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A BOOKUM & PEASE PRODUCT
1957 Brazil — Acre.

Aug. 5 — Cuyapin dos Ful. The town is most built on a high remnant of red fine soil standing as much as 15-20 m. above the surrounding flood plain of yellowish-gray silt and very fine sand. It is a rather diffuse town probably because the platform on which it is built is eroded into a very dissected surface which does not exactly lend itself to concentration of buildings. There is not much vegetation left in the town proper. Palms are common, and a few ingas and others. The ground has many places a close carpet of monocarp. A few coconut trees were noticed, not bearing very well. Not many ornamentals here.

On the flood plain the houses are more scattered and there are many fenced pastures. The flood
plain goes back only a few hundred meters.
At its back is a narrow strip of marsh dominated by a Hypolyco 
(Elephantopus), then the eskerament of the tertiary terraced rice
in a rather steep slope.
Much of the flood plain is in thin
are in a grain pasture
quite weedy with
Elephantopus, sp., and various
other unpalatable
plant, quite abundant.
According is about the
most common grass
but in thin. The back
part of these pasture,
against the marshes,
are apparently very
muddy in wet weather.
Much of this area is
covered by a scrub from
2-4 m tall, dominated
by a species of Miconia,
but with Leucaena,
Randa, Maytenus?,
Miconia, Enrafarinum,
and other shrubs and
vines, many of them
thorny, and thicket of
Desmost Dasmorurc
and another casitita
palm with spiny leaves.
In places are groves
of Acocorna and N.
Maximilian, v. v. various
Vamis, palms, and
low secondary thicket
of Ima, Friedi, Vasin,
miscellaneous, tangled with
Cassalfrum, Miconia
and other creepers.
This thicket is too
dense to walk through
very far without
cutting. Ground
cover is a stiff grass
probably Elytris, and
clumps of young
broad leaved and shiny
palm already shiny.

The low cliff of the
coastal plain on the
town side of the rice is
conspicuously slumped,
the slumping having
obviously occurred when
the ground was completely
soaked with water,
judging by its flow
pattern and the desiccation
cracks. The slumps are
separated by rather
1957  Brazil

evenly spaced cacti, about 2 cm. apart. some cracking off and collapse of the cliff has occurred while the slumping left it undercut.

Directly in front of the high escarpment in front of the town is a broad sandbar used for boat landing. a steam comes out behind this and follows the base of the cliff until the end of the bar is reached.

Aug. 5 Crueliers doeful on top of sixth cliffs above

38814  (spec.)
2    common in full sun
1 15  Campyloneurum
      rare on vertical face

3  6 Cleome spinosa  common

party  shady background
1  8 Helichrysum

in edge of thickets

1 5 Eupatorium
    very common on shores
    forest drain

Area Territory

On the other side of the river the bank lies at about 45° very evenly, and this slope is used for gardening. the rows running straight up and down the slope.

Two or three gray waterfowls, perhaps upset, are playing high in the river. a local person said these were "brazen", true and a much larger one.

Town said is best on milk, cattle, than agriculture. goats and cattle

pale green, aromatic,

dark greenish yellow.

branched; rays white.

erect herb 1-2 m. tall,
petals white, stamens manes.

flowers white.

semi scented, flowers fragrant, pale lavender.
climbing several meters, forming tangle, leaves very scabrous, influence, dry, woody vine; fruit immature, stigma purple, scandent shrub, petals vermilion, stamens purplish, shrub 1 m. tall, fruit immature; small tree, 4 m. tall, fruit immature. small tree, late scaly; fruit immature. glandular shrub. 1 m. tall, flowers white; fruit immature.

out more clearly by the rising sun. Complex and finely divided dendritic drainage patterns. Several clearings, exceedingly remote from river, boiling going on in one of them. These seem to be about on the divide between the two main tributaries of Rio Jundi. A clear Rio Var. on the direction of main drainage line changes from tranverse to come to somewhat more easterly. The forest here has abundant large emergent trees, thought to
very clearly by the low angle of the sun, even though we are flying at 2500 m. Many of them are bare or partially so. A very few are in bright yellow flowers.

Drainage generally trends north-easterly along main stream courses. Terrain is flat, between them incidentally dissected, though with low relief. To get any good idea of this country, both its vegetation and its relief, it should be photographed with the sun about 15° above the horizon.

Secondary drainage is to east near right south-east. Is join the main tributary of Rio Juma. This is almost parallel to course considered right. No down considered. Dissection in interfluvial areas is quite sharp, though relief is not great.

Flat valley along the main tributary very sharply cut off from the relief of the area on both side. Possibly 7 km. wide.

The banks of the river are rather steep, grassy at top, bare below, very narrow. A few shallow lateros somewhat less muddy than Juma.

Crested this river. One small clearing noted upstream on west bank.

General trend of drainage less to north-eastward, but very complex and sinuous. General angles bet. streams at confluence about 60°.

Relief immediately along course flattening out considerably. Still somewhat complex to right some distance, but very soon it is nearly flat for as far as can be seen clearly. Only a few small cutting shallow ravines visible.

Two small ravines far to right. Both natural, but there is a very small clearing some distance this side of them more than might be at first expected.

Two obviously artificial rather recent clearing's to right.

A few more far to right.

One large flat near a large almost circular oxbow of Rio Juma. Many small clearings and evidence of older one nearby. The oxbow very muddy.

Crested Rio Juma meanders, none abrupt not at all muddy. Muddy ones connected to main by narrow channels. Some clearing but not much along river.

Forest here has relatively few bare tree.
Old courses of rivers show up very clearly in vegetation, having a low very fine textured type, sharply set off from forest. Banks of river choked.

1951 style

Aug. 6, Einnepf (for Pessen)

Einnepf style

common in grass around airstrip

(St.) Final stages would probably be rather slow in coming as they would depend on filling in of the oribos and on normal drainage being reestablished. Soil profiles here would be enlightening.

8:30

So much hate that visibility is very low.

9:19

Haze still heavy, but his journal of night is reasonably visible. A劳动 and piece of channel are numerous on both sides. Probably too much of the history of changes in the course of the river could be worked out of the vegetation succession. All these oribos were studied and then applied as a means of arriving at the age of the various oribos. If studied on the ground for a section of the river, the next

9:14

Arrive Einnepf (for Pessen).

8:40

Well as in different stages of revegetation. Very means of study should be studied. The

10:16

Landed in mud at Camen at 9:10. Poor steep climbing ten silt banks. A little herbaceous vegetation on less steep parts. Thick grass at top of some sand bars.

Their flood plains, of salt are certainly Quaternary deposit. Though in the geological maps they are indicated as a part of the next testing area of the Missouri basin, could be definitely physiographically be careful study.
of properly taken air photos.

10:15
Took off from Lamaní.

Fuming is very conspicuous
here, some of it very recent,
judging by trees still burning, at
all angles on unplowed earth,
at high altitude the haze cuts
off visibility completely.

10:30
Low lying stratus clouds.

10:50
Lago de Yape - many clearing
in the vicinity.

11:00
Lape. Yellow sand beaches
on the lake.

The weather is cloudy
and surprisingly cool.

10:40
It was the same at Manaus
day before yesterday. They
said this was the third
cold front to come up from the
south this year, one of them
bringing a temperature of 17°C to
Manaus. There are rain
showers and gusts of wind
alternating with calm.

They seem to believe that this
is something new in the Amazon,
but it likely is not.

Prof. Schmidt of Kiel spoke
about the cold fronts coming
from the south up the interior
of the continent, spreading out
in the Amazón region, sometimes
extending down the river as far

as Belem. One of the crew of
the plane said they had
had such freezing weather
in Manaus.

Cultivated plants, notice these:

Cacalpinia purpurascens
Mangifera indica
Bixa orellana
Cori munita
Canavalia sp.
Anacardium blumisi
Carica papaya
Manihot esculenta
Annona sp.

Coffea arabica
Hura brasiliensis
Merismundicis

Musa sapientum
Musa paradisiaca
Citrus sinensis
Citrus aurantifolia
Polyzona guiephii

Inga sp.
Teckoma stans
Litora sp.

Ficus petricola
Hibiscus (hibiscus) sp.

Lagunaria tinctoria

Cardiaria terminalis (colored fan)

Antigonon leptopus

Anacardium occidentale
Psidium guajava
general. As seen from the
air between Belem, Manaos,
Tefe, and Cruzeiro do Sul,
the rain forests of light clay,
elevated, of the Tertiary
terrace present an astonish-
ingly uniform aspect.
They are dense, covering the
ground completely, have
numerous emergent trees
with large trunks and
spreading, umbrellike
crowns. Many of
them are bare almost to
the ground, some partly leafed
out, some fully, but still pale
green. A few are in flower,
bright yellow. The only visible
regional difference seems to be
in the number of emergent
number of the deciduous at this
time, the number flowering, etc.
These are not definite nor very
easily marked differences
and may not bear much
significance.
More significant variations
may be seen in the vegetation
of different colors, size, texture
and apparently lower
statute that occurs
along stream courses
extending into the above
described rain forest below.

Manaus to Belem. This
may be flooded land.
About Belfor, Manaos, Tefe,
are low areas,
apparently flooded much
of the time, covered by
brush or scrub forest,
sometimes with scattered
taller trees. Other flooded
areas have sparse
trees that lose their leaves
during the rest season.
Along the rivers are
nast regularly flooded
areas, some of them forested,
some with coarse dense
grass, others with
floating vegetation
and Victoria regia. There
are definite succession
to be worked out on new
land built up in the Amazon,
also in old channels and
low lakes both here and
along upper rivers such as
the others.

Besides the wet grasslands
along the rivers, there
are apparently natural
savannas, especially
from Pantanal on down, merging
with wet grassland, or to
hand and with palm forest on the
other savannas are very extensive
on Manaus Island.
1957 Brazil

Aug. 6 - Tefé

Experimental plantation

1 27 38326 Manihot esculenta

1 28 Manihot esculenta

1 29 Manihot esculenta

1 30 Manihot esculenta

1 31 Manihot esculenta

The immediate vicinity of Tefé is covered by a mixture of cultivated patches, grass, and secondary thickets of various ages. The town is located on a remnant, probably of tertiary material, that is never submerged by floods. This extends inland for a considerable distance, dissected by stream ravines.

In the secondary growth, Cecropia and Inga are two of the most important components, but various palms, such as...
Lago is a broad sheet of black water surrounded by low bluffs with frequent pale sand beaches at their bases. The water level is medium, fluctuating considerably, exposing broad flats and bares when very low.

Aug. 7 Forest beyond airport is dense thicket-like, very uneven from heavy logging. Only trees of small diameters or very arrested growth left near road. Undergrowth very thick along road. Cinchona found at edge of road. Very peculiar terminal branching habit.

Tallest trees are perhaps 20 m. but mostly about 10 m. Tall slender palms of several kinds are common, about 10 m. tall, bearing 2-5 m. but canopied broken and thin. A fairly thick layer of decomposing leaves and twigs, 5-10 cm. over a dark gray, firm, fine soil. Small, innocent looking palms about 2 m. tall and 5 cm. thick have

Amazonas

Fine stiff penetrating hair on trunk and branches. Quite smooth if crushed, some papernas.

Thick in less disturbed parts sparse enough to be walked through comfortably. Lipes, miscellaneous small palms, etc. Several species of Fuchsia and Fuchsia vine on the trunk. Some Bryophytes, etc. in trunks also various epiphylli and cyclanthae.

Vines, mostly clinging close to trunks. A few other herbs on ground, also seedlings, but most of ground not covered except by dead leaves.

Pituitary present but not abundant. Probably logged. Apparently few or no Bitholata. Pampas trees remaining are about 8 m. high, a very few to 40-50 cm. but almost none. Trunks generally straight and clear of branches for some distance. Some distance away from road the logging trunks less intact and the forest is in much better condition. Trees 10 cm. thick, and more common. A few Benthodiscus here. Probably few of at least
the remaining trees here have buttressed trunks through some stumps.
A Cecropia tree with white bark along rivulet in burnt area, sterile.
Some leaf epiphytes, both lichens and hepatics. Thick moss on fallen logs.
Potentilla seedling, a few cm tall, very abundant locally. Two species of
Olyrea, both sterile, at occasional in ground layer.
Here are quite a few trees reaching 40 cm, a few even
more. Very few liqueous trees.
Some very large lianas, but these only locally common.
Stems to 6-7 cm thick. A few seen much larger.
Small palm 4 rm tall, 3 cm
diam, with trunk 60
downward, pointing twice
12 cm long, flattened,
trunks exstalnate
A few very slender, unbranched
trees to 10 cm with crown of
carpet, pinnate leaves.
Teems quite abundant here.

Jepi Town - built
in a sort of peninsula
in lake. Two
terraces, one about 3-4 m
above present water level, probably just cut off
high water a partially
submerged - this is of
greyish silt.
The other perhaps 15 m
a.m. above the first, and
somewhat dissected, of
fine red material.

Bush of the village
the dissected terrace is
covered by a secondary
scrub 1-4 m tall, with
scattered Betel nut trees.
The scrub is a tangle
of Licanura Piper,
Thevetia, Laburnum, Visnia,
Gonania, Alchornea, se vine
and understories, hמורה
other shrubs, including trees of
Pithecellobium, etc. Till
cover in dense parts of Delonix,
in open parts of grasses.
Further away from town
trees become more abundant and
diverse. Conspicuously
absent are Cecropia and
palm. The only palm
noticed in a swamp, giving me
Aug. 7 - just west of Tefé air strip, in tall rain forest on fine silty soil, not flooded during high water.

38.8 32 Palicourea nitidella (M.-Arg.) Stapf.

Common at edge of cleared area

3 33 (gen.) Jacobina inaequale (Kunze) Nett. det. (Colling) 1978

Common, terrestrial

1 34 Trichomanes

Climbing on small shrub 6-7 mm. diam.

2 Act

Epiphytic on tree trunk

3 35 Trichomanes pumilum (Foëx) ex. Hook + Grev.

Act.

