large broken cumulus clouds seriously obscure vision over most of this country.

There are some evidences of shifting cultivation, but the greater part of the forest looks undisturbed.

D 2:15
n. of
Barragem
Baia de
Cassimbu

Solid forest except for rivers. However, what appear to be filled watercourses stand out very sharply because of a lower more fine-textured vegetation. View much obscured by clouds.

E 2:20
Rio Cassimbu
Rio Amazona
in distance

Solid forest but with a muddy stream in the distance. A small oval area in the forest appears to be white sand ~~with~~ with scattered bushes or small trees.

Forest ~~very~~ even in texture emergents apparently abundant. Color dark brownish green, mottled with lighter to somewhat reddish trees.

F 2:27
Rio Xingu

Crossed large river with some small sandy beaches

and with many inlets on both sides. This river much less muddy than others seen. Inlets are muddy but seem to influence very little the river. Streams running into the inlets are black. Some ^{small} grassland patches near these streams on west side of river. These are brownish straw color. Many streams in forest, all black water. Small sandy patches cleared near streams, sand reddish.

Patches or strips of different vegetation, lower, fine-textured, go from these black streams into the forest. Possibly swamp.

H 2:37
n. of
Rio Jarauai

Following to south of a small stream that lies in or on the edge of a strip of grass of some width. This grass quite irregular but with no apparent pattern. Huts scattered along stream.

I

Parts of this grassland are wet. Crossed this stream at 2:40

After this a large expanse of apparently undisturbed forest. Emergent trees quite abundant. Many of them lighter green than the rest of the forest, a yellowish, or brownish or reddish. The yellow ones must be flowering.

Cumulus clouds still abundant. A few large trees are bare, but these not conspicuous from this altitude.

J 7:47 Crossed a small stream
Rio Guajará running north, lined by what appears to be swamp. Farther down, the margins appear to be cleared and sandy. Joins a larger stream in the distance, running northeast, also with cleared margins.

K 7:52 A few small streams lined
S. of Rio Purus with narrow swamp strips. Texture of forest varies somewhat locally.

7:57 In distance to northwest vast
S. of flooded area. The water here is dark, not muddy. Much wet grassland, some swamp forest, especially

Rio Amazona along a very large
Ilha Cumis reddish, muddy river. An island in this has extensive green clearings.

M Beyond river again vast flooded, partially wet grassy area. Along the west bank of river a narrow, low wooded natural levee, some of stream courses in flooded land lined with trees, others not.

Many clearings on natural levee of river.

Flood waters on this side greenish, somewhat muddy, not as black as on other side.

Wet grassy areas bright green, mottled with lighter and darker green.

N 3:05
Lago Grande

3:10-13

Turned to left somewhat. ~~This may be Rio Tapajós~~ Much more flooded land. Also what appears to be many old stream courses. Part grassy part wooded, the wood mostly cleared except where swampy.

The pattern of strips of grass, swamp, and forest is very hard to understand here.

^O
R. Amazonas River again very muddy, flooded land with black water. Many clearings much shifting cultivation on islands and strips of slightly higher land.

Patches of what must be *Victoria regia* in ponds stand out & very conspicuously look like gigantic duckweed from 4-5 ft.

^P
S. of Santarem

Away from river the topography roughens and there is little good forest, much shifting cultivation, and some savanna and deciduous forest.

Bare trees very conspicuous.

Vegetation here is really very complex. This is the Santarem region.

Where a large black-water empties from a flooded area into the muddy ~~Amazon~~ ^{Tapajoz}, the area of mixing is very conspicuous and narrow.

Circled, descending 3:15 - 3:29

July 27 Santarem

The soil here on a small hill where a low cut is available is a conglomerate, semi-consolidated, of irregular nodules of ironstone, formed, in the opinion of van Brecken, by the breakdown of an old lateritic crust. The matrix is a reddish-yellow loamy material. Below this is an exposure in the street of what may be an actual crust. This may, however, be a compacted layer of the nodules.

Out in front of Santarem ~~between~~ perhaps 1 km can be seen a striking and sharp boundary between the black water of the Tapajoz and the yellow Amazon water. Many small rafts of vegetation in the Amazon part.

Black vultures are present in fair numbers around the city, and have very little fear of man.

Yesterday evening a very considerable number of what appeared to be scissor-tailed flycatchers were flying around a banyan tree at about sundown.

At the airport the surrounding forest is a low irregular dry type apparently much cut over in the

past, rather sparse, some deciduous trees.

The clearing along the air strip

33798

Pachalanthus
edge of air strip

July 27 - air trip Santarem - Manaus
Considerable cleared and brushy land to south of Santarem along Tapajos. Land between R. Tapajos and R. Aripuanã is partly ~~about~~ in grass, some of it with a scattering of small bushes. Boundaries of this are very irregular, not at all angular.

Of the forested part some is clearings in various stages of revegetation after shifting cultivation. These clearings tend to be angular.

A similar pattern is evident between the Rio Aripuanã and Lago Grande de Vila Franca.

But westward here the grass rapidly becomes less, except close to the lake. Shifting cultivation evident all through area south of Lago, but not excessive.

Route turned slightly southward to the way to west end of lake. Cloudiness and haziness begin to increase. Scattered low *Cumulus*. The forest

covered by low semi-herbaceous growth mostly *Cassia* spp.

On sandy soil with quartz pebbles. Sedges common, some grass.

becomes more continuous, shifting cultivation less and less evident.

Southward, along Rio Aripuanã, in the distance, large grassy patches are visible, but rapidly becoming less westward.

Along course sparse dendritic patterns of lower, finer textured forest, probably represent swamp.

Passing south of Lago Grande de Juruá the land is solidly forested.

Cumulus becomes much more abundant.

To south dendritic patterns of swamp (?) forest become numerous and abundant. Also conspicuous as headwaters of Lago.

Approaching Amazon there are 6-8 irregularly parallel sloughs parallel with the main river. Mosaic of grass and woody vegetation between these.

On the other side of the River is a vast mosaic of mostly water and light green wet grassland with some wooded land and swamps.

As usual, the main channels of the river are muddy, the other water clear or dark.

To the south much water, in places more than land. How much of the light green is wet land and how much floating mats of vegetation is not at all clear.

