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The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.





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Dudley Herbarium
Stanford University

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(PROBABLY ALREADY COPIED*)

Banana land brings 70.000 francs a hectar. Water is the great necessity. In summer they pay as high as 6

1000 francs a week for water. Banana patches are rented for 2000 TO 3000 pes etas annuallya hectar. The yearly production for the islands is 6.000.000 BUNCHES.

Hotel Oriental Arrecife ;lanzeret
Antonio Garcia et Garcia Arriero
San Sebastian; Gomora

Fyffes have a specially constructed steamer (cost about 100.000 dollars) built with the machine in the rear and with many ventilators. Speed 14 knots; 3000 tons. Then a they have a fleet of 1 little steamers that run to the smaller ports.

THE FOLLOWING LIST OF PLANTS OCCUR IN THE TEXT BUT WITHOUT NUMBERS.

Cupressus sempervivum
Thuya gigantea
Crataegus azarolus
Diospyrus virginiana
Argania sideroxylon (Morocco)
Melia Acederach Calla
Calla
Ruscus aculeatus
Cestrum aurantiacum
Jasminum odoratissimum
Bignonia venusta
Sida rhombifolia
Thunbergia grandiflora var.
Muehlenbergia platystachys
Eugenia Jambes (Myrtaceae trop. Asia)
Hardenbergia monophylla
Hevenia dulcis
Nerium Oleander

Grevilla Helileana
 Schinus terebinthifolia
 (det?)

Jachroma coccinea
 Platanus orientalis
 Cedrela odorata
 Swietenia Mahagoni
 Sophora
 Osmanthus fragrans (Himalaya)
 Thevetia nereifolia
 Erythrina sp.
 Eupatorium micranthum
 Pistacia atlantica
 Solanum Mauzerolesii
 Dombay molis
 Accalyphisa macrostachya
 - cuneata

Asparagus Sprengeri
 Cytisus proliferus

AT LAS PALMAS ACCORDING TO FIELD NOTE
 S ONLY (DET. not verified.)

Rhizophora mangle
 Aesculus
 Oreodoxa regia
 Platanus
 Cupressus macrocarpa
 Schinus molle Acacia Longi
 Acacia longifolia
 Eucalyptus (red)
 Ficus magnelioides

Jahandiy says along roads Las Palmas
Ficus nitida Thunb.

Hills above Santa Cruz
Teneriff. - *Opuntia*, *Euphorbia*
Regia Jubae some *Kleinia* *canariensis* Lindley.



Opuntia ~~sp.~~

CANARY ISLANDS

1916 - 1917

EXCURSION 2 I

Nov. 21, 1915

Man has changed the flora of the mountain-slope going up to Laguna completely. Streets passed planted to *Casuarina* and *Populus* (*nigra*). Further up the street car has planted *Populus* and in dryer spots a Tamarisk. On the deep soil of the plateau there are some magnificent avenues of *Eucalyptus*. In one spot between Teccorente & Laguna, I noticed several *Quercus suber* along the roadside. Occasionally also *Platanus*.

The suburbs of Santa Cruz are all terraced and every inch covered with tomatoes. Water is carefully preserved in tanks, but there is not enough for all. In fact the majority suffer.

Below where irrigation is feasible are fields of *Musa*. Everywhere rocky spots covered with *Opuntia*. Around Laguna all abandoned hills are covered with *Opuntia*. On the slopes considerable *Euphorbia* (*Regia Jubae*) mingles with it. Occasional scrub *Eucalyptus* show the dryness of the country.

The country places have dominant *Schinus molle* in gardens. Imprint of dryness everywhere. There is no exuberance



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erance about this tropical vegetation.
:in fact;with the exception of an isolated
fine *Araucaria excelsa*; one sees the same
plants familiar on the Riviera, but
nowhere as fine. *Peintiana Beugainvl*
illia, etc.

Lets of dust on the road.

With the moister richer region
of Laguna some (*Mimosa dealbata*). Then
for miles wheat fields have replaced the
original vegetation. In the gardens of T
Teoronte are some fine pines, *Schinus*,
Roses, *Fraxinus Phoenix canariensis*! and oc
occasional planted *Laurus canariensis*.
The square is lined with fine *Ulmus*. Throug
out the plateau region *Heliotropum* forms be
beautiful, big bushes; and *Rosmarinus* is cove
ered with flowers. The *Cleander* doesn't
look so vigorous.

The high peaks to the south show
a sparse forest of *Ficus* on the crests.
A few planted patches of pine are al
also seen on the slopes of the plateau.

The grainfields are now white with a c
crucifer (*Diploaxis cruceoides*?) and ye
llow with *Calendula arvensis*. The grain
is already 6 inches high. Some potatoes etc.

Back of Laguna is the big lau
rel forest.. Some patches ingullies to the
south, seem to indicate, that all the count
ry was formerly thus covered. Now nothing
remains; but a stray laurel in a creek
looking miserable amongst the arunda
cultivated.

This plateau region is typical
South Europe. Oranges are scattered all
around the houses, but only become mere m
numerous and fine on the western rim,
of the plateau, where exposed to the ocean.

more Wal
Walnuts are common, with some chestnuts.
and other fruits and vegetables, of



3

the Mediterranean region. (Figs! peaches, apples etc;) *Diospyros Kaki* is seen everywhere.

Vineyards are seen but rarely. On the roadside, under the plants of *Tamarix* and the *Daphne Gnidium*

(rare) the ground is green. We note *Oxalis cernua* and other familiar weeds. Near Teceronte some *Pteris aquilina*. *Rubus* forms dense thickets in waste places; and the blue flowers of *Vinca* common.

From Laguna to Teceronte is cultivated land of no interest botanically.

I saw troops of girls carrying loads from stuff on their heads from Teceronte to Santa Cruz. What a free gait!





Cave Dwellings Santa Cruz
Teneriffe



8
Laguna

EXCURSION 2

SANTA CRUZ TENERIFFE

Following the coast for three miles to the north.

In the streets of the city *Alternanthera aelyrantha* grows amongst the paving blocks; and *Juniperus phoenicea*, *Casuarina* and *Eucalyptus* are planted;

The road is then blasted out the cliffs, and we pass numerous cave dwellings.

Familiar weeds greet us on the wayside

Senecio cleraceus
Picridium tingitanum
Inula viscosa
Chenopodium murale

It, as yet, too early for them only *Calendula arvensis* is abundant.

Amongst these intruders, we see the fleshy leaves of the native *Beta Patellaris* and *Aizoon canariensis*.

The commanding note is, however, given by the grasses. DOMINANT.

Tragus racemosus Hall.
Cynara Dactylon

ABUNDANT.

Trichoaena Teneriffae Parl.
Eragrostis Barreli ex Daw
Penisetum cenchroides (slides) Rich.
Andropogon hirtus (cracks rocks)
Cyperus rotundus L.

Maritime flats now show a carpet of the fern "*gracilis*" of *Spergularia marginata*. Or again, patches of *Pertulaca Cleracea*.

The mountains rise directly from the sea. Their flanks and crags, above 50 meters, offer by far the most most interesting flora. Xerophytic paper excellence. The weird cactus like

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vertical windmill
Santa Cruz Terceira 10



A farm in the coastal belt
of Terceira. Orange, bananas
figs. - *Euphorbia corollata* pubes

4

Euphorbia canariensis is abundant; and often offers a refuge to the climbing *Rubia fruticosa*. This *Euphorbia* is already in bloom. When the stem is bruised it furnishes an astounding quantity of milky juice. After washing my hands this latex formed a regular rubber. I have no doubt that it could be utilized commercially.

With it is another dominant *Euphorbia*, *E. Regis Jubae*. We also note *Campylanthus salsoleides* ^{Walt.} *Phagnalon umbelliforme* ^{Walt.} *Salsola vermicillata* ^{S. Aubl.}

The most abundant is *Zellicofera spinosa*, which runs down to the water's edge. As does the fernlike *Pleocoma pendula*.

ON THE SLIDES COMMON.

Erodium cicutarium ^{L. Her.}
Bidens pilosa ^{Sch. Bip.}
Artemisia reptans ^{Ches. Sm.}
Salvia aegyptiaca

Where the canyons spread out their deltas, *Argyranthemum frutescens*, form *Linneanum*, become common. Here in cracks grew species of *Fumaria* 5 (*muralis*)? *Nicotiana glauca* runs riot everywhere.

The gravel beds bear water and where any soil can be scraped together, irrigation permits exploitation. The water is lifted by curious vertical windmills. These little farms form little oases in the desert of rocks. Bananas (and sometimes tomatoes) are the crop. Around the houses we note

Bougainvillea
Jasminum odoratissimum
Albizia Lebeck
Ceratenia siligua
Araucaria excelsa

Excursion 4

Teneriffe

LAGUNA (1)

December 2, 1915

Laguna (L)

Forest Mercedes & M)

Return by way of Bufadero

e-(upper "cloud region")- A : lower
-"dry" -B.)

The plain(draind lake) of La
guna reminds one of a landscape in
southern Europe, only the snow clad co
cane of the Teyde giving it a distincti
tive character. I took a false read o
wing to the deliberate false indicati
on of a native. The fields were yellow
with a *Calendula arvensis*.

Oxalis cernua

Androsacmun Webbianum

Rubus ulmifolius

Daphne Gnidium

Pteris aquilina

We are in the full cloud reg
ion. this once the home of laurel fores
ts. Today the last rests are found in
in the canyon and on the surrounding s
lopes of Mercedes. Even this last gre
ve is not typical, as the most valu
able species have been cut out. At th
the fringe, the wood gradually thins o
out, only a few trees of *Erica arborea*,
and scattering straggly bushes of the
forest essences remain. This then (if
not cleared entirely) passes into the
Erica arborea maquis, the final stage.
For miles to the north (towards Tagan
ana) this is all that remains (Here is a
also some *Erica scoparia*). Man does hi
s best, to keep this growth stunted. Pal
Only on the highest crest a scrubby g
rowth of young *Pinus canariensis* rem
indsef a destroyed forest.

The laurels (and *Erica*

6
 arborea) of Mercedes average 30 feet in height. The different species resemble each other in habitus and leaf; so that it is difficult for a stranger to distinguish them. Here *Illex canariensis* seems dominant. RARE
Laurus canariensis - *Myrica Faya*
Myrica Faya
Prunus lusitanica

The fringe; as said is almost pure *Erica arborea*. Dense shade reigns in the grove. Sometimes only *Hedera Helix* and *Pteris aquilina* can survive underneath. Generally, however, we find a dense undergrowth of various shrubs; magnificent ferns and the climber *Rubus ulmifolius*.

Aspidium aculeatum
Asplenium Adiantum -nigrum
Davallia canariensis
Polypodium vulgare (sunny rocks)

Where exposed to the moisture-laden winds, the trees are covered with moss and hanging lichens.

In the open "transition" (*Erica*) association; stands a 30 feet *Cytisus Proliferus*. Here *Cytisus ramesis* is common for *Canariae* is abundant.

Adenocarpus foliolosus
Origanum vulgare var. *megastachyum*.

Saxifraga mauritanica

The clearings (700 meters) offer a pasture of a coarse grass and *Fumaria (officinalis?)*

Capsella Bursa pastoris
Vicia sylvestris (moist)
Oxalis corniculata
Erodium cicutarium
Trifolium (several species)
Calendula arvensis
Calamintha menthaefolia
Stachys arvensis
Polygnum

7
An occasional *Asplenium adnigrum* may come up from below. Sunny exposures throughout the mountains

show the silvery foliage of *Andryala pinnatifida*. *Androsaceum Webbianum* also abounds and at lower elevations, sometimes becomes dominant.

On dry ridge has been planted to *Eucalyptus globulus*. The trees are young, but vigorous (near Laguna there are fine avenues of this species). Here also we note a few *Juniperus phoenicea* and a dense undergrowth of *Pteris aquilina* and *Rubus ulmifolius*.

We are at 630 meters. The sunny rocks present a curious variation of *Aeonium canariense*, associated with *Lebularia intermedia*. In similar stations the latter is often a dominant throughout the region; with this the bush *Micromeria thymoides* var. *citriodora*. *Inula viscosa* is common in deeper soil.

Certain high, sunny cliffs are covered with a variation of *Petrophytes brachycaulen*. It has a bulbous stem and crowded leaves. There are numerous specimens of this plant in the herbarium at Montpellier, under the name of *P. polyphyllum*. It reaches the maximum of its development (to 60 centimeters) near the lower edge of the cloud region. One rock near this limit, rose like

like an island from the sea of trees. It

was covered by-----

Lebularia intermedia
Androsaceum Webbianum
Aeonium canariense (var.?)
Phyllis nebula
Andryala pinnatifida
Polygala vulgaris
Ceterach aureum
Nethechaena Marantae



Euphorbia Regis Jubae W.B.
Teneriffe



Euphorbia canariensis
Kleinia nereifolia Haw.

At the base of this cliff, the rich soil was covered by.

Ranunculus certusaeifolius
Arisarum vulgare var. *Subexertum*
Pteris aquilina

The "story" of transition between "cloud" and "dry", shows outliers of *Lavandula abretanoides* (already in bloom). As we descend it becomes abundant, associated with *Asphodelus tenuifolius*, *Kleinia nereifolia* and *Artemisia*, probably *canariensis*. Moist spots show *Echium plantagineum*.

A moist cave offers.
Cystopteris fragilis
Adiantum capillus veneris
Asplenium palmatum

Now the song of wild canaries is a welcome greeting, after the stillness and gloom of the forest. The thread of water of the barrance enables patches of beans, figs and Celocasia to grow.

Petrophytes brachycaulon descends to 400 meters, and more. Then we see *Euphorbia Regis Jubae*. A little later *Euphorbia canariensis*. These two seem to be shunned by *Kleinia*, which, perhaps, is the most xerophytic of all. Both *Euphorbia* go to the ocean side.

As weeds we have *Bidens angustifolia* in bloom. Henceforth the dry formation is a monotoneous repetition.

Only when a series of cliffs with mere north exposure offer more favorable stations, we find a change. These rocks are then covered with lichens and----

Lobularia intermedia
Psoralea bituminosa
Aeonium canariense
- *Lindleyi*
Rubia fruticosa
Echium aculeatum
Allagopappus bituminosa



Argyranthemum frutescens Sch. Bip.
Teneriffe.



Flocama pendula Ait.
Teneriffe

Genespermum frutescens
Senchus gummaifer feuilles (dominant)

At the base of the rocks there grows abundant *Micromeria terebinthacea*. On hot rocks further down, we see-see *Aconitum urticum* (perhaps a variety) with *Kleinia nercifolia* and *Natechlaena Yellaea*. Whilst *Dracunculus canariensis* lines the wayside, with some *Arisarum* v. *vulgare*.

At about 150 meters the beautiful white flowers of *Argyranthemum frutescens* become conspicuous. *Flocama*

pendula does not come up so high. *Rubia fruticosa* is abundant amongst the *Euphorbia canariensis*. Here peaches

are in full bloom.

As we near the coast I note it in a pasture—

Fumaria capreolata ✓
Tamarix anglica ✓
Oxalis corniculata ✓
Geranium molle
Eredium cicutarium
Psoralea bituminosa
Bidens angustifolia
Calendula arvensis
Pteridium tingitanum
Stachys arvensis
Plantago psyllium
Euphorbia peplus
Chenopodium murale (abundant)
Scilla hex- heemorrhoidalis
Tricholaena Teneriffae
Brachypodium pinnatifidum



Euphorbia canariensis + *E. regis jubae* W.B.
Teneriffe.



EXCURSION 5

DEC. 9 . 1915

Santa Cruz along coast to San Andreas
Across mountains to Teganana.

B- "Dry region"

C "cloud region"

E - "Dry" west slope

They

The cliffs rise from the ocean but they are cut by many streambeds, in to a succession of dry crags and gravelly deltas. The rare patches of soil, if water is available, bear oranges, bananas, potatoes and tomatoes. On the wayside we note Mediterranean weeds, such as

Malva parviflora

Anagallis arvensis

Chenopodium murale

The formation as far as San Andreas is the "dry" of the coastal belt.
Dominant.

Artemisia canariensis

Euphorbia canariensis

6 *Regis Jubae*

Opuntia (in spots)

Achium urbicum is common.

The rock beds are abundant.

CLIFFS

Lebularia intermedia (scattered E)

Silene gallica

Erodium cicutarium

chium

Plocama pendula pendula

Inula viscosa

--Argy

Argyranthemum frutescens

Kleinia nereifolia

Senecio gumuifer

Levandula abrotanoides

Micromeria thymoides citrionera

Trifolium (several abundant)



Tomatoes



Rumex lunaria
(Artemisia canariensis)
Inula viscosa
Euphorbia Regis Jubae

19
= Inula
plate

In creek beds are abundant

Plocama pendula
Argyranthemum frutescens

Cliffs (scattering)
Lebularia intermedia
Inula viscosa
Kleinia nerekifolia
Senecio gummiter
Lavandula abrotaneoides Lam.
Micromeria thymoides citrifer

SLOPES (SPARSE PASTURE)

Silene gallica
Eredium gallicum- ciutarium
- chium
Trifolium (several abundant)
Asphodelus tenuifolius (abundant)

Allium trifoliatum
Scilla heemorrhoidalis
Cyperus rubicundis
- Distachys
Andropogon hirtus
Pennisetum cenchroides
Cynodon Dactylon
Eragrostis Barrelieri

Leaving San Andreas to
cross the divide, we follow up, a canyon.
Here some patches of bananas, oranges
figs, onions, maize and tomatoes.

With the usual dominant of
the "dry" region, sunny stations
show Rumex lunaria. This species
accompanies us clear to Tanager a?.

PHOTO

FOREGROUND.

Rumex lunaria
Euphorbia Regis Jubae
Opuntia

Beyond Artemisia canariensis
Inula viscosa



Aeonium urbicum

"Lindleyi"

Aeonium urbicum

"Lindleyi"

On rich moist soil, at the base of cliffs/

- Geranium nolle*
- Pseralea bituminosa*
- Echium plantaginum*
- Adiantum capillus Veneris*

On rocks/

- Petrephytes brachycaulon*
- Periploca laevigata*
- Aspidium aculeatum*

As we approach

500 meters altitude an occasional *Pteris aquilina* betrays the proximity of the story of the cloud s.

Here at the base of the rocks.

- Cistus menaspeliensis* (abundant)
- Epilobium parvifolium-lorum* (wet places)

On slopes:

- Periploca laevigata*
- Artemisia canariensis*
- Aphodelus tenuifolius* (dominant)

Here *Aeonium Lindleyana* and *Aeonium urbicum* are extremely vigorous (photo) The latter is already in bloom, and its stalks, protected by *Opuntia thomas*, reach a meter in height. They are protected- covered with bees.

This transition story, between *Cistus menaspeliensis* and the true laurel vocation. (as defined by occasional evergreen shrubs and *Erica arborea*) shows as dominant *Cytisus ramosissimus* (some in bloom) and *Periploca laevigata*.

The laurel forest has been destroyed. Its witnesses have a refuge in the creek bottoms. In such stations also *Polygonum serrulatum* is in bloom. The brush now contains many members of the original forest. It is an open formation, with *Erica arborea*, *Cytisus ramosissimus* and *Pteris aquilina* dominant.

VS

N

Senecio Tussilaginis covers the ground, in the forest and in the open; and is just commencing to bloom. This species crosses the divide and descends far down on the Taganana slope.

The fringe is always *Erica arborea* and *Pteris aquilina*.

The west slope is bare; but the climate seems to be moister. Nevertheless the Mediterranean plants come up high. DOMINANT.

Artemisia canariensis
Rumex lunularia
Asphodelus tenuifolius

SCATTERING

Periploca laevigata
Rhoderrhiza florida

At lower altitudes, approaching Taganana, the cliffs show.

DOMINANT. *Euphorbia canariensis*
Regis Jubae
COMMON:

Lebularia intermedia
Pseraloe bituminosa
Aeonium Lindleyi
- *urbicum*
Inula viscosa
Artemisia canariensis
Kleinia Nerifolia
Senchus gummifer
Lavandula abretaneides
Andrepegen hirtus

Cheilanthes pulchella
ROADSIDE ---Taganana--- in bloom
Silene inflata
Sida rhombifolia
Oxalis cernua
Lotus glaucus angustissimus
- *sativus*
Aeonium Lindleyi
Lippia nediflora
Allium nediflora

Then we note *Pyrus communis* in the hedges, and *Rubus ulmifolius* and



Wild Phoenix - Taganana



Dracaena - Taganana

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 Withania aristata on the walls.
 As on the east coast, the
 delta of Taganana creek shows a carpet
 of the white starred *Argyranthemum*
abrotanoides-futescens, with a little

Lavandula abrotanoides. Whilst the
 ocean cliffs show *Crithmum maritimum*:

The canyon of the creek offers the catkins
 of *Salix canariensis*, and a few straggling
 Phoenix (photo that may be wild. All

All the coastal cliffs are terraced
 and produced a good white wine. For the
 first I tasted Guavas. Then we have
 lequat, peaches and various exotic shrubs.
 Sweet potatoes are a staple.

The most interesting feature
 of this landscape is the *Dracaena*,
 which clings to the inaccessible
 rocks, above the town. Some fine specimens
 have been spared near the houses and
 in fields. (Photo). The village priest
 at has several in his garden.
 One is almost as big as the famous one
 of Laguna. It is younger, but
 higher and more symmetrical.

EXCURSION 5

December 11, 1915

X- Laurel forest, south of Taganana
 Y- adjoining *Erica maquis*

A beautiful forest! It is almost
 virgin and numerous climbers (among
 which I recognize *Smilax mauritanica*)
 make it almost impenetrable. What a
 change from the almost rationally
 exploited Mercedes forest; with its poverty
 of species, and sparse undergrowth.
 All these trees (excepting of course the
 abundant *Erica arborea*) have the same
 big glossy leaves (coriaceous and
 evergreen). The stranger cannot tell
 them apart. The shade is intense; it
 is almost dark.



Erica arborea (Ilex canariensis), *Davallia canariensis*
Taganana



Woodwardia radicans, *Erica arborea*, *Myrica*
Laurus canariensis, *Davallia canariensis*
Aspidium aculeatum
Ilex canariensis, *Aspidium*
Erica arborea, *Asplenium*
Aspidium aculeatum
Davallia canariensis

In its general physiognomy; when mere open, it shows a resemblance to the canyon flora of the California Coast Ranges, with its Live oak; *Umbellularia* and *Arbutus*.

Taganana weed bears a glorious stand of ferns.

Woodwardia radicans

Adiantum Capillis Veneris

Adiantum reniforme (rarer too dark)

Aspidium aculeatum
- *elongatum*

Asplenium palmatum

Cystopteris fragilis

Davallia canariensis

Davallia climbs up on the limbs of the trees. (Photo - *Erica arborea*, *Ilex canariensis*, *Davallia canariensis**)

On cliffs we note *Aichryson echetumum*. The ground is carpeted with moss and *Selaginella denticulata*. Here I collected an abundant herb "einbeere" 145, which I lost.

Androsaceum Webbianum is present but rare, it seems too dark for it; for as soon as we enter the adjoining open *Erica* maquis it becomes abundant. I only observed several species as shrubs in open spots, probably second growth after cutting out. Here were

Rhamnus glandulosus

Viburnum rugosum

Phyllis nebula

Apollonias canariensis (in bloom)

Myrica Faya

Here I collected *Erodium*

Epterys. The dominant tree of the wood (perhaps so on account of the axes) is *Laurus canariensis*.

Ilex canariensis

- *platyphylla*

Rhamnus glandulosus

Ptelemeria canariensis



Looking south from Top of ascent from Taganana
Erica (arborescens) arborea
Cut out wood house rising

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Taganana

Myrica Faya

As we approach the top of the ridge; the forest gradually becomes more open; the axe has been active. Finally a dense, tall maquis of Erica arborea is all that is left; and only isolated bushes of testify to its vocation in spots, the charcoalburner has even all but destroyed the Erica.

Where cliffs rise above the maquis, we find an interesting flora. Here, probably once grew the rare species -- Tinguarra, Sinapidendron etc.

DOMINANT.

Lebularia-intermedia----

Aeonium canariense

Petrephyes agriostaphis

ASSOCIATION.

Lebularia intermedia

Polycarpha teneriffae var. latifolia

Portulaca oleracea

Aeonium Lindleyi

Senecio tussilaginis

Periploca laevigata

Micromeria Thymoides

Salvia aegyptica

Plantago arborescens

Andropogon hirtus

Notochlaena Marantae

Vellae

Polypodium vulgare

Cystopteris fragilis

Blechnum spicant

Taganana has no roads. The people cannot export their produce. Hence they are every peer.

Wine is carried in 5 gallon demijons, across the mountain to San Andreas, 10 miles. Trails are rough and almost impassible in wet weather. As the load is carried on the head of women, a slip means a broken bottle; and the carrier pays for the damage. Thus the poor woman walks 20 miles to earn

one peseta.

I met many women and girls collecting dead weed upon the ridge beyond the forest. The heavy load is then carried to the village on their heads. This means a hard day's work. Their average wages for a load is 8 cents U.S.

Competition is keen. Weed is hard to find, so they must go further and further. They are not allowed to cut any tree or bush.

All would like to leave the country, but they are too poor. The fare to Cuba was formerly 14 dollars, today it is 40.

Excursion 6

Dec. 16, 1915

SANTA CRUZ south 5 miles 1/2 from the COAST; elevation 300 meters.

Available water means an intensive growth of bananas and tomatoes a little maize and rare wheat. I counted 16 olive trees; and a few Ceratonia.

The great mass of the land, however, is a rocky barren waste. It has not always been so. As far as the eye can reach, ancient terraces cover the slopes to tidewater. Today Euphorbia Regis Jubae var. canariensis, whose foliage glads the adjoining cliffs with a tint of green, has taken possession. Whilst Euphorbia canariensis is not abundant. The latter is in flower and attracts a host of insects. Kleinia is completely absent from this region. It is too early for annuals.

Common

Plecama pendula

Rare

Asphedellus tenuifolius

17
Fagonia cretica L.
Rubia fruticosa Jacq.
Lycium europaeum L.
Micromeria thymoides citriodora ^{W.B.}
Salvia aegyptiaca

-----EXCURSION 7-----

December 17, 1916

Santa Cruz -----Barranco de Buffadere

Coastal cliffs
Campylanthus salsseleides Roth.
Creek
Silene gallica
Ricinus communis

Wayside
Phytolacca dioica

PHOTOS (see before)

Tomatoe cultures
Farm --Bananas, Oranges, Figs,
Foreground- Agave, Piccama,
Euphorbia argyranthemae
Euphorbia regia jubae and
Argyranthemum frutescens
Vertical windmill

-----Excursion 8-----

Decien- 19, 1916

SANTA CRUZ TO LAGUNA

After rising above the "DRY
BELT" with its *Rubia fruticosa* we come
to the denuded "cloud forest region".
However only shrubs in the canyons and
the presence of *Aichrysen dichotomum*,

Davallia canariensis and *Polypodium vulgare* *Daphne Gaidium* and a carpet of *Senecio Tussilaginis* remain as witnesses to the vocation.

Vinca major and *Spartium junceum* are in bloom.

Wayside:

- Rumex acetosella*
- Carlina salicifolia?*
- Oxalis cernua*
- Eredium cicutarium*
- Cerastium triviale*

Phoenix and Pinus are planted in the gardens and I was struck by the *Heliotrope*

VILLA ORATAVA

EXCURSION 9

Dec. 21, 1916

Cliffs along road towards north for 2 miles, back through olive-groves of bananas.

Looking downen this valley, with its hazy atmosphere and intense cultivation, one can understand the enthusiasm of Alexander V. Humboldt. The beautiful cene of the Teyde is so well proportioned and harmonized with the landscape that it is difficult to realize it's height. Way down below us, we hear the thunder of the surf.

The valley is practically one single banana grove. The terraces extend from the sea to the limit of the dry region. The bananas depend on a copious supply of water for life. At present, naturally there is an abundance of water. A streamlet rushes through the streets of the "Villa". In the height of the growing season, however there is a shortage

so the farmers have erected cement tanks to hold the precious liquid for emergencies. These reservoirs are green with *Lemna gibba*.

Above the dry "belt" where water is no more available, we have wheat fields and a few vines. A story higher presents *Castanea*, which in turn gives place to *Laurus* wood, and finally to Pines.

The banana shoots are planted in rows 10 feet apart, with trees at 3 feet distance. They are carefully trimmed. The fruit is wrapped in cloth, laid in straw, and carted to the packing house. Then it is crated with moss and its own leaves; all handling is done with care. Tomatoes are wrapped in paper, were packed in turf mull, powdered cork etc.

Sometimes we note a few *Tamarix gallica*; *varcanariensis* on the wayside. Or it may be a glabrous form of *Cassia tomentosa*. Much more conspicuous are the fine avenues of *Eucalyptus* *Populus* and *Platanus* are rare.

BETWEEN TOCORONTE AND ORATAVA I saw no *Euphorbia canariensis*. *Kleinia* is rare at Oratava. The dominant on these cliffs is *Euphorbia Regis Jubae* with a great *Rumex Lunularia*.

Common (cliffs)

Lebularia intermedia
Spartium junceum
Cytisus preloferus form *canariensis*
Rubia fruticosa A. Ben
Acenium Lindleyi ?
Acenium urbicum
Acenium canariense (2 feet across)
Petrophytes braehycaulen
Psoralea bituminosa
Allagepappus dichotomus
Genespermum fruticosum

Argyranthemum frutescens
Artemisia canariensis
Carlina salicifolia
Senecio gumifer
Withania aristata
Scilla heimerhedei
Achyranthes argentea
Lavandula multifida
Allium tridactylites (in flower)
Habenaria tridactylites & in flower
Asparagus umbellatus Andrepegen hi
Andrepegen hirtus

On rocks and shady walls, the creeping rhizomes of *Davallia canariensis* are dominant.

At the base of the cliffs, deep soil bears a carpet of *Eredium cicutarium*, *Oxalis cernua*, (dominant) and *Calendula arvensis*.

In some coves, the rocks here in abundance the showy inflorescence of *Echium giganteum*, with it is *Sisymbrium millefolium*.

The nights are cold at Cratava.

-----EXCURSION 10 -----
 December 21 1916

BOTANICAL GARDEN PUERTO CRATAVA

This garden is a mile from the sea, in the midst of banana groves. It is scrupulously clean; has a large force of gardeners; and probably abundant water. as a fountain is playing. Unfortunately the direction cares more for shearing bushes into fantastic shapes, creating carpets of *Sempervivum* and having fine rosebushes: than it does for science. Less ornament and more labels would be desirable.

The individual trees are magnificent. Most of them are without labels. When they do have a name, it is not above suspicion, as I saw enough mistakes to make me dubious of all. One big *Ficus* with spreading "plank" roots was labelled *Phytolacca dioica*; and a big *Cupressus* like tree *Cephalis Ipecahuanka*.

At the gate we are welcomed by the biggest trees of the garden, the three *Araucarias* (with trunks a meter through) A fourth (*Araucaria braziliensis*) is being killed by its brothers. Namely;

- Araucaria excelsa*
- *Cunninghamii*
- *Bidwellii*

Near by is *Platanus orientalis* with a trunk 2 meters in diameter.

The glory of the garden is its palms. The finest and tallest is *Washingtonia filifera*; it equals in beauty any specimen I have seen in the San Bernardino desert. More beautiful and almost as tall are *Oreodera regia*.

Two similar specimens bear the label *Archontophoenix Cunninghamii* (Australia). *Phoenix canariensis* is abundant and reaches 20 meters in and more in height and more. They are overtopped by a *Phoenix dactylifera*. We note.

- Livingstonia australis* (23 meters)
- Baetris Gasipés* (New Granada) 20 M.
- Jubaea spectabilis* (enormous trunk)
- Elaeis guineensis*
- Hewea Fersteriana*
- Martinizia disticha* (New Granada)
- Trachycarpus excelsa* (10 meters)
- Raphis flabelliformis* (10 M.)
- *humilis* (Japan)
- Trinax argentea* (Panama)
- Latania Commersoni* (Island Maurice)
- Ravanala madagascariensis*

In number of species and size of individualsthe genus *Ficus* leads. Some of these have trunks 2 meters in diameter. The labels tell us;

- Ficus elastica*
- Ficus Pertuana*
- F. Cooperiana* - 1
- F. religiosa*
- F. suringaria* (Ambeina) apple like fruit.

Cycas revoluta is vigorous *Cycas* *Rimiana* (Philippines) 4 meters.

Then the *Acacia* family is noteworthy.

- Acacia dealbata*
- Albizia Lebbak* 5 (45 cent.)

The genera from the Australian region are abundant and many show the characteristic phyllocladia. One unnamed specimen was 30 meters high.

Amongst the *Myrtaceae* we note *Tristania conferta* with deciduous bark, laurel like leaves, and a trunk 60 cent. thick.