September 1978

3 36

37 sewage none

38 Cinchona amazonica Standl.

Single tree in edge of forest

Scarcely branched shrub 1-2 m. tall; peduncle maroon; panicle scarlet; calyx and corolla scarlet.

Rhizomes closely coiled around shrub, lateral, horizontal, fertile near top

Rhizomes and fronds closely appressed and adherent to tree trunk, rhizomes climbing vertically, tree about 15 m. tall, 16 cm. diam. dbh. Branched at base by strong curved stilt roots up to 1 m. high, fruit apparently immature; seed solitary, pendulous from one side. Leave gray, leathery, loose clump; base triangular, culms erect to arching, inflorescence branches divaricate.

Small tree 6 m. tall, 3 cm. dbh, bark very bitter; branching habit terminal, inflorescence terminal or small lateral branches; young buds galled by insect.
Aug. 7 - Tepe

Loose clump of 60 s. culms, 3.25 m. tall.

Near airstrip in ground
rather recently cleared.
The early stage in
succession has seem to
be first a mixed stand
of various grasses and the
herbs dominated by a tall
androspogon. This is
soon taken over by an
almost solid stand of
Elaeopis s. The latter,
was at time of visit,
about 2 m. or a little more
tall, just overlapping
the androspogon.

(a) Echepheura (1) simulates
Cuscuta. Lycopodium camu-
num in this sand. Doubtless
made by wood cutters and
nut gatherers. Stumps
are everywhere.

Further back trees
predominate and a
species of Macaranga
appears, terrifically
shiny on trunk, sheath
and somewhat in making
Lianas present but
not abundant.

Bigger tree about 10 m.
10 cm. tall.
Stelosperma very abundant
on ground.

Chubs not so dense.
Alder above common.
Aug. 3 - Lago Tapi
Placed opposite Tapi
completely submerged. 
A U-shaped forest, bordered 
by what seems to be a species 
of asterism. The large 
leaves are scattered, at least 
now the sub, intervals 
filled with tangled growth; 
about 4 m tall, 
very mixed composition,
large tangles of heliconia, 
many lianas. Many of 
these seem to be leguminous 
tallest about 10-15 m.

In many places, 
dense body of a slender, 
shrub about 2 m tall above 
water. Stems of this are 
quite intertwined. 
Across lake landed in an area recently 
flooded, ground still 
muddy. Trees to 30 m tall, most of 
smaller buttressed. Much 
of the ground still 
flooded, large trees 
widely distributed as close as 7 m, 
as far apart as 70 m in 
lines. The part still 
imundated scarcely 
has any very large

Amazonas

Canopy here is very 
vigorous. Little under 
growth except a large 
facade sapling, 
mostly 1-1.5 m, a tall 
also a broad-leaved grass, 
perhaps Hyparrhenia, 
0.5 m wide. 
Many lianas, many of 
them hanging vertically 
to ground, the tangled. 
On ground a layer of 
dead leaves mixed 
with silt several 
inches deep. 

Faintly developed 
but uneven second story 
5-10 m tall. Trees 1-2 dm. 
Large buttresses on some 
trees, height of 3-4 m. 

Small shrub palms, 5-10 m 
tall 2-3 cm dbh. common. 
One old stub of a tree seen 
or 7 m thick at base plus 
large buttresses. 

Some trunks, intricately 

laid as it is hard to tell 
if one a tree involved, 
except by presence of two 
three of foliage. 
Huge sheaths of Cocoe plus 
flowers and fruit 
lining trunk and 

circular branches. Perhaps not the ordinary species.
Deer moncur climbing to 6 m. some in tree.
A few homelied on trunks and in catchers, some large leaved Epiphyte around, also.

Following a long low ridge that continues slightly emerged, trees become large, and large anhy more numerous.
A large hieve, easily 30 m. high, almost 1 m. thick, those signs of old tapping.
One tree seen with a clear trunk 15 m. tall, well over 1 m. thick, with buttress, 5 m. high, extending 2 m. from trunk at base.

Low trees have not only buttresses but flying buttresses and still more. Trees here perhaps average 5 m. apart.
Pianas very abundant. Canopy still very irregular and incomplete. Above correspondingly irregular and in places dense undergrowth, in most places among it is possible to walk through at ease.

Plenty of mosquitoes.
Inflated, occasional and flowering, fruiting.
Climbing tree trunk
Other perhaps, 3 m. buttresses, up to 6 m.
At least total spread about 8 m. buttresses, rather irregular.
A trail of constraints going up into this tree along a buttress, carrying leader up. Would not see now.
Main buttress, about 30 m.
Upon, covered there by abundant epiphyte.
This tree bare at this time.
Epiphyte as mainly Salvinia an numerous, moth abundant. A big strangling fig lodge in the Costa. Spreading roots over large branches, one long root about 2m. thick has reached ground. A large tereiate next up the side between buttresses. Here are more homelied on tree trunks, very long ones. Many climbing ariads.

Judging by one partly decayed out these big trees seemed to be.
Leaving this place paddling down a long inlet lined on both sides by tangled thickets. High water level indicated by lower level of queen on these thickets is about 1.5 m. above present level. This would be a level continued for some time. Extents would perhaps have been higher. Along left bank of this the general level of the tree tops is about 10-15 m. from palmtrees reach canopy. Mud on leaves here shows water level to have been reached about 2 m. higher than present. Some areas are scrubbily thicket not more than about 3 m. a even only 6.

West of Tepic the land slopes rapidly down to the sea. For a mile or two the are homes clearing, etc. After that the vegetation is still disturbed. Palms, esp. Entipe and Mamititas are abundant. An occasional house. Steep slopes alternate with more gentle slopes. Where there is no obvious clearing the forest covering the slopes is tangled second growth with occasional large trees. Ravenously shows up here and there. After a while the shore is lined with an extensive scrub similar to the edges of the orange inundated land described above. This is about 50 m. wide, indicating a shallow bottom. Bluffs still cleared in second growth tangled. Then the land is low, possibly inundated at high water. The body of inundated scrub is much wider here, and the shore changes to typical inundated viera, the vegetation about 10 m. high, larger trees visible farther back. Bays and very abundant hey. Less palms. Then low tierra firma with Bethelites. Probably a restinga, this extending for some way back of a 100 m. fringe of inundated scrub an occasional house and clearing.
Then inundated land, much of it covered by the fire light green scrub 1-2 m. tall described on islands above, extends far into the lake. The larger vegetation here is sparse and scrubby, larger trees not more than 1 m. tall there mostly spreading flat topped Acacia. Stern seen here much like Thalassaen species.

A low sandy island has larger trees. This has only recently been submerged around the shore; there is a thin undergrowth of Pandoros. There are many different kinds of trees, more especially large through some have thick 5-10 cm. trunks. A few have buttresses, but some are only 3-7.5 m. high, mostly less.

Many epiphytes and strangling Plurias on cacti.

In low fruit most non-inundated places there is a neat layer of ledge and many tree seedling here make a ground layer 0.5 m. tall but sparse.

The peat is at least 50 cm. deep in these areas. It resists the insertion of a machete this far, in places the layer of seedlings is dense.

A second layer 6-7 m. high, if trees 5-10 cm. thick, then a very uneven emergent layer of larger trees, then a bed of palms. This also in places the peat is covered by a tangled network of lianas. Thickets of small trees 1.5-4 m. of larger 5-7 m. away. The peat is very silted up at surface.

The sand on this island is a low ridge 10-20 m. wide along the lake. Much of this the peat scarcely extends for some distance.

Plenty of mosquitoes.

Many lizards here.

Root system of lifted wetland trees here is very extensive but almost entirely superficial. These trees have no obvious pneumatophores.

Land firms perhaps 20-30 cm. above the root surface of peat.
A small sterile tufted
ridge, abundant locally,
in sand. The Palaeoceon
also forms a definite layer,
1-3 m. tall on the beach;
part of the ridge as well
as the sedge. Both also have
existing somewhat into
the heat.

That this area is inundated
by at least 1 m. is shown
by the occurrence of skeletons
of a species of fish, water
snakes, & that height on
the shrimps and trees.
These are generally intercalated
and very sharp.

The guide indicated that
the first stage by them is
exceedingly painful and
would make a man sick.

Not clear if this is when
the animal is alive or
when dead, and dry as now.

During the time I was in Tibet
the level of the Lake fell
at least 30-40 cm.

One of the leguminous
trees along the edge of
the inundated land
is full of hundreds
of birds that look about
half way between a
swift and a night hawk.
Some of some seen flying
over lake like swallows.

In general the inundated
land is covered by a
forest that is made by
a less inversely proportioned
in stature to the duration
of inundation, that is
to the depth of the water
where it grows. The
sparse growth of
Phutium with a few
stilt-rooted legume trees,
and the dense slender
shrub are apparently
permanently inundated.
The dense thickets may
be on land submerged a
good share of the time.

The tall forest
will grow large
trees on land that
definitely emerge for
a considerable period,
it is just being exposed
now.
Aug 8 - Small island in Lago Tefé, about 5 miles southwest of Tefé, sand bank and pant swamp inundated during high water.

38 8.40 edge of swamp forest

41 Palicourea abundant forming most of undergrowth on sand areas

42 Eugenia common in understory in common in forest

July 8 - Isthmus between Lago Tefé and Rio Tocantins.

3 44 in undergrowth

6 45 in secondary

July 3 - inundated island in Lago Tefé just opposite Tefé

5 46 edge of swamp forest

Amazones

- erect shrubs 2.5 m. tall from horizontal woody rhizome
- slender shrubs 2-3 m. tall, panicles and flowers white; fruit black
- small tree
- tree 15 m. tall, 20 cm. dbh, flowers yellow.

- slender shrub 4 m. tall, fruit white, stone large, juicy, enlarged, calyx purple
- tree 15 m. tall, 20 cm. dbh, flowers white

- small tree, flowers white, petals flushed with pink, and red stamens.
Aug. 9. Trip Tefe to Ignotos. By air, coldling dry side, but inside seat, dirty window. Left Tefe 9:55. South side. Pools near well forested except for depressions and old creeks, which have a lighter green scrub vegetation. Channels perpendicular to river, with open water and wet gullies. (About Coadi?) Considerable cleared land on south side of river, about Coadi. South of river, much open water and inundated land not shown on map. Very complex pattern—perhaps the course of two Mineros meanders and channels through an area of light colored inundated scrub vegetation. Curve follows south of this, considerable distance from N. Mineros. Between this and holimoes is another large area that looks like scrub vegetation. Also seen in distance on left.-

Come now on right of Tefe Mineros, paralleling holimoes but at a substantial distance. Holimoes swing north, past.

F just above holimoes, con.
10:51
Left, Finto Bay.
Lakes to west are not muddy—black water. Some wet grassland. Some clearing on the higher land.

10:53
On southward west of camp.
Finto Bay, & Finto Point are broad freshly exposed sand at mud flat mostly with no vegetation.

10:53
Lago Acuaro is apparently not one complex lake as shown on map, but several quite distinct one. Black water.
Visibility, obscured by clouds, and great altitude.
Land to west of lake lines east of line cut by many channels mostly running roughly parallel with nearest part of river, but this not very clear.
Some with water, some with wet grassland. None of this shown on map.

11:14
Fourth of nine, west of Finto Bay land is also cut by channels, first running north.
Broad recently exposed.
Sand and silt bars in main channels of river.
Westward, the channels south of the river mostly run east and west. Very much more complicated.
The land enclosed by the northward curve of the river around Finto Bay is mostly cut by very complex channels, mostly on the eastern side though.
A few black water near westward.

11:33
Paradise Point.
Many lakes and stretches of wet grassland in islands of south and west. Much low scrubly vegetation, with emergent trees, a few muddy channels. This apparently a land to west of river. Visibility very poor, rain, the islands swept by rain and composed of silt of parallel channels, and strips of land, with wet grass open water, and mud.
Broad mud flat, a bar in the river here, very recently exposed, still wet.

11:53
Both sides of river well forested. Low banks, mostly with grass, very narrow.
Island east of Finto is wooded but cut by several channels.
Mostly vegetated but on clear and others with mud.
the river was reached again, approaching Benjamin Constant.

In the various channels of the river there are many wide expanses of sand
and mud flats are beyond.

__Handed at 10.20 tarried a

good distance.

**Much cleared land.

South bank higher,

than islands, but not

very high; (Janetoni in my) 10.14

At Benjamin Constant

the banks are of clay

and badly slumped

cracked__

The village is built on

this clay terrace 2-3 m.

greatly present river level.

It is clear that the river

rises at least 2-3 m.

higher than this, as the

houses are up

on pilings over 3 m. The

clay is, I may say, brown

and black.

__Closed 6.30 went

south of river, on main land

and also islands.

__Much cleared land

and inundated to various

degrees in vicinity, judging

by the vegetation

left Benjamin Constant.

Weather very hot, rainy.
Solid forest to north. Then landed on cement on asphalt stub at Leticia (not indicated on map, 1013 or 1012).

1:29

Left Leticia.

Range exposed wet mud flats in river. Channel very complex. Visibility bad, now raining.

Left river on right. A few thin strips in forest that may be old channels or may be clearings.

A meandering very muddy river, much drier exposed on left, then crossing course which follows it on left side. This is scarcely according to map 950.

This area solidly forested as far as can be seen except for one small opening which can be a clearing made for palm vines.

Then two clearings on river opposite each other. A small lake, very muddy, perpendicular to river.

Visibility poor.

1:32

Solid dense forest. Amazon barely visible in far distance to right. Smaller river nowhere to be seen in sight.

1:34

Small vines, &c, evidently away from course, meandering.

Approaching a bit closer to Amazon.

1:41

Approaching Amazon almost out of sight to right. Solid dense forest between.

Still dense forest, Amazon long zigzagging out of sight.

In this forest emergent large quite abundant. A few trees leaves. Many just beginning to leaf out.

2:36

Here palms make up a substantial part of the forest, but their distribution is very uneven. Locally there are palm stands, not large, locally more.

Crossed a tightly meandering small very muddy stream in low water, perpendicular to course.