Complex patterns of old channels, especially on Ilha das Onças. Apparently much sand here. Probably the abundant light green is grass on a wet sand surface.

Passing south of Lago do Paua most of the land enclosed in the great bend of the Amazon here is inundated. Some sand, grassland, and forest especially along the river banks. Striking meanders of smaller streams here, partly outlined by strips of forest. South of this also mud water and much ~~as~~ wet grassland.

Reflection of sunlight shows that the light green grass has

considerable standing water between it.

Northwest of the Amazon ^{vs. 138} and south of the Parana de Silveira is another complex area of water, wet grassland and ~~to~~ forest or swamp, again with a complicated pattern ^{that} must represent old channels.

South of the river here is a curious mosaic of low drab-green vegetation with the dark green forest. View not good enough to make out what this is. Some water here but not very much.

Westward of ~~Stapinapa~~ ^{Stapinapa} and south of Rio Uatuma the landscape north of the course becomes forest again with little water except the Rio Uatuma to the north and occasional small irregular body in the forest. But to the south of the course the Lago Parac and Lago Canacari form large bodies of water very complex with bars and islands.

In the forest to north of course ravines and small streams become quite noticeable. In general, there

is far more water than one gets ~~any~~ idea of from the WAC charts.

Lago de Cris, in the distance to south form a much more ~~impressive~~ impressive body of water than appears from map.

The forest between the Ristatuna and Amazon appears not at all disturbed by man, very much cut by dendritic stream patterns, the more ~~important~~ important streams lined by swamp. This stands out very sharply in late afternoon sun, both because of shadows and color differences between forest and swamp, the swamp being a drabish green, rather than the dull dark ~~green~~ green of the forest.

Ristatuna is extremely complicated, and is ~~cut~~ certainly cut down into a slightly elevated plain. This impression of a slight rejuvenation has been increasing since Itapiranga.

South of course the Amazon has sloughs along both banks, not so close together as most of those

seen previously.

North of course the rejuvenation has increased so the ground actually looks hilly.

All densely wooded, but with swamp forest occasionally along some streams.

Along Amazon west of Casa Casimiro is some cleared land, especially along the north bank which is somewhat high. South bank is lower and with much water and wet grassland. The north bank has low bluffs 20 m. or so high, in places worn down to slopes. Westward these bluffs become a bit higher and more conspicuous.

Vast stretches of water to south.

Island east of Manaus has considerable areas of forest that seem in very bad shape, possibly the trees have been killed by burning or girdling. These patches are irregular.

Approaching Manaus the bluffs are higher and much dissected. Mostly wooded. Land back of them dissected and wooded.

Clearings become more and more numerous

July 28 - 41 km n. of Manaus

tall rainforest trees 30-40 m. tall, gradation of sizes from 10 cm. to rarely 80 cm. and spaced from 2-5 m. with abundant saplings and shrubs

Trees Sapotaceae, Leguminosae, Lauraceae, etc.

Palms principally in undergrowth.

Undergrowth is fairly abundant, to 4 m. high.

Can walk freely but must push bushes aside.

Very few ferns, some herbs such as Carintia, but much ground exposed, covered by leaves.

A brownish gray clay surface with no evident organic matter.

Many epiphytic lichens, mosses, hepatics.

Many Araceae vines clinging close to trunks - Philodendron, Symplocos, etc.

Canopy here rather thin perhaps 75-90, locally thicker.

The tree habit here is characteristic, clean trunks, umbrella top.

Has been selectively cut over for economic wood. Leaf epiphytes, especially undergrowth, abundant on old leaves, or on those such as palms that persist.

This general area, between here and Manaus is a dissected block of fine sandy sediments slightly bedded, pinkish in color. Here and there in cuts may be seen a thin layer of small concretions, not conformable with the bedding. Said by Stenberg to be concretions formed in situ without relation to bedding. The cuts are frequently darkened by a thin layer of algal discoloration, dark manganese purple in color.

Between 21 and 22 km. north of Manaus are small areas of grayish white sand, really podzolic in appearance, with a thin yellow-brown layer on top. In some profiles are irregular thin films or wavy layers of fine dark gray material.

Separated by thick layers of white sand

W. B. S. P. → The vegetation here is different, but has been burned over, so is not to be taken as necessarily typical. Besides shrubs of various sorts *Pteridium aquilinum*, *Lycopodium cernuum*, *Paepalanthus*, and several grasses are prominent.

↑ Cleared areas in the forest are largely grown up to several species of *Cecropia*. Toward Manaus the entire

✓ July 28 - 21 km. north of Manaus

On white sand in open scrub.

2 38799 *Paepalanthus*

3 38800 (algae) forming crust

✓ July 28. 10 km. north of Manaus

2 01 (algae) thin crust on vertical road cut on pink fine sand.

vegetation becomes a secondary thicket type with abundant palms of several species, *Cecropia*, *Vismia melanotoma*, and tangled with vines. Shifting cultivation being practiced here and spreading along the road.

Letters
refer to
red letters
marked
on WAC
charts
Aug. 1
A

Aug. 1 - trip by air from
Maua to Santarem
(in Catalina, south side of plow)

Ravines in Tertiary terraces
are rather steep walled and
the walls well wooded, black
water in bottoms of parts
near river.

Smaller islands are
a series of subparallel
channels and ridges,
channels with water
or wet herbaceous vegetation.

Difficult to be sure if
"wet grassland" seen
on trip up river is
always grass or if perhaps
some is floating vegetation.

careiro. Large island below
mouth of Rio Negro is
largely wooded, many
of trees leafless at this
time. Many clearings along
south side. The lake is
greatly enlarged now
and some of wooded strips
are still flooded, the trees
sticking out of the water.

Areas of herbaceous vegetation,
perhaps floating, with
mostly leafless trees with
white trunks scattered
through them. ~~Go~~ Down

C

stream somewhat still on
island, are strips of
leafless trees separated
by green strips much
narrower. Camargo says
the trees lose leaves during
inundation. Certainly
those on lower ground are
the leafless ones. (4 + 10 photos to 31)

Shallow spots along
banks with a blue-green
vegetation, probably largely
Pistia. Much of the
herbaceous vegetation
is floating, and when
the water rises (acc. Camargo)
it detaches itself and
forms enormous rafts,
to 200-300 m. long.