Of course we note fine specimens of the native *Dracaena*, one also from Madagascar.

Some noble conifers were unlabelled; most of them probably *Juniperus bermudiana* 86- meters x 80 centimeters. Another species of "weeping" habitus reached the same dimensions. More interesting was the rare native "weeping" *Juniperus Cedrus*.

Taxodium distichum was exuberant with a trunk of 65 centimeters.

Pinus canariensis over a meter

- *Halepensis* (less than a met.

- Remarkable specimens;
- Muehlenbeckia platystachys*
- Leptospermum laevigatum*
- Eugenia Jambes*

Hardenbergia monophylla (25°)

Bombax Ceiba (7 1/2 meters)

Hevenia dulcis

Grevillia Hilleana

Schinus terebinthifolius (?)

Casuarina sp. (20 meters)

* *quisetifolia*

Jacksonia

Jachromia coccinea (6 meters)

Cedrela olerata (41/- (1 1/2 feet)

Grevillia robusta

Swietenia mahagoni (1 1/2)

Sephera

Cannella alba (?)

Osmanthus fragans (Himalaya)

Pistacia atlantica (10 meters)

Eucalyptus varius

Pandanus (5 meters)

Arctocarpus Camien (Society Islands
45 cent. trunk)

Celtis australis

Fraxinus excelsior

SHERBS.

Peinodiana

Thevita nerifolia

Hibiscus

Erythrina Sp. §11

Abutilon

Eupatorium micranthum

Echium (cardica) (Madera) 2 1/2 M.

Scotenum Mauzewlesii

Bamboos reach 9 Meters and 8 centimete
However alongside of this exuberant ve
vegetation we find sickly or dying plan
ts.

Lagerstroomia indica

Thuja gigantia

Crataegus azarolus

Diospyrus virginiana

Argania sideroxylon

Melia Azederach

Ruscus aculeatus



Villa Oratava
Bignonia venusta

24

Theobroma cacao is grown under glass, as an experiment. The elder gardeners have striven to plant a collection of native plants. It is not so complete as one would like to see it and is not labeled. Statice Brassicaefolia from Gomer is interesting. Allied species are planted extensively in the surrounding gardens. Some reach more than a meter in height.

As fruits we note

Annona cherimoya
Carapa guianensis
Psidium Guayava
Persea gratissima
Mammea americana
Lequat!

Garden plants (beautiful!)

Dembya mollis (tree) enormous foliage
Acalypha macrostachya (red leaf)
- cuneata

Cestrum aurantiacum

Asparagus Sprengeri

Climbers

Jasminum grandifolium-florum

- simplicifolium (Himalayas)

Passiflora (red and purple)

In Oratava.

Jasminum oederatissimum

Bignonia venusta

Thunbergia grandiflora var .

(magnificent BLUE!)

Sida rhombifolia

Tecoma stans (very pretty yellow fl)

(Photo beautiful Bignonia venusta

VILLA ORATAVA

25
Not far from the botanical Garden,
is the Hotel Humboldt. Its gardens are fi
filled with a small leaved (red)
Eucalyptus and abundant Phoenix es
canariensis. Near the building, abundant
Statice, Pandanus scandelabrum (of
tropical Africa) Cupressus sempervir-
ens, Acacia longifolia.

In the Villa Cratava is still anot
her small garden. As it lies above the
d "dry" belt proper, we have a different c
climat. We note: Fine

Quercus suber

Cedrus

Sequoia gigantea Pritchardia filife

Pritchardia filifera

Magnolia grandiflora

Cupressus sempervirens

Fuchsia

Tree ferns

Erythrina

Banana

I notice that I have re-
istered no ferns from the botanical
gardens of the Puerta. It is probably to
e dry.

Every hotel has its quota of tu
tubercular patients

EXCURSION--22--II

December 22, 1916

BARRANCO AND DOWN TO

PUERTO CRATAVA

The entire region from the Villa .to
the sea, is under intense cultivation.
Only a few common weeds; but a trace of
the indigenous flora is left in the bed
of the dry torrent.
DOMINANT.

Elettaria



Villa Oratava
Aeonium Urbicum on the roofs.

Rumex lunaria
Euphorbia regis Jubae
(Atriplex ? like)
Aeonium urbicum is in bloom (In Villa O
Oratava it is abundant on the roofs
See Photo)
ABUNDANT.P

Phagnalon saxatile
Argyranthemum frutescens
Senecio Tussilaginis
Kleinia nereifolia
Nicotiana glauca
(Senchus gummiifer?)
Lavandula multifida

Sunny rocks are covered with
Chenopodium murale and Artemisia canarie.
sis.

EXCURSION II

December 23, 1916
VILLA ORATAVA TO IGOD (automobile)
The space between the sea and
the cliffs is narrow; but as the numerou
s canyons offer abundant water, every ava
ilable neck is terraced and planted to
bananas.

Between Oratava and Rambla the
cliffs of the barruecas bore vigorous Aeo
nium urbicum, in bloom; with Rumex lunari
a. Aeonium tabulaeforme and Sisymbrium mil
le folium demand a little mere moisture.
A rank Juncus (Bufenius) shows water. In
the gulches grows Salix canariensis

To the south of Rambla (La Rambla a recent lava flow extends to t
the sea. Here the jagged rock makes ban
ana culture impossible; however wherever
a few feet of soil can be scraped togeth
er we see potatoes, tomatoes and maize.

On the sterile, rocky ridges (from which we have a fine view of the Teyde) straggling outliers of *Pinus canariensis* come down to 200 meters. Some *Erica arborea* is seen.

However these lava fields bear as dominant *Cistus menaspeliensis* with a few *Cistus Bertheldianus* and

Ulex europaeus. The laurel "story" seems to be wanting. Pine association an anddry" formation mingling. *Pleocoma* is seen to at least 150 meters. It is associated with *Argyranthemum frutescens* (I even found the latter in bloom at 500 meters at the edge of the forest above Iced). We will remember that on the east coast these two plants keep down in the creek bottoms near their mouths. This proves that the air is moister and the sunlight is not so intense as on the east coast. In the entire stretch from Tederonta to Garachice the only specimens of *Euphorbia canariensis* seen, were a few at La Rambla. The bare spots in this region (belt) have as dominant *E. Regis Jubae*.

To return to the dry ridges of this lava flow.

COMMON.

Withaniae aristata (also at Iced
Kleinia noreifolia

Asphodelus aristatus---

Tenuifolius (localizd)

Euphorbia Regis Jubae seeks the most favored moist spots.

There are no *Crassulaceae* and even *C. Opuntia* is rare. We see no *Crassulaceae* until we get to Iced, when the familiar *Acaenium urticum* greets us on the reefs. Further on towards Garachice it accompanies the cliffs with *Acaenium tabulaeforme*.

EXCURSION 12

December 23, 1916

ICOD TO GARACHICO

From Icod down to tide water we again have banana fields. Up near town, it is too cold, and the plants look bad, but below and along the narrow coastal strip to the south, the bananas are vigorous.

Icod is devoted to winegrowing. The branches of the vine are tied together and trained on trellises 3 feet above the ground; or they are laid on the rocks. Here we see *Schinus molle*, *Magnolia grandiflora*, and *Ficus magnolioides*. The orange trees are magnificent, and just loaded with fruit. Neglect, over-crowding and poor varieties make the fruit small. According to size you get 2 to 10 for a cent. We see abundant figs and a *Morus* or two. Then we see patches of wheat or potatoes. At 500 meters we have a good growth of *Castanea*. Further up are fine apples, to judge by the baskets which the women carry on their heads.

In Icod remain a number of *Dracaenas*, 2 feet in diameter. There is a famous one, which, if not quite so thick as its partner in Laguna, is taller and shows a trunk of 25 feet free from branches.

At the base it measures 22 feet in diameter, but at 7 feet it dwindles to 12 feet. Some of the branches have a tendency to form aerial roots. (A phenomenon I also observed here on *Aeonium urbicum*.)

In the cracks of the *Dracaena* stem grow *Linaria*, *Cymbalaria* and *Rubia fruticosa*.

The coast line towards Garachico is close to the cliffs. High above us, (moist) we see traces of the laurel forest, and below *Pteris aquilina*.

a. It is a question whether the laurel a

association ever played a n important part in the vegetation; As the frequency of *Dracaena* would suggest net. The latter (in specimens of three feet trunks) comes to the ocean side. Near Garachico the gorges bear dense stands of *Salix canariensis*, but no laurels. However on the roadside, with the common weeds, *Fumaria*, *Erodium*, *Chenopodium murale*, *Oxalis cernea*, *Silene inflata* and *Inula viscosa* (already in bloom) we find the laurel indicator *Senecio echinatus*, with *Sida rhombifolia* and *Ferula Linkii*. *Ricinus communis*, *Nicotiana glauca*, and *Opuntia* are seen here and there.

Cliffs.

- Lobularia intermedia*
- Aeonium tabulaeforme*
- *Urbicum*
- Rubia fruticosa*
- Phagnalon saxatile*
- Artemisia canariensis*
- Kleinia noreifolia* (in spots)
- Asphodelus tenuifolius*
- Withania aristata*
- Euphorbia Regis Jubae*
- Davallia canariensis* (walls)

Common.

- Sisymbrium millefolium*
- Cytisus proliferus*
- Rubus ulmifolius*
- Umbilicus pendulinus* (shade)
- Lavandula multifida*
- Habenaria tridactylites*
- Myrsiphyllum asparageides* (shade)

Scattering;

- Paronychia canariensis*
- Androsaceum Webbianum*
- Pseralea bituminosa*
- Asparagus umbellatus* (sunny)
- Senecio leptoccephalus* (sunny)
- Allium trifoliatum*
- Scilla heemorrhoidalis* (oidalis)



Icod

Adiantum reniforme

Senecio echinatus

30

Here in a few favored coves, not too wet, but shady, N.W. slope; *Adiantum reniforme* becomes very abundant.

5((((((PHOTO))))))5

PHOTOS-----

Adiantum reniforme *Senecio echinatus*
Senecio echinatus
Eupatorium adenophorum (from Mexico)
Myrsiphyllum asparagoides
Pseralea bituminosa

MCISTADDTOMS.

BOTTOMS.

Adiantum capillus veneris
Vinca major

All tanks are covered with *Lemna gibbosa*.

Occasionally, the cliffs are cut by deep canyons. In such favored stations we have a rich collection of canarian plants. Besides the usual *Euphorbia* (with *E. Rogis Jubae* dominant) and *E. balsamifera* common, we find,

Aeonium urbicum
Genespermum frutescens
Picridium ligulatum
Periploca laevigata (common)
Messerschmidia fruticosa
Rhoderhiza florida
Rumex lunaria
Asparagus umbellatus
Allium trifoliatum
Adiantum reniforme

The beaches near Garachico are densely planted to *Tamarix canariensis*.

The cliffs of Gecent- Laya (fresh) here *Crithmum maritimum* and *Statice pectinata* var. *Selandri*.

I notice that the young sports carry their fighting cocks, with them in baskets from which the heads and tails stick out.

EXCURSION 13

DECEMBER 24th 1915

-----ICOD TO FOREST ABOVE-----

Woody growth has been entirely cut out. Terraces extend clear to the pine woods (into!). Only an occasional bush of laurel or Erica is seen. PTERIS HOWEVER is plentiful. Only at 500 meters, a small, isolated patch of pine showed a fringe of scattering fine Erica arborea, Persica indica, and Myrica. For lower down I am in doubt in spite of all these indicators, whether the laurel wood was really abundant or not.

Going up we pass

Polypodium vulgare (walls)
Aichrysum dichotomum
Rubia peregrina var. *angustifolia*

A few outliers of *Cytisus proliferus* appear, and at 450 meters this species covers the barren ridges; its white flowers are just opening. As yet is a bush. On the edge of the pine forest it attains 5 meters in height, with trunks 30 cent. in diameter. *Ervum tetraspermum* covers the ground.



Icod

Cytisus proliferus

(all
of the plants
seen on the
hillside are
of this species)

With 500 meters we reach the pine pine forest, and before we penetrate we pass an open bush formation, relict of the laurel stand. In spots *Cistus Berthelotianus* forma *symphytifolius* is abundant; but the dominant is certainly *Cytisus proliferus* forma *canariensis*. To my surprise I note *Argyranthemum frutescens*.

Common;

Ulex europaeus
Eschscholzia bituminosa
Rubus ulmifolius
Senecio echinatus
Andryala pinnatifida
Habenaria tridactylites
Davallia canariensis
Pteris aquilina

RARER.

Fumaria
Viola odorata
Androsaceum Webbianum
Adenocarpus foliolosus
Carlina salicifolia
Cedronella canariensis
Myrsiphyllum canariensis

Hedges show *Prunus* ? (domestica?)

ISLAND OF PALMA

EXCURSION 14

DECEMBER 30, 1915

GULCH NORTH OF SANTA CRUZ

The city has no level ground, and the hills rise from the main street. The terraces bear the usual tomatoes and bananas, but the latter are poor. IN PARKS.

Ficus (religiosa?)

Bombax Ceiba

Cecropia regia

Pritchardia filifera

Araucaria excelsa

Platanus orientalis

Populus (alba)

Acacia (dealbata)

PANDANUS UTILIS

Eucalyptus

Euphorbia (from south Africa)

Along the roadside (abominable)

there is considerable Tamarix canariensis, and the common weeds Malva parvifolia & Chenopodium murale. Calendula is not abundant. As we leave town the weeds are more abundant.

Bidens angustifolia is everywhere, and its prickly seeds cling to the clothes; a awful pest.

WEEDS

Fumaria capreolata ^h
Erodium cicutarium ^{Wied}
Geranium robertianum ^h
Hirschfeldia incana ^h
Silene gallica ^h
Oxalis corniculata ^h
Vicia (sativa)
Galium parisiense ^h
Hedynois polymorpha
Euphorbia peplus
Mercurialis perennis
Bromus maximus ^h

On the slopes *Euphorbia Regis*
Jubae is the dominant plant. One specimen was 3 meters high and had a trunk of 15 centimeters. *Kleinia nerekifolia* is abundant. *Euphorbia canariensis*, however, is very rare; only a few bushes clinging to the sunny cliffs.

Now we have a typical coastal association.

Ferula Linkii ^{Well.}
Rubia fruticosa ^{Jaeg.}
Inula viscosa ^{N.T.}
Artemisia canariensis ^{Less.}
Lavandula abrotanoides ^{Lam.}
Micromeria thymoides
Rumex Lunaria

(My notes give also *Arg. yranthemum frutescens*, but this is doubtful)
Opuntia is not so common as in Teneriffe

UNDER THESE WE FIND

Lobularia intermedia
Crucastrium canariense ^{W.B.}
Dianthus prolifer ^{L.}
Polycarpon tetraphyllum ^{L.}

ON CLIFFS.

Gnaphalium luteo album^{L.}
 Achyranthes argentea
 Forskalia angustifolia
 Andropogon hirtus^{L.}
 Trichol aena teneriffae
 Pennisetum cenchroides
 Eragrostis Barrelieri

Retama RHodorrhizoides
 Aeonium canariensis
 Echium aculeatum var.
 leucophaeum
 Asphodelus tenuifolius (in blo
 om)
 Pinus canariensis

On walls grows Davallia canariensis.
 Shadier spots offer Pteris, but it is r
 rare; as is Androsacmum Webbianum. Creek
 bottoms have abundant Eupatorium adenop
 herum; a native of Mexico; and it spreads
 on adjoining slopes.

-----EXCURSIONIS-----

DECEMBER 31. 1915
 SOUTHERN SUBURBS OF SANTA CRUZ

Umbilicus pendulinus
 Picridium ligulatum
 Lavandula abrotanoides
 Achyranthes argentea
 Eux Lunularia
 Eupatorium adenophorum

Higher up .

HIGHER UP

Euphorbia Regis Jubae

(dominant)

*Waltheria elliptica**Echium aculeatum leucophaeum*MOIST CREEK BOTTOMS *Adiantum Capillis*
*veneris**Commelina agvaria**Calceolaria chelidonioides*On the roadside *Cassia bicapsularis* was probably a garden escape.Beyond the cemetery are several pumice stone flows. They are too porous and dry for plant growth. In the cracks sometimes a little soil enables *Andropogon hirtus* to take root, and if moister, there may be lichens; otherwise we see only a rare stem of*Inula viscosa**Gnaphalium luteo album**Aristida adscensionis*

As soon as deeper soil is available we see a denser

ON POORER STRETCHES-----scattering

*Erucastrum canariensis**Calendula arvensis**Plantago Lagopus**Eragrostis Barrelieri*

DOMINANT

Plantago Psyllium

MOISTER AND RICHER

ABUNDANT

*Dianthus prolifer**Bidens angustifolia**Plantago Psyllium*-----
*Lagopus**Andropogon hirtus*

SCATTERING

Lobularia intermedia
 Linum angustifolium
 Erodium Botrys
 Trifolium sps.
 Vicia sps.
 Ferula Linkii
 Sherardia arvensis
 Bidens pilosa
 Tolpis laciniata
 Micromeria thymoides
 Stachys arvensis
 Pennisetum cenchroides
 Cynodon Dactylon
 Bromus maritensis
 -- rubens

RARE

Papaver Rhoeas

BARRANCO

Erucastrum canariense
 Silene gallica
 Erodium chium
 Bidens angustifolia
 Anagallis arvensis blue

Up here we get a fine view of the T
 Teyde. It is the last day of the year
 but it is hot.

EXCURSION 16

JANUARY 1, 1916
INTO THE CRATER, SANTA CRUZ

ON THE ROADSIDE *Aristida asce-
nscionis* is abundant, and in passing we
note the showy flowers of *Matthiola i-
ncana*. Throughout the crater *Bidens
angustifolia* is common.

The rocks at the entrance of the
crater show a "dry" flora.
DOMINANT.

Rubia fruticosa
Micromeria thymoides
Euphorbia Regis Jubae

COMMON

Lobularia intermedia
Retama thodorrhizoides
Allagopappus dichotomus

RARE

Artemisia canariensis
Echium giganteum

The crater shows two rock format-
ions. Steep cliffs of lava (sometimes
only with *Andropogon hirtus*; but usuall-
y rich in plants) and slopes and cente-
r of a pumicelike flow; porous and dry.
These inclines, usually, are poor in pla-
nt life. If, however, soil is present;
immediately there is the dense pasture
studied yesterday, namely,

Papaver Rhoeas (rare)
Dianthus prolifer *Silene galli*
Silene gallica
Linum decumbens

Trifolium arvensis

sp.
Bidens pilosus

Picridium ligulatum

Calendula arvensis
Thrinicia hispida
Anagallis arvensis
Antirrhinum Crontium
Erodium moschatum L. Her.
 ---- *cicutarium*
 ---- *Botrys*
Plantago Lagopus
 ---- *Psyllium*
Allium roseum
Bromus madritensis
Andropogon hirtus
Cynodon actylon
Pennisetum villosum

On the basalt cliffs isolated pine
s come down to 100 meters. Various
Phoenix canariensis, high up on the crag
s are certainly wild.

On the upper cliffs where the bare
basalt is exposed
DOMINANT.

COMMON. *Aeonium urbicum* (in bloom)

Petrophytes muralis
Aichryson punctatum (dwarf
form)

Scilla hoemorrhoidalis
Tolpis laciniata

RARE.

Petrophytes agriostaph yes

Two species of *Orseille* (279, 280)

Rocella luciformis Ach., *R. phycopsis* Ach.
abund. with numerous other lichens
Usually the rock surface is hidden
by brush.

Rubia fruticosa
Kleinia nereifolia (to 2 or 300
meters)
Euphorbia Regis Jubae
Rumex Lunaria (rare)

40
Climber *Bryonia verrucosa*.

At the base of these cliffs, the slides offer favorable stations.

DOMINANT

Ranunculus cortusarfolius!
Erucastrum canariense
Erodium cicutarium!
Daucus aureus
Galium tricornis
Senecio Papyraceus!
Chenopodium murale
Asphodelus tenuifolius (in bloom)
Pteris aquilina

RARE

Convolvulus siculus

Such rich protected nooks have attracted the farmer. Almonds and figs are planted. Amongst the rank brush, *Opuntia* climbs about; but the station is too moist and shady for it. Individuals may reach 5 meters in height, but the leaves are sparse and small.

Euphorbia Regis Jubae, however, in its glory, as it also attains 5 meters and has trunks a foot across.

In the shady nooks of this crater, we find a series of ferns

Davallia canariensis
Asplenium palmatum
Polypodium vulgare

In spots we have abundant *Adiantum reniforme*, and, as it does not require much moisture, it comes low down. Magnificent specimens of *Adiantum Capillis Veneris* seek moist places. Here also we find some *Juncus maritimus* and *Salix canariensis*. Perhaps now and then a bush of *Ilex canariensis*.

EXCURSION 17

JANUARY 2 1916

ISLAND: PALMA

Santa Cruz-Beloc-peneplain(200 meters)
to Asencion

In the lower reaches *Eupatorium*
adenophorum is often a dominant in the
creek gravels, with the usual *Euphorbia*
Regis Jubae, and both run up the adjoini
ng cliffs.

Way up on the peneplain, the sunny
crags of the gulches showed abundant c
oastal plants(all seen below)

Psoralea bituminosa
Aconium(canariense)
Inula viscosa
Kleinia nereifolia
Lavandula abrotanoides
Rumex Lunularia
Euphorbia Regis Jubae

In the lower stretches, on the bank
s exposed to the sun, I note further;

Lobularia intermedia
Gnaphalium luteo-album
Rotama Rhodorrhizoides
Micromeria thymoides
Andropogon hirtus

Here a beautiful red flo
wered escape from the gardens is the
mexican *Salvia coccinea*.

However these sunny upper reaches
have plants not seen further down.

Sisymbrium millefolium
Rubus ulmifolius

Cytisus proliferus

The shady cliffs of the canyons (lower) and those of the peneplain; show a decided difference, as the upper have a variety of survivals of the laurel forest.

Senecio papyracea, however, is found in both stations.

SHADY CLIFFS. (UPPER)

Rhamnus crenulata
Ilex canariensis
Aeonium canariense
Phyllis nobla
Erica arborea
Laurus canariensis
Apollonias canariensis
Adiantum Capillis Veneris
- reniforme (rare, seeks dryness)

(LOWER)

Cheilanthes fragrans
Davallia canariensis
Pteris aquilina (abundant on slide)

Sprouts (said to be *Apollonias canariensis*)

Webbia canariensis is rare below; more frequent higher up.

Straggling come down to 100 meters.

It is possible that the pine forest came to the tidewater. Isolated patches of pines are seen on the peneplain.

Several Phoenix (young and old) on inaccessible crags, were certainly wild. They had nothing to do with the fine palms around every farmhouse.

43
Going up to Beloc; we see, in canyons
Ricinus communis and (*Datura Stramonium*)
ROADSIDE

Polycarpaea teneriffae
Sida rhombifolia
Echium plantagineum
Euphorbia prostrata

Up on the peneplain *Oxalis cernua*
is not rare.

At Beloc, where undisturbed) the
ground is covered by the sod studied at
Santa Cruz (Ex 16)

Opuntia is not rare; and the banks of
the creek are green with *Rubus ulmifolius*
Cytisus proliferus is extensively planted
around fields, and often is grown as
a crop. If not trimmed it reaches the
size of a small tree. Vines are here
trellised in the European manner, though
trained rather low. In gulches *Populus*
albus is planted. *Eucalyptus globulus*
lines the roads.

Now the chestnut is abundant. One old
chap had a trunk $2\frac{1}{2}$ meters in
diameter. It is a curious fellowship of
Castanea, *Citrus*, *Phoenix*, *Ficus* and
occasionally

Pinus;

Peaches are abundant and in full
bloom; but they are dwarfed. All have
preserved their leaves; whilst the apple
trees have lost theirs. We note in
fields; pumpkins, Faba, onions, tomatoes,
garlic.

The main crop is wheat, although
considerable fruit is grown.

From the peneplain we see the
entire central range; only a mile or two
away. All the crests and gulches are
clothed with pines. However, the ridge
between

44
and the chestnut belt we see a laurel forest. Many parts of the chestnut groves are probably cleared laurel woods.

EXCURSION 18
JANUARY 3. 1916

Santa Cruz (Palma) in automobile; around southern end of island, to Llanos.

For miles the road is lined with Eucalyptus. Wayside weeds, *Raphanus sativus* and *Calendula arvensis*.

Wherever the ground is level and free from stones, it is planted to wheat and a little Faba. A farmer was already cutting ripe wheat for fodder. The entire island is terraced, a prodigious task. Phoenix is a favorite. at the south end I saw a little *Lupinus*.

Next to wheat viticulture is the most important occupation. All the vines are in little patches. They are trained on trellises, or over piles of rocks.

Chestnuts are abundant on the eastern slope. Their magnificent yellow foliage (a little green) reminds me of a northern autumn. On this slope only a few almonds are in bloom, (probably past); whilst on the western side they are covered with blossoms. All these almonds already have their leaves; whilst the prunes (in full bloom) are leafless.

Of the wild plants, *Cytisus prostratus* (more or less in flower) is, perhaps, the most common everywhere. Occasionally we see an *Asphodelus ramosus* in bloom. (beginning). Amongst the pines, sometimes, it is the only plant.



Cornbrecco Palma
Cytisus proliferus; Pinus canariensis

45
Although the pines come down low on the east side, there has been an extensive laurel forest there. *Erica arborea*, an infallible indicator as very abundant clear to the southern point, where a recent lava flow stops further advance. At this southern extremity, favored patches enable the pines to reach tidewater. In general this—however; this hard basalt is barren, and only a few *Rumex* *Lunaria* can find a foothold in the

cracks. I was surprised then to see, in a rich cove, an abundance of the beautiful flowers of *Ranunculus cortusaefolius*.

On both sides of the island, we see above us, ancient volcanic vents. On the western flanks, extensive lava flows have belched forth since the conquest.

As we approach Los Llanos the level lands are all cut up by these streams of jagged, dark lava. The soil here is nothing but a dark black sand.

Here man has removed the stones wherever feasible, and planted his wheat and his fig trees (a few chestnuts) in the open patches and cracks.

The entire western slope bears the stamp of dryness. Fresh flows are desolate wastes. Here also the pine forest reaches the sea; but man has destroyed a great deal of the stand, below us. A small bush (unknown to me) is sometimes abundant (*Psoralea* ??).

Cytisus proliferus is more common. Under the pines plant growth is poor; only a little *Rumex* *Lunaria* and rare *Echium giganteum*. As on the eastern slope (abundant everywhere!) *Euphorbia Regis Juba* is present. Here however it avoids the pine forest, and

is only common on exposed crests with deeper soil. It disappears on sterile recent lava, where *Kleinia nereifolia* takes its place. I saw no *Euphorbia canariensis* during the day.

As we approach Los Llanos; we see some patches of (*Retama Rhodorhizoides*) with *Euphorbia Regis Jubae*. On the wayside we notice frequent blossoms of *Glaucium luteum*.

I saw only one *Erica* on the entire southern and western stretch. Proof that the laurel wood never existed. If we compare the eastern slope with its deeper and hence moister soil - and probably moister air - we see that the laurels could live on favored ridges and in gulches.

Some good sized trees have been spared. They are accompanied by a great deal of *Cistus monspeliensis*, (beginning to bloom) and also *Pteris aquilina*. The dominant, as we have seen, is however,

Erica arborea. On all walls grows *Davallia canariensis*. All four of these are indicators of the ancient Laurel forest.

Where bare land presents favorable edaphic conditions, on both eastern and southern regions, the "sod" (studied in previous excursions) is dominant.

At Llanos the park showed *Ficus (religiosa?)*

EXCURSIONS 19

JANUARY 4, 1916

LOS LLANOS PASO DE GUMBRECITE

57
The town is in the "HOT BELT"

Kleinia neriifolia

Asphodelus ramosus (flower)

Euphorbia regis Jubae is common, w
with a few *Lavandula abrotanoides*,
it goes clear to the pine forest. On wall
s grows *Asplenium trichomanes*.

A woman offered me silk handkerchi
efs of her own growing (spinning). The thr
ee dominant crops are wheat, almonds and
oranges. The latter just loaded with frui
.t. One cent buys five oranges. Almonds
however bring 20 cents a pound.

Every bit of terraced soil is
probably carried in.

Water is a rare article here. They have tunneled into the upper crags
of the Caldera and pipe it down. A stone c
anal clings to the rim of the crater.
I tried to follow it to the springs; but
it made me nervous to look down into the
awful depth of the pit, and I quit.
We follow the pipe line, up a dry
creekbed.

Cytisus proliferus (photo) is in
bloom. I suspect its abundance is, in
part, due to man's distributing the seed.
As we enter the true pine forest, this
valuable fodder plant disappears. Here
Cistus Berthelotianus (photo) is the p
only undergrowth.

In the creek bottom, with the *Cytisus*
Inote.

Psoralea bituminosa

(*Androsaceum Webbianum*)

(*Gnaphalium luteo album*)

Micromeria thymoides

(*Andropogon hirtus*)

All the mountain sides and crests (excepting that of the crater) are covered
with a forest of *Pinus canariensis*.



Cumbrecilla
Pinus Canariensis

48
On the cliffs of the Caldera rim, a note;
ABUNDANT.

Aecium canariense
- *urbicum*
Greenowia aurea

SCATTERING.

Sisymbrium millefolium
Cistus Berthelotianus
Argyranthemum Webbii
Echium giganteum
Micromeria Thymoides

Other plants are rare.

The crater is thousands of feet deep. Erosion has divided the bottom into deep gulches, and has eaten into the rim; so that today the gorge resembles a deep canyon. The highest cliffs are bare. As the soil becomes more favorable, at every available corner is occupied by pines. (photo). Down in that almost inaccessible wilderness, is a little farm. It reminds me of the Cruikshank ranch. The tenant pays 300 dollars rent. From one patch he sold 400 dollars worth of Tobacco.

The entire north flank bears the stamp of dryness. The vocation is *Pinus canariensis* and *Cistus Berthelotianus*.

EXCURSION 20

JANUARY 5, 1916

LOSELLANOS----- SANTA CRUZ (in automobile)

Under the pines, throughout the island *Psoralea bituminosa* is abundant. Where low down lots of *Asphodelus ramosus*.

Towards the southern end I note on rocks.

Lebularia intermedia
Cronis dentata
umbilicus pendulinus
 (*Phagnalon umbelliforme*)
Habenaria trifoliata *adactylis*

Allium trifoliatum

One group seemed to be (*Adenocarpus foliosus*)

Cistus Berthelotianus comes down to the road in the pine forest.

EASTERN SLOPE

LAUREL VOCATION

Ranunculus cortusaefolius
Cistus monspeliensis
Webbia canariensis
 (*Retama Rhodantha*)
Rhodorrhiza

Cytisus proliferus
Myriophyllum asparagoides
Phagnalon umbelliferum
Erica arborea
Micromeria hyssopifolia
Aeonium urbicum (3 feet)
Notocollaena Vellae
Davallia canariensis
Pteris aquilina

Senecio papyracea forms carpets under the figs.

INFILTRATIONS (abundant) from the hot coastal regions are:

Psoralea bituminosa
Rubus frutescens
Artemisia canariensis, form
floribundi
Euphorbia Regis Jubae
Asphodelus ramosus
Andropogon hirtus

The rolling hills, penoplain and gulches, of the eastern slope, undoubtedly have "laurels as vocation. As the above witnesses, *Erica arborea* and sprouts testify. Pines, however, follow the ridges far down and may reach tidewater.

20

The fine *Dracaena Draco* at Breña Alta is wild.
 (In my notes I say, I say "Pteris" is not rare on the entire trap." I think that is a mistake as far as the western slope is concerned.

LAND AT TENERIFFE

AT Grátava banana land is held at 7000 dollars an acre. All depends on the amount of water available. In summer as much as 200 dollars is paid a week, for an acre of land. These banana patches are rented from 400 to 600 dollars annually. The islands produce 6,000,000 bunches a year.

EXCURSION 21

JANUARY 7. 1916

SANTA CRUZ TO CUMBRE NUEVO

PENEPLAIN.

Shade

Senecio (papyracea) dense patches

Pteris aquilina

Davallia canariensis

SUNNY

Rubus ulmifolius

Achyranthes argentea



Laurel forests
Cumbre Nueva
Tenerife

Iris foetidissima
Myrsiphyllum asparagoides
Soon *Erica arborea* indicates the

ancient laurel stand. Here on ridges, grow isolated pines (one 1 1/4 meters diameter). The survival of a pine forest below the cloud belt. The backbone of the island here forms a basin, deeply furrowed by erosion. The clouds sweeping in from the east and northeast, drift up these gorges, are stopped by the mountain range, and spread out like a blanket over this big hollow. The little fog that crosses over the crest is soon dispersed. This moist basin is the home of the laurels. - (photo)

In more remote corners a few fair sized trees survive. Big ones have all been cut out. Lower down the axe is always busy. The young branches of *Myrica Faya* are sought as fodder for the goats; and any kind of wood is welcome for fuel. Even bushes cannot resist this abuse.