Then the palm forest begins to brown. A definite pattern, possibly following stream courses.

2:40

Amazon in sight again.

Small new clearing.

2:42

Palm more generally abundant.
Aug. 10 - 9:45 a.m.

The town is situated along the river, on the flat top of a ridge or hilly area.

Inland, the slopes of the town extend for some miles, at least to the end of the road, which is in asphalt, fairly good condition, but not in excellent condition.
48

1957

Pam

This air in places
Abahna (2), in places
sharce stands of
lemon grass, about
tall, with dense
clumps of coarse
ground cover. Heavily
peated by cows.

Slightly hilly. A gray-
and-sandy soil, about
50 cm. deep gradually
cyang down to a pinkish, sandy clay.

This slopes very gently.
Almost flat.

A mile or more away
from the river, ending
beyond the air strip
in a broad shallow
stream or channel of
exceedingly muddy
water, flowing in a
curve toward the west.

49

Aug. 11 - trip by air from
Equito to Quinimayac
(5 C-3, left side).

Left Quito 8:00. Tsw clouds
immediately cut off visibility.

Glimpsed through clouds of dense forest.

Aerial type with some deforestation.

Another glimpse - this time palm
forest, little else, considerable
area.

Clouds breaking up somewhat.

Forest density is almost
a pure stand of palms.

A small stream, color of
river, soup - very muddy but
not flowing fast. Palm
forest ending.

Still palm forest, very dense.

Visibility not good, but still
palm forest.

Same with another small
muddy stream with ordinary
disturbed vegetation along.

A stream crossing course at
a sharp angle back to left.

Palm forest, but a narrow
straight strip of different
appearance running exactly
parallel with stream. Just could be a deep ravine with
palm in bottom, cut through
palm forest.
slight glimpse, does not reach palm forest, but visibility almost nil.

9:07 Small hole in cloud.

9:10 First part palm forest, then ordinary rain forest.

9:12 Slight glimpse of palm forest.

9:15 Rain forest with a few patches of palm.

9:14 A small muddy stream with a broad belt of rain forest, stream at right angles to cloud.

9:16 Rain forest and another angle.

9:17 Rain forest with a small stream, then more rain forest and another angle.

9:18 Rain forest with a few clean spots, rain forest along stream. Left it at 9:16 and came into extensive palm forest again.

9:19 Fairly extensive, has abundant emergents, many of them in flower, palm seen dominant in canopy, large small muddy (dark red) image.

9:20 Meandering stream, mostly hidden by trees.

9:21 Visibility obscured again.

9:21 Fairly extensive, tiny stream.

9:22 Tree has definitely not sunburned. Patches of fine, textured light green, but very intermittent and poor visibility. May be result of old shifting cultivation.

9:23 Solid rain forest, quite evident. Noticeable relief here but pattern not clear. Hills must be to your right, some distance in forest.

9:25 Partial clearing, small, with some palm trees still standing - could be natural but not likely.

9:26 Needles thick.

9:27 Relief still notable. Crossed small clean stream. Solid rain forest. Continuously moist from base and partly of recently leafed out trees.

9:30 Rain forest passed. Several conspicuous parallel ravines and ridges, fully wooded. No indication that course is now circling somewhat.
52

Clouds rather thick, but some openings - dense forest.

Forest uneven, patches where palm are abundant.

Several new clearings, several in cultivation some abandoned.

Definite shifting cultivation, some small channels or bows clear dark water.

Many cleared patches, largely plantations of bananas.

This is a channel of much larger river - small islands, doubtless.

Many mangroves and natural herbs, watered except when cleared for cultivation.

This area has abundant palms, mostly Mauritia, but also large several species of large pinnate palms. Many patches of Cecropia, representing old clearings - angular in outline.

A small L-shaped village, mostly thatched, one large un-roofed building along river, a mid.

53

Much clearing here, especially close to Guinque.

In forest are many trees in flower, wild scarlet blossoms, no leaves.

Air strip practically at edge of town. Thin, green but few, some sugar cane here, mostly bananas.

Road has yellowbrown at surface, bright red beneath, bordered after making a little. Soil on air strip quite sandy, but with a little clay, sandy clay in middle.

Military airport.

House here have mostly high-backed thatched roofs.

A few with tin or tile, large cloud, sky completely clouded.

Temperature warm but not hot. Took off from Guinque.

Vegetation around air strip of low-sagged thatched.

In clearing trees with many white flowers common, especially, abandoned clearing.

Road running out of town very red and cut, along it also bright red.

Following small meandering stream with conspicuous sand bars on convex banks. Forest undisturbed except for a few small clearings.
Visibility very poor.

Some sharp, rugged ridges visible ahead about clouds.

Near below.

Tiny clearing in brush, mostly undisturbed rain forest.

Some emergent trees confirm perhaps the reason the bare trees usually seem to be the emergents in that they are subjected to climatic extremes not found in and below the canopy.

Palm very abundant becoming almost dominant except near streams.

Small rain forest covering some large patches clearing on low hills beside.

Relief increasing rapidly. Sharp hills and deep canyons, all densely wooded, running up toward sharp ridge to left. Forest in canyons generally coarse textured, on ridges fine textured, in places so much so that it is certainly sand rather than forest - this born out by close look as we passed over a series of high, sharp ridge.

at 10:25. An isolated clearing way off up in these mountains. Passed over divide. On Tobacco side forest is mostly destroyed by shifting agricultural clearing in all stages of revegetation.

I 10:26

Typical patchwork, almost agricultural pattern, but rather little grass. Bananas and corn most abundant.

2 road, light tan color.

10:29 Passed an out at Maiohe, surrounded by considerable scrub vegetation, scattered yellow flowering tree in it landed.

Many plants flowering abundantly in scrub. Especially bright purple bigamous orchis.

Only small patches of forest of emergent left in hills around here.

10:55 Took off from tobacco. Several trees fairly abundant here. Fair sized town, mostly tile roof on large house. Flatting land in valley appears to be about 500 ft.

Under
actual cultivation, the next fallow, some patches or
patches of forest.

Several small towns scattered in valley.

Soil in these very red, rather dark, roads in hill

area to establish.

Inspiration of forest increases as we go up the valley of

Rio Mayos.

Torn - probably fire area, land very badly eroded

around it.

Some recently burned clearings.

Stream comes running from east into Rio Mayos

very rocky. Rio Mayos muddy. Land around village also very

eroded, so can as can be

seen from stream.

Large exposure of conifers.

Bedded gray rock just west

of Rio Mayos - doubtless exposed

by landslides into river canyon.

Land now mostly densely

forested, mountainous - this

came hill rounded and
covered by snow. High rugged

ridge at left, wooded to top.

Many ridges and steep

slopes covered by scrub.

Broad rapid flowing small

river flowing back toward huts.

0 A few clearings along this

are.

0 Checks well with

one or may except that it

flows many ways - is double.

Rio Mayos itself.

0 More and more clearings

white and red flowering

trees in forest.

Mostly banana planted in

clearings. A little sugarcane.

Land here half to mostly

cleared. Large unshaped

lake in rear.

0 Not so good.

0 Forest dotted with conspicuous red to bright

tall trees. Not clear if me a

more species in flowers, probably

several.

Maytamba in a wide

tender edge, exceedingly

eroded, some grassland

below. Much fallow land

a little fine active

cultivation. Forms (planting?)

dominant on much of fallow

land. Cecropia common on

wooded land.

Landed Maytamba:

or grassy strip.

Equest or howler is surrounded

by mainly second growth, thicket, mud walls around yards.

Cloudy and sprinkling.
58

1957 Peru

11:35
Torh off from Mogroamba. Very cloudy. Still some patches of mount forest here, especially in ravines and on steeper slopes. Many freshly burned clearings. Many palms in forest, possibly indicating mount forest.

11:49
Visibility very bad. Forest as place dominated by palms.

12:00
Meandering river, rather muddy. Much cleared land along it. Glimpses only, through deep cumulus clouds.

12:37
Flat land cleared, slopes not much so.

Small town below.

Very rugged ridge to left. Everything below forested. Then clouds cut off visibility completely.

12:37
Curved a large ring, altitude, said about 12,000. Meandering in deep canyon, bed sandy. 

Glimpse of light brown high country through clouds.

Clouds breaking. None cultivated upland country. Some grassy.

59

12:37
Clouds again. Highway below on flat ground, then entered valley. Valley with small fields outlined by low, dark, grassy, some small hills. Cultivated.

12:38
Another valley. This one grassy, small straw color, little or no cultivation. This seems very rugged country, shrouding. Ridge, shape, very arid, very much cultivated except steeper parts.

12:40

\[\text{Continued on next page}\]

\[\text{in grains}\]

\[\text{drown on 13,500 altitude}\]

Some very rugged (truly) terrain. Then some cultivation on gentler slopes. Much rock exposed, intricate pattern of deep canyons. Bed of strata starting.

12:49
Small round green flat place in valley, below. Otherwise, very rugged.

12:44
Much of this country, brown, not cultivated, much grass (all reading 12:46).
Large valley with river flowing north in broad flat, Some green cultivation in valley bottom. Mountains, mostly dry, reddish, with only sparse vegetation.

Conspicuous fire bedding. Almost no vegetation - scattered scrub trees, especially in under valley bottoms. Hills have town, cast - probably thin grass.

A number of broad flat valleys - bottoms full buff with dark dots of vegetation - dry washes, all flowing northward.

(Hills reddish, tops of ridges somewhat rounded - though eroded by wind, more reddish than bedded pebbles.

Westward dip of beds very conspicuous, and determine the physiography. Curves dark gray, green, almost bare crests of hills.

Apple trees (California), scattered over lower slopes and broad flat valley. Ellinorial fan slopes marked by most curious banded dark vegetation, immeasurable, snowed.

Parallel undulating line, all oriented transverse to course.

Crossed highway at steep angle to course.

Approaching coast. Broad pale sand-flat below, with only alone of vegetation scattered on it. Parallel line of rocks conspicuous here, perhaps same as what appeared to be line of vegetation above, but rather, as these above were immemorable, and an entire expanse landed at Tujillks.

Over airport remains a very large leafed, large, reddish leaf pine Boughinvillea, densely Shrub being, even the shrub. Perhaps this is B. spectabilis.

Coastal terrace here is almost devoid of vegetation, small patches of grass. The washer, such as below the airport, are more densely covered by low brush, grass, etc.

Left Tujillks. Tujillks immediately back of beach have thin grass.
mount. Several small villages in the cultivated area outside the city. The cultivated area narrows rapidly toward the foot of the mountains. South of this, the sandy coastal terrace is almost completely bare. A layer of clouds hangs against the foot of the mountains over the inner part of this terrace. The terrace ends seaward, in a low escarpment and slope of about 45°, with a narrower coastal strip back of the beach below it. Low parts of this area apparently grassy (probably Festuca). There are also tidal flats southward. And a spotty low vegetation inland from them, as well as limited grassy areas, appearing quite saline. Then, southward, another large irrigated area but without a noticeable town. This bounded on both sides by spotty dark shrubbly vegetation presenting a conspicuous blocky pattern against the sand. South of this, a fairly broad low terrace just above sea level, very flat, terminating inland in a sharp very straight line of truncated spine, either a fault scarp or an ancient line of sea cliffs. Inland from that low very rough foreshore with little visible vegetation. Then another narrow strip of irrigated land extending from mountain to coast, dark spotty scrub on both sides. Then more desert and bare hills or domes. Very little coastal stuff in
places now, a couple of cape-like coves, enclosing shallow bays on their sides, hills back of them very barren.

everything spread by fog or smoke. The higher Andean slopes in the distance look very bare, but to the south they have some vegetation at mid-altitudes. In places quite rugged.

Clouds breaking a little - more

irrigated land, small town. Rocky coastal bluffs, quite white in steeper places, forms back of them with very little vegetation.

Lehmbote, with small pier and fishing fleet. Low areas of dark vegetation at north. Large salin flat at south. Irrigated land to inland from town. To south some small tidal flats in from beach, then a vast featureless flat sandy area with really very little vegetation at all. Much more fog in a gama.

M

Bahia de las Animas has no irrigated land.

Hills with small sand dunes.
in the seaward slopes. A broad dry wash, angling inland which the highway follows locally the hillside is quite well vegetated with a dark shotty scrub, immediately adjacent as often completely bare tillandria common on high slopes especially on seaward side.

Must sand on the hills, lines of it trending inland. A small stream will wash in it and a small irrigated area and town, Culebra, the greenstrips following the stream back into the foothills.

Then a large flat, stretch of coastal talus, with small scattered bare hills.

An indistinct scarp parallel to coast but back from it, has sand on it in places. Southward the terrace is much dissected and bare, ending in a steep cliff cut in flat lying congenitally bitted material. These hills are low, very complex, and extremely bare of vegetation.

An area of waves, then dune, breaking against the hill, then a restricted area of scattered sand, then a

vast area of low hill, covered partly by sand, obviously blowing inland.

A very small cultivated flat, with some reddish very dry clay hills.

Inland a low, very red range of mountains, parallelising Andes, extremely bare of vegetation.

A shallow valley, area of green extends offshore a mile or so, breaking off abruptly. Perhaps this is just dissected rate. Granada covers most of the coastal area. The few bits seen are bare and dry.

Coast very bare, a low scarp just back of beach, then the terrace. A front of this, quite restricted is badly eroded, showing white underlying material. More granada, solid clear back to the mountains, and for long way southward.

The front slope of the sand dunes are very steep and very bare up to a high altitude, where the upper slopes are darkened by vegetation.