About $\frac{1}{4}$ the trees on
some areas, almost all in
others are leafless. A few
are in flower.

Systems of old meanders
and channels and "restingas"
or natural levees are very
complex. The enclosed water
is dark and with little silt.

New bars covered mostly
by herbaceous vegetation.

Montrichardia swamps
seen almost from time of
leaving Maua.

A few houses on levees.

In addition to elongate channels on the islands there are roundish or slightly lengthened ponds, the smaller ones filled with floating vegetation.

D

Ilha Ilha-Grande is a much more mature example of the islands built up of successive restingas. Mostly wooded with a few channels and meanders. Some elongate areas toward the lower end appear to be *Montrichardia* swamps with sparse tree cover.

The Amazon is café-au-lait color, all of the still water dark brown.

Below here palm swamps appear. Extensive *Montrichardia* swamps, large areas of floating vegetation. Meandering channels lined with strips of forest.

Calyptophyllum spruceanum

Hula repitans

Triplaris surinamensis

Crataeva benthamii

commonest trees are *Mimosa* ^{CA}

grasses *Paspalum fasciculatum*

Echinochloa polystachya

Haploenachne amplexicaulis

get geological map of Brazil
1/500,000 Mapa Geológico do
Brasil 1942 Secao Cartografica
do Com. Lithographica
Ypiranga, L. Paulo.
with Divisao de Geologia e
Mineralogia, Ministerio
de Agricultura, Rio de Janeiro.

E

Mouth of river e. of
Barraca. Many trees in
forest just coming into
leaf, some, prob. *Tabebuia*
and *Triplaris*, in flower

One way to distinguish
floating ~~from grass~~ vegetation
from wet grassland is by
the existence of trails occasionally
in the latter. Some grass
floating, some attached. In
some floating mats of grass
the center appears dead, the
margins green.

F

Area west of Parintins
Large areas of grass, both
attached and floating, mixed
with some patches of wood.
Occasional *Victoria regia*.
Herons (white) fairly common,
gregarious.

Grass may be attached but
in water to 3-4 m. esp. species
of *Oryza*. Some clearings here
and houses on piling. Cattle
grazing in water.

Patches cleared with large bundles of ~~just~~ macerating in water.

Tree with white trunk, mostly bare, seems to be *Triplaris*.

The wet grasslands in many places are grazed.

Jute is only produced near the water.

to W P-2 to 2 ~~W~~ W. of Parintins.
color 9-6 to 14 W. of Parintins.

G Parintins - old Japanese colony, plantations of rubber & Brazil nuts.

H Below Parintins an area of magnificent rain forest, with scattered trees bare, many with new light green leaves, a few in flower, bright pink ^{red or white}, some with white or yellowish flowering vines over their tops. Emergent trees common. The various shades of green and other colors making a vivid mosaic. Palms very common in canopy but not as emergents.

Forest of slightly lower elevations, possibly swamp, distinguishable by lack of emergents, lighter general color. *Babassu* palms.

rest of both rolls taken of the forest east of Parintins, the last dozen or so of brow with telephoto lens.

Eastward a few shifting cultivation clearings, especially but not all along a small watercourse mostly hidden by forest. Small ravines in forest have predominantly palms. This is on the Tertiary terrace.

I Eastward, in Rio Aripuanã drainage and north of it a few small hills. Stream courses lined with *babassu* palms. Small area, perhaps former clearing, pure stand of a smaller palm.

J Hills more numerous eastward north of main part of Aripuanã. More shifting cultivation. Swamps immediately along river. Patches of scrub savanna with small scattered *acaule* palms, some trees. Old stream course with white sand.

Rio Aripuanã has black water, occasional white sand beaches, mostly rather steep banks.

K

Forest here has less trees without leaves and less with young leaves than back a bit, more somber green color. Some small sand barrier ridges in edges of river, also hooks at ends of capes, pointing upstream. All this in "estuary" part of stream.

Shifting cultivation clearing in all stages of cycle.

L

Between Aripuanã and Tapajós some beautiful forest with numerous emergents with bright deep yellow flowers. Some other flowering trees, a few bare ones, palms with what appears to be distichous leaf arrangement (Coryzocarpus).

M

Rio Tapajós has ^{pink} sand beaches on west bank, also low pinkish bluffs there bar.

N

Much higher isolated hills (200 m.) east of Tapajós near Belterra. Alto do Chao. Tertiary erosion remnants. Some these bare or almost so.

Forest on this side seems more dry, far more trees bare of leaves. Some areas almost savanna.

Narrow white sand & pink sand beaches, pink bluffs.

Tidal influence here makes sand spits pointing upstream. Some siltiness from Amazon noticeable here.

Laterite boulders at bases of some of the bluffs.

Some sand points are covered only by scattered shrubs.

Contrast between the dark clear water of the Tapajós and the light cape-au-lait of Amazon islands across Amazon from Santarém and of parallel strips of restinga, wet grassland, and water.

Separated by large channels off the Amazon and containing ponds and large to very large lakes. Much clearing on restinga and swamp, the latter for jute. Vast Montrichardia swamps around lake.

Canals cut through restinga

Q

from Amazon to ^{Lago Grande} large lake by Camargo to let in silty water to fill lake and make land. The filling is very obvious at the inner part of the two largest canals. Herd of water buffalos. Here the water runs into the canal because of evaporation from the lake. Drops an enormous load of silt. The lake is very muddy in comparison with other lakes of this sort. The current into the canals is very noticeable.

Large patches of *Cecropia* on restinga, representing abandoned clearings. Separated by patches of degraded tall forest. *Triplaris* in flower here ^{abundant} much just along river.

Around channels and small lakes the wet grasslands extend out over the water as floating mats.

Aug. 1 - boat trip Santarem to Maracum, on north bank of Amazon below Santarem. Small floating rafts of grasses occasional.

Along north shore, on islands pioneer situations occupied by *Salix martiana*, a stage later *Cecropia* spp. on restinga and cleared land. *Salix* of several ages, up to perhaps 15 m. tall.