Here below, extensive groves of *Castanea* have been planted. In the clearings *Cytisus proliferus* is abundant, but as the laurel wood becomes more dense, it disappears.

At the lower edge of the laurel forest, the sunny rocks bear the last *Adiantum reniforme*; also;
Ilex canariensis
(*Asplenium palmatum*)
(*Aeonium urbicum*)

Now we enter the deep shade of the laurel forest, and admire a vigorous stand of beautiful ferns

DOMINANT

Asplenium Adiantum nigrum
Aspidium elongatum

SCATTERING. *Asplenium aculeatum*
RARE

Asplenium aculeatum
trichomanes

In spots a bush, *Bystropogon canariensis*, is not rare, sometimes it climbs up for 10 feet on the tree trunks. Another common plant *Ixanthus viscosus* is in bloom. *Iris foetidissima* shows its seeds.

Old moldering stumps of the destroyed giants (sometimes 1 1/4 meters thick) are surrounded by a fringe of adventive shoots. This second growth (as determined by the axel) seems to be mainly *Persea indica*; but *Ilex canariensis* is common.

next in number comes *Myrica Faya*. *Laurus canariensis*, *Viburnum rugosum* is abundant, and of course *Erica arborea*.

At lower elevations *Cistus monspeliensis*, with more or less (*Webbia canariensis*) is common. In the higher reaches of the laurel wood, a few *Cistus Berthelotianus* have been blown in from the pine clad ridge above.

The crests to the north of Santa Cruz are also pine clad, clear to the summit. Once they probably they extended down to the sea, without any intervening laurel belt, as obtained to the south.

At the extreme N. E. corner of Palma, scattering masses of laurels are said to exist, probably in canyons.

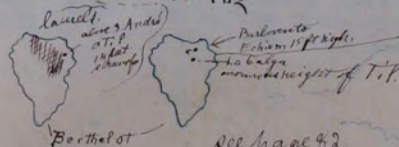
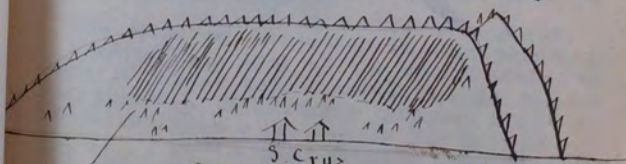
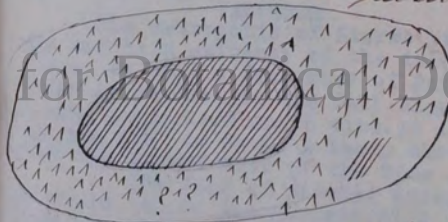
In the museum of Santa Cruz, there are many interesting relicts of the Guanches. One stick looks like the boomerang of the Australians. *Haliotis tuberculata* from Hierro resembles the California *Haliotis*. The had 2 specimens of granite (true) from Brena alta and Sauza, which certainly are not from Palma, as the entire island is volcanic. I am not so

certain about a piece of metamorphic rock with two big eakes-efcubes of Pyrite from the beach near Santa Cruz. It may be balast.

Leaving Santa Cruz for Hierro We skirt the bare lava cliffs of Palma. Here was abundant *Euphorbia canariensis*.

Looking at these bare stretches I wonder if if Pines did really come down to tidewater. Still I do not know how to explain the presence of these fine pines so low. The laurel wood probably came down low on these gentle slopes of the bass in.

ancient
distribution



See page 62.

On the coast of Hierro big breakers were pounding. A breakwater is being constructed to protect the small harbor. Slow work! Also arado has been commenced; but that is all. The old miserable trail must still suffice. I pity the poor overworked beasts on such footing. Splendid mules

HIERRO
EXCURSION 22
JANUARY 11. 1916

VALVERDE

The metropolis of Hierro lies at the northern extremity of the island. From here we have a fine view of Palma. The place is exposed to the full blast of the strong, ceaseless north wind. It is cold; and the air is damp. A heavy cloud hangs over the island most of the time.

The fear of pirates drove the settlers up, on the plateau, $3\frac{1}{2}$ miles from the port. The trail is abominable as are all of them in the island. Once they were paved but they have never been repaired. (since decades)

The town is a miserable place. The hotel as customary in such places + communities. Some of the houses show traces of former wealth and taste. Now all is squalor. The inhabitants, however are kind and have a reputation for honesty.

It's a poor country. As far as I see I have seen little farmland; but plenty of rocks. Mountains everywhere and

some big ones. Most of them are denuded; but the eternal bank of clouds, enables a dense sod to cover the soil. It is too early in the season for it to be well developed.

DOMINANT.

GRASSES

- Poa bulbosa L.
- Cynodon Dactylon L.
- Schismus calycinus

- Erodium cicutarium
- Botrys
- Trifolium subterraneum

COMMON LICHENS ^{ascomycetes} *Cladonia rangiferina* Roffa (345)

- MOSESSES
- Silene gallica
- Shwardia arvensis
- Stachys arvensis
- Plantago amplexicaulis?
- Rumex bucephalophorus
- RARE Calendula arvensis

Bare ridges offer abundant Sonchus tenerrimus. This is excellent pasture, and the raising of horses and mules is an important industry. At all events the beasts are sure footed.

Rain is scarce and springs are very rare. A series of tanks above town contain suspicious looking rainwater. In the town most houses catch their own rainwater.

These slopes were once covered by 1 laurel forests, as the next list of plants will show. Erosion has been violent. A series of deep furrows, in the depression below Valverde, offer more moisture and

shade. Their Thalweg is lined with Senecio Murrayi (see note)
GULLIES

STEADY SIDES

lichens

mosses

Pteris aquilina (± -)

Polypodium vulgare

Asplenium palmatum

Selaginella denticulata

Greenovia aurea

Aichrysum dichotomum

Rich spots show abundant Allium trifoliatum.

SUNNY SIDES

Senecio tenerrimus

Micromeria (thymoides)

A deep Barranco near town offers

Lobularia intermedia

Oxalis corniculata (double)

Cytisus proliferus (in bloom)

6 inch trunk, 15 feet high)

Aeonium canariense

Petrophytes muralis

Phyllis nobilis

Senecio Murrayi (abundant in a deep soil)

Senecio tenerrimus

Solanum pseudo capsicum

Micromeria thymoides

Habenaria tridactylites

Romulea grandifolia lora

Asphodelus ramosus (in bloom)

Asplenium marinum

- palmatum

Adiantum reniforme

- Capillis Veneris (moist)

Polypodium vulgare

(Notholaena Marantae?*)

Capparis is probably subsponataneous.

Davallia canariensis grows on walls.

South of town we have a dense brush of *Erica arborea* and *Myrica Haya*. Here wherever open, *Pteris aquilina* abounds. One sunny hill had a pure stand of *Spartium junceum*. A few *Rumex Lunaria* have penetrated from below. One or two pines have probably been planted.

In this secondary "laurel" association I note.

Cistus monspeliensis
Lupinus albus
Ervum (teraspernum)
Phagnalon saxatile
Senecio Murrayi *Tolpis laciniata*
Tolpis laciniata
Sonchus tenerrimus
Micromeria thymoides (sunny)
Allium trifoliatum

We climb down to the sea. Half way to the coast in the thalweg grows *INula viscosa*. The cliffs of the gulch offer

SHADY SIDE

(COMMON*) *Agonium canariensis*
Carlina salicifolia
Scilla haemorrhoidalis

SCATTERING

Lobularia intermedia
Senecio Murrayi (base)
Habenaria tridactylites
Davallia canariensis

A few plants of the opposite side have been blown over; *Euphorbia Regis Subae*, *Kleinia nereifolia*, *Rumex Lunaria*

SUNNY SLOPE
DOMINANT

Euphorbia regis Jubae

COMMON

Aeonium hierense ?

Artemesia canariensis

Kleinia nereifolia (rarer)

Rumex Lunaria *Asphodelus ram*

Asphodelus ramosus

Andropogon hirtus

With the exception of this *Aeonium*, this the typical association of the entire story, between the "dry" coastal and the laurel vegetation.

The "DRY" association below it.

Dominants

Artemesia Canariensis

Rumex Lunaria

Euphorbia regis Jubae

Asphodelus ramosus

COMMON

Psoralea bituminosa

Rubia fruticosa

SCATTERING

Lathyrus (annuus)

Bidens (angustifolia)

Kleinia nereifolia

Salvia horminioides

Euphorbia balsamifera

As we have seen the soil is too rocky and dry for farming. Only a few patches bear wheat or barley. The few fig trees near the coast, need stone walls for protection against the wind.

It is early for weeds, only an occasional *Capsella Bursa Pastoris* or *Chrysanthemum coronarium*, but around Valverde *Calendula arvensis* is abundant.

As garden plants we note the following, but all are scarce.

Ficus Carica
Pritchardia filifera
Phoenix canariensis
Pinus canariensis *Statice macrophylla*
Statice macrophylla (362)
Cupressus sp.
Araucaria excelsa
Eucalyptus globulus
Arundo Donax
Legum.
Dracaena (fine)

Peaches and one prune tree are in bloom.

In the morning countless canaries are singing in the hills. The priest told me that there once stood a very old *Dracaena* in Valverde but it had been destroyed by a hurricane. So it was indigenous

EXCURSION 24

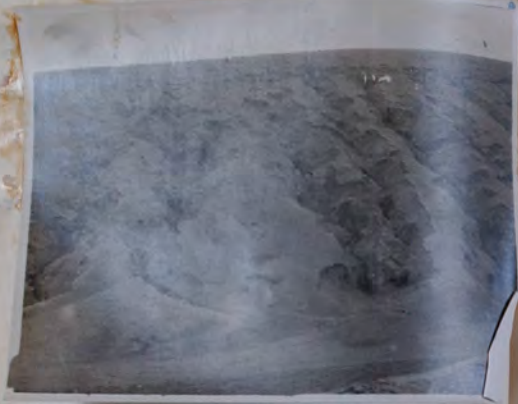
JANUARY 13 14. 1916

VALVERDE-----SABINOSA

TINOR-----T
 MOUNTAINS-----A
 MALPASSO-----B
 SABINOSA-----S

RETURN

EL GOLFO-----G
 LA CUESTA-----C



Hierro Erosion
denuded slopes



Hierro
 laurel vegetation
 Pinus canariensis
 AA Juniperus phoenicea

Euphorbia canariensis

h HIERRO

From Valverde to Tinor we have the usual pasture sod. Scattering are the "Laurel indicators", *Erica arborea* and *Myrica FAYA*.

The interior of the island consists of two plateaus. The first is at 1200 meters altitude. Numerous volcanic cones rise from this base. All the level land is pasture; not a shrub is in sight. It is probable, however, that once the laurel forest existed here; as most of the upper slopes are deeply furrowed by erosion. (photo) This is of recent date and probably a result of deforestation.

Passing a higher ridge, which divides the island in two parts, we come to another ridge-plateau. Here in summer a few potatoes are grown. More might be produced if the cold winds and eternal clouds did not interfere.

It is pasture land. There are no fences. Barring the want of drinking water it is an excellent country for raising mules. Goats are few, sheep more abundant.

This is an excellent the home of hundreds of big crows; as saucy as they can be. All are busy digging up the sod, in their search for insects. They bear the evil reputation of killing lambs; after having blinded them. My guide believes they come from Africa, I do not. A few gulls were keeping company to the crows.

In the center of Hierro reach the brink of a deep crater, whose walls are covered with black sand. Here the only vegetation is *Micromeria thymoides*. This species, further south, on the black moving sands of Mal Paso, is also the



Top of Ridge, Southern Hierro

Myrica Faya, *Erica arborea*
Micromeria thymoides



only plant, and it forms the undergrowth in the adjoining pine forest. (op. 3)

Below this crater, on the south slopes of the ridge, commences an extensive forest of *Erica arborea*, with subordinate *Myrica Faya*. On the adjoining ridges and lower down, pines appear.

Soon the trail follows the dividing ridge between the deep valley of Golfo and the eastern coast. A narrow strip on the summit is bare; perhaps cut out; but on both sides a forest of *Erica arborea* and *Myrica Faya* runs down the mountain side. (2 photos) On the precipice above the Golfo valley well, this stand passes into the complete laurel wood.

The undergrowth in the "Ridge" wood consists of *Micromeria thymoides*, the typical "sod" and abundant *Rumex obtusifolius*. Pines are as yet isolated.

With Mal Paso, the land slopes gently to the east. The *Erica-Myrica* association fades out, and a fine open stand of *Pinus canariensis*, with *Micromeria thymoides* undergrowth takes its place. This beautiful park landscape extends to the sea. The last tree of the forested ridge is the biggest in the island. (photo) (turn)

The flat crest known as Mal Paso, is worthy of its name. The black volcanic sand deepens and it is only with the greatest difficulty that the mules can get through.

With a sigh of relief, we finally commence to climb down the western slope. Outliers of the laurel forest appear and insensibly we pass into a dense stand of *Erica arborea*. Trees that attain 30 feet in height and with trunks 30 centimeters



Mal Paso, Hierro
Looking NE
Pinus canariensis - *Micromeria thymoides*



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With them we have *Myrica Faya* with trunks 45 centimeters thick. This association covers the entire western flank above Sabinosa.

As usual the dense shade has big ferns; probably the same as those of the forests of Palma (*Aspidium elongatum*, *Asplenium Adiantum nigrum*, and *Aspidium aculeatum*.) *Pteris aquilina* and *Davallia canariensis*. Then we note *Senecio Murrayi*. Open spots show abundant *Urtica urens*.

At lower altitudes then, we have *Adiantum reniforme* and *Asplenium palmatum*. Finally commences *Aeonium canariense*. In this *Erica* wood I collected (but lost) another *Aeonium*; possibly *A. holochrysum*.

Now a few *Rumex Lunaria*, later *Euphorbia Regis Jubae* and *Phagnalon umbelliforme*, announce the nearness of the "hot" coastal belt.

The clearings (as all over the island) have stunted *Ficus* *Carica* sprawling in the corners. Once I saw a patch of *Salix canariensis*.

We approach Sabinosa. The *Erica-Myrica* wood dwindles. The ridges now bear *Juniperus Phoenicea*, and the "hot" flora: with *Aeonium canariense* as dominant. Some of these canyons have considerable *Phagnalon umbelliforme-crum.*

At Sabinosa I was the guest of Mr. Feribio Duran. A generous hospitality (gratis) Everything good excepting excepting the fleas.

In the morning my host accompanied me a mile south to a deep gully. Here *statice macroptera* once was abundant: only a few isolated stems remain on the cliffs.



Mal Tasso, Hierro, looking north
Pinus canariensis, *Microseris thymoides*



Statice macroptera, *Asphodelus ramosus*
Pennis, *Echium hierrense*, *Aeonium*
canariense.
 Sabinosa, Hierro.

The goat and the zeal of would be botanists (remember the herbarium of the Santa Cruz, Palma museum curators) have destroyed the species. Mr. Duran told me that here also occurred a *Centaurea* named after him. I have been unable to find it in the literature.

This association is the type of the vegetation on all of the cliffs of this lower region. *Aeonium canariense* is dominant everywhere, and sometimes reaches 60 centimeters in diameter.

We note:

- Dicrananthes mutabilis* W.B.
- Odontospermum sericeum* Sch. Bip.
- Anthemis* (*Cotula*) slides
- Argyranthemum frutescens*
- Senecio Murrayi* Bern.
- Picridium ligulatum*
- Echium hierrense* (dominant on slides)
- Habenaria tridactylites* *Asphodelus*
- Asphodelus ramosus*
- Juniperus phoenicea*
- Adiantum reniforme*
- Polypodium vulgare*.

Polypodium coast is the

Between Sabinosa and the sulphur spring which stands in high repute for rheumatism and syphilis. I met many mules loaded with this water for shipment at Valverde.

From Sabinosa to El Golfo the trail follows the coast line. The soil in spite of being a loose moving sand, is cultivated. The main crop is wine. It is good but very strong. There figs and apples. Pears and peaches are in bloom. The heliot rope of the gardens is magnificent.



It is an intensely dry and pretty hot region. There are no springs. The people save the rainwater. At present they are driving prospect tunnels for water into the surrounding cliffs.

The flora is the same throughout the valley.

DOMINANT

Webbia canariensis
Aeonium canariense
Kleinia nereifolia
Rumex Lunaria
Euphorbia Regis Rubae
Davallia canariensis

Besides the type of *Kleinia*, we find here a variation with broader and more oval leaves. Subspontaneous are *Solanum pseudo Capsicum* and *Nicotiana glauca*. In spots *Cistus monspeliensis* comes down: a few flowers are in bloom - are open.

At *Togudaya* piles of boulders are almost hidden by *Davallia canariensis* and more or less of the beautiful *Notochlaena Marantae*. The latter climbs up into the laurel forest. On walls I notice a *Sonchus* perhaps *Gummifer*. *Rubus ulmifolius* is abundant. Mr. Duran told me that Hierro sent a commission to Gomera to get it for hedges. Clear up to the steep cliffs every available nook has been terraced and planted to vines.

The valley of El Golfo is Part of an ancient crater, whose greater portion has disappeared below the ocean. Two small rocky islands out at sea, indicate the ancient rim. The smallest of these is the home of the noted 2 foot lizards. My guide declared that they lived off of the excrements of the sea gulls.

The valley of El Golfo is

With the beginning of the dangerous, rough paved, awfully steep climb of the Cuesta we enter the true laurel forest. The cliffs behind us rise to a height of 1200 meters.

At first the walls and rocks bear;

ABUNDANT

- Adiantum reniforme*
- Ceterach aureum*
- Aeonium canariense*
- Senecio Murrayi*

RARE

Asplenium palmatum

The *Adiantum* disappears as we go up. In the dense shade of the laurels flourish the big ferns, probably the same as in the forests of Palma (namely *Aspidium elongatum*, *Asplenium Adiantum nigrum*, *Aspidium aculeatum*).

Davallia canariensis now covers the limbs of the trees,

WE HAVE

- Ranunculus cortusaefolius* (rare)
- Habenaria tridactylites* (e)
- Ceterach aureum*
- Asplenium palmatum*
- Selaginella denticulata*

The wood itself has, of course, as dominant *Erica arborea*. Some trunks reach 30 centimeters in size. Many laurels have been spared. Perhaps to protect the trail and the settlement beneath from falling rocks.



Visnea Mocanero

66
Ilex canariensis
Notelea excelsa
Myrica Faya
Laurus canariensis

It is possible that here may grow *Arbutus canariensis*, as I collected it at Mocanero further north. (not added)

The beautiful *Visnea Mocanero* is now in bloom, some trunks attain two meters in diameter at the base. They then have the habitus of oaks. One Mocanero has split an enormous rock by the power of its roots.

In this shade, we have as undergrowth ferns and *Senecio Murrayi*, where more open *Cistus monsteliensis* comes in. Where the rocks rise above the forest, we still have abundant *Aeonium canariensis* cems, with *Selaginella denticulata*, *Habenaria tridactylites*, and more or less of the cliff flora studied at Eabizosa.

As we approach the crest, gradually the laurels disappear. *Aeonium Holochrys* is seen. Finally as the influence of the cold and moisture of the summit makes itself felt; we note *Greenowia aurea*.

Once more we are on the barren plateau. In the protected valley of Golfo below, the weather was ideal; and oranges were in fruit. On the top the cold wind struck us, and the clouds enveloped all.

I paid 40 pesetas for the two mules for the two days: for local conditions, it is a skin game.

EXCURSIONS 23
JANUARY 12, 1916

Valverde TO BATHING BEACH
The hills of the coast bear the so
d already studied; with *Sonchus tenerrimus*
and *Rumex obtusifolius*. The rocky stretch
es however show;
DOMINANT

COMMON Euphorbia Regis Jubae

Aeonium (hierrense?) *probably yes*
Senecio Murrayi
Rumex Lunaria

RARER

Kleinia nereifolia

We pass a slide of black sand,
mobile and very dry. *Rumex Lunaria* is
almost the only plant.

RARE Lathyrus (annuus)
Psoralea

bituminosa
Pieridium ligulatum forma conge
sta

Where the soil is firmer, an occasi-
onal *Micromeria Thymoides* comes in.

This sand turns into a streak of
red, and the *Rumex* is all that can survive.

A series of steep cliffs, rising abo
ut 250 meters from the sea, bounds this sl
ide. These bear a dense vegetation w
ith *Euphorbia Regis Jubae* and especial
ly *Euphorbia balsamifera*. The latter shows
stems 10 centimeters in diameter.

Euphorbia Regis prefers sunnier spots,
where it mingles with *Kleinia Nereifolia*.
Here we see *Argyranthemum frutescens*:
but it is not in bloom. Where save from g
oats, *Lotus glaucus* var. *villosus* is i
n flower.

COMMON

Rubia fruticosa

Artemesia canariensis ^{Lees.}
Periploca laevigata Ait.
Echium aculeatum ^{var.}
Micromeria thymoides
Allium trifoliatum

and a grass

This association goes down to the ocean side. There, the dry rocks show *Rumex Lunaria* only: whilst the Ocean cliffs

Leonium (hierrense?) ^{probably yes.}
Crithmum maritimum
Kleinia nereifolia
Sonchus tenerrimus
Statice pectinata var. *Sol-*
andri

No *Euphorbia canariensis* was seen.
 (Leaving the Island I saw it on the cliff
 s to the north.)

 EXCURSION 254 *

JANUARY 15. 1916

MOGANERO ----- NORTH COAST OF HIERRO

THE ENTIRE REGION WAS ONCE A laurel forest, as remnants of *Myrica Faya* are scattered about. Here I also collected *Arbutus canariensis*. Today, all the land is terraced, growing potatoes apples and figs. Some land is pasture.

In all the Island I practically saw no *Adiantum Capillus Veneris*: it is too dry.

It was carnival night. The fun consisted in the boys running about dressed in sheets.



Landings, Hicaco

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EXCURSION 24 1/2

JANUARY 16, 1916

PUERTO OF VALVERDE

There is a great difference in the climate of the port and that of the town. Down on the seashore it is already intensely hot. Here one or two *Argyranthemum frutescens* are in bloom; and we see *Lavandula abrotanoides* with *Aeonium* (hierrense?). Otherwise we have the usual Hierro coastal flora already studied; with *Euphorbia Regis Jubae* dominant everywhere. Something new for the island is (for us) *Euphorbia canariensis* on the rocks south of the harbor; it is also seen further north on the coast.

Emigrants on the way to Cuba were leaving by my boat. A drove of mules filled the street. There is no drinking water to be had at the port. Barrels of it are brought in by steamer, for the men working on the breakwater.

GOMERA

JANUARY 17.1916

SAN SEBASTIAN

LIGHTHOUSE-----L

HILLS TO S.W.-----H

WE ARRIVED BEFORE SUNRISE, the silhouette of Teneriffe was beautiful. The landing is on the open surf. I was carried in on the back of a sailor. all merchandise is thus brought in on the back. In stormy weather passengers are hoisted to a cliff by a crane and derrick. What a waste and foolishness!

San Sebastian is a big town; but it's Ponda is abominable. I had to wait a long time for my room. The people are awful inquisitive and suspicious. When I dried my paper on the hillside, immediately men and boys crowded to see me. Questions! Suspicious! Cautious! Cautious! Twenty five boys accompanied me to the Ponda. They stood an hour in front of the house, waiting to get a glimpse of me. The children have a decidedly african cast of feature.

From the light house on the extreme end of the island, there is a wonderful view of Teneriffe. It is certainly the finest of the islands. Teyde to be had in the islands.

On my return a boy ran after me "Been to the lighthouse?" "Yes". He immediately whistled this important news to the townspeople.

The region passed is hilly, extremely rocky and dry.

Sumera & Sebastian
Euphorbia canariensis
Berthelotii 398



Light House, San Sebastian, Gomera.

DOMINANTS. *Phocaea*
Phloxis pendula
Sonchus spinosus
Euphorbia Regis Jubae

On dry cliffs there is some *Euphorbia canariensis*; but I saw only one miserable gnawed *Argyranthemum frutescens*.

On the extreme eastern point, a low *Euphorbia*, with extremely swollen branches is a xerophytic variety of *E. Regis Jubae*; *Euphorbia Berthelotii*. With it we have many big bushes of *Opuntia Europacum*. As subordinates between the rocks.

Aizoon canariensis
Phagnalon umbelliforme
Sonchus spinosus
Beta patellaris

And the globular cushions of the half dry andrope dry *Andropogon hirtus*.

The latter is reputed a specific "manna fera" for consumption.

A little barley was seen; but it was half dry.

In town Phoenix is abundant, and a big *Ficus* stands in the Plaza.

Every arable spot in the valley is planted to tomatoes. Here *Ricinus* is wild.

Climbing the mountains on south exposures.

DOMINANT
Phloxis pendula
Euphorbia Regis Jubae

COMMON
Sonchus spinosus

SCATTERING
Argyranthemum frutescens
 (in bloom)

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RARE

ERODIUM CICUTARIUM

Aristida adscensionis

Galium Aparine

Asphodelus fistulosus

Eragrostis Barrellieri

Pennisetum conchroides

Asphodelus fistulosus is rare below but more common above. We note the spiny leaves of a thistle.

All available hillsides are terra ced and planted to barley.

EXCURSION 26

JANUARY 18 & 19, 1916

SAN SEBASTIAN

DRY HILLSIDES TO WEST---D

CREST (ANCIENT FOREST)---F

GANCARAI MT. (1345 MET.)---G

LA LAGUNA---L

VALLE HERMOSA---V

AGUA---A

HERMIGUA---H

DRY REGION TO S. SEBASTIAN-S

The 18 being such a beautiful, clear, hot day, I decided to visit the mountains of the interior. In the night a strong north wind arose, and is still blowing. Throughout the island, stones are placed on the roofs, proof that these winds are frequent.

San Sebastian has a clear sky now; but the laurel region is enveloped in a dense cloud. Up there the equivalent of a heavy rain is falling.

It was a keen disappointment, when I arrived on top of Gancarai, to be surrounded by dense fog. At the same time the wind threatened to blow me off my mule; and it was cold.

Valhermosa



Valhermosa

Camera



Aguila 45

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We didn't get warm again until we reached Vallhermosa.

I rode a mule and was accompanied by a guide to beat him. It was a hard trip and I tipped him liberally. The

Performance was worth the money. Such sardonic laughter, curses, and confidential talks to long ears, that accompanied the tates of the club, I have never heard. The boss of the outfit however skinned me. I paid 7 dollars for the two days trip. It was hard and long; I will gladly admit.

The trails are villainous. Steep paved with horrible boulders, worn and decayed: bad in every respect. Downhill I walked, uphill frequently.

Leprosy exists. (Influence of Africa?)

The hotels are poor. Here in San Sebastian, it occupies a whitewashed room big enough to be barren, and it looks like one too. Fleas are abundant.

Vallehermosa, however takes a the sake. A horrible water closet!

In that hole they keep the pig. You can spit on his head. I didn't have the nerve to do it.

Vallehermosa is a beautiful spot. Hundreds of big palms, chestnut trees, banana patches, magnificent orange trees (the best fruit I tasted in the island); gushing streams, forest and sea!

Aguila lies in a cove overhanging the sea. Back of the village rise abrupt cliffs of a thousand feet, over which a cascade comes tumbling down, in a hundred leaps. Below the houses; the slope is terraced, and the banana patches go to

Attention page



Hermigua, Gomera.



attention page.

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This canyon is dry at the capital but has a running stream higher up. In the bed of this creek the flowers of *Argyranthemum frutescens* are common, with *Ploucania pendula* and *Sonchus spinosus*. I here saw the only specimen of *Rumex Lunaria* I met with in the island. Higher up in the same valley we note *Lavandula abrotanoides*. At the head of this canyon, where springs gush forth, *Coleocasia* was grown, wheat was ripe and *Papaver rhoeas* was in bloom.

The "hot" vegetation, climbs to the top of the ridge to the west of San Sebastian. On the top grew abundant *Cynara Carduncellus* var. *ferocissimus*, *Asphodelus* (*fistulosus*?) perhaps *tenuifolius*. *Euphorbia Regis Jubae* is still dominant. *E. canariensis* however is wanting. All available land is terraced and planted to grain. Phoenix is always near houses. Throughout the island slides bear an *Inula viscosa*.

This crest already shows the proximity of the cloud belt. Numerous *Cistus monspeliensis* (a few in bloom) indicate the ancient forest. A few *Asphodelus* (*fistulosus*?) still mingle with the *Micromeria thymoides*, *Erica* has been entirely cut out.

SUNNY CLIFFS

Lobularia intermedia
Sisymbrium millefolium
webbia canariensis
Erodium cicutarium
Greenowia aurea
Petrophytes agrostaphys
Bystrepogon origanifolius
Micromeria thymoides
Romulea grandiscape

attention page.



Hermigua, Gomera

As we get further away from human habitation, *Erica arborea* mingles with the *Cistus monspeliensis*. The clearings are still warm enough for stragglers of *Euphorbia Regis Jubae*; and in the cranny of a warm cliff, I even found *Kleinia nereifolia*.

The top of the ridge then bears the typical "cut out" laurel association.

Cistus monspeliensis

Erica arborea

Myrica Faya

Pteris aquilina (a great deal)

The rich pasture of Hierro is wanting in Gomera. The constituent species are probably the same, *Erodium cicutarium*, *Aristida adscensionis* etc.; but the growth lacks vigor. Perhaps the air is dryer here.

We enter the laurel forest. The clear sky of San Sebastian is hidden by the dense clouds that envelop us. Throughout the forest of this high crest, a continuous heavy dripping of water condensed from the cloud bank, saturates the ground. I have never seen such a fine example of foliage "combing" out moist ure.

Open spaces were dry. Under the trees the ground was as wet as after a heavy rain. Branches and trunks are heavily clothed with mosses and lichens (photo) and the soil is covered by a deep carpet of wet moss.

The stand on the top of the ridge, including *Ganao* itself, may be termed an *Erica* forest. An occasional *Myrica Faya*, *Laurus canariensis*, would seem to indicate the possibility of a former mixed stand. On the highest peak and in some inaccessible crags, a rare *Pinus canariensis* is seen. Tradition and the name (El Cedro) testify that for-

Myrica Faya

arborescens 49



Myrica Faya, Erica arborea
Garañán, Gomera



Myrica Faya
Erica arborea

attention
page

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tidewater. Peaches are in bloom.

However I would proclaim Hermigua the prettiest and richest valley of Gomera. here we see Bananas and some tomatoes, a mass of gardens, where Calla lilies are in bloom, and the Cuban Royal palm is in its glory. Many garden plants run wild.

Throughout the mountains we get pretty glimpses of Tenerife, with majestic Teyde. From Hermigua, with its foreground of tropical plants, its steep coast line fringed with breakers, the view is sublimely grand. (photo)

The three towns have a sort of derrick of steel, built out over the water, from the cliffs above. A cage enables the shipment of passengers and fruit in spite of these facilities most of the time the surf prevents the approach of ships.

In these warm irrigated valleys *Colocasia esculenta* is grown for home use. The upper valleys of the San Sebastian water shed have no bananas; but tomatoes. Oranges are grown everywhere. Between Vallhermosa and Agulo are many vineyards. *Opuntia* and *Eucalyptus* are rare.

We met camels at Hermigua. The people, as we have said, are of the African type, with deep black eyes! The Guanche type is rare.

In Vallhermosa Antonio Fernandez Armas gave me photos and advice. §!

BOTANY

San Sebastian lies in the full "HOT" region. All the rocky ridges and cliffs are covered with *Euphorbia canariensis*. Everywhere else *Euphorbia* *Regis* Jubae is the dominant. I saw one trunk 25 centimeters in diameter. The association runs up, far into the canyon. The water of the latter is diverted for irrigation.



Hermigua, Gomera



Hermigua

merly these crags once bore another conifer (probably *Juniperus Cedrus*). There are none left and my guide never saw any.

In deep woody gulches the laurels still flourish. Along the trails they have mostly been cut out. This is especially the case with *Laurus*. Whose leaves stock will eat. I notice a *Laurus* with a trunk 60 centimeters thick. On the south base of the cone of Ganaera a *Laurus* measured 75 centimeters; a *Myrica* 90 cent.

Ilex canariensis
Laurus canariensis
Myrica Faya

Here I collected an isolated *Silene gallica*.

The dominant essence today is *Erica arborea*. Some trunks are 75 centimeters through; but they average only 30 cent. The height varies from 9 to 15 meters. (Photo *Erica* 60 centimeters with *Laurus canariensis*.)

On the north slope of this summit, the undergrowth was formed by *Cistus monspeliensis*.