Fg breaking up. Coastal terrace in very hard beds, flat, featureless except for a few crescent dunes.
scattered across it - very few. No vegetation at
first then a fine
tackling, probably Tillandria
More going extending
inland to a low but very
shady and rugged range
paralleling the andean
but separated from them
by a flat valley. Here
there are several parallel
ranges in front of the
main andean escarpment.
Max irrigated land and a
small town surrounded by
farmers' hills. The cultivated
terrain here breaks off abruptly
in a vertical sea cliff. This
may be Chaccay

Coast south of here is
characterized by occasional
small hilly like areas, pointing
out. Here the coastal cliffs
are high, and clothing at about 45.
Then a small town with
no irrigated land sheltered
by a rugged peninsula. Hill
here covered by sand, with
everything burning beneath the
sand blowing up in wipple
on hills inland. No vegetation
except in a few low spots
and for back of beach and
a few patches of Tillandria

in the hills half covered
land.
A small stream and
some irrigated land.
Then the broad irrigated
stretches of the Rioja Valley
as intensively cultivated as
the Paroja Valley (Calif.).
Lines of eucalypts along some road.
Hill with Tillandria on
upper slopes.
Most of the outlying part
of Isma is mud colored,
with scarcely a tree to
relieve them. The downtown
part are as trees and as
mud colored, but there is
an occasional park and
some higher light colored
buildings.
Cotton fields along airstrip.
1957 Mexico

Aug. 14 - Trip from Mexico City to Los Angeles, Calif. (right side of DC-3)

9:20 Took off from Mexico City Airport.

This is located in a dry lake bed, partially flooded at the time.

Floating vegetation over smaller pond.

Much of dry area bare and cracked around edge, thin grass and then cultivated fields. Then a low cloud layer.

Vast areas of flat cultivated land, much of it apparently newly planted wheat at least the geometrically arranged trees are very small and cover very little of the ground surface. Irregularly scattered larger trees, especially on the boundaries of fields.

Orchards becoming less, cultivated fields a thin green or without vegetation.

9:30 Land, almost without vegetation, flat low rounded hills in midst of cultivated land, their thin soil completely gone, gray rock showing with a scattering of small bushes. Soil generally gray - dark purplish gray in cultivated areas, pale gray in eroded areas.

A hill with thin grass as well as brush, not conspicuously eroded.

A small reservoir with dam.

9:33 Group of low mountains with slopes very thinly grassy and with scattered bushes or small trees, some gullies, cultivated rolling land with black soil, considerable pasture, low hills with scrub vegetation, sparse to dense.

9:34 Some of soil light gray, some dark red, some almost black. Vegetation extremely thin: scattered small yrends, these very muddy, cafe-au-lait color. Low hills with very sparse soil.

9:35
1957 Mexico

Land now half to medium, with some deep ravine, little if at cultivated.

More intensively cultivated, landscape soil light gray to light reddish gray, brown. Very little vegetation, soil showing in most fields.

Cumulus clouds thicker, very little visibility. Glimpse of cultivated fields, eroded places, brushy areas.

Visibility better in middle distance. Rather little of land cultivated, mostly either thinly grassy or badly eroded, some with thin brush.

Close to course, intensively cultivated, flat black soil. In distance an irregular red-brown landscape, only the flattest places cultivated, the greater part badly eroded, some with almost no vegetation, some green.

Flat parts, cultivated, hills eroded to loose rock, with scattered bushes.

Reached cruising altitude of 20,500' above sea level

Visibility very poor due to low

Cumulus clouds.

Cultivated land with black soil. Hills covered with dense dark green shrub.

Flat cultivated land, some apparently in pasture, some eroded. Locally scattered trees; in middle distance a low mountain mass, lowest slope in pasture, upper slope scrub-covered.

Hilly land, flat, place cultivated, mostly eroded by sparse brush and thin grass, soil reddish tan.

Clouds thick, glimpses of whitish gray gullies eroded areas between scattered reddish brown cultivated fields.

Reddish brown pasture with very thin grass, scattered small trees, a clumsy, occasional cultivated patch.

Cumulus layer complete, as far as horizon.

Mountain mass with thin forest, flat light gray rock showing through.

Light tan to reddish flat cultivated land, hills with sparse scrub, a forest.
74 1957 Mexico

over light gray soil.

clouds again.

A 10:25

A dissected plateau covered by very thin grass
and scattered trees.

canyons winding through it, green in bottom of
largest ones.

somewhat taller, but
canyons much smaller.

close to counter some cultivated
land.

Cultivated land, soil the
color of dirty mule, darker
when plowed, then somewhat
reddish.

10:23

flock clouds.

10:32

Rough plateau with scattered
granaries, deep ravines.
Clouds.

10:35

Flatter to low hilly land.
Fewer, more cultivated, red
soil reddish, rougher, sand,
don't mix, light gray, with
very sharp scarp.

10:38

becoming rougher, more
isograde, hills of flat
beds traced by differential
erosion. These scarp
are everything except steep
guts. Clouds.

E 10:40

Low reddish, rounded hill
with many shallow
ravines, dendritic pattern,
slopes with scarp aground.

flattest place cultivated.

a rugged wooded mountain
range with steep gullies,
slopes, some peaks conspicuous,
flat-topped.

10:35

extensive rolling plateau
with patches of sage
forest of prairie land.

10:38

becoming more and more
dissected to an irregular
confused mass of flat
mountains with an
antecedent stream system
with main stream
in entrenched meander.

grass to sparsely wooded.

10:39

clouds, but in distance
flattish red land with
a little cultivation, very
sparse vegetation.

10:40

close to counter the same
confused mountains
wooded with pale
rock showing through.

10:42

Good irregular plateau,
locally dissected, flattish
grants granaries, rougher
granaries, then forest.
Rugged rocky mountain
with bedded rock, sparsely
wooded.

10:45

Wide plateau with
deeply incised stream system
somewhat controlled by the
strike of the bedding.

N 10:47
Another range of rough
mountains, built more thinly
and locally
wooded.

O 10:42
A broad valley, largely
cultivated, dark chocolate-
colored soil, hills almost
bare, pale with sparse
scrub, badly eroded.
Scattered small villages.

Lowest part of valley
cultivated and bright
Green, dissected parts
bare, more wooded or
with thick brush.

Valley continues, soil
locally red, a dark
brushy, gently hilly area,
and a brown much rougher,
and with very sparse bush.

Rough, low mountains,
dull brown, very little
vegetation except thin
scrub in ravines.

P 10:51
Dissected plateau, with
scattered trees on slopes,
green on flat places.

Bed, apparently level,
locally very dissected,
Little flat ground.

Then some flat area, think

10:58
Rough land with scattered

T 10:58
Dissected flat land, the
flat parts cultivated, soil
bare red-brown. Rougher,
parts with abundant
scattered trees. Many
streams in incised meanders.

U 10:59
Get rougher until little of
no flat land left, flatter
parts in grass, the rest space
woodland. Relief here is
not sharp, but pattern is
complex.

V 11:01
Changes to higher mountains,
but not especially rugged.
Woodland with thin grass,
very little bare.

W 11:03
Bedding of many long flat,
giving concentric pattern,
becoming rougher and more
densely wooded. Thick clouds

X 11:05
Rough, densely wooded
mountains on both sides.

Y 11:04
of course, these extensive,
mostly obscured by clouds.

Z 11:07
Some spectacular cliffs.

A 10:10
Dense forest.

B 11:11
Beautiful high cumulus clouds.
Very rough.

C 11:12
Bottoms of some valleys have
small bright green clearings.
A few clearing on slopes, too.

Mostly dense pine forest.
Spectacular canyon.
Large rain stream in middle distance.

Clearing locally now abundant.

Some beautiful red fluted cliffs, exceptionally pointed.
Occasional clearings or flat spots.

Forest generally getting thinner, some slopes are scrub-covered. Tops of some peaks almost bare.
Rock ledges, some slopes are like giant staircases.
Crossed steep canyon with
A very isolated small plateau or flat topped peak cultivated on top.
Completely cut off by giant steep side slopes.
Except for one apparently long, wide ridge with trail on top.

Mountain gradually change to a high, rolling plateau, partly wooded, partly in grass and cultivated, cut by enormous winding canyons.
Walls, woods, muddy streams in bottoms.

Words getting rather sparse and grassy in place.
Rolling hilly upland completely wooded except for scattered small clearings and close to course deep canyon with gray, pinnacle-walled plateau in distance, confined mountain close, average slopes about 30-45.
Wooded, a few clearings on partly grassy slope.
Woods much thinner, much reddish rock showing. Streams and muddy, cultivated patches, occasional level to gently sloping tops.

Considerable clearing locally, woods generally thin, but landscape still dominantly wooded.
Small clearings common. Very muddy slopes occasional.
Large pattern, tangle, grassy places, especially in distance.

Dry in clearings and slopes still about 45, about 95 muddy, otherwise wooded. Many rock cliffs.
Country continues rough, thin woods, much less grass.
Locally slopes are at least 1/2 grassy, rest thin wood. Relief becoming somewhat less.

Mostly wooded, little grass. Grass becoming abundant, wood very thin, only patches left at all dense. Apparently shifting agriculture has destroyed much of the soil.

Dominantly wooded again but thin woods, much bare rock and soil showing, a few small grassy patches.

Crossed a red muddy, large river. Winding in great meanders, entrenched in broad, V-shaped valley, gentler slopes with numerous cultivated patches. A small town on a branch of river.

Large grassy clearing on small plateau, a little off course.

Landscape partly grassy, partly wooded. Steep slopes wooded, gentler ones either grassy or very weedy and thinly wooded.

A large rough plateau cut and surrounded by deep canyons and valleys with high cliffs. Much more level land in grass or bare red soil. Some high, rocky land with very thin woodland. Then patchy dense forest. Large meandering stream in relatively broad valley. Stream red, muddy, valley mostly red soil, clearing.

Mosaic of wooded rough country and gentler topography, which is a patchwork of red soil and woods.

Then predominantly thickly wooded hills with some grass on bottoms of hummocky small valleys.

Sane, with conspicuous stream bed, bare and patches red. Scattered small farms, dark red, a purplish soil, some badly eroded and rocks piled in thirs.

Ground otherwise mixed wooded and grassy.

Clouds and fog getting north. Flat country largely wooded.

Local dark, purple, closed area. These somewhat reseverigated.
1957 Mexico

F 12:02 Vegetation varies from wood to thin pasture, mostly wooded.

G 12:05 Large muddy stream in sparsely wooded, hilly, country. Ridge tops tend to be bare or grassy.

H 12:07 thinly wooded country.

I 12:09 General cloud covers, cutting off all visibility.

J 12:17 Desert country, very sparse vegetation except in dry wadis, these draining westward. Some large blocks of cultivated land, possibly irrigated, partly green.

K 12:31 Very little relief, peculiar hallowed drainage patterns marked only by baron vegetation.

L 12:36 Patch of hilly ground, slightly denser vegetation of bushes, immemorial ravine radiating out of it down every low alluvial slope, curving to join the main washes, which generally trend westward but may for a while go in any direction.

along course
Gulf of California to left of column.

Northward the rocky banded outcrops are almost buried by alluvium, then emerge again.

General landscape is pale tan, dotted with bushes and lined with ravines, and washes. The banded rocky hills are purple, red, tan, gray, in irregular bands and spots. These hills are immediately along the coast. The course goes out over gulf, then.

Curvilinear perfectly straight line cuts across washstones to the gulf, and vanishes for ravines. Can't be anything but a road, but this does not look right, as though it were a line ruled in a map.

A sandy northward-plunging hooked cap in coastline, drawn running inland and a small bend back of them. Northward a small triangle of green irrigated land. Like colored hills end at the coast.
gradually back to small abrupt mountain in the distance.
A grizzly, tawny color, and almost no vegetation.
except for a dark line immediately behind beach.

The head of the gulf
has a low flat inland
flat delta land falls
of it with a lagoon.
Long trails of reddish
muddy water extend
out into the gulf.
Beyond these the water
is a rather muddy blue.
Broad Term round flat
border the island and
head of bay.
Back of these a very narrow
yellow sandy beach on the
Baja California side.
Back of this broad
saline flats, with
tidal channels.

Inland from these alluvial
slopes with a road paralleling
the coast. Backs of this
very rough, red, yellow
brown and gray hills.
Little or no vegetation on
any of this except a few
tiny bushes on the alluvial slope.
A landscape of scattered vantage rock in hill, protruding from a matrix of buff-gray alluvium, almost no vegetation. Washy tending north to the flat have sparse bushes. In distance at the bottom of the broad flat valley is a rather broad uneven land of vegetation, sparse in places, dense in spots. A broad dissected slope and escarpment with irregular scrub vegetation. Much of this a relatively level plateau. In front of the slope the alluvial flat the plateau is irregularly but sparsely wooded with occasional shrubs, with occasional dryish meadows along certain drainage lines. No clear stream courses here.

Passed a town, probably Tecate, crossed a highway, entering California. Country becomes more mountainous, but not rough.
Mountain along coast generally covered by thin scrub except niveine botttines shrubs, aronwood. Eastward they become more and more densely wooded to a very abrupt line, beyond which is desert except for higher ranges.

San Diego - built up astonishingly far back into the hills.

Hills with north slopes densely covered by chia, valmal South slopes almost desert. Ridge tops covered with firebreaks.

Hilly area covered by chia, the valley in cultivation, a rather thinly built up.

Several rather extensive recently burned areas.

Lime, gray from in cold, visible over Lantco any range extending eastward apparently by San Jacinto Mts. Torre乐队 to see through.