Some large areas of flood plain or low restinga dominated by *Muntingia calabura*. In places mixed with other small trees. Form a compact layer about 6-8 m. tall. Here and there are patches of rather tall ~~forest~~ forest of *Calyptophyllum*, *Triplaris* and a number of other species up to 30 m. tall, rather ragged.

Indentations in bank tend to have floating grass mats, prominences tend to be eroding rapidly, so that trees are down along the banks. *Triplaris* in flower or fruit, white.

Aug. 1 Maycun

~~Cleared~~ low ~~resting~~
~~resting~~ plain with low
channels, muddy
with *Ipomoea erecta*
on muddy flats - a pasture
weed. Terns fishing in
canal.

In old canals

Jussiaea

Pistia

Eichornia

Neptunia oleracea

Aeschynomene

Cynodon dactylon covers flats.

In flats is village
a grove of coconuts,
mature, but mostly
not very productive -
attacked in terminal bud
by *Rhynchospora* sp.

and by a moth larva.

Some trees rather loaded.
Perhaps look poor because
of using green nuts.

Here Camargo has his
largest canal, cut through
the restinga. The muddy
water flows in at a rate
of between 1-2 m. per second.
This said to be because
of the enormous evaporation

from the surface of the lake.

The vast wet meadows
grow on a muddy soil that
will not support the weight
of a horse, though it is
traversed by Indian buffalo
of which there are 1600 head
here, feeding in the wet
meadows. Produce a very
rich milk ^{which makes} good cheese.

The lakes, which normally
have dark clear water, here
have muddy water as in
the Amazon.

Water very seldom flows
out of the lake, only once in
3 or 4 years, then at driest
season for about 2 weeks
it flows in and out with
tide. Tidal fluctuation 20-25 cm.

The land that is built
up by sedimentation by the
water from these canals is
firm because of the proportion
of silt and fine sand.
When dry will support a
horse or station wagon.

Considerable *Eichornia*
in patches on lake, but not
excessive.

Salix martiana, small tree,
have enlarged bases and
conical, with bushy roots
at top of cone and above.

Oryzopsis
peruviana

Large white herons, bitterns, terns, a cormorant or gannet-like bird, etc. are common. Tern looks like *Thalasseus*, with large yellow bill and habit of bobbing it.

What appear to be boat-tailed grackles common near village. Several species of small shore birds, a hawk, and small thrush-like birds with yellow front parts.

Aug 2. Belterra

The rubber plantations have a ground cover of *Pueraria* sp. The variation in leafing out is explained by Townsend (geneticist at the plantation) as due to various clones used in top working the trees.

The soil here is dark and has a fair clay content. There is said to be a correlation between areas of dark soil and extensive Indian occupation.

Aug. 2 - Santarem to Belterra
low hills partly grassy, partly wooded, mostly showing clearings in various stages of revegetation.

Forest becomes more luxuriant toward Belterra, grass disappears.

At Belterra are large areas in Hevea. Different fields are in different conditions. Trees are quite individual in leafiness, from bare to fully leafed out. In some fields many trees appear to be dead (~~possibly not~~) but are not.

Belterra - 4 months dry season. 90" rainfall, 90 percent of which is in the 2 wet months.

Second growth very thick - conspicuous genera
Pyrissonima, *Mabea*
Belubra, *Vismia*, *Miconia*,
Davila, *Sabicea*, *Randia*,
Tabernaemontana, *Siparuna*,
Casearia, *Dioscorea*, *Cecropia*,
Attalea.

Pariana - Amazonia only, all in forest.

~~July~~ Aug. 2 - Pindobal

photos

Broken-down primary forest, largely palms - Maximiliana etc. at least near river. Calycophyllum spruceanum, Cochlospermum many other trees.
Copaifera

"Bordo dos Viveiros"
edge of plantation

Broken down primary forest - tall trees of Liptadenia, Bertholletia, Babassu, many other large trees up to 40 m. now sparse.

[Alchornea (or Apurimacum) cordatum] canopy incomplete, because of several years of selective logging, now has a thick underlayer 4-6 m. tall or more. Trees up to 1 m. diam. but now these are rare. Some buttressed, others fluted.

The soil here on the "Planalto" is gray-brown stiff clay on the surface, more yellowish below, very stiff clay - yellow latosol acc. Day. Planalto is a tertiary alluvium.

Letters
refer to
red letters
marked
along
Aug. 2
course
in WAC
chart.

A

B

C

Aug. 2 trip by air from Belterra to Belem (south side of plane)

N.E. of Belterra most of the Planalto is under shifting agriculture, some patches of forest left but mostly in ravines. The Planalto here is quite dissected by steep walled ravines.

Cycle here must be fairly long perhaps 5 or more years, judging by proportion of fallow land.

Down on lower terrace there is much shifting cultivation, too, but at least half the forest remains except near Santarem.

The Amazon is a braided stream on a gigantic scale.

N.W. of Lago Grande is an area of savanna with thickly scattered trees and thin grass. It seems heavily grazed, in places definitely overgrazed. In some places it is open with patches of trees. Cattle trails crisscross the grassy parts everywhere.

D

along the ~~inner~~ north margins of Lago Grande are abundant palms growing in the water (at this season). The muddiness of the lake, from the canals, reaches to some extent even to this side.

E

A small range of rather abrupt hills (said to be Carboniferous), beyond them some savanna. Scattered hills extend off to the north. In the

F

in the wet grasslands along the north side of Lago Grande are spectacular meanders of old channels. (shown somewhat on map). A few scattered houses on these wet grasslands along these meanders.

G

Along the south bank of the Amazon opposite Ilha Curua are conspicuous light pinkish-yellow low cliffs or bluffs. Scattered houses and clearings along restingas below Ilha Curua on south bank.

H

Between Lago Tamará, Lago Maracá and Rio Purusinho are what appear to be extensive *Montichandia* swamps

I

with scattered trees. Lake at head of Rio Purusinho is irregularly patched with numerous small islands of various sizes. Small patches of dry savanna south of it.

These are either man-made or man-extended as their margins are in places angular and there are scattered houses and buildings.

Many ponds and channels of black water. Many of the ponds have one or even two circular islands in one of them. One had 3, one at each end, one $\frac{1}{3}$ the way from east end.