The south flank of Ganaera peak, is an open wood; a tree-- tree trunk bore:

Aichrysum dichotomum
Polypodium vulgare
Davallia canariensis (common in the region)

The undergrowth consists of
Micromeria species ^{new best photo} *affinis* *M. tenuis* ^{Pteradi Brum}
Androsaceum Webbianum
Juncus (wet)
Pteris aquilina

Sunny spots offered small plants of *Viola sylvestris* in bloom.
(photo "ling" lost--- *Ilex canariensis* covered with moss & *I Myrica Faya*)

High cliffs rising above the trees are covered with *Greenovia aurea*, and *Aeonium canariense*.

As we have seen the entire culminating ridge of the Gnaonera is covered with an almost pure stand of *Erica*. The trees up here are smaller, averaging 7 1/2 meters. Fire has swept over a part. Below us, in the gulches, we see the magnificent laurel forests, that cover the western and central portions of Gomera. They are government property, and cutting is not allowed.

In my field notes I declare that this *Erica* stand was once mixed laurel forest. I now believe that it is an original association, on the highest ridges; although that does not preclude the possibility that man has modified it.

On the west and north the laurel wood extended almost to the sea. Even in the hot valleys of Hermigua, and a way down the barranca of San Sebastian we find traces of it.

Thanks to these woods every valley on the north and west (and more or less at the beginning of every valley to the south) has a fine purling brook. This is a rare sight in the Canary islands. Once all of the islands (excepting the two eastern) were thus favored; but the axe destroyed the condensing trees; the springs dried up; and the desert remains.

As we go down, and near the settlements, the forest grows lighter and lighter. The people chop ceaselessly, fire wood and fodder. One can judge of the

relative proximity of a farm house or village by the species of the woods.

The final stage has only a few bushes of *Erica* and rare shoots of *Myrica*, to testify to the cupidty of man. In the more open stretches of this lower border, the undergrowth gets a chance to to develop. An enormous leaved *Ulmus Rubus ulmifolius* climbs about. We collect *Adenocarpus foliolosus* var. *glabrescens*.^T The tall ferns *Aspidium* (*Adiantum nigrum*) with *Davalia canariensis*, are plentiful. An endemic *Senecio gomeraeus* is abundant.

Then as gradually the outliers of the coastal "HOT" flora come in, we leave the laurel forest with its drizzle and its cold. We are in the warm valley of Vallehermosa. Here are the greatest number of *Phoenix* that I saw in the islands. The majority are certainly planted. Still, judging by the numerous young trees in the gulches, around the this town, and above Hermigua; I believe that the se, low, hot, moist valleys are the home of this palm. This is guesswork! I have no proof.

Around Vallehermosa the hills belong to the former laurel stand. Here today *Juniperus phoenicea* is abundant, as it is on the hills of the coast, towards Agulo.

SUNNY ROCKS

Aconium Castelle- Paivae
- canariense
Andryala pinnatifida
Andreopogon hirtus

SHADY 21

Dicrananthes plocanoides
Adenocarpus foliolus
Greenowia aurea
Aeonium canariense (very abundant)

Senecio Gomeanus
Picridium ligulatum
Habenaria tridactylites
Allium trifoliatum
Davallia canariensis

SUNNY OPEN SLOPES 666---common

Parenychia canariensis
Rhamnus crenulata
Sarcothamnus scoparius
Psoralea bituminosa
Bidens pilosa
Artemisia canariensis
Antirrhinum Crontum
Calamintha menthaefolia
Microseris nov. sp. affinis
M. tenuis

Further towards Agulo
 Sunny slopes covered with a brush
 of *Erica arborea*.

DOMINANT

Adenocarpus foliolus

COMMON

Viola sylvestris
Androsaceum (Webbianum)

In a bottom, along a fine stream,
 half way between Agulo & Vallehermosa
 is abundant *Salix canariensis*.
Juncus acutus *Aspidium aculea*
Aspidium aculeatum
Polygonum serrulatum

Farms show the usual grain fields.
Gardens Phoenix. A field had many *Euphorbia helioscopia*.
BEFORE Agula High Crags.

ABUNDANT.

Euphorbia canariensis

A few *Euphorbia Regis Jubae* come up to 300 meters.

Rocks

DOMINANT

Aeonium canariense

COMMON

Lebularia intermedia
(extremely polymorph)

Shady Walls

Silene nutans

UMBILICUS PENDULINUS

Petrophytes agriostaphis

Aeonium Castello-Palvae

Allium trifoliatum

Davallia canariensis

AGULO

Opuntia (rare) *Plocama pendul*

plocama pendula

Nicotiana glauca

Euphorbia canariensis

-- *Regis Jubae*

The moisture oozing out of the cracks enables *Juncus acutus* and *Asplenium palmatum* to live. Here was the only station I saw in Gomera of *Adiantum Capillis Veneris*. A delicate fern was perhaps *Notochlaena Marantae*.

Towards *Hermitage*

Typical "hot flora"

DOMINANT

Aeonium canariense
and Eremophila aurea



Aeonium canariense
rather Greenovia aurea
 Summit south Hermigua Gomera.
Erica arborea
 (Cumbre del Guincho)

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Sonchus spinosus
Euphorbia Regis Jubae
 RARER

Sida rhombifolia
Kleinia nereifolia
Acacia Farnesiana is very plentiful.

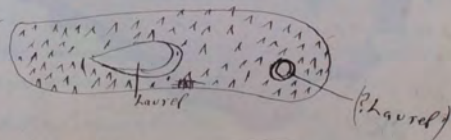
We cross the ridge between Hermigua and San Sebastian. IT belongs to the laurel vocation. We pass the usual stages of destruction, and note many *Viburnum rugosum*. The crest is covered with *Aeonium canariense* and some *Greenovia aurea*. (photo)

Leucophaea canariensis
 WITH THE WARMTH OF THE SOUTHERN SLOPE
 APPEAR
 ABUNDANT

RARER *Cistus monspeliensis*
Senecio cruentus
Echium plantagineum

Now we follow down the fine stream of water that flows towards San Sebastian. but sinks before we get there.

 In returning to America in spring of 1917 I again Passed the Island of Palma. There was snow On the mountain S.



Euphorbia canariensis
 Santa Cruz

Region of *Castanopsis* *monophylla*

to the land west



Euphorbia canariensis
Myrica phoenicea
 dry (hot) formation
 Laurel Woods.

big groves

Castanopsis monophylla

ISLAND GRAN CANARIE
EXCURSION 27
JANUARY 26. 1916

TUFF HILLS BACK OF LAS PALMAS

The city lies at the base of a small plateau. These beds are volcanic but deposited under water. Erosion has cut a series of parallel gulches: only the ridges showing the ancient peneplain. The slopes of the valleys are terraced and planted to bananas; if irrigation is possible. Although water seems to be plentiful in the ditches, most farmers have storage reservoirs, to be used when needed. In corners and waste places grow Phoenix. The houses are painted and are typically african. African is the shawl used as a head covering by the women; and african are the majority of faces underneath.

The entire vegetation bears the stamp of dryness. Already the monocarpal plants are drying up. There has been no rain. The trees also (particularly the big Araucaria excelsa) seem to suffer.

In the parks we see
Rhizophora mangle
Exotic fan palms
Aesculus (poor)
Platanus
Cupressus macrocarpa

Ficus magnolioides is frequently planted on the roadside. I saw one with a 1 1/2 meter trunk. Nicotiana glauca and Ricinus communis are plentiful.

about Ficus elaeagnifolia

Gran Canaria



Laurel
dry coastal
111 Pinus
R. gene laurel

see next page
must be binding

Thymus
Equisetum (used to scour intestines)
Tine " Ebstein)
Ruta chalepensis
Apium graveolens
Viola (odorata) for coughs

EXCURSION 29

JANUARY 27. 1916

PUERTO LA CRUZ

ISLETA rocks ---- C

DUNES towards Las Palmas
S-----D

the Isleta seemed a favorable field for exploration, but only- unfortunately a wire fence and numerous signs warned me that it was a fortified military reservation. The ground is a sterile dry, pitted lava ridge. On the town side of the fence not a plant is left. Within

DOMINANT

ELOCAMA PENDULA PENDULA

SCATTERING

Euphorbia canariensis

RARE

Sonchus spinosus

Crithmum maritimum

Localized (particularly towards the west) level depressions amongst the rocks, bear a dense stand of Euphorbia aphylla and an occasional Schizogyne sericea.

CRACKS OF ROCKS

Lythrum afum Cheilanthes fra

Cheilanthes fragrans

RARE

Euphorbia REgis Jubae

Maritima

Examination

Tamariskus gallica
 Schinus molle
 Acacia (longifolia)
 Eucalyptus (red)

The crests of the hills are extremely bare; in great part due to man's influence. All that remains are a few Euphorbia Regis Jubae, and rare Heliotropium erosum. As we climb down the slopes the vegetation increases in vigor, and forms an open brush. In Creek beds we see a little Plocama pendula. In shady more moist spots some rare Myrsiphyllum asparagoides.

DOMINANT

Euphorbia balsamifera

COMMON

Asparagoides - us albus (in spots)

Grasses

Digitaria sanguinalis (moist)

An. Andropogon hirtus

Eragrostis

Eragrostis Barrelieri

Pennisetum canchroides villosus

Stipa tortilis

Lamarckia aurea

* Lobularia intermedia (rocks)

* Helianthemum canariense

Malva parviflora

Erodium cicutarium

-) Botrys

Fagonia cretica

Medicago denticulata

* Lythrum afrum

* Rubia fruticosa

Collective
page

Schizogyne sericea
Sonchus spinosus
Anagallis arvensis (blue)
Lavandula abrotanoides
Salvia aegyptiaca
- canariensis (rare)
Plantago cretica
Beta patellaris
Scilla haemorrhoidalis
Crnithogallum narbonense
Arisarum vulgare?

EXCURSION 28

JANUARY 27. 1916

LAS PALMAS? COAST. 2 MILES SOUTH

Hills same association as EK; 27
also Eedypnois polymorpha; ditches lin
ed with Cyperus rotundus.
Coastal Plain (irrigated)

DOMINANT

bananas

RARE

grain (fodder)
tomatoes peas
peas

GARDENS

Tamarix gallica
Creedoxa regia
Phoenix (abundant)

In town a herb dealer offered remedies
Manzanillo (Anthemis Cotula?)
Leucophaea dasynophalla
Salvia canariensis
Rosmarinus Malva

Malva

Mantha

attention
page.

A LITTLE SOIL

- Frankenia capitata
- Aizoon canariense
- Grasses (some)

Near tidewater grows Senecio Flay us (with habitus of Senecio Rodriguezii)

Sand dunes between the port and the city. On top they are bare. Lower down appear Nicotiana glauca and Patches of Ononis serrata. ^{Forsk K.}

BASE OF DUNES (fixed)

DOMINANT

- Galilea mucronata
- COMMON

COMMON

- Konigia (intermedia)
- Ononis serrata ^{Forsk K.}
- Salsola Kali

SCATTERING

- Senecus spinosus
- Euphorbia (paralias)
- Lamarckia aurea

SUBSPONTANEUS (rare)

- Myoporum insulare (Australia)

EXCURSION 30

FEBRUARY 1. 1916
LAS PALMAS TO SAN MATEO

The automobile stage ceased running yesterday. England does not permit America to sell tires to neutrals. So I spent many hours in the diligence pulled by the 5 weary mules. They were winded everytime we stopped.

Towards the top of the penepslain, at Tafira, all slopes are terraced. Sannana patches are now rare. Grain is grown; but we see lots of Faba and Pisu, used as pasture for cows or cut for fodder.

At Tafira there are cane fields and a sugar factory. This industry is kept alive by a high protective tariff.

- grapes
- olives
- Ceratonia(rare)
- figs
- Schinus molle
- Acacia Farnesiana
- Cupressus sempervirens
- Auracaria-(imbricata (fine)

The road ,almost entirely, is lined with Eucalyptus(rostrata?)

Clear up to Tafira (ridge at 300 meters) extend a few Kleinia nereifolia a and Euphorbia Regis Jubaee(rare). Spartium Junceum and Adenocarpus foliosus are in bloom.

COMMON

CYTISUS CONGESTUS (BLOOM)

Isorales bituminosa

Farula Linkii (-bloom)

Asphodelus ramosus

On waysides is abundant, double O Oxalis cernua & fields show much Papaver Rhoeas , with Raphanus Raphanistrum.

At Tafira and San Mateo , are abundant on the rocks.

(Petrophytes brachicaulon?)

(Andryala pinnatifida)

AFTER LEAVING Tafira we see the first witnesses of the Laurek groupe A few Senecio Webbia show there violet flowers.

WALLS

Umbilicus pendulinus

Lobularia intermedia

Polypodium vulgare

The entire region from Tafira to San Mateo has plenty of Water and is subject to an intensive cultivation.

Although it is too cold for oranges
bananas, oranges do fine.
GARDENS

Quercus(suber?)
Merium Cleander
Heliotropium
Pritchardia
Iris germanica
Vinca mayor(runs wild)

As we near San Mateo an occasional
Cytisus proliferus appears probably plant
ed. Near town a Castanea has a trunk of
3 meters diameter. Intense cultivatio
Terraces! Eucalyptus (red) and rare
pines are planted. All the upper slopes ar
e covered by a sod. It was very cold. I di
dn't get warm all night.

EXCURSION 30

FEBRUARY 2, 1916

SAN MATEO TO LA GORRA (1700 meters)

(The highest peak of the island)

A dense cloud envelopped us at th
start. I could see nothing, and I got rea
l wet. After our Lunch it cleared up
and I had a fine view of the greater part
of the island. To the south, the valley
of San Bartolome showed Phoenix planted,
way down in the creek bed.

The entire Island was once cove
red by woods. Today only ~~the~~ on three
ridges(south of San Bartolomé north of
Mogan, and east of Agaete) a sparse pine
forest is left. Elsewhere tilled soil
extends to the ridges.

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A sod similar to that studied at Hierro (see!) covers the upper regions. In spite of its protection, recent erosion is evident. Proof of destruction of the real plant covering. This sod (see Hierro)

DOMINANT
Brodiaea cicutarium (& others)
Sinapis arvensis
Senecio crassifolia
Romulea crassifolia grandiscapa
 Rye had been harvested at 1200 met. amongst the rocks of the highest cumbre. A little lower, fields were white with *Raphanus Raphanistrum*, and still lower showed plenty of *Calendula arvensis*.

The dominant of all these ridges and peaks (to 1700 meters) and extending way down.) is *Cytisus ramosissimus*. On some Northern slopes at about 900 meters, it is mingled with considerable *Adenocarpus foliosus* (a villous form) which sometimes reaches a large size. Here also *Microseris lachnophylla* is common.

GORRA (top -1700 METERS)

DOMINANT

Cytisus ramosissimus

COMMON

Leucophaea dasynaphala (eaten by horses)

Usual sod

Alysum campestre

Lamium amplexicaule

NORTH SLOPE

ABUNDANT

Pteris aquilina

ROCKS (rare) *Asphodelus ramosus*

I am not sure what was the character of all these forests. Roots of trees, said my guide, are found on all these denuded ridges. I saw no laurels in the island (so far); but names of Mogan and a Brezzo (Ma del Brezzo, Pico de Cedro)

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indicate this wood. The presence of this abundant *Pteris aquilina*, indicates laurels. I found *Webbia canariensis* at 1500 meters. Sufficient proof in my opinion. Further down (9000 - 1200 meters) *Webbia canariensis* is frequent; but no trace of *Erica* or *Cistus* is to be found.

At about 1200 meters, on a wall grew *Aeonium caespitosum*. Nearby stood the last *Castanea*; a tree with a trunk of 1 -- 1 1/2 meters.

Another sporadic intruder of the upper regions is *Ferula Linkii*. Further down in the *Castanea* story (between 500 & 1000 meters) however, it is numerous.

From Las Palmas to San Mateo I didn't see a single *Argyranthemum frutescens*.

Today I saw two specimens, both in bloom, one at 1200 meters, the other in a gulch at 1000 meters. In the same barranco up to 1200 meters *Euphorbia Regia* Junbæ is not rare. *Asphodelus ramosus* is almost everywhere, but varies in number. Under the extensive chestnut groves which flank the mountain side at from 900 meters, *Asphodelus* forms pure stands.

Here also on walls

Polypodium vulgare
Asplenium Trichomanes
Notochlaena Vellae
(--- Marantæ?)
Tillaea muscosa
(*Aichryson pinnatum*)
(*dactyloctenium*)

SOIL

Carex muricata
Ranunculus cortusaeifolius

COVE

Salix canariensis

Oranges come up to 1025 meters in the chestnut groves; and walnuts are plentiful. *Cytisus proliferus* (in bloom) covers some slopes, and lines the fields. I am in doubt whether it is indigenous or not. 5 see a photo (Terror)

So far I have seen little *Opuntia* in the Gran Canaria. Only at San Mateo one hillside shows a profusion. As weeds I note *Psoralea bituminosa*, *Marrubium vulgare*; *Urtica* (*morifolia*)

EXCURSION 31

February 3, 1916

SAN MATEO 666-----VALLESQUILLO

TELDE.....	T
DIVIDING RIDGE NORTH SLOPE..	A
66-----	SOUTH-----
adjoining gulch-----	C
Plain Vallesquillo-----	d
FOOTHILLS OF COAST.....	E

Climbing the dividing ridge, between San Mateo and Vallesquillo, we note that wheat is grown to the top. This shady northern slope offers various stations. So covers a great of the upper parts. If the station is rocky, we find other plants. On the crest are cliffs which offer the most "original flora". Warm sunny exposure immediately brings in an infiltration of the "hot" *Innagully* *Pteris aquilina*, (*Aichryson dichotomum*) and *Webbia canarie* assist testify as to the vocation.

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WITH THEM I note.

Umbilicus umb pendulinus
Senecio Webbii
Canarina Campanula
Vinea mayor
Polypodium vulgare
Aspidium canariense
Selaginella denticulata

SOD

Grasses
Raphanus Raphanistrum
Silene gallica
Erodium cicutarium
6--- (chia)
Tillaea muscosa (abundant)
Sherardia arvensis
Senecio crassifolia
Calendula arvensis

Rocky

Ranunculus cortusaefolius
(abundant)
Lebularia intermedia
Cytisus proliferus (a few)
Aichryson punctatum
Ferula Linkii (in bloom)
Stachys arvensis (common)
Andryala pinnatifida
Micromeria hyssopifolia

The ground is covered with moss.

ROCKS OF THE CREST
BASE

Ranunculus cortusaefolius
Senecio salicifolia
mosses
lichens grass

ROCKS

Davallia canariensis
Polypodium vulgare
Oreohis patens

Umbilicus pendulinus
Aichryson punctatum
Greenowia aurea
Andryala pinnatifida
Carlina salicifolia
Micromeria hyssopifolia
Habenaria tridactylites

IN WET SPOTS

Cystopteris fragilis
 (So far, in this part of the island I did not see a single *Adiantum*.)

IN SUNNY SPOTS

DOMINANT

CYTISUS RAMOSISSIMUS (bloom)
 COMMON *Silene gallica*
Oxalis cernua (double)
 (single at Telde)
Sherardia arvensis

Scattering

Psoralea bituminosa
Lathyrus sativus
Inula viscosa
Asteriscus spinosus
Artemisia canariensis
Echium plantagineum ~~*antherinum*~~
Antirrhinum Crontium
Asphodelus ramosus (rare)
Lavandula abrotanoides
 Tall grass

ROCKS

AEONIU ~~*arborescens*~~ ~~*um*~~ As we cross over the ridge, to the south east slope, at first we have the same plants; and on ground.

Lobularia intermedia
Silene gallica (517)
Antirrhinum Crontium

ABUNDANT

Andropogon hirtus

BUT NOW

DOMINANT

Euphorbia REGIS Jubae
Asphodelus ramosus
 RARE.. *Kleinia nereifolia*

Soon however the rocky slope is too dry for most annuals.

Cheilanthes fragrans
Polygala latifolia
Tillaea muscosa
Petrophytes brachycaulon
Anthoxanthum aristatum

A valley covered with grain fields, many fig trees A little *Opuntia*, and with *Spartium junceum* common in the hedges, is next passed. Then we enter into a rocky gorge. It is surprising to see its richness, in spite of its low altitude.

ABUNDANT

Cytisus proliferus (subsp. ?)
 - *ramosissimus*
Euphorbia Regis Jubae
Asphodelus ramosus
Andropogon hirtum

RARER

Cytisus proliferus (subsp. ?)
Kleinia noreifolia
Lavandula abrotanoides
Rumex Lunaria

FURTHER DOWN

Psoralea bituminosa
Ploum pendula

UNDER ROCKS

Pteris aquilina
Cheilanthes fragrans
Notochlaena vellaea
Arisarum vulgare

The plain of Vallesquillo is covered by grain fields, Faba and Vicia. The weeds are Mediterranean.

Papaver Rhoeas
Fumaria officinalis
Capsella Bursa Pastoris

Raphanus sativus
 Silene gallica
 Oxalis cernua
 Geranium molle
 Sherardia arvensis
 Chrysanthemum coronarium
 Calendula arvensis
 Carduus SP.
 Hedypnois polymorpha
 Anagallis arvensis
 Stachys hirta
 Lamium amplexicaule
 Euphorbia helioscopia
 Asphodelus ramosus

The range of foothills along the coast is extremely arid. Sonchus spinosus is dominant and the only survivor on the most barren ridges.

It is associated with;

ABUNDANT

Euphorbia Regis Jubae

SCATTERING

Kleinia nereifolia
 Rumex Lunaria
 Asparagus (Pastorianus?)
 Andropogon hirtus

ROCKY STATIONS

Aeonium arborescens
 Plocama pendula pendul
 Ferula Linkii
 Lavandula abrotanoides
 Asphodelus ramosus

SUNNY CLIFFS

Euphorbia canariensis

WAYSIDE WEEDS

Brucastum canariensis
 Chrysanthemum Myonis
 Heliotropium (erosum?)

After these desert stretches with their *Sonchus spinosus*, the valley of Telde seems an oasis. Here grow bananas, oranges, Phoenix and tomatoes. There is a sugar factory, but is closed.

From Telde to Aguinas, we again have the dry formation, with its *Sonchus spinosus* and *Euphorbia Regis Jubae*.

EXCURSION 32
FEBRUARY 4. 1916

^{and}
AGUINAS

(Telde to Las Palmas;; T)
From Telde to Aguinas is a sloping plain, extremely parched. As at Telde the most sterile spots have *Sonchus spinosus* only. This is a desert; but there is abundant rich soil which only needs water to produce abundantly.

Aguinas grows tomatoes, grain, and figs.

In creek bottoms and on the lower slopes of canyons, one sees some *Euphorbia Regis Jubae*. Rarer, amongst some dry hot crags, a few *Euphorbia canariensis*. The mountain slopes as far as the eye can reach, are absolutely devoid of bush or tree.

Laurels, probably did not exist on these slopes. A single big pine, high up seems to indicate that pine forests grew on all these hills, and they possibly came down to low altitudes, like the forests of Palma.

Today the "hot" formation goes far up, especially *Euphorbia Regis Jubae*.

The sloping rocky rocky plain (desert) extends almost to Mogan, and to

to the sea. Vegetation is *Euphorbia Regis Jubae* and *Sonchus spinosus*. Even these are sparse. Only on the lower talus slope, the stand of *Euphorbia* is more dense.

South of Aguinas lies a hill, which is a shrine for devoted pilgrims. Before a cross, on the top Two women were praying and an eternal light was burning. The station is very dry.

Dominant

- COMMON
- Euphorbia Regis Jubae*
 - Lobularia lybica*
 - Sisymbrium*
 - Eragrostis ciliaris*
 - Plocama pendula*

- Eragrostis ciliaris*
- Picridium tingitanum*

SCATTERING

- Lobularia lybica*
- Sisymbrium Irio*
- Lythrum afrum*
- Echium maritimum*
- Linaria scoparia*

RARE

- Plocama pendula*
- Rubia fruticosa*

ON NORTH SIDE

- Erodium cicutarium*
- Myosotis macrocalycina* (as we near the richer base)
- Phagnalon* sp.
- Asphodelus tenuifolius*
- Ornithogallum narbonne*
- Aristida adscensionis*
- Agrostis verticillata*
- Cynodon Dactylon*
- Micromeria* (thymoides)

AS WE NEAR THE RICHER BASE.

Psoralea bituminosa
Rubia fruticosa
Phagnalon sp.
Convolvulus siculus L.
Salvia canariensis
Beta patellaris
Carex muricata
Euphorbia Regis Jubae (abundant)

ON SHADY ROCKS

Kleinia nereifolia (rare)
Andryala (pinnatifida)
ECHINUM Decaisnei

Lavandula abrotanoides
 In the creekbed *Plocama* is more numerous with *Euphorbia Regis Jubae*.
 The Field Weeds

Raphanus Raphanistrum &
Chrysanthemum coronarium)
 We return to Telde. North of that town, *Euphorbia Regis Jubae* disappears and *Euphorbia balsamifera* takes its place (and is more or less a dominant clear to Guia). Hot cress show *Euphorbia canariensis*. In canyons *Plocama pendula*; whilst on ocean cliffs appears *Argyranthemum frutescens*, a plant I have not seen on this entire coast. Farms show tomatoes, almonds, figs and some oranges.

-We need
 We return to T-
 We arrive at Las Palmas.

EXCURSION 5246- 32'

FEBRUARY 4 1916

LAS PALMAS TO ARUCAS.....P

ARUCAS.....A

GUIA.....G

GUIA TO AGAETE...D

The entire region is barren. Throughout this lower country of the northern coast of Gran Canarias, *Euphorbia balsamifera* is dominant. Dryer stations offer some *Euphorbia Regis Jubae* and rare *Kleina nereifolia*. The bottoms are irrigated from stored rain water, and bear bananas. We reach Arucas. Water is more abundant. There are enormous storage reservoirs, and the banana plantations become extensive. If water is available the banana terraces extend high up, and of course all the valleys are filled with bananas, more rarely tomatoes.

At Arucas hundreds of acres are planted to sugar cane, to supply a big mill here. High up at Moya, I still saw many patches. In general however, the cost of water makes banana culture more profitable.

For a couple of miles after Arucas, we pass hundreds of acres devoted to the raising of cochinita. Here amongst the banana fields, some of the richest terraced soil (irrigated) is planted to *Opuntia* in rows; all carefully cultivated. These Cactus patches are particularly numerous along the coast, where the wells furnish a water more or less saline. *Opuntia* and tomatoes resist alkaline water better than bananas.

These, most carefully tended cactus plants, are pruned to three or four leaves. The end leaf only is sacrificed to the scale. Each host leaf is

wrapped is wrapped with a cloth or paper to protect the mother animals from rain. One farmer had simply extended a sheet (a sort of tent) over the individual rows

In order to sacrifice so much labor and such good land, cochinita raising must pay. These Cactus fields were only seen in one other place in the islands, at Guia. (photo)

As we have seen *Euphorbia balsamifera* is the dominant throughout this northern coast region. The road for a stretch skirts the ocean. The beach and creek bottoms show dense stands of *Tamarix gallica*. Then the cliffs come to the water's edge, and the road winds up the mountain side, inland to Guia. The coastal cliffs a little further west, showed in one spot, the usual *Euphorbia aphylla*. COMMON

Crithmum maritimum
SCATTERING.

Lythrum (afrum)
Plocama pendula
Argyranthemum frutescens
Sonchus spinosus
Rumex lunaria

The adjoining mountain slopes also offer

Inula viscosa (*Sonchus leptophylla*)
Micromeria (*abrotanoides*)
Asparagus albus
Asphodelus ramosus

Some moist stretches offered *Senecio Webbii*; here also grew a white flowered *Cineraria*. My notes leave me in doubt whether it was a variety of the preceding or *Senecio echinatus*.

Aeonium (*canariense*) is on the rocks. All the open slopes bear the usual Sod. Potatoes, grain and figs are the crops.

I saw no trace of forests on this northern coast. Pines may have once extended down on the ridges, and perhaps laurels grow in some gulches (as shown by *Cineraria* and *Aeonium*.) Today it belongs to the "dry" formation.

Guia. -- Sugar factory closed.

Bananas.

From Guia to Agaete the soil is extremely dry. Too desert even for *Euphorbia Regis Jubae*.

Common

Sonchus spinosus

Ononis Natrix

DRYEST STRETCHES

Pure *Sonchus spinosus*

HOT CRAGS

Euphorbia canariensis

These bare slopes are a desert, in which the white walls of Guia and Galdar, rising above the green foliage of their oasis, seem typically african. The features of the inhabitants complete the illusion. Only the black facades of the big cathedrals give a stamp of its own. The people show an excessive curiosity.

Towards Agaete are many caves; once used as dwellings.

EXCURSION 33

FEBRUARY 3

MCYA

LCS TILCS-----T

The town lies up on the hill. The se crests are again the remnants of an old lava peneplain; now separated by deep gorges. The ridges and the bottoms of the valleys are farmed; but the slopes, especially where steep, show remnants of the flora.

- Ilex canariensis
- Laurels (Persea indica; possibly Creodaphne foetens?)

COMMON

- Erica arborea
- Myrica Faya
- Lobularia intermedia
- Silene gallica (common)
- Ferula Linkii
- Sherardia arvensis
- Andryala pinnatifida
- Sonchus (big saw toothed)
- Micromeria hyssopifolia
- Achyranthes argentea
- Euphorbia peplus
- Asphodelus ramosus
- Ornithogallum narbonense

SCATTERING

- Rubus ulmifolius
- Webbia canariensis floribunda
- Euphorbia
- Eupatorium adenophorum (Mexico)

- Artemisia canariensis
- Lavandula abrotanoides
- Faenychia canariensis

A bush of Echium Decaisne was 3 meters high, with a trunk of 10 centimeters.

Exposed moist rocks

- Aichrysum punctatum var. s subvillosum 1
- Aeonium canariense (abundant and big in cooler spots)
- Petrophytes brachycaulon
- Senecio Webbia (bloom 2 feet high)
- Senecio leptophcephalus
- Davallia canariensis
- Notochlaena canariensis Marantaceae
- Polypodium canariense vulgare

On sunny rocks we see an occasional outlier of the coastal flora.

- Kleinia nereifolia
- Rumex lunaria

Scattering

- Euphorbia Regis Jubae
- Senecio spinosus

In moist spots, sometimes we have abundant Echium plantagineum, or again Pteris aquilina. Rarer Ranunculus cortusaefolius. Andropogon hirtus on the waysides. slides

Dry slopes generally

bear Inula viscosa. Wet gulches, Salix canariensis, and Carex muricata. Bottoms also offer abundant Micromeria Thymoides var. rupestris and very rare Tamarix (Gallica.)

The upper ridges are poorer. They often have pure stands of Adenocarpus foliosus, sometimes it is mixed with a little Cytisus proliferus (pure patches) or Cytisus ramosissimus.

The infiltration from the irrigated fields of MOYA, (mainly sugar cane: but also bananas, fine oranges, apples, Fab a Phoenix*) has produced, on the slope below town, a rich meadow of exquisite grasses, yellow in spots with Chrysanthemum Myconis.

DOMINANT-- Plantago (*amplexicaulis*)
 Very com *Erodium cicutarium*
 com *Trifolium* Sp.
 Plantago--(*amplexicaulis*)--
Briza maxima
 - *minima*
 2 grasses (lost) no 541

COMMON

Silene gallica
Linum angustifolium

Medicago denticulata
Anagallis arvensis
Linaria scoparia
Stachys hirta
Rumex bucephalophorus
Euphorbia (*helioscopia*)
Asphodelus ramosus
Avena fatua
Lamarckia aurea
Poa annua

In the bottom abundant

Bidens -(*pilosa*)

In the creek grows *Nasturtium officinale*.

At Moya *Quercus pedunculata* had been planted. also *Eumalyptus* (*rostrata*?) lines the roadside; *Populus alba* and *Vinca* run wild. (*vinca mayer*) The weeds are Mediterranean, amongst the *Euphorbia helioscopia* and double *Oxalis cernua*. are conspicuous. The numerous tanks are covered with *Lemna* (*gibba*). *Arundo Donax* is abundant in all canyons.

For the first time in the island of Gran Canaria I notice *Adiantum Capillis Veneris*, along the ditches.

LOS TILOS -----T

About Two miles above Moya, in the cañon, is the first laurel ^{wood} I have seen in the island. Along side grow some splendid orange trees.

The owner of this grove has spared several hundred acres of trees, and it gives the illusion of a virgin forest. A fine stream of water is caught here for the Moya farms. It may be that the trees have been preserved to safe guard the water supply.

This is a pure stand of Tilos, *Oreodaphne foetans*. Probably the other constituents of the forest have been cut out, as the slopes bear

- Ilex canariensis*
- Erica arborea* (dominant)
- Persea indica*
- Myrica Faya*

In spite of this modification, this noble grove bears the stamp of virginity. It is beautiful and reminds me ~~of~~ strongly of a California laurel ~~grove~~ canyon. Unfortunately my visit was marred by a pouring rain.