Arrived for Angeles International Airport, Inglewood.
uniform. Some areas here are "dry farms" of
match and lumber companies.
At Mineral; lower slopes and benches are covered by a slightly
open forest of Pinyon juniper, Douglas-fir, and Abies
etc. 40-50 m. tall, shading irregularly, with
mostly evergreen dominants, 120 cm. dbh.
Lichens common on trunks.
Flat valley bottoms mostly in meadows.
Forest gradually changes upward to
mixed and lodgepole
pines. At 8000' some small
pinus contorta. Mixed, favoring
quarter to Pinyon, Abies, and
silvast mata which appears. The bulk of the
Pinus contorta, which is the
dominant tree to timberline,
which is between 8000 and
9000'. The forest in the
subalpine zone is sparse
and irregular with much
bare ground. A ground
covered by Cupinus sp.
Large areas of low scrub
of Arctostaphylos wai-mui

Castanospermum californicum,
and locally Ceanothus
and very locally Palisade.
The scrub has
much lower stature
at higher altitudes (9000').
at 6000-7000' it may be
1-2 m. at 8000' it is 0.5 m. or
less. Castanospermum flowering
abundantly at 7000', in bud at 8000.
Large fire scars (3)
covered by a dense scrub
of Arctostaphylos and
Castanospermum. Very few conifer
coming up in this.
North of Park is some
woodland of oaks and
junipers in places with
Pine sabiniana.
On Pit River are large
grazing and cultivated
areas at about 4500'
Rush Creek , south scene
of Ash
Modoc Co. is lined by dry mixed forest of Pinyon
ponderosa, Pinyon, and
Chamaecyparis. Conifer
species grow along
streams. In hills above
and junipers sp. and
scattered pines. This
is much grazed. Large
beds above hard scattered
pine,
Aug. 13 - Upper Rush Creek
Camping ground, northwest of Adin
in grove of tall pines, incense
cedars and pines on gentle
slope along creek.

38 47

c. common
43. Cornus sericea
common along creek

same - open slope with
grass and low Artemisia
scattered pines and junipers

49. Allium
common

50. (comp) Calypadenia
occasional

51. (comp) Calypadenia
occasional

52. occasional

53. Jepthirymum
common

54. Polygenium
shrub near tree

55. Juniperus occidentalis
common

56. Juniperus
one tree seen

57. Usnea?
very common on tree trunks
in thick forest.

Motor Co.

leaves white beneath,
dish white
shrub 1 m. tall; fruit
pale bluish

505.1

flowers white
flowers white

flowers pink
flowers pinkish white

red 5 m. tall; fruit
very glossy

tree 5 m. tall
Aug. 19 - From Reid Creek
North the relatively
level land is grass and
dark-brush covered. Steep
slopes have juniper
woodland.
Most of this country is
covered by lava beds. East
of Crater Lake the broken
lava debris contains many
obsidian pebbles and flakes.
To the north the junipers
disappear except at higher
altitudes. East of Crater
are scattered junipers, but
in the Malheur River region
there are none generally.

The distribution of Artemisia
tridentata is very irregular.
According to Maynard Torrey
Artemisia tridentata is very
susceptible to fire, while
brooms
nurture is favored by fire
but cannot stand competition,
Broom has been favored
greatly by sheep grazers who
have deliberately burned
it to encourage it for winter
feed. However, A. tridentata
is encouraged by overgrazing.
Most of the flat valleys
land is under irrigation
except where the soil
is too alkaline. The flat

Idaho

lands are mostly sparsely
covered with vegetation, locally
called "slices"). Due
to a very high sodium
content, it is not alkaline. Soil
profile very similar
except for very thin

Lava beds, west
of Craters of the Moon
are mostly sage brush
covered. Characterized
by cracked domes &
bubbles.

Craters of the Moon
National Monument
has Rim Rockieti
scattered over it,
with sparse sand
of Cenarches (2), Cluniebatic (2)
Plumna (2), Clinothamnus
Philadelphus, etc. On other
slopes is sage brush mixed
with grass. On new
Cinder slopes a low
cushion-like Erigeron
and several other Eriogonums
are common generally, some
borage, actea, etc.
Northeast of the Monument boundary three ages of lava are seen, subjimined. Good vegetation of Artemisia, Chrysothamnus, several pines, etc.

Extensive rolling sage brush country west of Middle Butte and Little Butte. The surface is a lava flow covered by silt and small lava pebbles and cobbles. The silt is cracked into polygonal about 3-12 cm. across outlined in small pebbles. Here and there are areas complete bare of vegetation, 1-4 m. across, the approximate center of each occupied by a large ant hill. Beneath the dark and white lava particles making a low mound 1-3 dm. across. Possibly ants break the area clear, as some were seen carrying fragments of plants toward the sides of the area.

On the west slope of the Tetons between Victor and Teton Pass the forest is a mixture of Abies, Picea, and Pinus contorta, possibly other pines. There are large open slopes, probably old burned areas with a profusion of flowering herbs — Epilobium, angustifolium, Rudbeckia, aster, and a great many others. The lodgepole pines here have slender dark gray trunks. Only one individual seen had a trunk at all approaching that of a Yew common in California.

The forest on the eastern slope is similar to that on the west side. On the ridge at Teton Pass there is a grassy strip.

At Wilson in the Snake River the flood plain is very broad and mainly of well-rounded gravel. It is cut across with sloughs, with the land partly thickets, and partly open wood of Populus, Larch, red alder, partly trees, and partly open gravel flats with much grass and Chrysopis, as well as other plants. Willows are abundant, as well as two spp. of Eleagnus, Carya, young Populus, etc. The Populus trunks reach almost 1 m. dbh. and have heavy caly ridges of bark.
Aug. 21 - Wilson, Snake River

broad gravelly bottom land.

78S 38W Anemone alnifolia Nutt. occasional in thicket on

3 59 Gayophytum in open place on

2 60 Lopodia on road embankment on

1 61 Aster very common in open places on

2 62 Helianthea (Chryopsis) very common in open places on

1 63 Aster very common in open places on

3 64 Polygonum very common on bare gravel on

2 65 Cornus sericea common in wet sparsely

66 Eileagnus very common in wet sparsely

bushy area on

2 67 Eileagnus abundant in wooded and

bushy areas on

1 68 Salix abundant in wet areas on

2 69 Populus lanceolata dominant tree in wooded

areas on

shrub 4 m. tall; leaves glaucous beneath; flowers light pink.


twist, flowers blue.

rays bright purple,

dish reddish.

bushy, turning reddish;

flowers white, reflexed.

shrub 1.5 m. tall; stems brownish, red; fruit white.

slender shrub 3 m. tall;

ripe fruit silvery green,

flesh dry, mealy.

much branched shrub

1 m. tall; buds only.

slender shrub 4 m. tall;

leaves silvery,

tree 6 m. tall, 50-10 cm. dbh.

others to 25 m. tall and 75 cm;

a matthijs, with prominent only

ridge on twigs; spike.
1957

Wyoming

Aug. 22 - 4 mile south of Jenny Lake, north of Moose
Gayophytum
along fence around meadow

Aug. 22 2 1/2 mile south of Jenny Lake

Picea contorta var.
common in patches of wood

Grand Teton National Park
Large meadows of Artemisia, mixed with
grass and herbs.
Patches of woods of
lodgepole pine, spruce,
for and aspen.
Lodgepole pine, slender;
trunk tending to be gray
brown.

In Yellowstone Park most of the
way up the west side of the Loop Road is through lodgepole pine
forest. Where the road gets a
bit higher there are and pines
become common. There are also common
Aug. 23 - At the end of the West Fork of
common in mixed woods
flora of canyon
Picea contorta var.

72 Galium aparine
in tall grass under pines

Teton Co.

flowers white

tree 30 cm. d.b.h., 22 m. tall, dark
gray, brow, thin, scaly,

below the pine belt, at 5800 ft.
on both sides of mountains.
Canyon of North Fork of
Shoshone River is a very
spectacular gorges with
palisades and towers
cut in a volcanic tuff of
brecia. Coniferous forest
on talus and other slopes,
mixed forest of Populus, Salix,
Picea, Abies, etc.
Undergrowth of Populus, Salix,
and various other shrubs.
The Populus tremuloides throughout
this area is in bad condition. The leaves
gray and distorted because of infestation

of colly by a leaf miner.

trees 10 m. tall, 30 cm. d.b.h.

erect, but supported
by other plants.
Aug. 27 - Bet. Cody and Greybull.

East of Greybull - cultivated bottom land with cottonwoods - popular.

West face of Bighorn Mt. is a gigantic escarpment of white sedimentary beds - no little vegetation - sagebrush on fans at base, coniferous forest in flat tops and in upper parts of canyons. Home red beds at bottom.

Top of Bighorn Range is rolling with extensive meadow land with patches of forest, mostly lodgepole pine, spruce locally. East escarpment feeds with Pines ponderosa and some spruce.

Then extensive sage plains. Small patches of pine on low hills.

east of Gillette. Then more sage plains to foothills of Black Hill near Devil's Tower. At Devil's Tower the hill have sparse Mexican fescue grass and sage. On the cottonwood Clupurus hirsuta, ragweed, a meadow mix. Overgrown with Rose as a large mat (like Saint John's wort). Edge here is Artemisia rigida, also at least 2 annual Artemisias. The Devil's Tower is an intrusion of gray granite up through red beds (speed hill formation) and buff sandstone (bundane formation), jointed into long vertical prisms.

Prairie Dog Town east of town. The outliers of the black hill to the west have abundant sask, undergrowth in the uneven forest of Pinus ponderosa. In the main body of the black hill there is almost a pure stand of Pinus ponderosa. In canyons Betula populifolia and P. papyrifera are common. To the east Casionus...
Augs. 25 Rockerville Picnic Ground

in open pine forest

3 3774
Galium boreale l. occasional

75 Monarda fistulosa var. comm.

(cot) macrocups neathare (but not in such abundance as on the west side.)
Pine Beer east-west of Rapid City. Eastward is good mid-grass or short grass prairie, some areas of it under cultivation.
Rolling topography, light gray soil.
South of Wall are the Badlands, more desert cut into the prairie by erosion. This prairie has been overgrazed in the past. Has considerable Opuntia locally, Erosion in the Badland topography is rapid. The surface is so wet when wet clods and clumps, cracking, the surface can loosen and come off in polygons or feet (5-8) in area.

roots yellow

flowers velvety pink

4.4 west of Kadoka Jet is what appears to be a pothole, with open water. Willow and cottonwood. Another small one in Kadoka Jet east of main part of village.
Between Kadoka and Belvidere are quite a few depressions with ponds in their bottoms. East of these are many ponds from dammed ravines, but no natural one seen.
East of Belvidere, ravines tend to have trees in them. East of Plantation mound, became a common feature of the landscape giving the appearance of semi-wooded country, though trees occur naturally only in ravines bottom and along streams. Only near first falls are any trees seen in uplands.
Aug. 26 - East of Sive Falls, are some patches of oak woods on bluffs and bluffs. East of here for a considerable distance farm woodlots are more and more common, but probably mostly planted. East of Jackson at least some of the country appears to be naturally wooded, but some areas are prairie judging by the very sandy soil.

Beaver Creek Valley State Park is in a wooded valley. Acer, Ulmus, Tilia, etc.

Trees 25 m. tall 40 cm. dbh.

Trees to at least 20 m. tall, 25-38 cm. dbh. # 38976 and 38878 growing together about equally common, fairly distinct in leaf shape and aspect. Bark very similar. Leaves of 38878 perhaps averaging broader.

The herbaceous undergrowth here looks definitely eastern. The sugar maples are of two sorts, var. nigraum and var. glaucum.

East of here the country is definitely wooded.

At La Crescent, along the Mississippi is an extensive marsh a bog, extremely varied. Seems in good shape; even though both highway and railroad cross through it.
High cliffs of a yellowish, flat bedded rock just behind LaCrosse.

Ieland Eastward along the Driftless Area, remnants of the same a similar formation occur as the Bluffs - Mill Bluffs, etc. These are spectacular, surrounded by cliffs.

Near Wisconsin Dells is Rocky River Falls, a flat valley bottom covered by white pine, surrounded by steep wooded slopes with oaks and red maples.

Shangri-La resort with Camphor cedars and Rhododendrons, etc.

Lower Wisconsin Dells boat trip. Wide cut in flat sandstone beds, jointed into huge trapoidal shapes, bordered somewhat as the 45th Parallels.

Mixed forest along tops of cliffs of Pinnate Abies.

On left bank, large pines and tamaracks, on right, one large white pine.

On top of cliffs, the forest is principally pine.

"Dells" from Delle = flat layer of sandstone.

with a little field, on low sandy bluffs around.

mainly broad-leaf trees.

Dome shaped, waving in the wind as they blow.

Spectacular cliffs, sandstone cliffs. Below old site of Newport cliffs have definitely mixed forest.

USGS gauging station - water here about 45 feet.

Many cliff swallows nesting under overhanging cliffs.

Sandstone ends abruptly at lower end of Dells. Lower part of gauging station at lower end of Dells - a cable stretched across from which stream velocity is measured every 10 minutes.

Water dark brown.

In places pine and birches grow directly in rock crevices, with no visible soil.

On stretch about 3/4 the way down has low banks on both sides - here a large amount of one of the glaciers came through, cutting away the sandstone.

Where the Dells are present, the area is nonscutenated. Most of forest is rather low, not over 30m.
1957 Ohio

Aug. 28 - Independence Dam Park, 6 mi. e. of Defiance, Maume, N.

Celtis

dominant in wood along canal bank

Canal banks wooded principally with Celtis and Alnus, either separate stands or mixed. River banks with elms, Celtis, etc.

East of Upper Sandusky road side stand in a pine grove of Beech-Maple forest. Trees 5-7 m. thick and 30 m. 30 m. tall. Sappy 1-1.5 m. Understory 1-2 m. tall, principally of maple saplings. Both var. minor and green leaved "saschaum" type mixed. Some Pinus resinosa.
Sept. 20 - from train window
5 minutes south of station
in Wilmington, a large
area of marsh, apparently
tidal with channels
that would permit
exploration by canoe.
Oct. 27 - Difficult Run

Graecum luscula
Pisum sativum
Viburnum dentatum
Physostegia virginiana
Nepeta cataria
Convolvulus vulgari
Ptelea triloba
Rudbeckia laciniata
Asplenium platyneuron
Piptostegia acrostichoides
Botrychium virginianum
Verbena anticaefolia
Salvia cernua
Kalmia latifolia
Celastrus scandens
Hedychium carnosum
Hedychium pulchellum
Corydalis americana
Cedar leaves
Osteomeacia
Helianthus divaricatus
Aster stellatus
Aster novi-belgii
Aster novi-belgii
Centranthus ruber
Centaurea maculata
Hypoxis amara
Nov. 7. - air trip. 
Washington - Richmond

Deciduous forest areas red, yellow and reddish brown contrasting sharply with green of pine patches.
Mixed pine and deciduous wood much less in area than those predominating one or the other. Some areas of low wood immediately along Potomac are completely leafless and gray. Areas of tidal marsh are gray-green and marked by pleristically widening tidal channels. Marsh is generally very sharply set off from the woods landward of it. Gullies higher land is generally wooded. As the course gets significantly away from the Potomac plants begin reaching Richmond the deciduous trees become more and more bare until there is very little color left. Where land is cut off ravines and stream bottom land the trees in the rear almost entirely leafless while on the hills there is still some color. A few flat upland areas are still as colorful as the country just this side of Washington. Immediate vicinity of Richmond is much more colorful again.