J

R. Purú,

Streams running northward into Rio Purusinho, and Amazon have broad strips of what looks like tidal marsh. A little shifting cultivation on higher ground along or between some of these streams.

There is apparently much water in this area and to east covered by thin vegetation. In places looks almost like glaciated muskeg terrain.

This sort of thing very sharply set off from forest on somewhat higher ground. More and more cumulus clouds.

K

Farther east "tidal channels" become very conspicuous, even at some distance from the Amazon. These are either in wet grassland or *Montrichardia* swamps. Too high alt. to tell, looks brownish green. Land is definitely flooded but vegetated. This terrain is sharply set off by its brownish or yellowish-green color and entirely different texture from the slightly higher forested land bordering it to the south and on islands in it. The inundated land is extensive and extends dendritically southward into the forested higher ground.

It extends from about along our course north to the Amazon.

L

Along south ~~of~~ edge of this inundated area, farther east, ~~is~~ is a belt of palm forest, ranging to savanna, with hummock-like islands of dicot forest.

This is just west of Rio Xingu. Boundary is very irregular, width varies from very narrow to quite wide, and dendritic extensions reach up into the forest just as the inundated land did a little

farther west. These palm strips may have been what I took for swamp (about here on the trip from Belem to Santarem.) (not entirely but much of it.) (less, eastward)

This has been roughly following Rio Jacaré.

M

A tributary of it from the south, west of Rio Xingu ~~is~~ is a broad strip of what is probably wet grassland with much ~~of~~ *Montrichardia* swamp, a few small patches of palms.

East of this stream is slightly elevated, somewhat dissected wooded land with narrow branching fingers of palm forest. By the nature of this pattern these palm forests must mark small stream systems, but the streams cannot be seen.

N

Some grassland with areas of palms on west side of Xingu. Parts of this may be rather wet. Does not extend more than a short distance up the river, very little developed on east bank of Xingu. A few old channels, lakes, etc on east bank, filled with wet grassland, some narrow white sand beach, but broken.

O

P

Small stream running north, east of R. Xingu, in narrow strip of wet grassland. Has at least one farm south of course.

Q

East of this is what seems to be an old channel, running north, rather wide, of white sand with a sparse scrub (photo).

R

East of the Xingu the dendritic patterns in the forest are definitely not palm forest and definitely do follow stream course, appear here to be narrow flood plains which have been rejuvenated, have a meandering ravine in them. The vegetation on these flood plains is conspicuously finer textured than is the surrounding forest. In the surrounding forest are more bare trees and much more variation in color of trees.

R. Cassini

Baia Cassini

S

The Rio ~~Cassini~~ before it enters the Rio Cassini has a spectacular drowned ravine pattern, with the green islands and peninsulas standing out very sharply against the black water.

The land here is somewhat higher than the water, so

T

There is no inundation but very low wooded bluffs East of and south of Rio Cassini are some slightly dendritic,

U

grasslands, apparently occupying old stream courses or narrow flood plains, now left stranded.

V

Some shifting cultivation here along south banks before river narrows to form the narrow winding channel called Rio Anapir.

W

Some shifting cultivation along both banks of this. Here some old dendritic flood plains are covered by forest locally largely of palms.

X

To the north a very irregular grassland possibly occupying an ancient flood plain, quite wide. A few narrow ones of this sort, is just north of Rio Anapir. These seem definitely to be stranded flood plains.

North and west of Baia do Portal are some rather large ~~some~~ grasslands, no obvious pattern - near Malgaso. Tajapuni Estrecho do (Tajapuni) angles

across into the Rio do Para,
 then Rio
 macaúba
 and several
 other small villages.

Rio do Para ^{starts as} a series of
 parallel curved channels,
 slightly braided.

The main channel of the
 Estrecho do Papim is extremely
 muddy, the others almost as
 much so.

The islands between
 these channels, as well
 as those of Rio Para are
 almost solid forest. A few
 little irregular grassy patches,
 numerous shifting ~~cultures~~
 agriculture patches, mostly
 on or near the channels.

More small patches of
 grass as we go east,
 north of Rio do Para. Also
 more shifting agriculture and
~~patches~~ irregular patches of
 a different, darker green, sort
 of palm.

Many large channels
 or straits coming south
 from Amazon to Rio do Para,
 all very muddy. Eastward
 along Rio do Para many
 very irregular small savanna
 (photo). Then a sizeable area
 where the grassy parts exceed
 the wooded parts, this rather

well away from the Rio do Para,
 north of it. Pattern of forest
 and grass intricate (photos)
 appears to be dry, from
 appearance of the very few
 trails must be sand; grass
 seems to be rather tall,
 scattered bushes and small
 trees in parts. Several parts
 of it have been recently
 burned.

Eastward of this some
 smaller, less intricate
 patches of similar grassland
 generally forest, considerable
 shifting cultivation. Irregular-
 ity of pattern of this, similar
 to that of the savanna patches,
 suggests that this may have
 been the origin of the savanna.

Considerable areas of
 the forest east of here are
 of lower stature, much
 finer texture, than that
 surrounding it. ~~In the~~
 Almost like a scrub. In this
 are smaller patches that
 are almost savanna. This
 complex may be secondary
 after shifting cultivation, but
 the boundaries are neither
 sharp nor angular.

East of this there is an
 extensive network of channels

of various sizes around islands of various size. Northwest much savanna, with a small proportion of forest, but ^{varying} locally. Much shifting cultivation on some of the islands, with houses along channels, also many ~~to~~ boathouses.

The island area is generally wooded except for clearings, north of the island complex the savanna-wood complex continues eastward, extensively.

The forest on the islands has many palms, though not predominantly palms.

Rio do Para has become enormously wide.

C The savannas to the north become more and more extensive and with less forest, and the island complex disappears eastward, the savannas finally approaching the bay of Rio. Eastward, also, they have generally many scattered shrubs and small trees.

E South bank of Rio do Para a Baía de Marajo varies between yellowish sand beaches, very low ^{wooded} bluffs,

to occasional stretches of very low bare light colored cliffs.

F Much shifting cultivation in the area west of Belém. All stages of revegetation.

- ✓ Aug. 2 - Belterra, "Bordo dos Viveiros, Rio Tapajós in ~~rain forest~~ somewhat disturbed forest on clay soil

38802

rub.