The trees are old and average 22 22 meters in height. The largest trees split in branches at the base, and may attain 3 meters in diameter at the base.

A dense shade reigns underneath; only *Euphorbia peplis* survives. Where a little more open, the wood contains:

Geranium Robertianum
 - *retundifolium*
Artemesia canariensis
Pteris aquilina (dominant)
 On many tree trunks grow *Aichryson punctatum* var. *subvillosum*,
Asplenium *Adiantum nigrum*.

The open spaces along the creek show much

Athyrium Filix Foemina
Pteris aquilina
Webbia canariensis
Besleria Yervanorae

The presence of *Eucalyptus* in the wood gives one a shock. What a fool the owner is.

This is the most northerly looking landscape I have seen in the Canary islands.

The beating rain made the home trip a difficult task. This volcanic soil is slippery in the extreme. I now realized the advantage of the pavement; after all the wearing I had indulged in, in a dry weather. Unfortunately the clouds hid the ocean, but I could hear the roar of the breakers, far below.

From Moya to Arucas the hills are bare. Only in deep gulches we see some indications of Laurel wood. *Euphorbia Regis Jubae* comes up high. All available patches are planted to bananas; as water is relatively plentyful, and we see enormous storage reservoirs.

Euphorbia balsamifera
Agate 54



Euphorbia balsamifera
Agate, Gran Canaria

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EXCURSION 34
FEBRUARY 7/1916

Agate

Agate lies about a mile from the sea. As usual, irrigated lands bear bananas and tomatoes, and some Arundo Donax, used as poles. A few olives grew along the ditch; and one or two Ceratonia, higher up in the valley. Then we have peaches, Noquat, figs, Ervum, Ervilia. Wayside weeds are Chrysanthemum coronarium, Euphorbia helioscopia.

The surrounding hills and valleys belong to the "hot" region. No trace of the laurel vocation is seen. On the crest of the high peaks to the south, isolated remnants of pine forest appear (see next excursion). The crags below are, however, almost bare, with only a few scattering pines.

Almost all the low, rolling coastal region, has as dominant Euphorbia balsamifera (Photo). One specimen was 2 meters high with trunks of 70 centimeters and branches of 18 centimeters.

DOMINANT

Euphorbia balsamifera
Common

COMMON

Senecio spinosus

SCATTERING

Euphorbia Regis Jábæ

Rare

Abutilon fruticosum

Lycium afrum

Salvia canariensis

Euphorbia canariensis (hot crags)

Way up on the mountain side we notice the white flowers of a few *Argyranthemum*

frutescens. Lower down, (with exception of one or two specimens in the bed of the creek) it is entirely wanting.

This basal association is subject to variation. In spots it is richer. So the low hills along the coast. Here

Paronychia argentea
Ononis Natrix var. *ramosissima*
 (*Phagnalon saxa*
 (*Phagnalon saxatile*)
Inula viscosa
Asteriscus spicatus
Picridium (ligulatum)
Linaria scoparia
Heliotropium erosum
Micromeria (thymoides)
Andropogon hirtus
Tetrapogon villosus
Phagnalon umbelliferum-orme

RARE

Plocama pendula
Kleinia hereifolia Here also grow some *Helianthemum canariense*, which in the Agaete valley, in a few spots, forms pure stands.

On this hill the irrigation ditch presents an interesting study. Above was the sparse, open, dry brush, of *Euphorbia balsamifera*, *Sonchus spinosus* and *Phagnalon umbelliforme*. Below a meadow had been formed and the *Euphorbia* and the *Sonchus* had all been killed off; only *Micromeria (thymoides)* seems to like the water.

DOMINANT

Psoralea bituminosa!!
Andropogon hirtus
Avena fatua

COMMON

Brucastrum canariense
Linum strictum

Common

Fagonia cretica
Ononis dentata
Convolvulus siculus
Chrysanthemum coronarium
Echium plantagineum
Plantago lagopus

ABOVE THE TOWN THE ROCKS OF THE GULCH
 OFFER

Aconitum urticum
Rubia fruticosa
Artemisia canariensis
Periploca laevigata
Lavandula abrotanoides
Micromeria (thymoides)
Salvia canariensis
Rumex lunaria
Asparagus umbellatus
Andropogon hirtus
 In creek some *Elaeagnus pendula*
 SHASHORE

ROCKS

Crithmum maritimum (and on sand)

Beach

Frankenia capitata
 K x
Xyrophylum Featanesii W.P.
Astydamia canariensis Dc.
Heliotropium erosum Lehmann
Beta patellaris Moench
Chenopodium canariensis Moench
Tetrapogon villosus Dc.

The hills to the south--- north of Ag
 of Agate, in spite of their S.W. expos
 ure offer more favorable soil, as the ri
 dge is covered with extensive patche
 s of grain. It is nevertheless very dry

Euphorbia aphylla
Agac.



Euphorbia aphylla 55
Agac. Gran Canaria

as *Senecus spinosus* is more abundant than *Euphorbia balsamifera*.
ON THE SLOPES.

Matthiola parviflora
Ononis Natrix ramosissima
Calendula arvensis
Heliotropium arvense erosum
Micromeria (thymoides)
Chenoclea canariense
Rumex vesicarius
Andropogon hirtum
Digitaria sanguinaris
Tetrapogon villosus
Erragrostis Barrelieri

As we go east all these thin out, finally we have an entirely new association, of *Euphorbia aphylla*, which covers the rolling, for a mile or two (photo). On extremely dry (extensive!!) areas, all plant life seems to be absent. Among the *Euphorbia aphylla* SCATTERING

Helianthemum canariensis
Ononis Natrix ramosissima
Andropogon hirtum

We cross a ravine, to where a northern exposure offers more moisture. Immediately *Euphorbia aphylla* disappears and *E. Regis Jubae* becomes dominant with a few *Euphorbia canariensis*, on the crags. Here are, still, isolated *Ononis Natrix ramosissima*.

The story above this coastal association is dominated by *Euphorbia Regis Jubae*; and *E. balsamifera* and *Senecus spinosus* disappear. The amount of *Euphorbia Regis* present, however varies. On shady slides, its number is exceeded by *Ononis Natrix* var. *ramosissima*, which fades out as the moisture conditions become less favorable.

In the transition zone between the Euphorbias, I note

Inula viscosa (slides)
(*Asteriscus spinosus*)
Arisarum vulgare

RARE

Withania aristata
Echium Decaisnei (The white flowers of this *Echium* are conspicuous in the gulches.

ON ROCKS

Lobularia intermedia
Ononis Natrix var. *intermedia*
Aeonium canariense

All open spaces of the Euphorbia Regis Jubae storey, however is clothed with a sod. ^{are}

Linum strictum
Ononis angustissimus
Trifolium campestre
Geranium molle
- (*retundifolium*)
Erodium cicutarium
- *malacoides*
Echium plantagineum
Sonchus oleraceus
Rumex bucephalophorus

Excursion--24- 35
February 8 1916
AGAETE

AGAETE TO EL VALLE -----A
EL VALLE TO PINAR DE AGAETEV
PEAK.....P

The valley runs E--W. Yesterday we studied the vegetation on the shady slope. On the sunny flank opposite, we have.

CRAGS

excursion "(35

CRAGS

ABUNDANT

Eupherbia canariensis

THALLUS

Plocama pendula

Artemisia canariensis

Senecio spinosus

Picridium tingitanum form
filifolia

Lavandula abrotanoides

Salvia canariensis

Euphorbia Regis Jubae

Andropogon hirtus

Irrigation available means
bananas everywhere. *Ceratonia* was noticed
and some planted pines. *Prunus* and almond
(now in leaf) are in bloom. Old *Juglans*.
A few oranges.

Crossing over to the shady side
the ascent begins. *Plocama* goes to 275
meters

MOIST ROCKS

Acenium urbicum

Inula viscosa

Kleinia nereifolia (rare)

Senecio? a big

Senecio leptophylla

Salvia canariensis

Adiantum Capillis Veneris 6 (abundan
t)

Bottom

Salix canariensis

500 METERS

RUMEX LUNARIA \$ A LITTLE*)

The slopes are covered with the usual sed. Abundant Veronica Anagallis sur round a spring.

650 METERS

SHADY NORTHERN SLOPE

ABUNDANT

Cistus monspeliensis

Pteris aquilina

RARER

Webbia canariensis

This proves that formerly a laurel wood grew beneath the pine storey

ABUNDANT ALSO

Inula viscosa

Asphodelus ramosus

SCATTERING

Euphorbia Regis Jubae

Salvia canariensis

Allium trifoliatum

850 METERS

A pine or two and Cistus Bert helotianus(forme without long hairs.) announce the upper story/ but as yet the laurel indicators and Asphodelus ramosus. dominate. On the rocks grow Greenowia aurea. gradually the ~~breaks~~ "laurel" group; gives place to Cistus Berthelotianus. Cistus monspeliensis mem entarily becomes rare; but is again nume reus on a flat higher up. Thus on the pl ateau, where the station was protected and moist, laurel woods existed amongst the pines. This testimony is corroborated by the presence amongst the Cistus monspeliensis of several Myrica Faya. Moist spots show Salix canariensis.

Isolated witnesses of the Laurel vocation exist to the summit of the range. I note
 1200 METERS - *Ilex canariensis*
 1240 ----- *Erica arborea* (small)
 1300 ----- (north slope culminating peak--) *Erica*

Also throughout this belt of pine *Webbia canariensis* and *Pteris aquilina* are abundant, especially in gulches. This then could indicate that formerly the upper crests had a covering of laurels. The pines were certainly much reduced, if present at all.

Today, however, with the first *Cistus Berthelotianus*, we enter into the realm of the Pine.

Undergrowth
 DOMINANT

Cistus Berthelotianus
Pteris aquilina
Asplenium ramosus

COMMON

Inula viscosa
Periploca laevigata
Microseris lanata
 ----- *thymoides*

SCATTERING

Bystropogon origanifolius
Phelipaea ramosus

The pine forest is open out out. All trees are relatively small. I was told that above Guia there are still a few with large trunks. (I think I saw them from the steamer, near the top of the barren central massif of the Island, I could see a few isolated trees.

The mountain range climbed today is identical with two crests lying to the south. These the map calls Tamadaba and Pinar ar Payenal: whilst the peak I stand on would be the

Pinar de Agaete
Cistus Berthelotianus 1646



Pinar
Agaete Gran Canaria



Asphodelus ramosus, Cistus Berthelotianus
Pteris aquilina

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Pinar de Agaete. All are a series of separate crests and deep gulches. On these. On these Peaks, no laurels could be detected anywhere.

The entire island as seen from here is barren; but for these three pine clad ridges, and the two or three trees of the central massif. I notice on the map, to the south the following names.

Pico del Cedro
Ma del Brezo.

2 Photos
pine woods

pure Cistus
Berthelotianus

Asphodelus ramosus
Pteris aquilina

Summit of the peak
1300 meters

DOMINANT

Cistus Berthelotianus

Asphodelus ramosus

ABUNDANT

Pteris aquilina

RARE

RARE

Ranunculus cortusae-folius

Aeonium caespitosum

Remula grandiscape

There is a fine view from here of the denuded central massif. Teyde was beautiful; floating above the clouds. On the plateau, amongst the pines, are farms, with grain fields. Populus alba had run wild. Planted we have Chestnut s apples, pines, and Nerium Oleander.

FUERTEVENTURA

EXCURSION 36
FEBRUARY 15, 1916

Along the south horn coast of Fuerteventura the sea is calm and of a remarkably beautiful blue. From the steamer we note one large grove of Tamarisque, at Gran Carcajal. Otherwise trees and bushes seem to be totally absent.

The island is formed by a series of hills and small valleys; finally passing, to the north, into an extensive volcanic plain. Several miles before we reach Puerto Cabra, there is limestone which seems to be an old pebble plain, surrounded by volcanic peaks. Here are numerous lime kilns, which certainly have been an important factor in the destruction of any woody growth that may have existed.

The entire island seems practically barren. A scattering of a gray perennial is certainly *Sonchus spinosus*. As it is a constant feature of the landscape, on the northern plain. Camel loads of *Suaeda vermiculata*, brought into town as fuel, indicate that it also is not rare. A rare plant looks (from the boat) like *Lycium afrum*. Sometimes the coastal cliffs showed a few green bushes of (*Euphorbia Regis Jubae*). They become abundant only on a flat lava flow, about half way between Gran Carcajal and Puerto Cabra, but nowhere else.



Puerto Cabra, Forteventura



Only two or three farm houses were seen: miserable, square; flat roofed; "african" huts: with holes for windows. In the adjoining gulches camels were grazing. The raising of this beast is the great industry of the country.

A few huts constitute the city of Grand Carcajal. The landing is an open roadstead, and everything must be carried through the open surf. The harbor of Puerto Cabra is no better, but a small stone jetty, facilitates commerce. I saw camels being loaded by means of a derrick; whereas in Hierro the mules had to swim out to the steamer.

Forty camels and a host of donkeys were assembled to meet the mail boat. All the dromedaries looked well fed. They were munching their rations of chopped straw, barley and a little green.

As at Gomera a large force of soldiers is stationed here. Officers fill the hotel. Puerto Cabra is a dreary hole. In many windmills big lava stones were grinding out gofio. The climate is extremely dry and already it is hot. With great care, patches have been cleared of stones, and these are used to wall out stock. Grain is planted; but this is a dry year and not a blade is seen. A few figs (bushy) straggle along the walls; a rare pomegranate, one or two Phoenix canariensis; a group of Cuntia; that is all.

The townspeople have created a park, with water that may be available. Tamarisk is dominant (canariensis) some Casuarina, Phoenix and Aescia (type longifolia.).

[Faint, mostly illegible text, likely bleed-through from the reverse side of the page.]

In the grainfield, the the only surviving native is *Sonchus spinosus*. Throught the island if any moisture is available *Nicotiana glauca* is present.

The rough, volcanic plain that extends for miles around the town, is practically a desert. The sparse vegetation, that finds a foothold amongst the loose rocks, is mainly *Chenolea canariensis*, and (as we have seen) an occasional *Sonchus spinosus*. Near town I collected a little *Mesembryanthemum cristalinum*.

The rare freshets have cut deep gullies into the plain. On the sunny slopes, *Chenolea canariensis* and *Suaeda vermiculata* are abundant- about the only plants that can resist the dryness. However on the shady flanks, at the base where plant life finds more of the precious humidity, we have a rich Keraphytic flora. I suppose this spreads out everywhere, if the rainfall permits.

- Lamarkia aurea*
- Pennisetum cenchroides*
- Schismus calycinus*
- Stipa tortilis*
- Asphodelus tenuifolius*
- Forskohlea angustifolia*
- Chenopodium murale*
- Aizoon canariense*
- Hedysmeis polymorpha*
- Picridium tingitanum*
- Mesembryanthemum nodiflorum*
- Spergularia marginata*
- Astragalus tribuloides*
- Medicago laciniata*
- Erodium cicutarium*
- Eragrostis ciliaris*

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Mercurialis annua
Malva parviflora
Frankenia capitata
 - *Pulverulenta*
Atriplex parviflora
Ehretia spinescens
Salvia egyptiaca
Heliotropium erosum
Scrophularia arguta (rare)

EXCURSION 37
FEBRUARY 16 1916

Puerto Cabra to Hills 6 miles N; W.
(Crest ---P)

As we cross the plain the dominant
 s are *Chenopodium canariensis* and *Suaeda vermiculata*. The first is more abundant
 the latter always present, especially in
 dry puddles. As usual *Sonchus spinosus*
 is scattered about, but only becomes
 abundant on hillsides. As usual *Sonchus*
spinosus is scattered., but only becomes
 abundant on hillsides. *Frankenia pulver*
ulenta sometimes shows its pretty pin
 kn flowers. Then we see the entire calle
 otion met with yesterday. . The excessi
 ve dryness and particularly the abuse o
 f pasturing, however has made all of the
 rare; it needs close attention to find
 them. The only species absent in the
 interior is *Masembryanthemum crystallinu*
 m. In gulches grow a few *Lycium spartui*
Spartium and always *Nicotiana glauca*.
 afrum

Amongst the *Opuntia* of a farm I saw a

few *Ononis* Matrix. and *Ferula* Linkii.
The loose rocks are covered with a lichen (*Parmelia*). At a distance they look like so many shrubs.

All these species climb the sunny hills, where they mingle with other plants, and increase or diminish with the exposure. On sunny slopes rare, but common on the shady side is a *Asperula* (perhaps *Scilla* dasyantha).

SUNNY HILLSIDE

- Spergularia marginata*
- Erodium cicutarium*
- Crucianella canariensis*
- Thrinia hispida*
- Cynara Cardunculus ferocissimus*

- Asphodelus tenuifolius*
- Lamarkia aurea*

SHADY SLOPES

- Rosa crystallina*
- Ononis Matrix*
- Mesembryanthemum nodiflorum*
- Senecio crassifolius*
- Anagallis arvensis* (blue)
- Rumex bucephalophorus* var. *canariensis*
- Mercurialis perennis*
- Better-shady-cliffs*

BOTTOM SHADY CLIFF

- Ranunculus cortusaefolius*
- Umbilicus pendulinus*
- Echinum maritimum*
- Romulea grandisocapa*

On the cliffs *Ranunculus cortusaefolius* and *Rumex bucephalophorus* var. *canariensis* are the most common; but many of the plants from below occur.

Not a single *Crassulaceae* was seen.

the top again shows all the species of the plains: but here *Euphorbia Regis Jubae* and *Senecio spinosus* are the most conspicuous. A higher elevation further west shows, showed an extensive population of *Euphorbia Regis Jubae*. Here on top we see also *Helianthemum ledifolium* and on sunny side Abundant & abundant *Mesembryanthemum nodiflorum*.

WEEDS OF FARMS

Fumaria species
Chrysanthemum coronarium
Picridium tingitanum (common)
 — (ligulatum)
Calendula arvensis
Hordeum murinum

From this peak the entire island seems to be barren desert. I doubt whether it ever had trees. Several villages are in sight. Most houses have a carefully tended *Opuntia* patch. I saw one *Araucaria excelsa*. Figs are grown near walls. Olives and almonds are rare. Fruit trees poor, especially oranges. Peaches are in bloom. The valleys of the interior have good soil and are more or less terraced. This year the grain has dried up. Only where a careful preservation of the runoff water has moistened is there a crop. Here the wheat is ripe, and we see big onions. The farmers expect half of the years to be dry.

In one village, fields of potatoes were covered with a coarse black volcanic sand. (or rather grit) to a depth of 45 centimeters. This mulch does not show a weed, and the spuds looked good and healthy: but at what sacrifice of Labor!

Puerto Cabra
Chenopodium canariensis & *Suaeda vermiculata*
 60



Surroundings Puerto Cabra, Fuerteventura
Chenopodium canariensis, *Suaeda vermiculata*



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Goats seem to be the most common animals. Sheep are rarer. I saw a few few camels pasturing on their favorite *Suaeda vermiculata*.

 EXCURSION 38

FEBRUARY 16. 1916

COAST

South of PUERTO CABRA

The coastline is rocky except in front of some sandstone cliffs, and dunes; where we find beaches of sand. It has no vegetation. Some Plants of the interior, however, come down pretty far NAMEDLY

Suaeda vermiculata

Erucastrum canariense

Some fine *Tamariscus gallica* canariensis, with trunks 60 centimeters, grew near tidewater.

Where exposed to the winds the human oaks of the dunes show a dense stand of *Tragacanth Moquinii* which then mingles with the usual associations. We go inland and the soil becomes more rocky

The sandstone cliffs are more recent than the lava. They have a few *Zygophyllum Fontanesii*

 EXCURSION 39

FEBRUARY 17. 1916

COAST, NORTH OF PUERTO CABRA

PUERTO-Camels-- *Chenopodium canariensis*

Suaeda vermiculata

a

The rocky plain comes down to the coast, and brings with it the usual flora, but sparse:

Frankenia pulverulenta
 ----- *capitata*
Frankenia-erectica *Fagonia*
Sonchus spinosus
Chenolea canariensis
Suaeda vermiculata
Eux spinosa

ROCKS OF BEACH

ZYGOPHYLLUM Fontanesii

Ononis Matrix (a few)

Sonchus spinosus

In one spot the beach had deepened
 1 ; hence more moisture was
 available and the vegetation better developed. All the usual species were present; most important

Frankenia pulverulenta
Picridium tingitanum
Chenolea canariensis
Medicago minima
Lotus lancerottensis
Lotus arabicus (pink)
Senecio crassifolia (abundant)
Heliotropium erosum
~~*Helianthus*~~
Linaria heterophylla (yellow)
Philopaea lutea
Beta patellaris
Atriplex parvifolia

It is quite a novelty to see pretty flowers in this desert. I imagine a rain would awaken a carpet of North African annuals.

At Agule some tomatoes are grown.

They are shipped via Gran Carcajal, in order to avoid the wharfage charge of the capital.

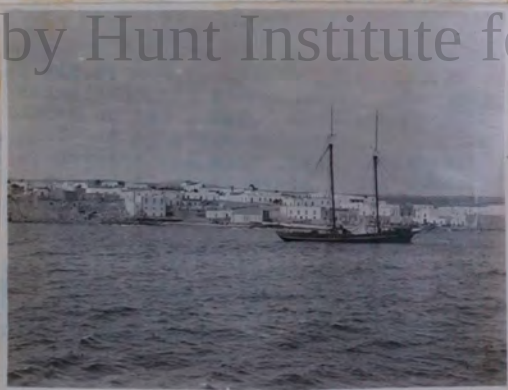
The spring, in the hills which supplies Puerto Cabra, is slightly alkaline.

Two camels were exported today. They were hoisted kneeling, into the boat, by means of a derrick. Camels are worth about the same as a good horse. 125 ---- 150 dollars. They can carry twice as much as a horse, but cannot go so far. The economy lies in the food, and in the resistance to heat and thirst. They can do without water for 8 days.

With me, a politician came to the island. He is running for congress, and all his constituents came flocking into see him. Some rode horses, more on donkeys. A priest, in black robe; was astride of a diminutive burro. The padre carefully protected his complexion with a parasol. To bad I had no Kodak.

Fuerteventura is the land of little donkeys. They are everywhere and everybody rides them. It is said that formerly wild donkeys existed in the island.

When the politician left, he made the mail boat wait for an hour; whilst he and his friends toasted their success. Little he cared for the tooting of the steamer. It pays to have a pull in this country.



Puerto Cabra
Fuerteventura

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EXCURSION 40
PUERTO CABRA TO LA MATILLA
(9 MILES TO THE NORTH.)

FEBRUARY 18 .1916

My intention was to reach the west coast, but on the divide I realized that it was too far, and as the formation was the usual dry plain, I ~~desisted~~ desisted. My time then was spent in the study of the shady barrancós below (west) La Matilla. These are probably typically of the entire north slope of the island.

To the watershed we have the usual "plain" flora. They spill over on the ridge, but then disappear. At the end the succulent *Suaeda vermiculata* is seen, no more and I collected my last *Chenopodium canariensis* at La Matilla. The steep sunny southwest flanks show dominant *Sonchus spinosus* and *Euphorbia Regis Jubae*. The latter assumes a different habitus, and has the foliage of a darker green, if it grows in the moister canyons.

An inner ~~canyon~~ valley (like others I saw in the distance) is intensively cultivated: crops mainly grain, rare peas, and potatoes. Here the soil is deep and relatively free from stones. This agriculture gives life to several squalid villages. Each house has its well cared for patch of patch of *Opuntia*. Fruit trees are rare, figs the most common. *Phoenix* is seen, but is rare.

On a cooler north slope were planted.

Olives
 Punica granatum
 Peaches (bushy)
 Tamarisk

At Antigua springs permit the raising of tomatoes.

This year 4th. of course, the grain crop is lost. Rain falling now could not save it. To utilize every drop of moisture that falls on the hills the slopes (especially around Puerto Cabra) are covered with a network, of shallow furrows, leading to the fields.

In these inland valleys, each field has a stone wall at the lower end. The inside surface of these dykes, are banked with soil; thus making of every grain patch a sort of reservoir. The plowing is also done on the contour lines.

In these moister grain fields.

WEEDS

Papaver rhoeas
Raphanus Raphanistrum
Phagnalon saxatile
Chrysanthemum coronarium
Picridium tingitanum
 (ligulatum)

Inner side of an embankment

Ononis laxiflora
Vicia lutea
Phalaris minor
Hordeum murinum

On the dry ridges of this northern slope, *Asphodelus tenuifolius* is dominant, often pure (where very dry.) and then only 20 centimeters high.

- (*Lamarckia aurea*)
- (*Aveha fatua*)
- (*Pennisetum conchroides*)
- (*Scilla dasyantha*)
- Echium maritimum*
- Lycium afrum*
- Plantago (syrctica)*
- Euphorbia Regis Jubae*

reference

Just after Matilla (north slope)
 the thick soil has been deeply eroded. D
 Down in the creek bottom, with the *Asp*
hodelus tenuifolius we see the usual *Ni*
octiana glauca and *Ricinus communis*.

ON SUNNY SLOPES

DOMINANT

- Sonchus spinosus*
- Asphodelus tenuifolius*

COMMON

- Eragrostis ciliaris*
- Kleinia noreifolia* (common on
 some sunny cliffs)

In dense hedges of *Asparagus albus*,
 climbs the purple *Convolvulus elongatus*.

Just after Matilla (north slope)
 the thick soil has been deeply eroded. D
 Down in the creek bottom, with the *Asp*
hodelus tenuifolius we see the usual *Ni*
octiana glauca and *Ricinus communis*.

And the rare bushes of *Lycium europ*
aeum attain 1 1/2 meters. in height.
 Here *Barkhausia hieracioides* is in blo
 om; *Helianthemum canariensis* sometimes
 forms pure stands, or it may be the pur
 ple patches of *Spergularia marginata*.
 Amongst the cliffs the beautiful showy
Rumex vesicarius is abundant. Under the
 rocks four plants are drying up ,

without having flowered.

- Umbilicus pendulinus
- Allium trifoliatum
- Arum canariensis
- Arum isarum vulgare subexert

On shady cliffs, Ranunculus cortusaefolius is not rare, but has degenerated flowers. Only where moisture is available, are its petals normally developed. With it grows the beautiful violet flowered Romulea grandiscapum. These steep crags, show a tendency to a "CANARIAN" STATION

ON ROCKS

Ranunculus cortusaefolius (normal)

- Ononis laxiflora
- Odontopernum sericeum
- Senecio crassifolium

AT BASE

- Fumaria
- Lotus lancerotensis
- Spergularia marginata
- Erodium cicutarium
- Beta patellaris
- Rumex vesicarius
- Romulea grandiscapa
- Asparagus albus

These cooler northern slopes of the central range, offer a varied flora. It is impossible to go into detail as to each station; but we note:

- A Adonis intermedia
- Matthiola tristis
- Lobularia marginata
- Garrichtera Vellae
- Linum strictum

[Faint, mostly illegible text, likely bleed-through from the reverse side of the page.]

- Erodium cicutarium
- ohium
- Cnoris (Matrix)
- hebecarpa
- laxiflora(sometimes dominant)
- Medicago minima
- Trifolium campestre
- Lotus lancerotensis
- arabicus
- Phagnalon saxatile
- Thrinicia hispida
- Picridium tingitanum
- Urospermum Picroides
- Anagallis arvensis
- Bohium maritimum
- Linaria sagittata
- Asphodelus ramosus (mcister"
- ~~Bromus-maximus~~
- Micromeria tenuis(rare)
- Bromus macrostachys
- rubens

Brachypedium silv

The mountains of Fuerteventura are too low to reach the clouds . Only the highest peaks are sometimes touched As I Found no "witnesses" of the laurel vocation, and as Euphorbia Regis Jubae goes to the very top of the ridges, I believe that the entire island belongs to the dry "hot" formation. Consequently forests or trees, never existed, and co could not live .All attempts at forestat ion are doomed to failure

The island belongs to the vegetat ion groupe of Algeria. It is of a semi desert type.

From the steamer, I saw that all the north of the island, as well as some flat

detached fragments of land in the strait between Fuerteventura and Lanzarote, are the same volcanic, rocky plain; with the usual flora.

I have been told that a very few bushes of *Apollonias canariensis* exist in the island. Wild olives (*acrobuchs*) also were formerly found; but these were certainly introduced.

Fuerteventura has few inhabitants.

Puerto Cabra sleeps, lulled to rest by the swish of the waves. The moonlight The moonlight shimmers on the calm tropical sea, and casts a hallow over the bare, whitewashed huts. Date palms sway over flat roofs. A belated camel, with velvet tread, glides by. A donkey brays in the distance. It is Africa!

The strumming of guitars, breaks the silence of the night. It is the melancholy theme of the Spanish dance. A band of young men crowd about an open door. Within, the women the women are seated around the walls, and in the center of the only room, several couples turn about.

Now a dancer, or a spectator



breaks forth in song; a plaintive wail; the legacy of the Arab. The refrain is taken up by another man or woman, and the dance goes on. The verses are improvised, and the dancer singer voices his every thought; whilst the people gravely listen, as the inmost soul of many a human being is thus laid bare.

Only in pauses is the charm broken. Cups of rum are handed about. There are cheroots and wine for all.

Then the male dancers give way to outsiders. The song, the step of the "Seguedilla", the weird movement of the arms, that accompanies the canarian "Folias" recommence. These people, simple in their habits and poor in money, enjoy themselves like children.

That is the romance of the scene. It is but a variation of a rustic gathering in Andalusia, or in the Balearic Islands. In Fuerteventura, however, it has a deeper meaning. A child has been born to the house. For a full week this revelry has gone on. The bed of the mother and babe stands in a corner of the room. For seven nights the poor woman has endured this smoke and noise.

What a trial it must be! I wonder if this is not an ancient Guanche custom.



Arrecife, Lanzarote.



Chenopodium canariensis *Suaeda vermiculata* *Puccinellia*

LANZAROTE

EXCURSION 41
February 21, 1916

ARRECIFE

The plains about Arrecife are even more sterile than those of the neighboring island, but the flora is the same. The soil is nothing but a mass of rocks. In places these outcrops have been plowed and sown. Every yard of level soil is freed from stones and ~~so~~ cultivated. The grain is drying up, and all the vegetation of the ridges and plains is burnt up. Grasses are the most numerous plants.

Pennisetum cenchroides
Aristida adscensionis
Stipa tortilis
Eragrostis Barrelieri
Schismus calycinus
Bromus (macrostachys)
Lamarckia aurea (localized)
Hordeum murinum

DOMINANT

Suaeda vermiculata L
Aizoon canariense

COMMON

Mesembryanthemum nodiflorum
Atriplex glauca

SCATTERING

Spargularia marginata
Medicago minima
Calendula arvensis
Heliotropium erosum
Echium maritimum



RARE

Malva parviflora
Picridium Tingitanum
Plantago co. renopus
Decumbens
Chenolea canariensis

Sonchus spinosus is rare, seeking the bottom of gulches, but is on the lower flanks of the mountains. It is frequently attacked by Cuscuta episonchus. All this vegetation is sparse and poorly developed. Where some figs or a Phoenix is cultivated, there is often Nicotiana glauca. Near town, I again notice Mesembrianthemum crystallinum. One beach bears a pure stand of this plant, and it is abundant and in bloom. *on the coast crest*
I climbed a volcanic cone inland. The plants here were a little more vigorous.

SOUTH SIDE
DOMINANT

Sonchus spinosus
Lycium afrum
Suaeda vermiculata (used as fuel)

Euphorbia Regis Jubae
Then most of the plain plants come in up (excepting the "succulents")
Amongst the invaders are

Linum strictum
Lotus arabicus
Echium maritimum

ON TOP

Sonchus spinosus
Linum strictum
Chenopodium (hebecarpa)
And a peculiar dwarf villous variation of Erucastrum canariensis E.

NORTH SIDE

L^oaj

Lichens (Orehilla?) are abundant. Otherwise the flora is the same as on the sunny side. The descent was very steep. I had great difficulty; and had to slide down, on the seat of my new trousers.

Lanzarote, as seen from this peak, is entirely bare. Numerous villages are scattered about. The whitewashed houses have a more prosperous look. Through the center of the island, one can trace an extensive lava flow. Onions seem to be the main crop. Then we have peas and considerable cochinilla. One of the *Cupuntia* patches was well cared for, and had a deep mulch of volcanic sand.

The cactus looked vigorous, too. I saw no cochinilla scale, however. They say where no water is available; that they must wait until there is plenty of sap in the leaves. Where irrigation is possible, two or three crops are possible. (But where could they get their water from?)

Camels ~~are~~ and donkeys are abundant. I saw an entire family piled on one camel.

At Arrecife steamers must anchor or way out in the open roadstead.