Richmond to New Bern.

Just after leaving Richmond flew over tremendous area turned by bulldozers and a large military installation covering a large area.

Pine covers a large proportion of the northern part of the country the trees are still fairly colorful in the deciduous woods.

Well to the south, perhaps just south of the Dan River, are large areas of deciduous woods not especially colorful. Small cultivated fields are scattered here and there. Also, exact similar, sharply bounded patches of solid pine though no pine is evident mixed in the woods. Stream courses are marked by strips of leafless tree.
North Carolina

Shorthly north of New Bern is a large solid forest of pine with prominent sink. Probably managed for pulp wood. River at New Bern very dark water. Neuse and Trent rivers unite here. Pines here seem to be mainly Fines treed, but perhaps some 1 Australian.

New Bern to Wilmington, south of New Bern a vast area of forest. Near river are meandering bayous lined by Taxodium. The forest is a mosaic of pine and deciduous wood with patches of deciduous wood apparently representing low ground. Large areas are thin pine wood or even savannah with very scattered small stands of pine and red oak. Dense low vegetation. The larger such area has a sallow grass. Then an area about 1/2 cultivated much of the wood deciduous. Then pine with stream courses lined with deciduous trees still showing some color.

South of here large areas

of forest but with some large military establishments. Mosaic of pine and deciduous wood, some old fields. Some savanna and old field areas seem to have been planted by trees, seemingly the number of roads is cut off from that of the amount of settlement. Considerable savanna, probably heavily grazed judging from trails.

Southward: pine wood, very sparse and irregular, pine savanna than forest. Stream courses very sharply outlined by strips of deciduous wood. Brady of tidal marsh of some width along sound, bounded on sound side by a low beach ridge. Wilmington

Many areas of white sand visible. Around Wilmington airport are considerabIy large areas of longleaf pine. In open areas Iochas or halmbtia shrubs in fruit show up conspicuously because of white flowers. Black water pond surrounded by red-brown cypress.
1957

North Carolina

Wilmington to Charleston.

Still a narrow strip of land along coast.

Pine with areas of swamps, mostly evergreen.

Trees stand out grey and leafless.

Away from coast perhaps 20% of land under cultivation.

Fallow, 40% a mixture of pine, deciduous woods, and beachy savannas, with

low color, but leaves largely already fallen. Soil in

cultivated fields white

sand ranging to black peat.

Southeast of a fast-moving wind and inland, and change in trend of coast this pattern continues right out to coast.

Here is a canal on channel

back of a beach ridge and strip of marsh. Small

estuaries with tidal marshes.

Along a strip along

now grey in color.

Several small bays

filled in and outlined by sand ridges.

Considerable proportion of

beach ridge occupied by

cottages, southward merging into an almost continuous town, with many small pines.
Country inland from

be very largely wooded

except for strips of

cleared fields along highways.

Then broad strips of

cropland, forested with

meandering rivers and

or brooks, separated by

strips of pine, generally

tending toward coast.

Very little of this cleared.

Mosaic shows up very

well now, as swampy

growth shows considerable

fall coloring in dull red or

grayish red to brown.

Then mosaic becomes

more generalized and

deciduous forest may not

be swamp. Large areas

of this now almost continuous

crossed by a few roads.

Some old sawmill sites, marked

by great piles of sawdust.

Then somewhat more

cultivated land, areas of

grove savanna, interspersed

with the mosaic.

Then a large estuary

district with a broad

meandering river and a

broad area of marshes,

probably Cooper River.

Nov. 8 - view from air.

Islands mostly low

hilly. Two parts

deciduous and two of this

large submarine

platform partly covered

by irregularly distributed

patch reefs, these mostly

sandy in center, dark

shale banks around

outer edges and a spit

in inside.

Occasionally near enough

to surf to cause breakers,

especially near outer

part of platform.

Emerged plants

forming an incompleter

ring. Littoral cliffs in many places.

Largely covered by boulders

etc. Large excavations.

Plants seen

Acacia excelsa

Bidens pilosa var.

Dolichos viscosa

Ternunculus vulgaris

Cassuaria equitata

Nerium oleander

Helianthus high.

Cyperus repens

Alyssum annulare var. wilkesianum

Ranunculus cernax

Rhus glabra margin.

Heliotropus transilvania.
Pandanus tectorius
Royalton regia
Delonix regia
Musa nana
Isandra guttae
Manihot esculenta
Leucentha chinensis
Neem (Azadirachta indica)
Asparagus officinalis
Eichostrophum sandwicensse
Taan
Punica granatum
Arundo donax
Canica papaya
Malvaceae
Lantana sp.
Tamarix
Pomegranate (Punica granatum)
Codiaeum variegatum
Vamnum maximun
Bryonia nervosa
Pittosporum tokei
Eucalyptus deglupta
Neturis delicata
Cocos nucifera
Grevillea robusta
Phoens (Phoenicophora)
Pomoco
Leucadendron araucana
Melia azederach
Dorbea odorus
Punica granatum
Thevetia peruviana
Tetra panax papayifera

Jasminia caspica
Pashalum vaginae
Ampelina
Foumeleafa grapholade
Gatbaranthus rogers
Petunia
Bougainvillea
Cardia sertata
Vernum indicum

The open woodlands
of juniperos Bermudensis
are almost entirely
dead from a"blight" that
attacked them after the
war. One healthy tree was
seen. A few of the otherwise
dead trees have one or
two healthy branches.
Large parts of the landscape
are dominated by these
dead trees.
The rugged parts
of the island seem to
be entirely made up
of thinly bedded calcareous
sandstone or aeolianite.
This is very intricate
cross-bedded, and contains
occasional red-beded
soil horizons. Solution
pipes filled with red soil
are also common. The
aeolianite seems
unstable.
the extend below sea-level. It has been
undercut at the base
in many places and
they are apparently no
low tide erosion platform.
The sub-aerial erosion
attacked the beds
differentially and they
make them much more
obvious than they would
otherwise be. Pitting is
not too obvious, and
pinnacles as in reef
limestones were not seen, though columns and
Such crassus forms are
common.

Plants:
Washingtonia filifera
Agave americana
Agave nevadensis
Fernica japonica
tragacanth vulgar
Plumeria rubra
Ficus elastica
Orozemica
Bennichia frutescens
Leptinum praelocatum
Cynodon dactylon
Piperis nodiflorum
Pistis dactylis
Crotalus enigm
Lewicola glabra

Euphrasia, Carana glauca?
Ceratx joychius
Engenia uniflora?
Fibonacci tiliaca
Peroea americana
Bambusa vulgaris
Bottle palm, Homoe
Calandris pinnae
Feruss aquamarina
Eupholia bungeforti
Euphorbia arboreus
Typha
Skapom "lotus"?
Jossupium sp.
Acalypa "marginata"
Caryota "ficus-indica"?
Tabernia pentaphylla?
Hibiscus mutabilis
Zinnia elegans
Tagetes "glandifera"
Chrysanthemum
Cunabans arricula
Holidiads sp.
Euphorbia timewali

Many cattle in the plain
Lolais land crab
Holodiads sapuanins?
Caryota (Rammannia)
Lottokos "peta indica"
Gorin sp.
Euphorbia hirta
Canaraia "otwifoli"
Euphorbia berteroana
Euphorbia heterophylla, generic
Leucaena glumules
Chrysobalanus americana
Warwick Long Day

Coconuts bear some nuts
there but said not to
be edible.

Euphorbia antiquorum
Euphorbia fulcra
Euphorbia fulcra
Chrysalis americana
Climatis
Carnis

The landscape is
mostly dominated now
by introduced shrubs
and trees, especially Laurel.
Before the junipers were
destroyed by a scale insect
they must have been

the dominant factor.
Even now the old dead
shelitons are very
prominent. They are
being replaced by existing
insects from introduced
to control the scale, but
were eaten by lizards,
birds were brought in
to check the lizards,
but evidently the
polite thing was
futile because the
danger was recognized
too late.

Tisre jatoia amphilodesk
has antlers attached about
half way up the corolla tube.
The corolla is slightly
thickened below the sinuses
but has no scales, exartici
c such appendages. The
style is cone-like and an
enlarged stigmas sessile
on top of it. The young
fruit is covered with a
cap like stigma stuck
on its summit and unburst
in center.
Dry farming agriculture area - most farms rather large irrigation. Very little irrigation, but a few widely separated flat-bottomed ravines, bottom cultivated. Apparently some olive groves in these. A little maquis-like scrub on the steeper side of these ravines.

Then a dendritic system of V-shaped ravines cut into the plain. Very little flat-bottomed maquis muller.

Then some rather big areas of maquis or scrub forest in not too rough land off to right not clearly visible. Some shallow meandering ravines some of them slightly vegetated in bottom.

Other plain still fluffy, shaded with thin green.

More winding dendritic ravine systems along farm enclosures formed by hedgerow windbreaks. Then an irregular patch of thick forest, just southwest.
a small town (perhaps 20 min. after takeoff), with a
very muddy river
meandering in broad
flat bottom of ravine
town probably halted.
Then rather extensive
forest landward of it;
patches of grass in it.
This land is flat, only
occasionally slightly
dissected. Most dissected
deltas are bare, not even
very grassy. Parts of past
very sparse, woodland
to savanna. Broad
strip of grassland along
a narrow meander parallel
with course, winding
between dissected
many small side ravines
perpendicular to main one.
About 10-20% of land
forested, then becoming mud-
less. A small reservoir.
(35 min.). Then more forest,
most of land cultivated (dry
farming). A meandering
muddy river following
course beneath planes;
small winding tributaries
with water. - Perhaps
this system is tidal.
Then another larger tributary

closely meandering, joining
course. - Joining larger one.

Small irrigated area
along this. Dissecting
sharply with adjoining
dry farmland areas by this
dark color of irrigated land
and close gridiron pattern.

(30 min.) A small area
of low, very barren hills,
in places somewhat grassy.
Some limited flatland area
in scrub forest, then more
barren, thinly grassy, hills.
A small compact town
in a flat valley of a
muddy meandering river
(canyon). Country generally
hilly. (45-50 min). (10-15 min.
flight)
Rugged mountains in
distance, with slopes bare
probably wooded, a string
intermediate hills brushy.
Meandering estuary system
extending fairly wide
back into flat valley
between foothills. There
are the Riff WYs, more and
more bad northward.
Intermediate hills rugged,
still brushy like foothills.
Cali Chapman.
Small villages here and there.
These hills are of sedimentary beds dipping east striking north. Mediterranean climate. Originally across from Gibraltar very hilly with thin brush. Rugged peaks at just west of C.S. Pan Gibraltar 9:35 Rock not very impressive from air.

Spanish hills quite rugged, folded sedimentary beds, confused in arrangement. Betic Cordillera. Brusky with patches of woods in valley, and in sheltered slopes. Crests tend to be bare and rocky.

Eastward mountains higher, more rugged, less vegetated. Mountains along course quite well covered by brush and forest. To east some very rugged very bare ranges. Then there very confined mountain valleys trend westward, shingly draining to wooded with numerous tiny villages or farm sites on tops of hills. Larger towns here and there.

Spain
Then the country tends to flatten out with innumerable small rounded hills, very thinly vegetated. As reservoirs very irregular in shape. Over a smaller kind like no compact town scattered at intervals, small village here and there between them. Much open pasture, some cultivation. Country flatters out so there are few noticeable hills, some very shallow dendritic drainage systems. Leather houses very conspicuous, white.

Small city along a river. Red cliffs looking like stumps conspicuous in afternoon sun.

Hours now more and more surrounded by walls. Visibility poor because of haze. Turning east on an airfield—probably today.

Quadrilingual wire across course at 5:30. Meanders across a fairly level but rolling plain, more and more deserted away from me.
Nov. 11 - Tripoli

Outs trip west along coast to Zarzis.

This is on a broad coastal plain of an aeolianite of quartz and shell fragments. It is rather soft, used for building, stone when sawn into blocks.

On this terrace, which is perhaps 500 above sea level, with a thick layer of old dunce of fine sand and dust, making a rolling landscape, in places open and with very thin vegetation grazed off by sheep; in most places covered by grasses of olive grove, olive and date mixture and date grove. Ceratonia is fairly common. Rose of Eucalyptus and of Tamaris, and of an Acanis with very long white spine, occasionally of Cupressus sempervirens.(?) Planted as windbreaks for along road. Branches of Ligustrum to common along roads. Citrus sinensis occasional. Ficus retusa as street tree in villages. Acanis longifolia fairly common.
This landscape is resultant of activity of wind and influence of sand. The only wild plants which can stand heavy grazing by sheep, slow woody mat-like herbaceous plants. Olives and date planted in enormous numbers. Wells are very numerous, mostly with windmills.

Along the coast the loose surfacing material is blown away and the estuarine is being wind-eroded. Its bedding is rather flat, no small terraces are exposed at various levels. There is a prominent terrace just above sea-level in many places (photo).