2

occasional

1

03 *Virola*

occasional

2

04 *Pouteria lita* Eyma det. J.M. Pires July 1984

occasional

- ✓ Aug. 3 - Uriboca, northeast of Belém

In edges of rain forest on sandy soil

1

05 *Olyra latifolia*

common

1

06 (Hernand) *Sparattanthelium*

common

Aug. 4 - air trip Belém - Santarém. Manass. (north side of plane)

A few patches of pepper (*Piper nigrum*) in vicinity of Belém.

Baía de Marajó is very muddy, light cap or light color, opposite Belém.

The islands outside of Manass. ~~seem to be~~ are covered by what seems to be undisturbed swamp forest

Letters to refer to blue letters marked along coast of Aug. 4 on white sheet.

A

mostly

tall tree with deeply fluted trunk 50 cm. thick; fruit immature.

tree; flowers yellowish.

tree

erect.

shrub 3 m. tall; sterile; branches rather subscandent.

except for some clearing on the ~~large~~ largest. Patches of *Montichardia* occasional among the trees.

B The savannas in the eastern half of Marajó Island are covered by scattered shrubs or small trees.

C West of the savannas for a short distance the clearings are mostly immediately along

L Large savannas west of lower Xingu around Paraiso. These extending westward into extensive forests of palms forming in dendritic patterns far into the main rain-forest, which is very dense and continuous here, unbroken westward to the wet savannas bordering the Rio Purusinho.

M Cumulus very abundant. Victoria regia abundant in streams ponds, etc. south of Rio Purusinho.

N Patterns of flooded land and patches of dry savanna and forest ~~along~~ ^{south of} this river are very intricate, not easy to interpret from air.

O Broad belt of wet savanna and flooded land south of Amazon ^{well} east of Santarem. Extensions of this into forest with abundant palms.

P Victoria regia in water, locally ^{very} abundant.

Parts of the wet savanna have a brown color. Victoria regia a light "duckweed" green. ~~Grass~~ Areas of coarse grass rooted or floating, bright light green. Montrichardia swamp (?) dull green.

Q Dry savanna north west of Lago Grande has abundant

scattered bushes and small trees in most parts. Has been in parts ~~too~~ badly overgrazed so much red and white sand shows. Western part is especially this way.

A road traverses the western part (or two roads), merely two wheel tracks visible from air. Some small areas have been burned rather recently.

R Back of Santarem the forest is sparse on flat areas and much overgrazed, dense on hills except some that are cleared. Bare ground shows with cattle trails south of the airport. Much of this sort of ~~open~~ scrubby woodland between Santarem and Belterra. Some is really savanna with abundant trees.

S On the Rio Tapajós is what appears to be a bloom of algae, locally concentrated by wind so as to be visible from the air.

T Across from Santarem on the peninsula between Rio Tapajós and R. Arapiuns, between Vila Franca and Boa Vista are large savannas with few

trees. In the middle of one of these a fire was burning, already having blackened a substantial area. Scars of older ones also seen.

Many sand beaches and spits around lower Ariguan. Visibility becomes poor because of haziness.

Old stream courses show up in place as sandy stretches with open scrub. Usually a strip of differentiated vegetation bordering these and connecting different patches along same old stream-course. Just east of Parintins.

West of Parintins is a vast area of land, mostly flooded at high water, with only the vestiges of a natural levee remaining dry. It is a complex of meanders, old channels, levees, wet grassland, ponds, lakes, swamps, etc. Large sheets of water with numerous small islands, even single trees growing in water.

In places has the appearance of a labyrinth of channels.

W. of Ressaça a large meander cuts off abruptly a series of parallel channels and bars.

West of this east of Fax Caracari is another labyrinth of levees, channels, islands, etc. and the whole area immediately surrounding this lake is unbelievably complex, a drowned shoreline of wet savanna, black water ponds and inlets, patches of swamp forest, and levees and channels.

West of it the terrain changes first to predominantly Montrichardia swamp (?) then to forest, much interfingering. North from Tacotiaris is a very conspicuous road cut thru the forest, showing up bright red.

The joint-crack structure described by Sternberg begins to show up well here, stream intersections and turns ~~being~~ mostly forming right angles.

Even where the streams cannot be seen, their courses are marked by strips of lighter green finer textured vegetation in the dark green of the forest. Forest otherwise rather uniform except for rare patches of very large pale green trees that show up against the dark green background.

C The ~~left~~ Rio Urubu below
 São Raimundo is a striking
 drowned system showing the
 joint-crack structure rather
 well. This is, of course,
 up on the Tertiary terrace
 rather than on the flood plain.

D Another drowned system,
 much more complex than shown
 on the map, on stream above
 Casa Casimiro, east of Manaus.

E West of here a few small
 savannas, apparently with
 white sand, probably ~~the~~
~~the~~ resulting from clearing and
 burning.

Aug. 4 - Santarém, Est. de Pará
 In cleared sandy ground
 around airport.

- 38807 *Cassia*
 2 common
 2 08 *Turnera*
 rare
 2 09 *Cassia*
 common
 2 10 *Fimbristylis*
 occasional
 2 11 *Boueria latifolia?*
 occasional; frequented by fire ant. (*Solenopsis*)
 2 12 *Cassia*
 dominant over much of area
 1 13 *Turnera*
 common

Aug. 4 - Manaus

Cultivated plants noted:

Ficus retusa (common street tree)

Mangifera indica

Alocasia macrorrhiza

Hibiscus sabdariffa

Polyscias guilfoylei

Dracaena sp. (leafy for some distance up)

Cordyline terminalis

Cyperus alternifolius

Polyscias fruticosa

Dieffenbachia maculata

Lagerstroemia indica

Alocasia (large pinnately lobed lvs.)

suffrutescent herb to 2.5 m. tall

~~low~~ low bushy suffrutescent
 herb; flowers yellow.

low spreading shrub

caespitose in small tufts.

spreading, somewhat elongate
 herb; flowers very pale lavender.
 stiff shrub 0.7 m. tall; flowers
 bright orange-yellow.

flowers very pale blue.