Fishing smacks however seek protection amongst the rich reefs, and back of the breakwater. These vessels come from the rich fishing banks off the African coast. I watched them unload their dried cargo, from the boat to camel's back. The crews are a motly crowd: a curious mingling of various types of negroes, arabs and spaniards. One fellow was regular featured and had a shock of long curly hair; I suspect he was an abysinian or from that neighborhood.

Along the coast south of town,



Arrecife, Lanzarote



62-62

Yaiza
Sand Mulch, grapes, Onions, Opuntia
Grapes, Onions, Opuntia. 40



Yaiza, Land covered by Sand Mulch.



Vineyard covered by Sand Mulch.
Vineyard covered by Sand Mulch.

the usual association comes almost to tidewater. I note an *Erodium* and *Asphodelus tenuifolius* here is only 15 centimeters high. To the south the sea coast offers also

Silene apetala (passed)
Euphorbia paralias (on beach)
Lamarckia aurea. (moist corners)

EXCURSION 42
FEBRUARY 23 . 1916

ARRECIFE TO YAIZA-----Y
YAIZA TO FIREMOUNTAIN----F

Most of the land passed between these two towns is planted to onions or grain. The latter is dwarfed and dying; but the onions look well. All the fields are covered with the natural mulch of black sand: an admirable conservation of moisture. All crops show careful cultivation and enormous amount of labor is involved. It is a pity that an off year causes so much loss.

Around Yaiza the crops look better. High piles of sand are piled up as windbreaks. The fields thus assume a regular checkerboard appearance. Here also are many vineyards. Each grapevine is planted in a deep pit, which is planted in surrounded by walls and highbanks of sand (photo). The wine is excellent, fruity and strong. A few oranges are grown in protected corners, but they look poorly.

Peaches and almonds are bushes. They are in bloom. *Ceratenia* is very rare.

Figs are the most abundant fruit trees in the island: now growing on high, bald peaks, then again in deep volcanic sand. In the absolutely barren rock desert (later on) a fig was growing in sand. It was however a dwarfed bush, 80 years old.

At Yaiza the sand mulch of the onions was 15 centimeters thick. Maize is said to require 30 centimeters.

In gardens I saw *Merium* (good) *Eucalyptus* (poor) In the patio of the inn a magnificent purplish red flowered *Begonia* was climbing over the wall.

It had a stem 15 centimeters in diameter.

Every farm house has its carefully cultivated *Opuntia* patch. There are three races of the plant.

- 1 Large Leaves --- Red Fruit
- 2 African Small Leaves, covered with a velvet, fruit poor, fibrous
- 3 Cochenille host. Leaves long-narrow, white fruit. The scale looks like a mealy bug.

~~MISSISSIPPI~~

ARRECIFE TO YAIZA

Usual association, with
RARE

Euphorbia paralias

Papaver somniferum

--- *Rhoeas*

Picridium tingitanum

Silene apetala

In Yaiza a few very poor specimens

Odontospermum sericeum

We met a camel loaded with branches of an *Euphorbia* 5 cent. thick. It comes from the south and is called sweet Tabayba to distinguish it from the "Bitter" Tabayba (*Euphorbia Regis Jubae*). It is used for corks. I am in doubt.

(later *Ramalina vulcanica* Nyl.) 52
 Rocks covered
Stereocaulon denudatum var. *pulvinatum* P. 712



lava desert. Mt. de Fuego, Lanzarote.



as to what it is; probably however *Euphorbia balsamifera*. Most of the camels passed are, are loaded with onions for export (highly prized in Cuba). All the houses are whitewashed and have a prosperous look; some even make an effort at ornamentation. We see no such squalid huts as in Fuerteventura.

From Yaiza to the "firemountain" is two hours camel ride. The trail crosses a lava flow. It is the roughest, most barren and desolate region I have ever seen. The path is covered with rough, keencutting fragments of lava. In most spots the bare rock juts out. The poor camel (a female) came home with bleeding feet. In most spots the bare rock. Our lazy coachman had to go along, and climbed on top. The owner walked. My companion (Francisco Franchy Arcefe), the coachman and I made 500 pounds. I said nothing! as long as the owner did not object. ----

Camels are said to easily carry 700 pounds (14 quintals); a great big male may take 16 quintals.

The barren lava feels waste showed no vegetation, outside of a white lichen no. 713 *Stereocaulon denudatum* var. *pulvinatum* (Schaerer) Th. Fr. which covers the rocks.

An occasional olive lichen 714 *Ramalina* *canisiformis* (Nyl.) *vulcanica* (Mont) Nyl. was also noticed. Only in some isolated stations, where sand had accumulated; a very rare *Polycarpha Teneriffae* was struggling for life; and, strange wanderer, a single culm of barley. In one spot was a volcanic blister (pho to) containing a deep pit. Stuck out above the sand.

(18) det. Pouly de Leduc.



MT de Fuego
Teneriffe

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Firemountain consists of a series of craters. The flanks and the base are covered with deep sand. All lichens disappear. Sparse and very rare is other plant life.

BASE

Senchus spinosus

Flanks

Polycarpae Teneriffae (rare)
Polycarpae candida var. *robusta* (still rarer) Down

Down in the sand of the bottom of a crater, to my sand-surprise, stood an abundance of a tall gramineae, resembling *Agropyrum repens*, possibly *Lolium rigidum*. I was afraid to get I would not be able to get up again, so I did not attempt to reach it. I regret my pusillanimity.

Usually the sand is black and loose; but where iron is abundant it is firmly cemented. The ridges are bare lava. Only in the most favored spots we may see an unfortunate *Polycarpae T. Teneriffae*.

The top of fire mountain is a mass of calcined rock, filled with pumice and sulphur. Dig down 30 to 50 centimeters, and you find heat. In certain crannies, paper takes fire. We cooked eggs, and we half baked a sweet potato by burrying it for half an hour.

The view from the peak is extensive. All the north of the island is a barren waste. In the distance, on an isolated peak we notice an *Euphorbia* (& (*Regis Jubae*?)). On sandy crests grew a few figs. Otherwise as far as the eye can reach, it is a rough, black sterile lava sea.

The camel cost me me 3 1/2
hours work I dollar
Cart 2 horses 44 kilometers 2 1/2
Dollars . I gave liberal tips

666666666666666666666666666666666666

GRAN CANARIA S

TERREB

The coastal region is of the usual xerophytic type, with *Euphorbia* (*balsamifera*) dominant, if not to dry. Usually only a few *Senchus spinosus* are able to survive. Bottoms show Bananas and a little sugarcane.

Up on the mountainside, a village was surrounded by extensive, carefully nursed, Opuntia fields. This is also

Andropogon hirtus
Avena fatua

Avena fatua

Briza maxima !

Lamarckia aurea (rarer)

The following witnesses testify to the Laurel vocation.

(*Webbia canariensis*)

(*Eystropogen canariensis*)

Pteris aquilina

Some *Cytisus ramosissimus* comes comes down in the gullies of the north slopes. The dense stand of *Kleinia* on the same exposure, certainly has had its limit raised by the destruction of the forest. With it grow *Rumex Lunaria* and (*Sonchus Leptocephalus*). On the rocks we see a tall *Aeonium*, perhaps *A. arboreum*?

As we approach Terror, the dominant of the higher slopes (where sufficient soil is present) is *Adenocarpus*. *Foliosus*, commences to appear. Among its dark foliage, we note the silvery patches of *Cytisus proliferus*; probably introduced.

The neighborhood of Terror is highly cultivated. Grain is the main crop.

Faba vulgaris

Lupinus

Castanea Vesca

Oranges (rare)

Olives (rare)

Phoenix

Ficus (magnolioides) big!

Araucaria imbricata

Populus alba runs wild in moist ground. On one estate ("Oserio" it is planted as woodland. This farm is an ideal home; with a beautiful view. The owner has many places like it; but lives in town.

Ar

Colocasia esculenta



Terror-Gran Canarias



In hills
Cytisus proliferus
Adenocarpus foliolosus
Adenocarpus foliolosus

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Arundo Donax fills moist corners
Colocasia is found in wet canyons. (photo)

With Terror we are now in full laurel vocation; as is shown by the shoots of Asphodel- Apollonias canariensis in the creek. For the first time in Gran Canarias appears Erica arborea (vigorous) amongst the Castanea, Populus and rare Olea of "Oserio".

A high ridge shows deep erosion; proof of late deforestation. Elsewhere a green pasture covers the slopes (photo)

Needs are

Fumaria
Erodium
Oxalis cernua (single, but double found in creek)
Phagnalon umbelliforme
Stachys hirta
Eragrostis Barrelieri
Avena fatua

Rocks

Aconium (canariense?)
Polypodium vulgare

Shady creek bottom

Aichrysum dichotomum
Salix canariensis
Polypodium vulgare
Asplenium palmatum
Aspidium elongatum
Athyrium Filix foemina
Davalia canariense (rare)

BANKS OF CREEKS overrun by

Eupatorium adenopherum (Mexico)
Vinca major

Tenerife
Senecio Webbii, *Arundo*, *Populus*
 Terror Gran Canarias 49



Senecio Webbii, *Arundo*, *Populus*.

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We had previously noted a station of the rare *Adiantum Capillis Veneris* at Moya. Here we have another; it is abundant.

SUNNY SOUTH BANK

- (*Erucastrum canariense*)
- Viburnum rugosum* (bloom)
- (*Andryala pinnatifida*)
- Myosotis macrocalycina*
- (*Microseris thymoides*)
- (*Rumex bucephalophorus*)
- Canarina Campanula* (beautiful climber ; orange bellshaped flower)

Polypodium vulgare

Pteris aquilina

Equisetum ramosissimum

(Photo

Senecio Webbii

Arundo Donax

Populus

Ranunculus muricatus

Leana)

TENERIFFE

MARCH 13.1916

SANTA CRUZ &

BARRANCO BUFADE
 RC .2....(B)

EXCURSION 44

Although it has rained for a week or two, the early annuals have dried up (particularly grasses); and the new growth needs time. The ravines show fine

streams of water, now.
LOWER COASTAL REGION

ABUNDANT

Galactites tomentosa ^{Moench}
Echium plantagineum (dominant
t in gulches)
Antirrhinum Orentium L.
Plantago Lagopus L.

SCATTERING

Papaver Rhoeas L.
Sinapis alba L.
Erodium sp.
Polycarpon tetraphyllum L.
Medicago minima ^{Druff.}
Malva paryiflora L.
Fagonia oretica L.
Torilis infesta ^{Hoffm.}
Calendula arvensis L.
Picridium Tingitanum ^{Sch. Bip.}
Anagallis arvensis blue
(blue is rare)
Stachys hirta L.
Plantago Psyllium L.
Chenopodium murale L.

Lamarckia aurea ^{Moench}
With the coastal succulents
Already studied.

SUNNY SLOPES OF COASTAL BELT.

Lotus (glaucus?)
Linum gallicum
Salvia aegyptiaca
Micromeria terebinthifolia ^{sea}
Aristida adscensionis

GULCHES

On dry rocks, in shade, at 120
meters: *Adiantum reniforme*

WET SHADY ROCKS

- Dianthus prolifer
- Silene gallica
- Cerastium glomeratum
- Sagina apetala
- Aichrysum punctatum
- Centranthus Calcitrapa
- Allageopappus dichotomus
- Seriola aetnensis
- Wahle, nbergia lebelioides
- Micromeria teneriffae
- Plantago Lagopus
- Anthoxanthum aristatum
- Festuca Myurus

DEEP SOIL

DOMINANT

- Trifolium campestre

COMMON

- Brucastrium canariense
- Scabiosa maritima V. grandiflora
- Scorpiurus vermiculatus
- Terilis heterophylla
- Borrage officinalis
- Echium plantagineum
- Lamarckia aurea
- Parietaria Judaica

AROUND DWELLINGS

TRANSITION STORY

GRAIN FIELDS

COMMON

- Migella damascena
- Papaver Rhoeas
- Gladiolus segetum

SHADY SLOPES (vigorous growth)

COMMON

- Trifolium campestre
- psoralea bituminosa

Aconium Lindleyi

(I am in doubt whether this is
not *Lam. hally*, *Scilla* Roy. *Lam.*



Aconium Lindleyi

Bufadero

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Scorpiurus vermiculatus
Galactites tomentosa
Echium plantagineum
Antirrhinum Orentium
Plantago Lagopus
Achyranthes argentea
Rumex bucephalophorus
Avena fatua
Lamarckia aurea
Briosa maxima
-- minima
RAREER *Trifolium angustifolium*
-- arvense
-- Becconei

SUNNY SLOPES
DOMINANTS

Artemesia canariensis
Euphorbia Regis Jubae
Andropogon hirtus
The "hut" formation goes far up, but gradually outliers of the adjacent laurel storey appear.
Sonchus Oleraceus (rare)
(*Androsace Webbiana*)
Polygala vulgaris (*polygala*)
Adenocaulon dichotomum gradually becomes more abundant, and finally is dominant.

At first in the gorges, we have only one *Aconium*, *A. urbicum*. On the rocks of the transition story it reaches the height of a man. It is there associated with vigorous *Kleinia neriifolia*. On northern exposures (*Aichryson*) (*punctatum*) abounds everywhere. Then appears *Aconium Lindleyi*; which sometimes covers the cliffs (see photo). On shady rocks the immense leaves of *Aconium canariense* come down to low altitudes. We note *Petrophys brachycaulon*. Thus we may find five species of the *Crassulaceae* together. At the upper limit of the transition zone is a sixth species *Aichryson dichotomum*.

but as it is associated on the rocks with the following plants, we must consider this in full laurel vocation.

Webbia canariensis

Senecio Tussilaginis

Polypodium vulgare

Davallia canariensis

Pteris aquilina (fills gulche

The limit of the "hot" plants has certainly been raised. In sunny places *Euphorbia canariensis* goes to the top of the ridge.

Abundant of course (as seen before)

Artemesia canariensis

Euphorbia Regis Jubae

Andropogon hirtus

SHADY SLOPES

Solanum vespertilion and various "Canarian" perennials, like *Echium aculeatum*.

Now the enormous rosettes of *Aeonium canariense* become dominant, and *Aeonium urbicum* disappears.

In the transition story, crops

Vicia monanthes

Grain!

Ceratonia (more or less subspontaneous)

Olives(2)

EXCURSION 45

MARCH 14, 1916

COAST SOUTH OF SANTA CRUZ (Already visited)



irrigated wheat.
Teneriff

abandoned
Santa Cruz, Teneriff



Euphorbia Regis Jubae, Placama, Greyia, the ...

In the "hot" belt no crops can be grown without irrigation, even wheat needs it. (photo). The entire hillsides are terraced. Once they were grain fields today they are abandoned to Euphorbia Regis Jubae (photo). With it are .

- Placama pendula
- Artemisia canariensis
- Sonchus spinesus

DRY RIDGE

Euphorbia canariensis
In spite of the rain, there is little of the annuals. Asteriscus aquaticus is dominant.

On other slopes

- Cynara Cardunculus var. fere cissinus
- Micromeria lasiophylla
- Euphorbia Regis Jubae (Scilla)

BARE ROCKY SLOPES

SPRINKLING

- Matthiola parviflora
- Noteroceras canariensis
- Erucastrum canariensis
- Eragrostis ciliaris
- Malva parviflora
- Linum strictum
- Erodium (chium)
- Medicago minima
- Scorpiurus (sulcatus)
- Picridium tingitanum
- Campanula erinus
- Anagallis arvensis (blue)
- Stachys arvensis
- Plantago lagopus
- Avena sativa

Crossing the ridge, we reach a series of valleys extending towards Laguna. These must be out of the "hot" region proper, as extensive wheat fields grow without irrigation. In one field grew *Silybum Marianum*.

At Taaro (about 150 meters) a deep barranco showed;
3 EASY DRY CLIFF

ABUNDANT

Trifolium campestre
Briza maxima

SCATTERING

Dianthus proliifer
Oxalis cornu (double)
Geranium rotundifolium
- *Robertianum*
Erodium (chium)
Plantago Lagopus
Rumex bucephalophorus
Phagnalon saxatile
Umbilicus pendulinus
Arisarum vulgare
Avena fatua
Adiantum reniforme

With them grow a certain number of "Laurel" indicators.

Ranunculus acris
Petrophytes brachycallon
Andryala pinnatifida
Achyrantes argentea
Parietaria Judaica

However, today they are restricted to the canyons. The surrounding hills still belong to the typical "hot" formation.

DOMINANT

Euphorbia Regis Jubae
Opuntia

ABUNDANT

Briza maxima
Psoralea bituminosa



Terror, Gran Canaria
cave dwellings

Terror, Gran Canaria
Gran Canaria

RARE

Oxalis corniculata

Kleinia nereifolia

A number of *Tamarix* (*canariensis*) are planted on the wayside. Here I notice a patch of *Hordeum murinum*, very rare in the island.

In the *Euphorbia* brush of the coastal belt; soldiers were practicing squad firing. Sentinels stationed about never said a word to me. At the end of the road, I sat down, right back of some square bill beards. An officer happening by warned me, that these were targets I would surely have been killed! What a stupid selfish lot these peasants are anyway.

Throughout the hills are powder magazines. On the roadside lay a drunken man. The women returning from town were smoking.

EXCURSION 46

MARCH 15. 1916

LAGUNA MERCEDES I
RETURN BY CANYON TO
SANTA CRUZ B

Just before Laguna abundant *Spartium junceum* is in full bloom. The roofs of the city bear a crown of *Sonchus oleraceus* and *Aeonium urbicum*. Rubbish was covered with *Conium maculatum*.

On the plain of Laguna .
 FIELDS
 CARPET

Trifolium subterraneum
 SCATTERING
 Raphanus Raphanistrum
 Oxalis cernua (single or double)
 Erodium (malacoides)
 Calendula arvensis

RARE
 Papaver Rhoeas

ROADSIDE
 Daphne Genidium (bloom)

As we go up we pass grain fields and a little Lupinus albus. An upper slope the dense sod offers a fine pasture. We cross the divide. The fields are gay with white, red, blue, and purple flowers.

Papaver Rhoeas
 Fumaria

Raphanus Raphanistrum
 Silene gallica
 Linum angustifolium
 Geranium Robertianum
 Trifolium subterraneum
 Vicia lutea
 Calendula arvensis
 (Stachys arvensis)
 Gladiolus segetum

The dominant tint, however, is the blending of the pale yellow of Oxalis cernua (single) and the violet of Echium plantaginifolium. The path is lined with the enormous leaves of Cynara Cardunculus var. ferocissimus.

SOD OF NORTH SLOPE OF THE CREST
 Cerastium siculum
 Trifolium subterraneum

San Juan Tenebrionidae, Ruffiniaceae
Head Barranco Bufadero Tenerife 83



Ranunculus scutellarioides

Senecio fuscus

Aichryson dichotomum

S

Scorpiurus (sulcatus)
Daucus aureus
Sherardia arvensis
Echium plantagineum
Plantago Lagopus
Rumex bucephalophorus
) *Avena fatua*
Briar maxima
- minor
Vulpia sciureoides
Bromus mollis

Along walls the purple flowers of *Senecio fuscus* are now common, and an occasional *Ranunculus scutellarioides* appears.

Both are abundant on the deep, soil, at the base of the moist cliffs, facing north. These crags bear an interesting association. In the first place all the familiar pasture plants.

Silene gallica
Geranium molle
Trifolium minus
- *campestre*
Psoralea bituminosa
Phagnalon saxatile
Senecio vulgaris
Plantago Lagopus
Luzula purpurea
Erodium Betrys
Lamarckia aurea
Bromus mollis

Here grow a profusion of different lichens.

Then we have an abundance of *Aichryson punctatum* and the inaccessible crags are often yellow with *Greenewia aurea*. *Androsacnum* (laurel indicator) seeks refuge in moist corners.

CRANES6 RARER?

- Cytisus ramosissimus
- Ferula Linkii(bloom)
-) Micromeria Thymoides

These plants already have the earmarks of the "warmer" association: and in fact; outliers of the "hot" story come far up. *Artemisia canariensis* is the boldest, but *Euphorbia Regis Jubae* is a close second. On dry, hot, sunny crags, half way up the mountain; *Euphorbia canariensis* is seen. On slides is an occasional *Asphodelus ramosus*, in bloom. In the bottom of a ravine *Echium plantagineum* runs riot.

When *Euphorbia Regis Jubae* becomes more common and an occasional *Kleinia nereifolia* appears, then the crevices above our heads are filled with *Aeonium Lindleyi* (see photo on page 147, 152).

Aeonium canariense is more or less abundant, and descends to the Belt of *Aeonium urbicum*. However the latter is rare in this canyon. The Ravine is poorer in plants than any I have yet seen. The frutescent "Canarian" type is rare. Then we miss the wealth of *Crassulaceae* found in the Barranco de Bufadero. Probably this valley is dryer.

Only the uppermost cliffs are interesting.

- Aeonium canariense*
- Greenowia aurea*
- Sonchus gummiifer*
- Senecio Tussilaginis*(at base

Down in the creek I note *Dracopis canariensis*.

The ridge to the north (south exposure) is covered by a laurel forest. Here are springs. It is probable that the fear of losing the water, preserves the wood Santa Cruz. Santa Cruz is building most expensive and ambitious waterworks to bring this water to the city. I believe that they also intend to tap springs on the other side of the Anaga Range. Great cement canals wind around the mountain side; big pipes go down and up the intervening gulches. More than a hundred men are employed.

EXCURSION 47

MARCH 19, 1916

GUIMAR

TOWN ... G

CANYON ABOVE TOWN..

§ PLAIN NUMBER

Top of hills

above town ; ; ; . T

Throughout the region roadsides and fields bear abundant *Euphorbia segetalis*. Higher up, we find with it *Tricholaena teneriffae* and in moister ground, *Geranium Robertianum*, and *Geranium rotundifolium*. *Ricinus communis* and *Nicotiana glauca* are not rare in gullies.

At Guimar there is also lots of *Mercurialis annua*. On cliffs *Rumex Luaria* and *Plocama pendula*. In the gravel of the creek a lot of mediterranean weeds.

Stellaria media
Erodium (*chium*)
 - *cicutarium*
 - *ciconium*
Geranium Robertianum
 - *retundifolium*
Mercurialis annua
Medicago minima Grufb.
Bidens angustifolia
Thrinicia hispida
Calendula arvensis
Picridium tingitanum
Antirrhinum Orentium
Linaria simplex
Stachys arvensis
Chenopodium murale
Fennisetum cenchroides
Lamarckia aurea
Bromus mollis

With these the natives

Aichryson dichotomum
Micromeria thymoides

We follow up this canyon. At 300 meters various laurel indicators find enough moisture to live.

(Erucastrum canariense)
Androsacum Webbii
Webbia canariensis
Phagnalon saxatile
Bidens (angustifolia)
Parietaria debilis
Pteris aquilina
 Mosses

Here on top of the cliffs-bluffs, *Allagopappus dichotomus* commences and soon is dominant clear to the chaparral. Dry ridges also offer abundant *Andropogon hirtus*. Wet corners are rich in *Adiantum Capillus Veneris*. Amongst the boulders of the creek, we find a few *Cheilanthes pulchella*. This fern gradually increases in number, and at 350

meters, fills all cracks under the boulders. *Echium plantagineum*, rare in the creek, is abundant on the hillside.

Creek, 350 meters

MEDITERRANEAN GROUP

Stellaria media
Linum strictum
Trifolium campestre
 - (*angustifolium*,)
Vicia (*cirrhesa*)
Inula viscosa
Phagnalon (rupestre)
Anagallis arvensis
Plantago lagopus
Rumex bucephalophorus
Mercurialis annua
Parietaria debilis Forst.
Briza minor (400 meters)
Nothochlaena Marantae

CLIFFS

Aeonium canariense
Aeonium urbicum (bloom)
Petrophytes brachycaulon

SHADE CLIFFS

Senecio Heretieri (abundant beautiful purple flo)
 - *Tussilaginis* (rare)
 And a canarian composite bush -- big prickly flowers)
 Between 400 & 500 meters, all shady cavities are filled with *Adiantum reniforme*. Here within a radius of 100 yards, one can collect 10 species of ferns

Nothochlaena Marantae R.Br.
Davallia canariensis Sm.
Ceterach aureum A. & Link.
Polypodium vulgare L.
Asplenium palmatum Lam.
 - *Adiantum nigrum* L.
Adiantum Capillis Veneris L.
 - *reniforme* L.
Cheilanthes pulchella Pers.

SUNNY SLOPE

Nethochlaena vellae ^{Deer}

New (at 400 meters) we may consider ourselves in the Laurel vocation; but outliers of the "hot" lower formation still occur.

Rubia fruticosa
Plocama pendula
Argyranthemum frutescens
Artemisia canariensis
Allagopappus dichotomus
Lavandula abrotanoides
Rumex Lunaria
Euphorbia Regis Jubae
Aristida adscensionis

At 500 meters most of the m have disappeared.. WE note

Rubus ulmifolius
Jasminum odoratissimum
Arisarum vulgare

We still have *Allagopappus dichotomus*, but now *Cistus monspeliensis* is common. Fifty meters higher a few *Cistus Berthelotianus* (form *symphytifolium*) come in. We also note a few *Ilex platyphlla*.

SOUTH SLOPE & 500 METERS)

Cistus monspeliensis
Webbia canariensis
Psoralea bituminosa
Aconium urbicum
Kleinia nereifolia
Allagopappus dichotomus
Lavandula abrotanoides
Rumex Lunaria
Daphne Gnidium
Euphorbia Regis Jubae
Nethochlaena Vellae

NORTH EXPOSURES (550 meters)

Lobularia intermedia
Cistus monspeliensis
 - *Bertheloti*
Wobbia canariensis
Ilex platyphylla
Trifolium angustifolium
Petrophytes agriostaphys
Aecium urbicum
Allagopappus dichotomus
Senecio Heretieri (M)
Senecio Tussilaginis (rare)
Andryala pinnatifida
Erica arborea
Comvolvulus althaeoides
Jasminum odoratissimum
Tamus edulis
Asparagus umbellatus
Habenaria tridactylites
Asplenium Adiantum nigrum
Davallia canariensis
Polypodium vulgare
Ceterach aureum

At the 300 meters level, the gravel beds of the creek, and mant sunny terraces bear grape vines; trained on the ground. They produce an excellent white wine. Pears and peaches are in bloom. At 380 meters - the entire canyon is built up in terraces. These are covered with a bushy *Prunus domestica*, in part run wild. The few almonds have already ripe fruit. Then we see oranges and lemons. Sometimes *Cytisus proliferus* is planted.

Climbing up the exceedingly dry

tuff hills, we find the entire flanks and crests (570 meters) terraced and cultivated. Almost all these terraces can be irrigated—cultivated—irrigated.

Grain and potatoes are grown. Many of the terraces are now empty; probably awaiting a summer planting of potatoes. Here I collect a varied flora of Mediterranean weeds. On walls grows *Parietaria officinalis*. Then we note:

Papaver Rhoeas
Fumaria
Spergularia marginata
Scleranthus annuus
Linum angustifolium
Trifolium stellatum
Vicia disperma var. *segetalis*
Ervum tetraspermum
Conyza ambigua
Senecio vulgaris
Thrinax hispidus
Anagallis arvensis (blue)
Echium plantaginum
Rumex bucephalophorus
Plantago lagopus
Euphorbia segetalis
Bromus mollis

Roadsides show rare *Hordeum murinum*
DITCHE- Gnaphalium luteo album
 Of the original plants I only saw some

Cistus monspeliensis (bloom)
Paronychia canariensis
Androsace Webbiana
Adenocarpus foeniculus
Allagopappus dichotomus

The high ridges to the west are covered with pine (see commercial photo)

EXCURSION 48

MARCH 19, 4q 1916

GUIMAR TO COAST (Puerta Guimar ----P)

Leaving town the soil is the same dry porous tuff we saw yesterday. All the slopes are terraced. Some coffee is grown. Naturally the natives put up the claim "The best in the world"! The main crop is grain; but some bananas and excellent oranges are raised.

In town roadsides showed

Marrubium vulgare

Urtica stachycoides

The vegetation is the dry "hot"!

Plocama pendula

Argyranthemum frutescens

Euphorbia Regis Jubae

Sonchus spinosus

CANYON (altitude 80 meters)

COMMON

Allagepappus dichotomus

Lotus sessilifolius

Pagonia cretica

Heliotropium (erosum)

Echium plantagineum

Micromeria Tragolymus

Euphorbia (helioscopia)

Pennisetum cenchroides (coast!)

Avena fatua

Aristida adscensionis

Hordeum murinum (rare)

The coastal hills all show ancient terraces; but all are now abandoned to *Euphorbia Regis Jubae*.

We now see numerous *Euphorbia canariensis* and a few Subspontaneous *Alce vera*.

A ragged, black, fresh lava flow forms the beach. Here are many little pools filled with marine algae.

LAVA BEACH

RARE

Spergularia marginata type *Dillenii*

COMMON

Phagnalon umbelliforme

RARE

Zygophyllum Fontanesii (to 2 meters high)

Astydamia canariensis

-----FURTHER INLAND

SCATTERING

Frankenia ericifolia *Chm. Sm.*

Plocama pendula

Euphorbia Regis Jubae

Around this part is the best development of any that I have seen in the islands of *Euphorbia canariensis*. One bush measured over 7 meters in diameter.

(photo)

Erodium cicutarium

Rubia fruticosa

Sonchus spinosus

Cuscuta Episanthus

Micromeria (*thymoides*)

Parietaria debilis

Ferskalea angustifolia *Port.*

The flora was interesting, but the people were not. The children called for pennies; the mothers for pesetas.



Euphorbia canariensis (7 meters across)
Puerto Guimar, Tenerife
7 meters in diameter.

EXCURSION 49
MARCH 20, 1916

GUIMAR

Canyon above 600 meters, continuatio
nof excursion 47, following ditch.

DOMINANT6 TO TOP6)

- Cistus monspeliensis
- Erica arborea

COMMON

- Scattering Pteris aquilina
- Cistus Berthelotianus
- Cytisus proliferus(bloom)
form canariense
- Androsacnum Webbii

Towards the top Erica is almost
pure, with a sprinkling of Cytisus proli
ferus, Arbutus canariensis, Pinus canarie
nsis.

At 650 meters commences the dense b
rush. It is a laurel wood, but sadly in c
out out. Practically only shrubs are left.
The red trunk of Arbutus canariensis whic
h rise above the coppice attract attentio
n. One trunk measured 60 centimeters in
diameter. This species looks like our Mad
Rone. In fact these canyons strongly
resemble the chapparal of the Californi
a Coast Ranges.

Shrubs of the Mocan, Visnea Mocanera
are abundant, but I only saw one tree, re
aching 4 1/2 meters, with a trunk of 60
centimeters. Rubus ulmifolius is common.
CONSPICUOUS

- Ilex canariensis(bright red
berries!)
- Viburnum rugosum(flowers)

RARER

- Androsaceum Webbii
- Rhamnus glandulosa
- Allagepappus dioicetomus
- Jasminum odoratissimum
- Notelaea excelsa
- Bystropogon canariense
- Myrica Faya

At the head of the ditch a single fine young tree of *Creodaphne foetans*, showed its acorn like fruits. *Micromeria* (*thymoides*) is scattered about. *Senecio Heretiri* is present, and scattered about, but prefers the bare rocks, and goes up to 800 meters. Way up in the gulch, it seeks the sunny side. *Aconium* has the same distribution.

Senecio Tussilaginis becomes more abundant as we go up. *Briza maxima* is not rare below, but avoids the laurel forest.

WEEDS

COMMON

- Silene gallica*
- Linum angustifolium*
- Geranium Robertianum*
- Trifolium campestre*
- *arvense*
- Vicia (cirrhosa)* *dr. Sm.*
- Lathyrus sphaericus*
- Anagallis arvensis*
- Stachys arvensis*
- Rumex bucephalophorus*
- Briza maxima*
- *minor*

RARE

- Helianthemum guttatum*
- Myosotis macrocalycina*
- Dracunculus canariensis*
- Parietaria debilis*

700...800meters

- Ranunculus cortusaeifolius*

- Petrophytes agriostaphyes
- Greenovia aurea- quadrantal-
is? ("*)(833)
- Asparagus umbellatus
- Allium trifoliatum

The moisture and shade of the Laurel association Brings in a good stand of ferns: mosses and Selaginella denticulata cover the ground.

DOMINANT Davallia canariensis
Common.

- Polypodium vulgare
- Aspidium vulgare
- Aspidium aculeatum (higher up)
- Athyrium umbrosum
- Asplenium palmatum (higher)
- trichomanes (higher)
- Adiantum nigrum

- Notholaena Vellae
- Cheilanthes pulchellata (750 m)
- Adiantum Capillis Venaris

Adiantum reniforme is rarer in the wood, but increases as soon as their is more light with moist air. At 800 met it is still abundant. (mixed with Asplenium trichomanes*) The wall of a spring at 750 meters was covered by Cystopteris fragilis.