Air, east from Tripoli - just back of coastal strip described above the sand desert begins. Vegetated strip, really very narrow. Boundary broken by patches of dunes which spread into the cultivated land. A few small patches of open woodland mixed with patches of cultivation and areas of dunes. The dunes form a reticulate pattern of ridges paralleling coast but rather irregularly so. Many orchards, mostly appearing very young and half overborne by sand east from Tripoli. Eastward very bare. Orchards mostly somewhat inland. But here the vegetated strip is much less well developed. Then an area of dissected into low rounded dunes, hills, a few trees in ravines and bottoms where the bottoms are flat. In wider flat places are cultivated patches. Then more sandy flats, but without much more dissected by shallow ravines, scattered cultivation, scattered small patches of trees. Gully erosion along ravines.
More cultivation eastward. The cultivated patches stand out dark, rather purple, against the pale sand. The more dense but not abundant oriented perpendicular to east. Then an extensive area of geometrically arranged fields, many of them apparently schools, but as so in very few cases. These forming an elongated, roughly triangular toward coast. Coastal area itself bare and sandy. Eastward this becomes less regular and wide, but mixed with sandy areas.

Visibility much obscured by dust in the atmosphere, this very sharply limited upward at possibly 20,000.

Extensive wet salt pans and visible through the dust because of reflection of sun on water. These form an extensive belt a mile or so back of shore for some distance. As course leaves up coast, the relief becomes extremely slight and the irregularity very gentle. Vegetation practically disappears, and is present but apparently, as a thin sheet, not forming dunes. Remnants of very slight, high, flat surface have a curious amoeboid form with rounded lobed edges the very flat type swept clean of sand and slightly darker than the surrounding sand. Tiny very short osiers run down their sides. Rarely there are traces of one or more still higher surface superimposed in these. In places the remnants of the lowest of the surface above base are very extensive.

Southward the type of relief is maintained but becomes higher. Some evidence of beds concentrically undulating, forming ring-like ridges. A few tiny bushes and small trees in lowest washes very locally. Southward the relief
Libya - Sandh Anti

A considerable way farther on another strip of widely separated parallel dunes, only half a day's line, not nearly as sinuous as those farther back. Then another series of 4 lines, somewhat irregular. Then another. These series are separated by very flat land. The dust in the air makes visibility so poor that other details of the ground can scarcely be made out. The last three series, as well as a fourth, at a greater interval trend about north and south. The relief here is very slight.

Nov. 12 - Dharan -

Landscape appears practically bare. Eight buff-gray buffy gold with abundant stone. Irregularly distributed widely shaded small bushes and tufts of grass and sage. Cyphens sp.

Around base Teriun and Tamarix are common ornamentals. Horse peas were trained in hollies.
Nov. 11 - just west of Tripoli, on bare ground just back of sea cliffs
Chrysanthemum

Nov. 12 - Dharan
in very sparsely vegetated disturbed stony ground near airfield
3 81 Helictotrichon sarothrae (Dela.) common
3 37 (golden ? andusa ?)
common
3 33 Cyperus conglomeratus Roth ?
very common
3 84 (grass)
occasional on roadside
2 35 (grass)

2 36 (trig) Rithothlynum

Nov. 13 - just south of Dharan, along coast
1 90 (grass) Distichlis
very common
Nov. 14 - Ain al Khudrih, Al Hasa Oasis
1 91 Zygophyllum spinosum (L.) Willd. planted
Nov. 15 - Haffuf, Al Hasa Oasis
1 92 Zygophyllum spinosum (L.) Willd. planted

very bright yellow.
low spreading mud-handled shrub, flowers white, compact densely branched low bush, caespitose, somewhat glaucous spreading at base erect
leaves with a strong very disagreeable odor, stems green, flowers white, stiff, low spreading bush, leaves gray.

sitting small mound
of sand.
small tree, leaves green beneath, from
small tree
Nov. 19 - desert south of Dharan.

Very flat coastal terraces determined by height to which capillary moisture rises. Little dry material simply blows away.

Inland there is a curious vegetation of clumps of Phoenix seedlings (?) and Tamaris. Occasional fan-shape palms locally said that the clumps will not develop cauliferal trees without aid of man.

Nov. 19 - air trip Dharan to Jurf. Open rocky country with scattered rounded bushes, low and there areas of dunes, these in places drifting over areas of vegetation. The most conspicuous part of the vegetation is clumps of date seedlings south along the gulf coast as the salt flats, capillary level absolutely bare of vegetation except for patches of sparse date which have caught low sand patches. The salt flats are dark grey brown, the sand pale. Some low dunes, increasing as we leave the coast. Then almost continuous dunes with some sparsely scattered clumps of dwarfed date, scattered bushes between them, especially on low spots between dune crests. Some bushes even on rather active parts of dune.

Large expanse of this duneland. Then some areas where the rock surface
has been scorched clean, flat bedding being removed at one or two different levels in places giving amoeboid forms. Then some rather extensive salt flats much darker in color than either the sand with bedded salt. Some dunes here rather crescentic in form, inland ponds occasional probably very salty as no vegetation surrounds them. Little or no vegetation on the crescentic dunes, though some between them. Large dune strip with most ground, probably very alkaline. Then several large ones, mostly covered by date gardens. Some green wheat fields surrounded by dates and covered by what appear to be needs. Some deep natural wells.

In Oasis, the dominant tree is date, but in undercropping of pomegranate, jujube, fan palms, catappa, Citrus, Melia, Moringa, Lonicera, Oleander, tomato, citrus, Ipomoea, Cassia occidentalis, peach, bananas.

In market one merchant has basket of sunflower seed, cantaloupe seeds, pumpkin seed, sea lily, pepper, peanuts, pistachio, cedra, and beans, chick peas, pinto lentils, sesame seed, rice.

In the oasis at Khalidin, the date palms dominate, but in open places alfalfa is grown. A date palm is a common weed. Phragmites communis along canals. Ceratopteris, a broad leaved fern, and a slender grass-like aquatic also Chena in water. Tragia, melengos, and orioes in gardens. Some jujubes in shade and tamarisk around edges, pomegranate planted under date. Potamogoton, Ruppia maritima also in canal. Several grasses under date in shady places. Some areas in open evidently too alkaline to produce alfalfa. Lawsonia, crimson jujube has less green root beneath.
Air of Khadhur

Spring with small field, some date, my and terracinas. Bottom ting with Chana
some rice. Around edges of my field Parshau
vulpinatum or something similar.

Another spring with
Limping around edges, I have
also Parshaua a long
grass-like succulent.
Erectal. Floating Keratopla
and around their edges, giving rise
to some vegetation.

Air trip with Prem Nofin

Some ponds - some evidently
so salty that nothing grows around them, others
with a dark greenish vegetation.
Salt flats absolutely bare
grass. A sand ridge around
them with bushes. A wet
sandy field with sand
pushers, each holding a
mound of sand. Small
flat topped hills are remnants of an old surface.
The sand near
is partly gray, partly
tanish. The mining is not at
all complete, possibly some
wind sorting.

The flat terrace due to
the capillarity table extend
a long way (some miles) in
from the gulf, but is in
most places covered by
dunes a semi-stable sand
flat.

In general perhaps
75% of the country is
covered by sand, half or so
of it active.

The gulf coast is, in blue
mark of bars, shallow
lagoons, etc. in some
places rather sharply
set off, but generally shale.
Some rise lying at new
miles out in the gulf.
Many such between
mainland and Bahrain.

In sandy areas are
about a general order of
magnitude of a clump of
vegetation - large palm clump,
rounded bushes, and small
tufts of sedges, grasses, etc. etc.
Nov. 15 - Sheathed Island

Elongate sand cay with a low beach ridge along seaward side, depression in interior enclosing a pond, very shallow, bottom rather flat.

Along a part of the seaward coast thin beds of very soft friable beach rock at south end of this discontinuous exposure it is dark gray-brown, the grains covered with a slimy dark organic matter, the remnants of the top layer falls, (fig.)

gets harder toward middle finally breaks out in a feeding fashion away from parent beach ridge

Landward beach ridge slightly lower than seaward. Enclosed pond mainly shallow but with a small deep spot at the north end. Shallow channel running sinuously southward and finally cutting through the seaward beach ridge.

This channel has two tiny strips of very thin, very soft beach rock partly thick, very gently dipping toward channel.

On inner slopes of beach ridge and small flats between it and pond is an irregular thin vegetation, mostly of a very fleshy beardgrass or suffruticous chenopod, a few mats of a halicarnia-like me, this blue-green, the other yellowish and partly dried up. The greater part of the islet is bare.

In the pond were a few individuals of a curious coelenterate, like a medusa that rests on the bottom, tentacles up, like a sea anemone. It moves slowly over the bottom. When turned over in the water, it pulse, like a medusa, then turns over and sinks. The tentacles are short, thick and slightly branched, gray-brown, very well camouflaged against the bottom of the pond.

Cassiopea andromeda (legophormidae) (cuv. Ted Bayer)
Nov. 15 - Chos Chug Island, Persia.

22 Dec. Dharam

Lax open calcareous sand

3897.3 (lacks) Haloxylon salicarium dominant when there is any vegetation.

94 (lacks, ? Arthrocnemum glaucum?)

Nov. 16 - road from Dharam to Dammam.

Rather irregular rolling coastal slope, almost level, sandy with gravel and bedrock showing through occasionally, white chalk. The surface is hummocky, with small mounds of sand, up to 1-3 dm. high, 3-5 dm. across, each surrounding a tuft of one of two sedges or another greenish, leafless plant.

Road from Dammam to Al Khabar.

Part of this is sandy and hummocky like that described above, away from Dammam clumps of dwarf palms become bushy, dense, suffruticous, leafy, to 0.5 m tall, splitting calyx soft, very fleshy, leaves fleshy. Stems swollen, taste fleshy bluish green, forming a low circular mat-like hub.

More and more common locally. Near Al Khobar, the ground becomes less sandy and firmer and with many low bushes, especially Hyphophyllum coccinum. Near the town are some sand dunes with fanus planted to stabilize them.
Nov. 17 5 km. w. of Coast Guard st. 73 km. w. of Herman, tundra, alpine

Crescent dunes of fine to medium sand, the coarse grains red-brown, the fine
grains the coarse warts of wavelets.

The principal plant is Euphorbia sp., forming very widely scattered small
clumps on the less active slopes of the dunes, great dense clumps in the
spaces between the dunes. Seedlings common in sand.

Depression in concavity of dune has a salt flat in it surrounded by

sand...sun...hummocks

Low ground with hummocks formed around clumps of Euphorbias and of the slender
glass. In the sand between the hummocks are several plants but there
are not abundant. The mat-like Distichlis and other grasses occasional here and
in the salt flat. Tamarisk rare in salt flat.

Many hummocks of Euphorbias are dead. Both

around salt flats and

on dunes

Humarocks about 6 ft. high, 1 ft. across, or

nearly smaller, some
twice as large.

Euphorbias are capable of

producing heavy vertical rhizomes and spreading

up with some sand
accumulation.

The sand grains are

round like pebbles up to

1 mm. or even 2 mm. diam.

reddish tan. Fine dust-like
material gray.

Salt flats dark
gray-brown, salty, with

atmospheric efflorescence when dry, have somewhat
moist,
two or more orderly

ripples or wavelets

and roughly 1 cm.

of dunes.

The dunes are facing

oriented with concavity along

southwest to south. Today

the wind is coming from

near the direction of the

concavity and the concavity

function as a baffle.
158

1957  Saudi Arabia

Nov. 17 - 33 km. W. W. of
Pharor, toward Abyzoua
In depression between
dunes

1 3.8895
2 Cyperus
   By far the most abundant
   plant, forming sand hummocks
3 94 Cyperus
   same
4 97 Cyperus
   at base of inner dune
   slope, deeply buried.
5 98 Distichlis
   on thinsand on salt flat

2 97 Ragonia?
   on sand on salt flat
3 3.8900 Anchusa?
   occasional on low sand mounds
2 01 Tamarix
   rare on salt flat
3 02 grass
   common on sand hummocks
4 03 (List? Phacelia?)
   rare on low sand ridge
3 04 grass "edge"
   common on sand mounds,
   same
   on low dunes
3 05 rare

4 06 (grass)
   common

Al Ah

casefitece

casefitece

forming a dense mat.

compact closely branched

head up to 4 dm. high.

hills with ascending

stems from base, almost leafless.

depressed green shrub

steak.

loosely casefitece.

steak, almost dried up.

glaucous gray.

intricately branched

rounded mass 0.7 m. high.

shrubs x m. tall, much

branching, branches terete,

petals crimson, with white edges,

fruit with crimson tints.

casefitece erect shrubs.
The Dhawan area is readily divided into four physiographic types of country. On the Dhawan dome and anticline there is rocky outcrop and hill area, mostly bare rock, hard brown limestone, occasionally with small thin areas of limestone covering. This has almost no vegetation. It is an places cut into hummocky little buttes, some quite isolated from each other.

In lower ground there is a gently rolling or sloping type, either sandy or gravelly, with innumerable small hummocks of sand held by clumps of Cyperus or other plants, this covering all almost sandless with fairly abundant vegetation of a number of species. This lies on coastal slopes and between dune areas, sometimes extending out over the coastal salt terraces, i.e. either gravelly or semi-stabilized sand. These are small to vast areas of crescent dunes. Where these impinge on the coastal salt terraces the description is more applicable.

The last type is the absolutely flat salt terraces with no vegetation. There are numerous thin sheets of sand, several irregularly branched tidal inlets on coast. At the mouth of one of them, enclosed by a conspicuous hooked spit, is a small compact city. The country has no visible vegetation. Back of the city sandy desert with major dune ridges at about 70° to course. These crossed by very sharp, closely spaced ridges parallel with course. Clusters of crescent dunes not well formed, scattered there and there on this. The major ridges well separated by flat bare plains. Then the dunes become irregular, then a broken range of low but sharp mountains, then gently rolling, alluvial fan country, then irregular flat, nestled, sharp low mountainous country. The drainage is out of this toward and through the first broken range. This is no visible vegetation even through sand.
The mountains are very rugged and come down almost to the coast, with a very narrow coastal plain, but with several large valleys cutting through, one to left of course ending in a semicircular bay. The coast generally looks like a great fault scarps. The mountains increase in height from the interior toward the coast.