Aug. 5 - air trip, Manaus - Teffe
(north side of plane)
(6:30 a.m.) Peninsula between
Rio Negro and R. Solimões densely
wooded. Slightly dissected.
Wisp of mist lying in low
spots, vanishing rapidly.
Apparently this is part of
the Tertiary terrace. Several
farms and shifting agriculture
along west bank of lowest
~~tributary~~ s.s. bank tributary
of Rio Negro. This group of
tributaries makes a rather
intricate drowned system
that shows the joint crack
pattern very well.

red letters
on wall charts
A Aug 5
note

Then a thin layer of very
low clouds or fog made visibility
poor for a short distance, then
this thinned out until it
lay only in the shallow
ravine, bringing out very
well a roughly rectangular
pattern - not quite rectangular,
about 80/100'. Entire area is
densely wooded. The drowned
river system emptying at
Manacapuru shows this
also, but not clearly. It is
very intricate, the dissection
here being much finer
than to the east.

Just west of this a solid

B

very low cloud layer.

Opening in clouds at what
is probably ~~Lago Anaman~~.

~~It is~~ the western extension
of the south branch of the
drowned drainage system
(perhaps Lago Anaman)
It has a conspicuous
settlement on the north bank with
clearings.

C

7 a.m.

D

One small clearing noted
to west of western arm of
the system. This system is
also very intricate, especially
just east of the settlement.
Still a more or less rectangular
pattern, but not too clear.

E

Small lake east of Lago
Anaman also a drowned
system but not much more
intricate than indicated on
the map. I suspect, judging
from its position ~~and~~ in rela-
tion to Lago Anaman that one
or the other is wrongly placed
on the map. Lago Anaman too
far north or the other too far
south. Anaman also no more
intricate than on the map. Both

F

G

show angular structure
very well. Fourth end of
east part of Lago Anaman
has cleared ~~bank~~, several
houses other grassy clearing
nearby.

A Another smaller drowned system with considerable grassy clearing around it south of main body of Lake Anaman, west of south end of east arm. These clearings are mostly very green.

Low cumulus and stratocumulus too thick, westward, for good visibility.

7:26 Series of ponds surrounded by grass, ~~could be the~~ ^{extends north a short way}

I ~~Anari inlet~~ P. folimoes visible on left of plane.

Otherwise all is densely wooded.

Low layer of thin wispy clouds, not enough to obscure visibility completely.

J Upper end of Anari Inlet also has considerable clearing.

Clouds thicker westward.

7:30 K Considerable cleared area but not very visible because of construction of plane - mostly beneath. To north densely wooded.

L Long inlet ~~west~~ ^{west} of Codajaz shows striking angular pattern. Visible only in distance.

M Below mouth of this inlet the Tertiary terrace apparently comes right to the bank

N of the folimoes. At least there are low bluffs. At mouth of inlet there is a narrow flood plain island. Passed mouth of inlet at 7:40. Big loop of main channel of river encloses ~~2~~ ¹ large islands with typical pattern of channels, levees, lakes, ponds, etc. River is very muddy. Much less wet savanna and floating vegetation and more forest here than on similar islands below Manaus. Visibility rather poor but possibly some shifting cultivation here.

A thick layer of cumulus below and nimbus or stratus above, and rain on the window obscured visibility.

7:50 P & Q Glimpse of two fair sized lakes & channels north of the river with what appear to be fair areas of wet grassland.

Q Islands across from Camana have some wet grassland in interior in patches, mostly forested. Some of this may be floating vegetation on the lake margins.

R At least one house and ^{small} clearing on south shore of upper island.

S The island west of Camara has dense forest but the lakes are bordered by grass, possibly partly floating.

T Above this island the north bank is densely forested. Visibility very poor.

809u Large lakes north of river.

#V Slightly higher ground with scattered houses and clearings between lakes and river. This apparently just west of 63°.

Clearings have tall straight trees with umbrella like ~~crowns~~ crowns left scattered in them.

W The forest on the island south is rather uneven but largely of trees of this habit.

8:14 Landed on water at a sizeable town on low bluffs of red soil, perhaps 10 m. high. ~~Coari~~ A rather bare town, few trees except a

X clump of two of coconuts, one or two other rather large trees - mangos & figs, perhaps.

West of Coari where river turns north the bank is high and red.

Some clearing along the west bank of the river to the

across from here rather recent. Visibility obscured by rain. Island across from 709 also coffee apparently all wooded except narrow cleared strip with scattered house at least one new clearing inland.

West of this in the south not as nearly as can be made out through holes in the clouds, all is tall dense forest.

8:10 Wait on the north bank in some grass, but too obscure to see if it is clearing or wet grassland.

C

Clouds are very thick. We are following river. Raining.

Many lakes and ponds visible to north, but no details. Some of the closer ones have some grass around them, probably wet grassland. Some flooded land with trees. Lakes become isolated westward with less grass. Then more numerous. (few a few areas of low scrub, possibly on slightly higher ground, no patch like a low elongate ridge.

8:50

D

Westward rather uneven forest, some patches finer textured and lower. In taller forest quite a few leafless

a just leafing out emergent trees. A few scattered tall bright yellow ones in full flower.

Then a large area of lighter color, more even height - possibly swamp forest or inundated forest. Seems sharply set off from darker green forest to north, possibly by a low escarpment. A small black water pond in the middle of this lighter forest. Westward this interfingers with taller forest - the difference is considerable.

Then mostly tall forest, again with the yellow flowering trees. Then a meandering narrow river channel and some cut off meander, some wet grassland, perhaps floating. Several new clearings on north bank of this. ~~Possibly~~ ~~then~~ some patches of low dense forest, almost scrub, lighter dull green. Tall forest mottled with trees in various stages of leafing out. Some red - possibly in flower.

9.03

E

Then many channels in confused arrangement, much

wet grassland. Some inundated land with small trees.

Then rather irregular tall forest. A few clearings, possibly grass-~~land~~. Also some that are clearly wet grassland. Scattered ponds.

Westward more ponds surrounded by a scrub vegetation. Patches of this scrub may mark location of former ponds. This pattern of ponds, scrub and forest more marked westward. Boundaries between scrub and forest become sharp.

The scrub seems to be in water. Still farther west the scrub becomes more of a wet savanna with scattered ~~tall~~ bare trees and low bushes or partly grass.

F 9.12

Then we cross the Holimides which is wide here.