An immense yellow composite flower with serrate leaves was inaccessible probably a Senchus.

We note:

- Senecio Tussilaginis
- Peristylus cordatus
- Arisarum vulgare

COMMON *Euphorbia segetalis*
SCATTERING dry region
Inula viscosa
Micromeria (tragethymus)

Isolated *Aspidellus ramesus*

RARE *Aspidellus tenuifolius*
On shady rocks *Senecio Heretieri*
is frequently seen.

A few *Tamariscus canariensis* were
planted by the wayside; and once I passed
Datura Stramonium.

As we reach the summit of the first
ridge, at about 400 met.

Artemisia canariensis
Senchus spinosus
Euphorbia Regis Jubae

From now on, clear to Arica, *Cistus monspeliensis* is a constant companion. This seems to indicate that the entire region was once a laurel forest. Today all the land is bare; clear to the pine forest of the ridges. All these slopes are terraced. One finds traces of terraces in the wildest and most arid places. Where irrigation is feasible, a few potatoes are grown. The rest is all planted to wheat.

GUIMAR.... FASNIA

TERRACES

Argyranthemum frutescens
Micromeria (tragethymus)
Andropogon hirtus
Pteris aquilina

Daphne Gnidium and *Cpuntia* may go
up to the pines.

CANYONS(MORE SHELTERED)

Matthiola parviflora
 Plocama pendula
 Rubia fruticosa
 Inula fruticosa viscosa
 Allagepappus dichotomus
 Kleinia nereifolia
 Rumeex Lunaria
 Asparagus umbellatus
 Scilla?

On the sunny rocks of these gorges Euphorbia canariensis reaches 500 meters altitude. Thus we have the anomalous distribution of Cistus monspeliensis below Euphorbia canariensis. In the moist spots in the Cistus belt we find occasionally Aspidium (aculeatum) and Pavalia canariensis.

In spite of these "hot" colonies in the barrancos, the region belongs unquestionably to the realm of Cistus monspeliensis.

This formation continues beyond Fasnia; but the hot element becomes more and more pronounced. All day long, the soil has been the same dry, porous tuff, but now the dryness becomes excessive.

We pass the usual hot species, amongst which Sonchus spinosus predominates. We still see Senecio Heretieri in the shade.

Lobularia lybica
 Medicago minima
 Rubia fruticosa
 Phagnalon saxatile *Carl.*
 Thrinchia hispida
 Anagallis arvensis
 Echium plantagineum
 Antirrhinum Orentium

Camphylanthus salsoloides
Plantago lagopus
Einaria scoparia
Andropogon hirtus
Piptatherium caeruleum (dry)

Avena fatua

As we near go south, at 350 m meters, *Cistus Berthelctianus* comes in and is more or less abundant.

With the usual species

Lotus sericeus (?)
Plocama pendula
Linaria scoparia

I lost my way, and wound up at an isolated ranch house, way up on the mountain side, "Casa Vieja" south of Ico Icer. There they told me that there was no fonda at Arice; so I had to cross the hills to the port - Puerto Abeno. CASA VIEJA (350 meters)

Cistus monspeliensis
Cneorum pulverulentum (goes to 200 meters)

Plocama pendula
Argyranthemum canariensis
Lamarckia aurea

From now on the country is wind swept and dry. (intensely so). We still see a sprinkling of *Cistus monspeliensis*; and this species goes down to 125 meters in the canyons. However now (at 200 meters we have *Euphorbia canariensis*).

Then, as we near the coast, a newcomer is dominant: *Euphorbia balsamifera*. Henceforth *Euphorbia Regis Jubae* is absent, or is restricted to creek bottoms. *Euphorbia balsamifera* often

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forms pure stands; but generally a few other species appear in isolated specimens.

Plocama pendula
Sonchus spinosus
Micromeria (tragophmus)

180 meters

Coastal hills now show occasionally pure *Sonchus spinosus*.

ASSOCIATION

DOMINANT

Euphorbia balsamifera

Common

Sonchus spinosus (localized)

Scattering

Frankenia ericifolia

Aizoon canariensis

Plocama pendula

Rumex vesicarius

Piptatherium caeruleum

Schizanthus calycinus

ON ROCKS

Senecio Heretieri

Rare

Trifolium campestre

Psoralea bituminosa

The fonda was fair at Puerto Ba

Abono. The host bamboozled me into taking a guide. I didn't want him and I didn't need him.. Fool that I was!

Throughout the south there are numerous cave dwellings. In this village are some very interesting ones.

EXCURSION 50

MARCH 22, 1916

PERITO ABONC & ARICCA{}--EL RIO
P C R

GRANADILLO

My guide and my host are pure africanin type. We met numerous camels; on the way to the port.

All day long Micromeria (tragothyms) was a constant, but scattering. Asphodelus is localized and sparse.

ramosus
With 160 meters We first encounter Cistus monspeliensis. This then is a dominant clear to Granadilla. Near El Rio, for first time I saw Cytinus Hypocistis on its roots (I again noted it southern Teneriffe.) Inula viscosa also goes from Tidewater to Granadilla. At first Euphorbia Regis Jubae is wanting; but higher up, especially in the dunes it is not rare. Kleinia nereifolia is localized, but dominant when present.

All available patches are planted to grain. Here grow.

Papaver Rhoeas
Salvia verbenacea
Picridium Tingitanum
Thrinchia hispida

COASTAL BERT (lower)

Lotus (sericeus?)
Cneorum pulverulentum Vent
Mesembryanthemum crystallinum L.

Plocama pendula Ait
P Phagnalon umbelliforme DC

Sonchus spinosus (abundant) R.
Euphorbia balsamifera Ait.
 — *canariensis* L.

SCATTERING

Matthiola parviflora R. Br.
Helianthemum canariense Pers.
Zollukoferia nudicaulis Boiss.
Tragepogon porrifolius L.
Linaria graeca Chav.
Plantago Psyllium L.
Rumex vesicarius L.

300 meters

FLAT AT ARICO

Statice Thouini Vis.

COMMON

Plocama pendula
Andropogon hirtus L.

RARE

Asparagus umbellatus L.

EL RIO

DRY RIDGE

Euphorbia Regis Jubae
 ---- *balsamifera*
)--- *canariensis*
 (goes higher)

At El Rio we cross a deep bar
 rance on a wooden bridge.

Recks

North exposure

(*Androsacmum Webbiana*)
 (*Aeonium urbicum*)
Senecio Heretieri
Polypodium vulgare
 and 2 "Canarian" bushes

South Slope

Cistus monspeliensis

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Argyranthemum frutescens
 Kleinia nereifolia
 Euphorbia Regis Jubae
 - Canariensis(rare

IN ANOTHER CANYON FURTHER SOUTH

Oxalis corniculata
 Plantago Psyllium

Here a few Cistus Berthelotianus betray the nearness of the pine region. Straggling Pinus canariensis come to 430 meters. This may be the limit of the ancient forest. The woods today only cover the upper ridges.

Cistus monspeliensis continua to be the dominant (with a few Phocaea pendula) I believe that these gentle slopes. (now a rocky waste) as far as they are occupied by Cistus monspeliensis were once covered by some species of laurel. I am uncertain which ; it seems too dry for the typical laurel wood.

The soil is a tuff; built up of fragments.

We cut across the hills. The trails are villainous. I'm fagged out. Luckily the fonda is fair. It is some job to dry my papers, of which I carry so few as rain is threatening continuously.

Every available spot of this region is terraced, and under cultivation. Available water means potatoes and to matees. Where not irrigated we have grain and figs. Grapes are few but give an excellent white wine. At El Rio we note Oranges and almonds. In Granadillo we see some beautiful Citrus groves, of fine large trees. At this place

water is abundant, and it is a pretytown.

But damn such roads. And ditte the se barrances. It seems impossible that pack animals canpass some of the stretohes I saw today.

EXCURSION 51

MARCH 23, 1916

MULEBACK

GRANADILLA..VILLAFLO..S.MIGUEL

We abandon the soft tuff of the lower hills; to follow up the hard lava of a ridge. *Cistus monspeliensis*, our constant companion since 2 days, is absent for a while. Outliers of the hot vegetation still exist with *Inula viscosa*. Further up *Cistus monspeliensis* reappears in abundance. With it is some *Asparagus (umbellatus)*. On the ridges (sunny slopes only) the *Cistus* reaches 900 meters. Down in the gulches however; in company of *Euphorbia Regis & Jubae* it goes clear to Villaflo (1100 meters)

At 550 meters this *Cistus* association shows a few *Cistus Berthelotianus*, *Adenocarpus foliolosus* and rare *Cytisus proliferus* form *angustifolius*. Already a pine or two are seen. At 670 meters, we have patches of pine; and the *Cytisus* becomes more common. However *Cistus monspeliensis* remains dominant.

Cytisus ~~*proliferus*~~, *Cistus monspeliensis*
Pinus



Villaflor, Tenerife. alt 3000



Pinus canariensis
2 1/2 meters diameter

At
With 800 meters, the real pine
stand commences. Now *Cistus Berthelotianus*
is abundant. A little higher *Cistus Mons-
peliensis* retires to sunny slopes, with
its friends.

Kleinia nereifolia
Inula viscosa
Scilla?

The northern slopes are now entirely
covered with *Cytisus proliferus*, which
then becomes dominant at 1000 meters.
At 900 meters, however, it still mingles
with *Cistus monspeliensis*, and it
is in full bloom. A beautiful sight!

(photo)

Down in the deep canyon I see.

Ranunculus cortusaefolius
Aconitum (urbicum)
Sanicula Heretleri

The hills about Villaflor (1150
meters) are all covered with pines. Most
are young; but a few are noble trees.
(At 1250 meters) One has a trunk 2.7/10
meters in diameter. Above town the
undergrowth gradually thins out. Still
higher bare only are seen. The last plant
s are *Cytisus proliferus* with an occas-
ional *Adenocarpus foeliolosus*.

The region above the pines is
probably peopled by dense stands of *Spar-
tocyttis nubigenus*, as camels loaded with
their Equisetum like branches
were met.

All land clear to Villaflor is
terraced and intensely cultivated. Grain
(good without irrigation), lentils,

grapes, figs, almonds are the crops. In Villafior it is cool; but oranges still grow. Pears are fine. We see a few apple's chestnuts, and walnuts. At Villafior peaches are all in bloom.

Below, the fields showed the usual weeds; above *Convolvulus althaeoides* was common, and *Calendula arvensis* rare.

Again we admire the prodigious lab or expended on these terraces. The land looks dry; but two inches down their is moisture; perhaps owing to the cloud bank s. In June all this is planted to potatoes without irrigation.

SAN MIGUEL

Towards the south, way below us we see many volcanic cones. Beautiful orange s!

Peaches and prunes in bloom. Almonds, figs, wheat; *Cynoptil*

A single *Kleinia*.

Fonda is ordinary. They put up my bed in the dining room. My landlady has several girls working on embroidery.

EXCURSION 52

MARCH 24. 1916

SAN MIGUEL Adeje

The day's journey was entirely in the hot dry coastal formation. Only in one spot, half way, between Adeje and S. Miguel, a high ridge, of hard lava, bore lots of *Cistus monspeliensis*. (Here also was a single *Cytisus proliferus* and a few *Aeonium urbicum*). In Creek bottoms isolated *Cistus Berthelotianus* have been washed down. Adeje abundant *Euphorbia*.

As far as Adeje abundant *Euphorbia canariensis*, on the rocks, climbs to the top of the crest inland. At Adeje they reach 550 meters, but back of that town a new crest appears, which is pine clad.

DAY 43
DAY'S TRIP

DOMINANT

Plocama pendula pendula
Euphorbia Regis Jubae

COMMON

Inula viscosa
Pennisetum cenchroides

SCATTERING

Lobularia (lybica)
Silene gallica
Erodium Sps.
Geranium sps.
Vicia sps.
Thrinacia hispida
Tolpis barbata
Anagallis arvensis
Plantago (Psyllium)
Arista adscensionis
Lamarckia aurea

RARER

Cneerum pulverulentum
Kleinia nereifolia
Asphodelus ramosus
Scilla?

VERY RARE

Psoralea bituminosa

One Specimen

Euphorbia balsamifera

LOCALIZED BUT THEN ABUNDANT

Argyranthemum frutescens
Sonchus spinosus
Andropogon hartus

FIELDS

Papaver Rhoeas
Echium plantagineum
Picridium tingitanum
Convolvulus althaeoides
Gladiolus segetum (rare)

The region of Adeje is the hottest in the island. It is rich in Plants and would make an admirable center for botanical exploration.

Just north of town, at an elevation of 300 meters, are a series of dry tuff hills.

Here we have .

DOMINANT.

Justicia hyssopifolia
Euphorbia balsamifera

COMMON

Argyranthemum frutescens
Sonchus spinosus
Andropogon hartus
Pennisetum cenchroides

SCATTERING

Fagonia cretica
Pygmaea unguicellata (rare)
Allagopappus dichotomus
Messerschmidia angustifolia
 (viscous form)

IN THE GARRIGUE AROUND ADEJE

ABUNDANT

Glaucium juncea
Sisymbrium irio
Cneorum pulverulentum



Bryonia verrucosa
Wahlenbergia lobelioides
Lavandula abrotanoides
Asparagus umbellatus

Here I collect an *Asparagus*

Here I collected an *Echium*

Echium (see page 181)

NO. 875) it may possibly be *Echium Bennettii* Coincy. The leaves are narrowly linear 3 centimeters long and 4 centimeters millimeters wide, slightly serrate, tuberculate with a few hairs; a low perennial plant. I can find nothing in the Montpellier herbarium like it. The closest would be *Echium strictum*. I have not the literature to decide whether it is new or not.

Throughout the region, clear to the top of the mountain, *Opuntia* is everywhere. The small leaved form with, horrible spines and deep purple fruit is the most common, but I believe bears no food value. This product is raised near houses on a long leaved form with paler fruit and much fewer spines. Women are busy scraping the scales bugs off with a spoon. The insect seems to prefer the shady side of the leaf. The color is found in the female and her eggs.

Throughout the day, grain was the main crop, figs abundant; oranges frequent. Water probably rare. Bum inns!

In the Adeje "hotel", the pig and chickens wander about the dining room. Otherwise the place was good. The people were kind. The type is pure African. They have the same shy manner towards strangers that is shown on the neighboring island of Gomera, which is only 15 miles away, and in full sight.

EXCURSION 53

MARCH 25, 1916

ADEJE.....BARRANCO DEL INFIERNO-INFIerno
 Around house Alce vera is sub-
 spontaneous.

The hot formation comes way up in
 in the sheltered canyon. On the rocks

Euphorbia canariensis meets the pines
 Oranges grow here at 400 meters.

IN THE BARRANCO

DOMINANT

Plocama pendula
Rumex lunaria (500 meters)
Euphorbia Regis Jubae

Abundant

Micromeria (*lachenifolia*?)
 Scattering (around 400 meters)

(*Dicroanthus scoparius*)
Rubia fruticosa
Lobularia intermedia
Psoralea bituminosa
Inula viscosa
Phagnalon umbelliforme
 (Allagopappus dishetomus)
Echium sp. (*Bonnetii*?)
Justicia hyssopifolia
Cuscuta sp.
Lapandula abrotanoides
Andropogon hirtum
Lamarckia aurea

Rare

Cytisus proliferus (*angustifolius*)

Phagnalon saxatile
Kleinia angustifolia
Echium (*candicans*)
Asparagus scoparius
Asphodelus ramosus
Parietaria (*debilis*) rocks

Barranco Inferno. Touriff

Senecio abbreviatus, *Adiantum reniforme*
Achryson dichotomum, *Tolpis laevigata*
Eulalia Petiolaris, *Brickellia*, *Asplenium*
Webbiana, *Polypodium*, *Rumex*, *Loranthus*

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The walls of a ditch were covered
 with *Adiantum Capillis Veneris*
 MOIST STATIONS

Juncus effusus
Trifolium campestre
Gnaphalium luteo album
Picridium ligulatum
Polypodium vulgare

As we near the 400 Meter line, a few small
Aeonium (*Cilicatum*?) show themselves
 on the rocks; with *Sisymbrium millefolium*.

Dense thickets of a very large leaved
 form of *Rubus ulmifolius* now impede
 passage. The creek is lined with *Salix*
canariensis.

Now appear numerous survivals of the
 laurel formation.

Webbia canariensis-(bloom)
Androsaceum Webbiana (bloom)
Trifolium angustifolium
Achyranthes argentea
Pteris aquilina

Cistus monspeliensis also is in full
 bloom. This species however only occurs in
 a narrow belt.

Favored stations on the shady slopes
 of the barranco, show islands of
 canarian endemics, within the mass of
 "hot" plants.

Saviniana acerifolia
Senecio leptocarpus
 - *abbreviatus*-(photo)
 - *faucis Cerei*
Adiantum reniforme

With them are several evergreen shrubs,
 particularly *Ca. tha cassinioides*.

High above us, numerous young
Draecena Drace, share the inaccessible
 crags, with *Opuntia* and *Euphorbia canariensis*.
 The very top is clothed with pines.

As we wind up the canyon, *Senecio*
Tussilaginis appears. At 450 met.

Walls covered *Adiantum reniforme* 89



Barranco del Infierno, Tenerife



Sonchus abbreviatus, *Adiantum reniforme*,
Aichryson dichotomum, *Polemonium*,
Background - *Polemonium*, *Androsace Webbiana*,
Polypodium vulgare, *Rumex*, *Canaria*

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for the first time we collect *Euphorbia streptopurpurea* on the cliffs.
ABUNDANT.

Sisymbrium millefolium
Trifolium campestre
Psoralea bituminosa
Aichryson dichotomum
Aeonium urbicum
Carduus bacccephalus
Tamus edulis
Polypodium vulgare
Asplenium palmatum
Davalia canariensis
Adiantum capillis veneris

At 500 meters altitude, a high wall stops further advance. Here two beautiful waterfalls come tumbling down. The dense shade and moist air offer an ideal refuge for *Adiantum reniforme*; and it covers the walls in pure association.

(Photo) On the southern exposure of this deep basin, the sun reaches the bottom, and a rich vegetation ensues.

Rubus ulmifolius
Aeonium urbicum
Hedera canariensis
Solanum nigrum
Asparagus (umbellatus)
Adiantum Capillis Veneris

A sunny rock was photographed. It showed

Aichryson dichotomum
Petrophytes brachycladon
Sonchus abbreviatus
Tolpis laciniata (enormous
balearic leaves)

Adiantum reniforme
background
Androsaceum Webbiana
Rumex lunaria
Polypodium vulgare

A number of big chestnuts are found in the upper canyon, also a few figs and almonds. *Prunus* are in bloom; many have run wild.

EXCURSION 54

MARCH 26, 1916

ADEJE.....GUIA

An abominable trail, of villainous pavement and naked rock. The trip is a continuous up and down. We pass 25 barrancos of which 5 are deep ones. My poor mule had to pack an enormous, heavy pack-saddle. What waste of force, and stupid cruelty. §1

The entire distance is occupied by the "hot" formation. All the elements are present; but vary as to species and number. *Opuntia*, *Euphorbia canariensis* and *Plecom pendula*, climb to the top of the ridge. On the crest are pines. As we approach Guia the latter come further down. Finally a few miles before reaching our destination *Pinus canariensis* descends to 400 meters. Here, however *Juniperus phoenicea* is more abundant. One fine *Sabina* has a trunk 50 centimeters in diameter.

A little before Tejina, on the ridges (and much lower down in the canyons) *Cistus monspeliensis*, mingles with the *Juniperus*. I had not seen *Cistus* since Adeje. We may say the same the same for *Asphodelus ramosus*.

Here grow also

- Inula viscosa*
- Argyranthemum frutescens*
- Artemisia canariensis*

Picridium tingitanum
Jasminum ederaissimum
 (wanting in the true "dry"
 region).

In the creek bed, here a single specimen of *Cistus proliferus* had
Cytisus been washed down.
 There can be no doubt that the hills
 above Tejina & Gáia, were once densely
 wooded-(testimony as to character-
Cistus monspeliensis and *Jasminum*?)
 THROUGHOUT THE DAY
 DOMINANT

- Plocama pendula*
- Euphorbia Regis jubae*
- *canariensis*(rocks
- especially of canyons)
- *balsamifera* (locali
- zed on the dry lower slopes)

LOCALIZED

- Phagnalon umbelliforme*)
- (*Asteriscus aquaticus*)
- (*Periploca laevigata*)
- Lycium europaeum* (half way dry
- est stretch, common)

RARER

- Kleinia noreifolia* (prefers
- canyons)
- Sonchus spinosus*
- (*Campylanthus salsoloides*)
- Asparagus umbellatus*
- Pennisetum cenchroides*
- Aristida adscensionis*

The annuals are rare. It is
 too dry here. The usual weeds are
 found in the grain fields; but sparse.
 Amongst which I note

Papaver dubium
Anagallis arvensis
Convolvulus althaeoides

The canyons offer more interest, as there all the "hot species" mingle with the elements of the upper region. The deepest gorge offered me 4 *Euphorbias*

E. REGIS Jubae
E. balsamifera
E. atropurpurea (shady)
E. canariensis (sunny)

I have been told that on the rocks of Etchebade, above Guia, *Phoenix canariensis* grows wild.

The entire region from Adeje to Guia is terraced, and planted to grain. The dryness causes a poor stand. The rare irrigation enables tomatoes to grow. Bahamas, vines and particularly oranges are rare (want of water). Figs and almonds more common. Agave is occasionally planted for fodder.

The dominant plant of the whole country, clear to the summit, and sometimes entirely covering the hillsides, is *Opuntia*. All the retaining walls are planted to it. It is the true cochinielle variety, with few spines and elongated, lanceolate leaves, sometimes attaining 2 feet in length. The cochinielle scale, then, is abundant.

The population has the typical africaneyes and cast of features. In Guia however I noticed a few peasants of the Guanche type. Only once we passed a blond blue eyed child of the Guanche type-celtic origin.

I wish to dwell upon the dryness of the region. The sky was beautifully

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blue all day long. Up to Adeje it had been obscured by the cloud banks every afternoon. Whether the southern end of Tenerife is thus always free from clouds, or whether it is an exception all day, I do not know. The dryness of the country would suggest freedom from clouds.

EXCURSION 55

MARCH 27, 1916

GUIA.....SANTIAGO.....BUENAVISTA..

GARACHICO

For many miles we cross a recent lava flow; presenting bare jagged crests. Small depressions have been reclaimed and a fig or almonds planted.

COMMON

Plocama pendula
Kleinia nereifolia
Asphodelus ramosus

RARE

Artemisia canariensis
Micromeria (thymoides?)
Rumex Lunaria (gulches)

Throughout the day I noticed the big leaves of a liliaceous plant, perhaps a *Scilla*.

As we go up, the "hot" formation gives place to a sparse pine forest. We pass a number of *Juniperus phoenicea*; then the pines follow down a ridge to 400 meters.

At 750 meters, on this fresh lava, we are in an open pine wood. Here grow a few *Euphorbia Regis Jubae* (some magnificent specimens).

Kleinia nereifolia

- asphodelus ramosus
- COMMON 5(750 meters)
- Adenocarpus foliosus
- RARE
- Cistus monspeliensis
- Cytisus proliferus
- ramosissimus

- SHADY ROCKS(cracks)
- Notochlaena vellae
- Cheilanthes pulchella

The upper crest is densely clothed with pines.

We continue to climb; passing a village and patches of grain; we reach a bare peak. A fine view rewards us. To the east the snowy cone of the Teyde; to the north and west, deep gulches lead to the sea. Gomera looms up, to the south.

Then we skirt a deep gulch "El Valle"; filled with terraces and villages. The trail is abominable. Much more so than usual.

At 900 meters, on the shady cliffs Euphorbia atropurpurea replaces E. Regis J. Jubae. Inula viscosa however is still abundant. This Euphorbia with Cytisus ramosissimus are dominant, to the highest point reached.

The steepness of the grade compelled me to walk down to Santiago. A sprinkling of Adenocarpus foliosus now mingles with the two dominants. Soon Euphorbia Regis Jubae reappears. In the valley, on the barren rock of a recent lava flow it reaches great size. Here also Kleinia nereifolia is abundant.

as still is *Adenocarpus foliolosus*; but *Cytisus ramosissimus* peters out. Common also is the beautiful purple flowered *Diercanthus scoparius*.
Santiago

- Papaver Rhoeas*
- Eredium species*
- Geranium sps*
- Holianthemum guttatum* Mill
- Tolpis crinita* ^{have}
- Crepis virens* L.
- Anagalis arvensis* (blue)
- Festuca Myurus*

At Santiago we found a bunch of *Sardines*, cheese nuts, and figs.

Teyde now lies in full view. Its slopes are more or less pine clad. Probably once all its flanks were crew-wooded.

A last ridge separates Santiago from the western coast. The trail was unusual, very rough, I had the prospect of walking up and down. The mule then was useless. So I paid full price and sent the man back.

This last ridge belongs to the laurel vocation. *Cistus monspeliensis* is abundant, running far down in the creek beds. *Cytisus proliferus* also as common. Whilst a *Micromeria* (probably *thymoides*) is an outlier from the "hot" region.

WE NOTE

- Androsacnum Webbianum*
- Erica arborea*
- Leucophaea stricta*
- Eupherbia stropurpurea*

The summit offers a typical cut on (900 meters) out laurel wood. Below us to the south are deep gorges.

Isolated

Isolated *Myrica* Faya amongst the *Erica arborea* indicate the proximity of a more virgin wood. Soon the stand becomes more dense and the *Erica* trunks are larger; we note a few "laurels". Here in a clearing, *Viola tricolor* with *Festuca Myurus* were abundant. We are on the outskirts of the laurel forest "Monte del REY", in the mountains back of Los Silos. This wood is rather open on the borders. As undergrowth it here shows a dense stand of *Androsaceum Webbianum*. A carpet of *Geranium anemoneae-folium* covers the ground; and we also note, abundant/:

Renunculus cortusae-folius

Cineraria echinatus

Myosotis macrocalycina

I here, probably, collected *Peristylus cordatus* (label lost).

As we penetrate into the wood, the shade gradually increases. It becomes so dark that it is difficult to distinguish the species of trees. Now the trunks of *Erica* are from 15 to 30 centimeters in diameter. The following, have trunks ranging from 30 - 50 cent. in diameter

Myrica Faya *Ilex canariensis*

Ilex canariensis

Laurus canariensis

Persea indica

In this intense shade, the carpet of annuals is replaced by ferns.

(*Aspidium aculeatum*)

(*Athyrium umbrosum*)

Asplenium *Adiantum Nigrum*)

Here at 850 meters lies a densel y wooded bassin. In its deep gorge I distinguish the tops of noble trees, rising above the mass of foliage. Unfortunately a heavy bank of clouds hides most of the scene. This wood, however cannot compare in size nor in beauty with the stands of Gomera; although probably it's most remote corners hide the finest trees of Teneriffe. As much as I saw of it, it is being heavily cut out. (particularly Erica) by the charcoal burners. The largest trees thus disappear.

To get out, I followed a woman carrying a hundred pound pack of charcoal on her head. Before her trotted a heavily charged mule. Her daughter, of 10 years, toted a load of 50 pounds. The son of 7, carried 25 pounds. As he was a boy, he had the privilege of carrying his load on his shoulders. The trail was steep, slippery, and dark. Still, the girls sang to beat the band.

The gradually increasing lighting of the forest betrays the nearness of the settlement. The wood is now composed of a "pure" laurel stand, like that of Mercedes, with little or no undergrowth. As we approach Palmar, the cuttings out increases. Finally only the well known garrigue remains; bushes of Erica arborea and scattering Myrica Faya. Here Senecio echinatus is in full bloom everywhere and ~~Androsace~~ Androsaceum Webbianum is common. Then gradually Cistus monspeliensis becomes numerous. In spots, curious fact it mingles with Cistus Berthelotianus.

The village hovers in sight. The slopes are terraced and subject to an

attribution
major fault
on.

attention.
two pages
over

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Sonchus leptocephalus
(*Campylanthus salscoides*)
Lavandula abrotanoides
Asparagus (umbellatus)
Cliffs, south of the port.

SUNNY SIDE

Argemone mexicana
Pseralea bituminosa
Crithmum maritimum
Phagnalon sa xatile
Argyranthemum frutescens
Kleinia nereifolia
Picridium crystallinum
Galactites tomentosa
Lycium afrum
Microseris (thymoides)
Statice Solanderi
Euphorbia balsamifera

SHADY SIDE

(NORTH)
Frankenia ericifolia Chr. Sm.
Vicia lutea
Senecio echinatus
Picridium crystallinum
Ruaex Lunaria-if
Avena fatua
Briza maxima
Lamarckia aurea
Bromus maximus
Bromus mollis
Metochlaena Marantae

These, however, were not all in one spot. Two accurate associations are as follows.

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Polycrpa^{ca} latifolia
Frankenia ericifolia
Lycium afrum
Asparagus umbellatus

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Argemone mexicana

see preceding
page

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At Los Silos the hotel was closed. I decided to hike it to Garachico. Arrived at dark. Three beds taken. Ref used to receive me. Prospect to walk to food. Footsore! Tired! I run about town seeking a bed. None! Finally resolved to eat and clear out.

Several guests spoke in my favor. Madame offered to put a bed in the dining room. Accept with thanks. She showed bad grace. All's well. Next day bill 12 pesetas. Worth 6. I pay but give her a piece of my mind.

EXCURSION 56

MARCH 28, 1916

Garachico (Realajo Baje;;;B)

This is a picturesque place, all it needs is a fine bathing beach, to make it a beautiful summer resort. I watched the loading of bananas on a little steamer in the diminutive harbor. A heavy swell makes landing difficult. All around the port Argemone mexicana is abundant.

On rocks back of town.

Meonium umbelliforme

Phagnalon urbiolum

Phagnalon umbelliforme

Allagopappus dioetomus

Argyranthemum frutescens

Kleinia nereifolia

attention

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intense cultivation. Water is abundant. Grain and chestnuts are grown. Phoenix abundant. Walls are abundant covered with:

Senecio echinatus
Andryala pinnatifida
Polypodium vulgare

At 500 meters a cliff was entirely covered with *Aeonium tabulaeforme*.

The road clear down to Buena Vista is paved with awful cobbles. This with the steepness makes tiresome walking. We follow down a valley, and traverse numerous squalid villages. I was the subject of intense curiosity.

At 450 meters an occasional *Euphorbia balsamifera* shows itself, and gradually increases in number. With it *Opuntia* is seen. Several young *Dracaena* seemed wild.

The coastal plain now spreads out before us. A dry region! High above us the cliffs bear scattering *Euphorbia* bear *canariensis*; the first seen since *Gila*!

All slopes and plains, clear to *Garachico* bear an abundant - almost pure and abundant growth of *Euphorbia balsamifera*. Only a few *Euphorbia Regis Jubae* follow the gullies. *Acyranthemum frutescens* also is scarce.

The laurel forest furnished an abundant supply of water to the plain. Buena Vista has the poorest soil and here tomatoes are grown; but from *Los Jiles* to *Garachico* is an endless banana field. Here lies an abandoned sugar mill;.

Lotus glaucus
Petrophytes polyphyllum
Schizogyne sericea
Picridium crystallinum
Withania aristata
Asplenium Adiantum nigrum

REALEJO BAJO in auto. Object; search of "Cardencillo"; for Daveau.

WONES!

Throughout the region moist stations, especially of gulches, show abundant *Senecio echinatus*. At Realejo Bajo, on a wall; *Spartium junceum* reached 4 1/2 meters. Here the northern flank of the mountain belongs to the laurel formation; although only fragmentary bushes of the original stand are found on inaccessible rocks. Every available corner is terraced, clear to the summit. Here for the first time, I here saw *Linaria Cymbalaria*. It is abundant on walls, and follows the irrigation ditches to the sea.

RELICTS.

Lebularia intermedia
Androsaceum Webbiana
Pseralea bituminosa
Adenocarpus foliolosus
Aconium canariensis
 - urbicum(rare)
Aichrysum dichotomum
Petrophytes agriostaphis
Inula viscosa
Eupatorium adenophorum
Phagnalon saxatile
Allagepappus dichotomus
Senecio Tussilaginis

- Erica arborea
- (Andryala pinnatifida)
- Anagalis arvensis
- Micromeria (thymoides)
- Davallia canariensis
- Pteris aquilina

As at Guia and Icod, this is the region where "drawn" work is produced. The Hindoc merchants, now beat down the prices as the war has ruined the industry. They tell me only cheap work is now produced. A poor woman, now only makes 6 cents (U.S.) a day. Formerly she got 50.