**Wild Karachi area from air.**

Landscape of parallel ridges formed by tilted beds, not a sign of vegetation, but some apparently cultivated patches. Then irregular low hilly ground with washes with bushes, but very sparsely vegetated. Light grayish brown color. Braided washes and level desert savanna with no continuous relief. Segment backs of narrow coastal flats.

The city is large and sprawling, without trees, but with a big green field in its middle. Scattered low hills, then a range of higher ones to the north. Flat ground locally gullied. Vegetation holding hummocks of sand.

Around field Calotropis is common, also, grasses. A compactly branched cespitose Euphorbia (c) looking like a cholla cactus. Considerable cover of dry grasses and weeds, scattered low bushes.

The only ornamentals around the terminal are Lepidium sytran (budh), Dodonaea viscosa (budh), Kokia carophyllus, Trees ok.

East of Karachi a large dry wash and some patches of green irrigated land. Vegetation in cultivated areas sparse but noticeable, bushes, and small trees. Trees in irrigated sections. Cultivation disappears rapidly to eastward, giving place to desert flat country cut by meandering rives and small dry washes. Evidently sedimentary beds lying rather flat.
Low range of hills, darker than sandy color of country across come about 60 feet to E. Country of washes, ravines, flat, very little vegetation visible except some along certain washes, and a few tiny cultivated patches. Then several valleys with many cultivated patches protected by wind breaks of trees. This is a few miles. The Indus River. These valleys lead down to the river. The river course is broad and bare, meandering. Few vegetation than is usual along its banks. Water very muddy. A dam across directs water into a large canal. Range level a bit back from the river on east side. There much apparent irrigated land—sun reflected in water in ditches and on ponds nearer river. Many towns and cities country to east thickly populated, some small areas of dunes. Great network of canals. Land generally dark gray-brown, some green, an
edge a small city or large town. Then flat dry land, partly cultivated, mostly desert. Here a very low point, blocking structure of longitudinal rising sand, running northeastward, rising gradually and shearing off abruptly onto three smalls running southeastward.

This continues for a distance then a dry streambed. North of this a strip of numerous small rectangles serves as patches of yellow color, several hundred miles wide, to south a bow rugged range of mountains.

To south of river, some strips of irrigated land, some dry farming. The river is that running past town, More and Many cultivation. Course follows some miles north of river. Valley mostly cultivated, but generally brown in color, very few small green patches. Village numerous. Another immense cultivated plain this with much less irrigation and more dry farming. Level large reservoir a lake to the south. Rivers running north, near course, much smaller, some vegetation along banks. More green in field, live, but general color dull, slightly reddish gray brown. North of river a small bare range of sharp hill, reddish, brown.

A few small hills and a shallow lake. These areas that have scattered trees like palm savanna. Then a series of southwest trending sharp ridges and several fairly large alluvial lake, smaller ones dry. Palm savanna becomes less evenly distributed. Areas of low hills that looks like dunes (but may not be) perpendicular to come, like waves.
Alluvial fans at base of ridges very much dissected by small dry washes between the ridges, running to lakes.

More such ridges, but only short lengths, than more conspicuously vegetated. Cultivation mainly England, if I am interpreting the rectangular pattern rightly. Then under the corn, areas of intricately gullied land, the gullies cut into fields, probably recent.

Then land rather solidly cultivated except in a few strips. A vine system apparently tamped up, running slightly northerly of east than course.

Then more range of rolling low mountains, crossing course at about 60° south. Nearing New Delhi, some of these mountainous quite rugged, rather high.

Nov. 19 - trip by auto to Agra from Delhi, and back.

The country here seems green and much wetter than that flown over yesterday. Road lined with trees - mostly Aeganadha, and also other species - Ficus, Poutera, Tamarindus, Parmentiera, Phoenix, Acacia, etc.

The fields are cultivated, mostly pigeon pea at this season, already harvested.

Scattered trees in fields - Pongamia, Sesbania, etc. Phoenix, etc. About half way to Agra, Tamaris becomes most abundant tree in fields.

The land in a distance on each side of road is badly vegetated and eroded, with Prosopis and Acacia, some places like a thin forest, elsewhere open savanna with clumps of leafless spiny caffias with vermilion flowers.

Grazing animals very abundant. Birds also, especially...
Ganges R. in sight.

Along course to

north, very broad and

very bordered.

Town of country still long,

but many cultivated

patches green.

Conspicuous gully erosion

does not extend far east

of Delhi.

Many old channels and

ruins, south of Ganges;

mostly with home trade.

Sheet erosion continues
to be noticeable.

Crossed Ganges - not

very muddy but not much

water, broad sandy flat.

Some uncultivated areas.

probably flooded seasonally,

along river, but scarcely

some vegetation than in

higher areas.

As river goes southward

north of it are specially

tenacious rather bare

uncultivated areas, and

north of these rather dense

cultivated areas with

many trees around

houses and villages.

Then more uncultivated

smaller areas, some

eroded, some stream-bottom land.

crows, crows, crows, etc.

and various waterfowl

and shore birds, pigeons,

swallows.

Indian buffaloes and zebras

most abundant animals.

many sheep (wool sheep),

swine, hogs, many donkeys,

and a few water buffaloes,

etc. Monkeyelly.

NW. - air trip, New Delhi

via Calcutta to Bengal.

East of Delhi the land is

flat, intensively cultivated

but with considerable

areas of intensively and

irrigated, gullied land.

Landscape at this season

is brown, locally greenish.

Many villages.

Irrigation canals, small

reservoirs, etc. study.

Along river, probably Ganges, is

extensively meandering.

Toward south. Some of

landscape somewhat

green toward east, some

sheet-eroded land.

Many ponds. More sheet erosion

and more canals eastward.

Himalayas in sight in the

distance.
General view of landscape becoming greener, rather than browner, eroded areas being bare. Many meandering old stream channels, on both sides, of all sizes, some dry and cultivated, some partially or wholly filled with water. No gallery forest whatever, nor has there been so far, since leaving the U.S. More and more trees in landscape but no forest - scattered trees, thickets, small unplanted patches common as well as around houses and villages. Traced half, scarcely regulate areas still common, but smaller and more numerous than earlier. Occasionally fairly large ponds. Some bed areas not so inconspicuous divided into plots, without trees, rather sharply defined. Many of these partly flooded. Still large irrigation canals. These, both here and westward, are very straight, disregarding minor topography, even crossing fairly sized streams as aqueducts.

More uncultivated land, some evidently subject to flooding, unelevated, many shallow floodplains. Magnificent snowy range of Himalayas with clearly visible traces, aspect becomes drier again as we approach and then an enormous northward meander of the Ganges, here with much more water than when seen before. Some areas east of it appear flooded, but not clearly visible. Aspect still quite dry.

Much cultivation. General color brown, a few trees around the numerous villages and along small roads and field boundaries, also local patches. Then a broad sandy bar or river bed, with a few small braided channels. On it, this apparently contained by levees. A big canal to east of it and crossing it at a distance, and a tower of course perhaps the bridge that enters Ganga at Patna. Suddenly the cultivated fields become much larger.
plowed and were regularly arranged. The soil very dark. Possibly collected farm in cotton soils? Then some dark, rugged hills and mountains rising sharply from the rather low plain, a large range of them farther south possibly running south into Oregon. On a two isolated such hills to eastward greenish with thin grass. Toward and fairly large affluent, running north into gorge, then another and more hills. The toposogaphy roughens and suddenly becomes partially forested. The trend of the hills is about eastward a north of east, becomes dense, then abruptly disappears as country becomes level again, though here the drainage patterns are very well outlined by trees. Then a remarkably very narrow sharp almost continuous ridge looking as follows: "

More hills, especially north of course, scattered

South of it, densely wooded, rougher land—not all wooded, flat places bare or grassy. Very high peak near French, many smaller ones. These all look like intrusives. The trend is eastward. Many tiny isolated are protruding up through the plain north and south of main range. Some linear ones not quite parallel with the rest in distance south. Plain predominant, brush, scarcely cultivated in some lifting. part except for small patches, limited areas of widely spaced large trees, windbreaks or hedge, surrounding houses. Cropped. Denuded. Pine-wide shallow, Braided. More isolated intrusive hills south of it. Plain now has few trees. But flat worn wooded. Scattered cultivation. More rough land, steep wooded. Many small ponds on flatter land which is now mostly grassy.
India

Hills here are lower, less abrupt, not likely Intensive but erosion common. Vault now covers considerable area. Flat grassy areas narrow, more or less dendritic reticulate. Another medium-sized river, affluent of Damodar, with broad grassy area on both sides. Mattock of wood, hedgerow around house and ponds. Course more a less following this line hill south of river. Then a vast plain with many villages with trees, ponds surrounded by hedgerow, but little cultivation on some areas near locally. Old meandering channel lined with houses surrounded by trees. Land now green, and more cultivated. Several meandering streams, apparently distributaries, as they widen out southwest. The house-lined channels become numerous looking like galleried fruit. Notably this whole plain is in rice but hard to be sure. Considerable areas of village, tree garden. Hooghly River, Road and

India - Pakistan dirty. Calcutta a large dull reddish brown city with no trees. East of it large tidal ponds surrounded by tall green reed grass. Then broad flat plain with abundant old meanders filled and in rice. Many villages. They complicated structure, with places considerable areas of water, some of tidal flats are marsh and not cultivated. Intricate networks of large channels. Islands grassy toward land, mangroves toward sea. The grassy area may be mostly wet as the channels are lined by bushes but little noticeable. Tidal channels in the vast mangrove swamps very intricate. A few sandy areas and dikes in them, most numerous and conspicuous eastward. The channels and the head of the Bay of Bengal very muddy. Seaward rivers have some sand beaches, bars and holes. A little cleared beach only area on extreme seaward point.
On the Burma coast are three conspicuous low terraces, mostly cultivated the escarpments wooded. Much of these the hills are wooded.

This arrangement continues in the south south of here near, rising to the inside the point there is an estuary with a mangrove swamp. Southward they are considerable cleared areas. Much of this the marshy moors are intricately dissected and on the west side covered with what appears to be rain forest. On the east side visibility is poor.

At the front are large grassy areas, patches of forest and many areas of paddy fields. Some very green grassy areas. Some grey fallow areas mixed with green fields. The meandering Bazarre ions.

On the east side the greater part of the cattle low land is cleared. Gallery forest along rivers and streams. Many areas of old stream channels and small lakes and adjacent flooded land. Broad gallery forest along streams in otherwise intensively cultivated land. Then very extensive marsh and land, some of it in rice, dwelling along natural holes along streams. Much flooded land in vast areas of marsh and some swamp. Then the Inawaddy, a broad muddy meandering river. Tremendous areas of old channels and slough, more extensive marshland and great flooded areas. Less rice away from hands than near it. Marshes then much rice with areas of higher ground with small flocks with hedges. Toward the sea, the land is intensively cultivated, but with winding tidal channels and estuaries. Rice patches partly brown partly green. Reflections of sun shows considerable area under water. Mangroves right along coast, mostly leading south.
The Gulf of Martaban is very muddy. The east side of the Gulf is low, with sand beaches, some marsh and swamp, but with extensive rice fields, cut by wide sandy accreting tidal channels, then with gallery forest on narrow natural levees. Very soon the country is hilly, the hills mostly grass-covered but with wooded ravines. Where ravine bottoms are low there are paddy fields. The grass is bright green, probably Imperata. Large meandering streams with numerous paddy fields along them. Higher ridges between Burma and Thailand densely forested and very complicated. A considerable width of very rough, sparsely forested country. The border must be examined since it follows the divide. Some paddy fields in larger valleys. Eastern is solid dense forest except in south of course a rather sparse patchy area with some low bare windings and cliffs.
Nov. 24  Road to Ban Na
Flat rice fields, with
Termite huts with trees, up
boulders of low but abrupt
range of hills. steep, steep
slopes are brushy, locally
very dry, mostly with
banana bunches between the brush
small trees, locally grassy
with scattered brush, dry
places badly eroded. Toward
Ban Na scattered trees of
Dipterocarpus suffruticosus;
still remain from the former
forest. Some brashness.
The water here has
recently been much higher,
said to flood during rainy
season, now drying very
rapidly. Reddich ditches
have only shallow muddy
water in bottoms, small
fish very abundant, being
fished intensively by very
extensive methods.

Nov. 24 Raining
Degraded dry evergreen
forest in steep canyon
with swift stream
at lower altitudes the
forest on the canyon sides
is very open and logged
out, with a solid layer
of Musa acuminata,
other weedy species in
more disturbed places.
This part has been subject
to fire, also. Above, here
on steeper rocky slopes
the forest becomes much
better, but still very
irregular, much
undergrowth of ferns,
shrubs, vines, saplings,
small trees - no definite
layers. Trees to 30-40
or more. Many vines
and lianas both here
and below, also rattans,
but only young ones
of no the habitat seen.
Innumerable buttressed
trees - Tetrameles? Some
aridus, caudiciforms, etc.
Ficus. Few epiphytes.
Cacti - in ground
layer, all seen small.
1957 Thailand

Nov. 14 - Naeng Raising canyon, hills northwest of Nakorn Nayok in degraded dry evergreen forest

32927 Cardiospermis abundant among roadside weeds and bushes

2 08 (Canthium ?)

on steep shaded rock slope

1 09 (Asarum)

on steep shaded rock slope

2 10 Lithosperma

very common in undergrowth

1 11 (fern)

occasional on steep shaded rocks

3 12

common on bare soil

1 13 (Narax gyrophi ?)

common in undergrowth

2 14 Taraxacem congestus occasional

Nov. 17 Kan Lon, base of first hill north of Nakorn Nayok in edges of muddy rice fields

3 15 (Spath)

abundant very locally

5 16 Bacuralepis

common on road embankment

vines, twining

collar brownish white, shrub semi tall, leaf to 1 in. tall, bract white, lower ones with green veins, upper white, purple veins, costa purple, base with succulent stem, small root system, flowers deep purple, tubular, 5 lobed, leaf glossy, sterile, tiers to 2 m tall, petal white, translucent (flower picked my from ground beneath, Dec)

forming a low mat, flowers transversely, flower purple.