G

Small islands ~~east of~~ south east of Tefe have wet scrub in interior, forest in periphery, narrow or wide. A few houses on banks. Some patches of wet grassland on east end of Ilha Panenin. Some filled or partly filled cross channels running southeast. Areas of wet savanna in interior. Some ponds and wet grassland.

H

Swamp forest around Lago Tepe very mottled with trees in all stages of leafing out.

Tepe is a substantial town. ~~Some pale tan beaches with clearings~~ ~~with clearings~~ ~~around~~ ~~shores of Lago Tepe.~~

Left Tepe about 10:46 south along lake, then at considerable altitude out over forest. Cumulus clouds make poor visibility, but forest seems uninterrupted.

I Thus for 35 minutes, then a small exceedingly meandering river at right angles to course.

And a single meander of one farther ahead, to right, this one broad in places, possibly before more meanders, a large very muddy reddish river - certainly Rio Jurua. Dense forest except possibly ~~some~~ a few clearings along river. ~~Some~~ some cut off side meanders or low lakes, or perhaps other channels, as they are rather muddy. Then a lake, ~~probably of a larger~~.

J 10:57

Then a large muddy ^{or bow} then one not muddy and with grass along the edges. The river has narrow bare muddy banks.

L 10:58

Crossed Rio Jurua. A few narrow winding very muddy tributaries or channels in forest and a large muddy oxbow.

Channels and oxbows mostly muddy in dense forest along the north ~~side~~ side of Rio Jurua toward ~~east~~ Camuari.

11:16

Local areas of dense lower scrubby forest or swamp, but not frequent.

11:22

M

a few small ~~staple~~ clearings. Show a little relief and reddish soil. Travelling at lower altitude. Forest quite mixed, many trees leafless or leafing out, closely mottled appearance.

Much shifting cultivation locally as we approach ~~Camuari~~ ~~at~~ at a fairly low altitude.

Landed on Rio Jurua. Sandy banks about 6-8 m. high, forest almost down to banks, a narrow strip of grass at top of bank. The forest looks rather

some palms not much

scrubby, probably second-growth but ^{small trees} hard to tell. Very dense, about 10 m. tall.

The sand must have some clay as the cut banks in places stand up ~~rather~~ almost vertically. Seems to be an irregularly bedded fine pinkish tan colored alluvium. Large sand bar on north bank. River 100-150 m. (?) wide.

Take off

11:40

Considerable shifting agriculture locally near ~~Camuari~~ ~~Camuari~~ Camuari.

N

Unbroken forest for a considerable distance.

11:57

Altitude and haze cut visibility to practically zero.

12:08

A meandering river ^(Rio Bia) in dense forest, crossing course at about 100° right, not very large, but muddy. Visibility very poor, but forest still seems unbroken.

12:40

P

Only a few scattered cumulus clouds now, less haze but travelling at very high altitude. The forest seems uninterrupted.

12:57

Q

Coming down to slightly lower altitude - still unbroken forest. Cumulus clouds increasing.

There seems to be some slight relief here, but not much.

R 1:05

Forest noticeably mottled by bare emergent ~~tree~~ canopy trees.

1:08

S

A fairly extensive clearing on right. A river on left (Rio Palao). A couple of small clearings, one being burned.

1:11

T

Then rather extensive cleared land under plane, forest by north, river to south. (R. Juma) River extremely meandering, still fairly large, many oxbows, then muddy. River very muddy and well

broad sand bars on convex sides.

Forest very dense, mottled brownish green, scattered yellow flowered trees.

Region clearings occasional, evidence of early shifting cultivation.

Many emergents in forest. Many palms, mostly in canopy.

Cultivation of sugar cane and bananas. ^{Extraneous (Jamaica)} ~~and banana~~ ^(Jamaica)

Small town with grassy air strip (photo). Vegetation on west side of air strip (photo) ragged secondary forest in which palms are prominent. ^{at large leafed trees very common here also.} ~~so~~ On other side are houses and cultivated patches for 0.5 km. or more. Many patches recently burned.

Left Enonibi

A 2:05

Quen
cutters
on hill
about
ang. 5

Occasional clearings, otherwise dense forest. These apparently on slight ridges transverse to course, but a larger one close to course is ~~set~~ on flat ground. The relief is slight but noticeable.

2:12

B

Group of small clearings, then what appears to be a savanna, too close to course to see well. Casimaria.

Intense
deforestation
was on
land to
great plain

215
C Large muddy meandering river with clearings (a savanna) on west side, some extending or occurring some distance from bank. Otherwise forest. Some ox bow lakes and traces of old channels.

Then gaining altitude, a slight haze cut visibility to nearly zero. Scattered cumulus clouds.

220
D A large area that looks like savanna west of an extremely meandering muddy river with many and complex oxbows. Can not see it well but it is sharply demarcated from the forest.

220
E At least one small channel lined for a way with grassy clearing. Following now with meandering river on the right at some distance. Still many oxbows, some very muddy, some not. Some are choked with vegetation.

225
F These large groups of clearings on west side of river. Oxbows now mostly not muddy.

230
G A few small clearings, otherwise the meandering river with its oxbows is in the midst of a tremendous forest. The meanders have sand bars on the convex sides when they are close enough to be seen that well.

300
H Large cumulus clouds rather abundant. Left the river far to the right, still visible.

2310
I Approaching river again, at a lower altitude. Meanders very noticeable, ~~is~~ wide pink sand bars on the convex sides as oxbows that is practically circular filled in, one end with low woods, the other with grass. The oxbows here not muddy.

314
Several clearings along river.

317
Clearings and some signs of old ones away from the river, then more and more cleared land and abandoned cleared land. The whole area has been cleared except small ravines and steep places. An area some miles across, at least north of the river. Cruzeiro do Sul (the town is on irregular high ground, perhaps 30 m. above the river).

Active clearing going on. Around the airport are thickets and much tall herbaceous cover - this of *Pteridium*, *Urena*, a gigantic form of *Pilea rhombifolia* or something similar, and several tall grasses - a *Paspalum*, an *Andropogon*, what looks like a *Panicum*, and the smell of *Melina* is very strong but none seen. The herbaceous growth is 1-3 m. tall.

19 200

179
180
181