A master worker (forelady) b is Juana Hernandez Perez
San Augustin

Realejo Bajo

I had a long chat about the banana industry. This entire valley (Cratava) is one great banana plantation. Formerly each bunch was worth as much as 1.60 dollars, however the war has cut the prices to 50 cents.

The choicest banana patches (terraces) produce 2 dollars a square vara per year of which half is profit. This explains the enormous prices paid for land.

The vital question is water; Without it land is worthless. Water is a monopoly here.

Close to the ocean side, a number of big springs burst forth from the cliff. One furnishes water to the port of Cratava. The other, is pumped up for a mile onto

at

AEONIU CANARIENSE ... PUERTO CRATAE



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potatoes
Lupinus albus
Oranges (a few)
Pears (in bloom)
Apples - -
Prunes - -
Walnuts (higher up)
Chesnuts - -

Hedges are overrun with Rubus ulmi folius, whilst at their base we occasionally see the Purple heads of Senecio Tussilaginis.

The entire region was formerly laurel forest as testified to by;

Androsaceum Webbianum
Aichryum dichotomum
Micromeria lachnophylla
Asplenium Adiantum nigrum
Pteris aquilina

WE NOTE HERE ALSO:

Hypericum glandulosum
Phagnalon saxatilis
Andryala pinnatifida (walls)
Vinea mayer (moist, sunny)

Erica arborea has been so thoroughly cut out, that I saw none under 650 meters. With the first Erica I collected many plants. The fields show the common mediterranean weeds.

DOMINANT

COMMON Trifolium subterraneum

Linum angustifolium (abundant clear into the forest)
Trifolium campestre
Rumex bucephalophorus

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mountain side by Yeaward brothers. Here they have leased all these lands surrounding; and the water then drops from terrace to terrace to irrigate bananas. This pumping plant cost 100,000 dollars, and formerly yielded 800 pipes a day. Now somebody has tapped the vein higher up and the spring only yields 4000 pipes.

These big fruit firms have an enormous capital invested in boats, etc. I saw a packing house in Gratava. Bananas were packed in crates or in big pasteboard boxes, an expensive affair. The packers have agents in all parts of the islands.

EXCURSION 57

MARCH 29. L 1916

REALJO BAJO -- PUMPING STATION --
TO PUERTO GRATAVA ALONG THE
COAST BLUFFS

In one spot *Euphorbia canariensis* was abundant on the rocks. It again appeared at the "Puerta".
DOMINANT

Argyranthemum frutescens
Senecio echinatus (base cliffs)

COMMON

Euphorbia Regi Jubae
Sisymbrium millefolium
Spergularia marginata
Tamarisk canariensis
Frankenia ericifolia
Linum strictum
Ononis dentata
Mesembryanthemum cristallinum

Rock. *Neonium canariense* (photo)
Petrophytes agriostaphys
attention

SCATTERING

Erodium cicutarium
Geranium Robertianum
Fumaria sp.
Oxalis cernua (single)
Trifolium arvense
Hedysarum polymorpha
Galactites tomentosa
Centranthus ruber (subsponta)
Anagallis arvensis (blue)
Echium plantagineum
Antirrhinum Orentium
Scrophularia scorodonia
Trixagon Apula
Stachys arvensis
Plantago lagopus
Muscari comosum
Silene inflata
 - *gallica*
Avena fatua
Briza maxima

RARE

Pavaver Rhoeas
Gladiolus segetum

Earlier in the season, these grain fields show a form close to *Dilleni* of *Spergularia marginata*; as a dominant; but now it is drying up.

The most attractive of these weeds are numerous showy Leguminosae

Ornithopus compressus
Scorpiurus vermiculatus
Vicia lutea
Ervum tetraspermum
Lathyrus sphaericus
 - *tingitanus*
 - *minimus*
 - *clymenum*

Viburnum Tinus
Agua Garcia - 92



Viburnum Tinus
Agua Garcia

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The cut out forest of Agua Garcia commences at 750 meters. Now the trees (fortunately many fine ones) are spared to safeguard the watersupply. A heavy undergrowth of young shoots and the following have sprung up in more open station:

Adenocarpus foliosus
Spatecytismus nubigenus
Viburnum rugosum

An occasional tree-like *Cytisus proliferus* is probably subspontaneous.

Viburnum loves the sunny fringes (photo) but on the higher ridges, the undergrowth of the shady younger laurel and *Erica* wood also shows a pure stand of *Viburnum*.

In deep moist canyons this dense undergrowth is composed of the shoots of the old roots, and

Androsace Webbiana

Rubus ulmifolius

Viburnum rugosum

Phyllis nobla

Bystropegon canariensis

Gesneuinia arborea

Smilax mauritanica

In clearings *Ornithopus compressus* becomes a dominant but it alternates with *Brachypodium sylvaticum* even more common.

Abundant also in rich soil, are the pretty flowers of *Ranunculus cernuus*: whilst *Viola tricolor* is twise as rare. In the intense shade, *Hedera helix* creeps about on the ground it rarely climbs the trunks.

Persea Indica



Agua Garcia, Tenerife



On the moist shady rocks of Madre del Agua is an abundance of
Cystopteris fragilis
Asplenium palmatum
 In the forest we have also numerous;
Aspidium aculeatum
Asplenium Adiantum nigrum
 (tree trunks)
Pteris aquilina

I did not see a single *Adiantum* on the entire day's trip. *Cistus* is totally absent.

This forest is much more interesting than that of Mercedes. The latter is a dense wood, it is true, but is composed of many only one or two species rationally exploited. Here on the contrary, we have many genera (I suppose I did not recognize all) and the open stands enable one to see the individual trees.

The relative proportion of the constituent species, has been modified by man. *Laurus canariensis* is not common: but near the lower fringe some magnificent specimens have escaped the axe. photo (see *Laurus canariensis*?)
 (or more probably *Persea indica*)

Erica arborea is the most abundant, especially in the denser stands. Some of its trunks are 45 centimeters in diameter. They slant in all directions, but are never vertical. The trees are, perhaps as beautiful as those of *Gallera*. Amongst them, with the habitus of a *Populus* are the tall upright poles of *Ilex platyphylla*.

DOMINANT

Erica arborea
Myrica Faya



Erica arborea, Myrica Faya, Ilex platyphylla, Viburnum
ruginosum, Gramineae
Brachypodium sylvaticum

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DOMINANT

Erica arborea
Persea indica
Myrica Faya

NOT RARE

Ilex platyphylla
Laurus canariensis

PHOTO (Slanting two specimens of Erica arborea, Myrica Faya, Ilex platyphylla)

on the upper edge of the wood, all waste land is occupied by a paquis of almost pure Erica, with a rare Adroscaphum Webbiana, and a rare dichotomus. This secondary formation goes to at least 950 meters. So here certainly, the limit of pines does not go below 950 meters.

Here in this beautiful wood the brilliant authorities have struck a few exotic pines and Eucalyptus. Pines! Walking is difficult in these woods as the clay is slippery as glass.

photo
Erica arborea
Myrica Faya
Ilex platyphylla
Viburnum ruginosum
gramineae

GOMERA

EXCURSION 59

31 APRIL 1916

HERMIGUA

Sailing along the southern coast of Tenerife we see that it is exclusively occupied by *Senecio spinosus*
Euphorbia balsamifera
canariensis

The cliffs of Gomera also show a great deal of *Euphorbia canariensis*. As the surf precludes landing most of the time, an immense trestled derriok has been built out from the rocks by the fruit company. Passengers are hoisted from the steamer in a cage, a thrilling experience. (see photo)

A fine stream of water runs through the little valley of Gomera-Hermigua. At this time of the year half of it goes to waste and frogs are jubilant. We note *Colocasia* and *Arundo* in abundance. We note *Colocasia* and *Arundo* in abundance. A little corn is grown; but the great crop is bananas. All available hillsides are terraced. Wherever the water cannot reach we have the dry "hot" formation.

DOMINANT

Euphorbia balsamifera

SCATTERING

Plocama pendula

Euphorbia Regia Jubae

RARER

Ferula Linkii

Lavandula abrotanoides

Kleinia nereifolia

Recks are covered with *aeonium* Casté-
lae Pavae. A little more moisture bring
s in.

Psoralea bitumineza
Peterium verucosum var.
Teneriffae

Phagnalon saxatile
Agrostis verticillata
Micromeria lasiophylla
Allium trifoliatum

On hillsides *Stachys hirta* is ofte
n dominant.

When we reach the rich bottoms
with its abundant moistu're, the veget-
ation is exuberant. Besides common eu-
ropaen weeds we note:

Papaver Rhoeas
Fumaria muralis
Oxalis corniculata
Polycaron tetraphyllum
Melilotus indica
Chrysanthemum segetum
Senecio appendiculata
Galactites tomentosa
Taraxacum officinale
Picridium ligulatum
tingitanum *Hyecia*
Hyecyamus albus

Leronic agrestis L.
Lippia nodiflora Rich.

Chenopodium nodiflora mural
Euphorbia peplus

Euphorbia terracina L.
Piptatherium coerulescens P. B.
mileaceum *Coel.*

Setaria verticillata
Equisetum ramosissimum

Moist spots show *Commelina agraria*.

Between the paving blocks grow *Alternanthera*, *Achyranthes*. Along the wayside *Bidens pilosa* and *Sida rhombifolia* are common. Exotic garden plants run wild in abundance. *Phoenix* is subspontaneous. In gardens *Plantago* and *arborescens*.

On the wall we notice *Parietaria judaica* and *Davallia canariensis*. At the base of bowlders grows *Aspidium mollis*. Whilst moist rocks everywhere are covered with *Adiantum Capillaria veneris*. In the canyons *Pteris aquilina* and *Achyranthes argentea* almost reach town.

Hermigua is a beautiful place. The accommodations are poor. My room has 4 beds. There are plenty of flies. I believe, however, that I have caught them all; but it was a difficult task.

In the upper part of the village a church is finished with hardwoods grown on the spot. This reminds of the chapel with its beams of *Apollonias canariensis*.

It was Good Friday; and the peasants had come in to join the religious procession.

EXCURSION 60

APRIL 22, 1916

HERMIGUA

The creek bed with its moist sands offers many plants, some of which are washed down. Many of the springtime annuals are still in bloom here.

Asperula officinale
Inula viscosa
Stachys hirta (dominant low
 or slopes)

Equisetum ramosissimum
Euphorbia peploides
 - *helioscopia*
 - *terracina*

In laurel region.

Inula viscosa (abundant)

Epilegium parviflorum ~~abundant~~ *lorum* *sub*

Juncus maritimus

SCATTERING

Ranunculus muricatus
Fumaria muralis
Raphanus Raphanistrum
Cerastium sicutum
Polycarpon tetraphyllum
Erodium (malacoides)
Geranium (Robertianus)
Oxalis corniculata

Trifolium campestre

Pteralea bituminosa

Scherardia arvensis

Anthemis octula

Lippia nodiflora

Plantago lagopus

Rumex bucephalophorus

Juncus bufonius

Juncus effusus for

Typha angustifolia

Grasses are abundant.

Setaria verticillata
Verticillata
Piptatherium coerulescens
 - *mileaceum*
Agrostis verticillata
Briza maxima
 - miner (a single plant)
Pea annua (along water)
Lolium perenne (spontaneous)
Bromus (madritensis)
Hordeum murinum (rare)

RARE

Papaver Rhoeas
Gladiolus segetum
Rumex Lunaria
Pteris longifolia (under rocks)

The ascent of the dry hills to the south of town shows.

DOMINANT.

Plocama pendula
Senecio spinesa
Euphorbia balsamifera
Andropogon hirtus (higher up)

COMMON

Ammi majus (higher up)
Phagnalon saxatile
Argyranthemum frutescens
Hedyscyma polymorpha
Kleinia neriifolia
Rumex Lunaria
 with the following, which
 penetrate the laurel belt

Psoralea bituminosa
Asenium (Castille Paivae)
Micromeria lasiophylla
Porskealea angustifolia

RARE

Silene inflata
Erodium cicutarium
Echium plantaginicum

One edge barrens slope nothing but *Zell*
ikeferia nudicaulis remains.

A little higher up the soil is moister and a number of *Juniperus Phoenicea* appear. Here grew an isolated *Echium aculeatum*, and *Brachypodium arbuscula*. I note also *Lavandula abrotanoides*

SUNNY ROCKS

Aconium (Castellae Paivae)
 - (*Saundersii* (rare)

Petrophytes murale (rare, shade)

On the sunny ridge the "hot" plants mingle with laurels.

Psoralea bituminosa
Galactites tomentosa
Micromeria lasiophylla

The proximity of the laurel belt with a consequent increase in moisture makes the pasture richer, the higher we go. Many species, however, are already dried up.

OF THE WITHERED DOMINANTS/

Linum strictum
Plantago lagopus

STILL VIGOROUS ARE
DOMINANT

Peterium verrucosum Teneri
 ffae

Andropogon hirtus

Sinapis arvensis

Common

Silene gallica
Trifolium campestre
 angustifolium
Legia gallica
Asteriscus spinosus
Campanula erinus
Urospermum picridae
Barkhausia foetida b.
Convolvulus althaeoides
 sioulus
Salvia olandistina
Piptatium caeruleum
 romus madritensis
 rubens
Briza maxima
Aegilops macrochaeta 54 H
Aristida adscensionis

Rare

Calendula arvensis
Cichorium intybus
Tolpis barbata crinita
Lamarckia aurea

We climb further, Pasture

Dianthus prolifer
Cnemis dentata
Ervum dispernum
 hirsutum
Lotus Berzii (probably var.
 glauca)

Melilotus indica
Trifolium scrabum
 campestre

Micromeria lasiophylla is still a faithful companion.

Now, for some time, we have been in the ancient laurel region, as is shown by *Pteris aquilina*, and perhaps by the vigor of *Inula viscosa*. In the

Psoralea bituminosa
Pteridium verrucosum Ehr
Ammi majus
Galactites tomentosa
Convolvulus althaeoides
Euphorbia regis Jubae
 (a few)
Asphodelus tenuifolius (a
 single plant)
Avena fatua
Bromus madritensis

211

cleared spaces, however lowland species still persist.

Psoralea bituminosa
Pteridium verrucosum Ehr
Ammi majus
Galactites tomentosa
Convolvulus althaeoides
Euphorbia regis Jubae
 (a few)
Asphodelus tenuifolius (a
 single plant)
Avena fatua
Bromus madritensis

But now *Asplenium* *Adiantum nigrum* is found under the rocks, and we see the *Erica* and *Myrica* that man has spared. Bottoms are covered with

Rubus ulmifolius (var. *Bellii*) ? *Populus* is surely subspontaneous. Here terraces bear potatoes. With *Pteris aquilina* the big rocks of *Aeonium canariensis* begin to appear on rocks. Gradually their number increases until finally, the high sunny slopes bereft of their forests, are covered with it. Today

Today is Easter Sunday. At 5 o'clock in the morning, the church bells began ringing and for an hour or two kept up a continuous violent clanging. Firecracker rockets were shot off continuously. I was told that it was the procession of the Sacrament. I suppose all the peasants of the country were present. I suppose all the peasants of the country were present. If I had known about it; I should have gone. As it was I staid in bed.

EXCURSION 61

APRIL 8 24 1916

HERMIGUA

S(CANYON OF WATERFALL*)

A mile or two above town a high waterfall leaps into a gorge below. It falls from the rim of a plateau at 650 meters to a pool at 300 meters.

Pity the power is lost. Here the gulch is filled with *Salix camariensis*. The walls are festooned with *Senecio appendiculata* and in the water we have *Nasturtium officinale*, and a grass.

High up the crags bear various laurels. I could only distinguish the fruits of *Oreodaphne foetens*.

In this canyon

ABUNDANT

Senecio appendiculata

SCATTERING

*Viola sylvestris**Vinca major*

RARE

*Viola tricolor**Senecio Bourgeai*

The moisture and shade permit a vigorous growth of ferns.

*Gymnogramme leptophylla**Cystopteris fragilis**Athyrium umbrosum**Asplenium palmatum**Aspidium melle**aculeatum*

Many of these are familiar to us in the laurel forests. With them

are several species that perhaps resist sunlight better, as they go further down, in the creekbed.

Athyrium filix femina
Asplenium Adiantum nigrum
Pteris arguta
 - *longifolia*

Davallia canariensis

All wet rocks throughout the canyon, are covered with *Adiantum Capillis veneris*. Near the falls, on the rocks we have a mingling of *Crassulaceae* from above.

Aichrysan punctatum

- *dichotomum*

Acaenium canariense

AND FROM BELOW

Petrephytes agriestaphya

Acaenium Castelle Paivae

We saw yesterday, that *Briza maxima* is abundant below, whilst *Briza minor* is very scarce. This seems to indicate that *Briza minor* is a laurel constituent. Other moisture loving plants (laurel group?) at 3000 meters are.

Delphinium staphisagria

(abundant at 200 meters)

Epilobium parviflorum

Polygonum serrulatum Lay.

As usual a few of the plants "hot" penetrate far inland. At the pool I still note

Pseeralea bituminea

Micromeria lasiophylla
 (laurel?)

On the sunny slopes above we see mingling with laurels and *Pteris aquilina*.

Artemesia canariensis (oaky on) at 200 meters

Kleinia neriifolia
Euphorbia Regis Jubae
Whilst, a little further d

down.

Micromeria lasiophylla
Stachys hirta
Pledana pendula
Pteralea bituminosa
Davallia canariensis

The moist atmosphere permits the laurel group to extend far down. 200 meters.

Achyranthes argentea

110 METERS

Erica arborea
Pteris aquilina

90 meters

Androsaceum Webbianum

As the valley opens out, the moist sand of the streambed bears familiar European plants. Grasses are abundant. *Poa annua* lines the water courses. *Lamarckia aurea* was only seen in rare specimens and far up. The others were all collected yesterday.

Vulpia sciureoides
Avena fatua
Piptatherium coerulescens
Miliaceum
Agrostis verticillata
Bromus madritensis

1 meter

Nasturtium officinale

- Stellaria media*
- Oxalis corniculata*
- Geranium Robertianum*
- Spergularia marginata*
- Rubus ulmifolius*
- Helesciadium mediflorum*
- Gnaphalium luteo album*
- Bidens (pileosa)*
- Anthemis cecula*
- Galactites tomentosa*
- Hypochaeris glabra*
- Hedypneis polymorpha*
- Taraxacum officinalis*
- Campanula erinus*
- Echium plantagineum*
- Convolvulus siculus*
- Veronica Anagallis*
- Rumex bucephalophorus*
- Mercurialis perennis*
- Centella agraria*
- Luzula salicina purpurea*
- Carex*
- Carex vulpina*
- divulsa Good.*

EXCURSION 62
 APRIL 25, 1916
 HERMIGUA K... EL CEDRO

We follow the canyon of the water-fall. The path then becomes steep, narrow, and sometimes squeamish.
 We reach 300 meters. Along the stream *Salix camariensis* is abundant. Here the meister spots offer a refuge to

211
 Convolvulus althaeoides
 Microseris lasiophylla
 Stachys hirta (abundant)
 Rumex bucephalophorus
 (abundant)
 Euphorbia Regis Jubaee (close
 to E. Bertholletii)
 Andropogon hirtus
 Bromus mollis
 The mediterranean flora goes at
 all higher in this cleared land. We follow
 an irrigation ditch.
 At 350 meters
 Papaver Rhoeas
 Nasturtium officinale
 Trifolium campestre
 Bidens (pilesa)
 Galactites tomentosa
 Picridium intermedium
 - ligulatum
 congesta
 Telfia barbata
 Stachys hirta
 Galadialis segetum
 Pipta therium mileaceum
 Avena fatua
 Vulpia sciureoides
 Brachypodium sylvaticum
 Here grow many young Phoenix?
 probably subspontaneous. Adiantum Ca
 pillis Veneris lines the ditch. The p
 pretty Lathyrus Tingitanus may be a
 subspontaneous as the same or a simil
 ar species is cultivated higher up.
 Both Brizas are present.
 Then small bushes of Ilex canar
 iensis, Erica arborea and Myrica Faya
 ; and rare Laurus canariensis, are t
 the fererunners of the forest. That

212
 Convolvulus althaeoides
 Microseris lasiophylla
 Stachys hirta (abundant)
 Rumex bucephalophorus
 (abundant)
 Euphorbia Regis Jubaee (close
 to E. Bertholletii)
 Andropogon hirtus
 Bromus mollis
 The mediterranean flora goes at
 all higher in this cleared land. We follow
 an irrigation ditch.
 At 350 meters
 Papaver Rhoeas
 Nasturtium officinale
 Trifolium campestre
 Bidens (pilesa)
 Galactites tomentosa
 Picridium intermedium
 - ligulatum
 congesta
 Telfia barbata
 Stachys hirta
 Galadialis segetum
 Pipta therium mileaceum
 Avena fatua
 Vulpia sciureoides
 Brachypodium sylvaticum
 Here grow many young Phoenix?
 probably subspontaneous. Adiantum Ca
 pillis Veneris lines the ditch. The p
 pretty Lathyrus Tingitanus may be a
 subspontaneous as the same or a simil
 ar species is cultivated higher up.
 Both Brizas are present.
 Then small bushes of Ilex canar
 iensis, Erica arborea and Myrica Faya
 ; and rare Laurus canariensis, are t
 the fererunners of the forest. That

the air is much moister is shown by.
Androsaceum Webbiana
Viburnum rugosum
Senecio appendiculata
Asplenium Adiantum nigrum
Selaginella denticulata

However it is still an open stand & (axel)

At 380 meters, for the first time in Genara, appears *Adiantum re-niferum*. Although it accompanies us for some time, it is rare and depopulate. This is ~~is~~ not it's home.

The rocks offer (in bloom)

Aichrysen punctatum (sunny cracks)
 - *dichotomum* (400 meters)

Asplenium Castilloi *Palvae*
 - *canariense*
Greenewia aurea (dryer 400 meters)

Petrophytes agriestaphyes
 - *murale*

AT 400 METERS ALSO

Lebularia intermedia
Delphinium staphysagria
Pelypedium vulgare

Here however still occurs
Pseralea bituminea
Kleinia nereifolia. The latter was seen at 470 meters. At 400 meters for first time.

Andryala pinnatifida
Cynoglossum pictum ~~AV~~

Up on the plateau at the head of the falls (-650 meters) these two are common in open spots. Up here also in the creek bed we have abundant *Pteris aquilina* and more or less *Athyrium Filix femina* and *Pteris longifolia*.

For a mile or two then we cross a cleared land. The ground is covered with *Viola sylvestris*; and *Athyrium (umbrosum)* and *Athyrium Filix femina* abundant.

SCD

Silene gallica
Erodium (malacoides)
(Geranium Robertianum)
Geranium melle
Trifolium subterraneum
Lotus (arabicus)
Thrinax hispida
Rumex bucephalophorus
Luzula purpurea
Carex vulpina

New to the west, and north of us, we see magnificent laurel forest. This plateau is cut up into gentle sloping valleys: each one with a purling brook. Man has probably altered the original stand, by cutting out the most valuable woods: because the species are few. One old moldering stump of *Persea indica* was 1 4/5 meters in diameter in diameter. In spite of this being a government reservation, goat is ream about at will, so that it is not virgin wood. I found two old stout trees, far in the forest. Testimony of man's interference.

Client's Edition
 (Medical) (Reproduction)
 (Guaranteed Reproduction)
 Guaranteed Edition
 Titled Edition
 (Guaranteed Edition)
 (Guaranteed Edition)



Erica arborea, *Pteris aquilina*.

Only where the streams have cut
their way, abundant sunlight filters
in. On their banks, we
find all the ferns collected in Herm
igua.

Gymnogramme leptophylla
Cystopteris fragilis
Athyrium Filix Femina
- umbrosum
Aspidium nolle
- aculeatum
Pteris longifolia
- arguta

The composition of the forest seems to vary. *Erica arborea* is rare on many northern slopes. On southern slopes it is abundant.

(Photo shows Erica trunk 60 centimeters in diameter.)

are dry or Erica gradually becomes dry
ex. Erica dominant. It's trunks diminis
hin size, until finally when we reach
the summit (as also on Garajenay)
Erica arborea is practically the only
plant . To what extent this is due to
man I do not know . Certainly the
size is a subordinate factor. I believ
e the tall trees kill off the lower
Erica.

Persea indica, Myrica Faya
 El Cedro, Canaries



Persea indica, Myrica Faya in background

Where *Erica* is rare, the two dominants are *Persea indica* and *Laurus canariensis*. The undergrowth (if not too shady) is always *Pteris aquilina* and *Myrica Faya* is present, but is not so common; at least in the bottoms. A rare element is *Netelea excelsa* (Palablanca).

The two predominant trees offer magnificent specimens. Many *Laurus canariensis* are over 30 meters high and 1 1/5 meters in diameter.

PHOTO

~~Persea indica, Laurus canariensis, Myrica Faya~~

Persea indica does not form such symmetrical trees, but the trunks attain a larger size.

Photo *Persea indica* (perhaps with *Myrica Faya* in the background) (creek)

The creeks resemble the canyons of the California Coast Ranges; but the trees here are larger. On my way home, I crossed a ridge to the south east, coming out by another gulch.

The sunny upper crest.

NORTH SLOPE

Erica arborea

Laurus canariensis

Persea indica

Myrica Faya (a few)

Pteris aquilina was still the most common undergrowth; but as the station shows more sunlight the enormous *Aspidium aculeatum* also appears.

We descend. The ridge is a again cut out. Rocks are covered with *Asterium canariense*. Bushes of *Myrica Faya*, *Ilex canariensis* are now abundant in a gulch a few big *Persea indica* have been spared. Here I collected *Mar rubium vulgare*.

As we go down, the hills are denuded and show erosion. Only traces of *Ilex canariensis* are left. At 450 meters we meet the outliers from below (here figs are grown.)

Artemisia canariensis

Rumex Lunaria

Euphorbia Regis Jubae

In the forest a one armed shepherd joined us and stuck to us like glue, so as to get his share of our dinner and fine wine.

On the way home we picked up my guides family. They were loaded with branches of *Erica* and *Ilex* for fodder, whilst these of *Myrica* were to serve as bedding. The 11 year son of my companion, asked his father if he might sing. No! grandfather had just died. poor little chap! With a 50 pound fagget on his head. Then the children asked their little girl companions (all carrying heavy loads) to sing for them. This they did and with a will; making up in noise what was wanting in melody. Song seems to lighten their burden.

My landlords daughter (see photo) who serves at table, goes off frequently to gather these twigs as if fodder for the sheep. Poor girl! How hard these women have to work! Everything is carried on the head.

Persea indica

100



El Cedro, Gomera



Laurus canariensis 4 1/2 in diameter
Pteris aquilina

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Tomorrow is steamer day, so the bananas are rushed to Fyffes packing house today. Some farmers employ donkeys; but most of the bunches are brought down on the heads of women and boys (rarely men). Photo. The banana plantations look poorly. The war has made fertilizers hard to get and costly; at the same time the price of bananas has gone down.

FLEAS!

The dining room is full of them. A fine fellow jumped on my plate at noon. They keep me busy all night. I never such an active bunch. Up to 6 years ago (probably to the advent of the fruit company) Gomera was a forgotten corner, and extremely backward. The people ate geese made of Pteris. They spun and wove their own wool. Many people are drowned by the incoming tide, whilst looking for mussels. Formerly there was only one boat, once a month from San Sebastian.

I made an excursion along the coast to Agule, to ~~un~~perched high up on the cliffs. From the town to the sea the mountain side is covered with terraces producing bananas. Photo. (plate). Here a derriek and cage enables shipment. From the trail between Agule and Hermigua I had the finest view of Teneriffe to be had anywhere (see photo elsewhere). Two boats were leaving Hermigua landing.

Engr. 12-956

July 1901

Exobasidium lauri not found

CAVRO

Agulo *Castellei* *Pavie*
Acenium Lindleyi *canariensis*
Acenium Lindleyi *canariensis*



Euphorbia Balsamifera
Euphorbia *Castellei* *Pavie* *Lindleyi*
Acenium *Agulo*

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EXCURSION 63
 APRIL 27 1916
 COAST

HERMIGUA Agulo

The trail winds along a high prementary that separates Hermigua valley, from the elevated cove of Agulo. Steep high cliffs enclose the latter. The usual wet flora occupies the dry coastal bluffs: but individual outliers of the "cooler" flora come in, as *Achyranthes argentea* and *Rhamnus crenulata*.

The cove of Agulo, although in greater part, belonging to the same xerophytic formation (with *Artemisia canariensis* in bloom) has so much water available, that the laurel vegetation comes low down, and occupies the cove straight up from the sea. *Acenium canariensis* here mingles with the "wet" plants. A high waterfall, and the drippings from the cliff enable the entire mountain side to be devoted to banana cultures. Dryer terraces are planted to grape vines.

COASTAL BELT

The driest, localized stations bear *Senecio spinesus*.
 Dominant

Acenium Castellei Pavie (ph etc)

Euphorbia balsamifera (photo)

COMMON

Acenium (*Lindleyi*)
Pleocoma pendula
Psoralea bituminosa
Kleinia nereifolia
Micromeria lasiophylla

WEEDS

W

Sinapis arvensis
Galactites tomentosa
Convolvulus althaeoides
 And various *Ligulaefolia*

Scattering *Phagnalon umbelliforme*

RARER

Salvia canariensis
 IN THE MOIST AGULO COVE
 COMMON

COSMOPOLITES

Nasturtium officinalis
Trifolium resupinatum
Epilobium parviflorum
Helesciadium nodiflorum
Gnaphalium luteo album
Taraxacum officinale
Juncus maritimus
Adiantum Capillis Veneris

LAUREL WITNESSES

Briza minor
 (*Briza ~~maxima~~ maxima* is present but rare, in dry places)
Senecio appendiculata
Achyranthes argentea
Salix canariensis
Phoenix is subspontaneous.
 WALLS ARE HERE COVERED WITH (PHOTO)
Aeonium Castille Paivae
 - *canariensis*
Avallia canariensis



Aeonium canariensis
Senecio gomeraensis
Rubus ulmi folius
Erica arborea
 Agulo

EXCURSION 64
APRIL 28 1916

COAST
SOUTH OF PORT HERMIGUA

These hills are bare and dry.

DOMINANT

Plocama pendula

Phagnalon umbelliforme Arg
Argyranthemum frutescens
(slopes of coast)
Senecio spinesus

COMMON

Linum strictum
Erodium cicutarium
Medicago minima
Lotus Berzii
Aconium Castellei Paivae
Gnaphalium luteo album
Senecio crassifolius var.
Thrinia hispida
Microseris lasiophyllum
(with *Cuscuta Epithymum*)
Salvia aegyptiaca
Euphorbia balsamifera
Andropogon hirtus (higher up)

Bromus maximus
Phalaris minor
Aristida adscensionis
Avena fatua

NEARER OCEAN

Pteridium ligulatum form
(congesta)
Campylanthus salsaleides

CLIFFS

I OR 2
Echium aculeatum

Filomacris

General New Laurels



by Hunt Institute



Porre² indica. (slut hgt)
Borneo Laurus canariensis

228

Adenocarpus viscosus

Adenocarpus viscosus. However the "het" regia sends up a number of Artemisia canariensis, and an Euphorbia Regia Jubae. The latter if few in number, is represented by fine specimens; one was 4 1/2 meters high.

We breakfasted in a moist clearing, on the plateau here;

Violatricolor

Silene gallica

Stachys hirta

Luzula purpurea

Juncus maritimus

Carex divulsa

Now the brush shows the usual bushes of the cut out forest. We pass scattered huts. In the upper large isolated trees appear

Ilex canariensis

Persea indica

Laurus canariensis

The undergrowth is exclusively
Pteris aquilina. I snapped a general
view of these vast weeds.

The undergrowth is exclusively

Then I picked up a second guide
to show me the largest trees in
this, the "ARRAMAQUE" forest. It bears
the same stamp as its neighbor in the
canyon's south across the ridge;
"El Cedro". Here also a purling brook
comes rushing by. If one avoids
king up at the evergreen crowns the
scene resembles a northern beech
ed. (Photo *Persica indica*).
The only

The only undergrowth is a light stand of *Pteris aquilina*. We

1/4 foot diameter.



Laurus canariensis
Arcaeaque de Arcaea



have here a distinctively northern "atmosphere" or Stimmung, in a tropical latitude. These dense stands of the noble trees are of great beauty.

DOMINANT

Persea indica

Common

Laurus canariensis

Myrica Faya

SCATTERING

Ilex canariensis

3 PHOTOS

1 trunk diameter 1 meter

1 ----- 1 1/5 -

1 *Laurus* and *Persea*.

In these gulches (lower reaches) *Erica arborea* is rare; although the trunks of 60 centimeters thickness were passed.

The finest *Laurus canariensis* had been uprooted by a tornado. Above it a strip of forest is said thus to have been destroyed by a tornado.

Here the biggest living tree is the "Laure de Arcaea", a decrepit old codger with a trunk 1 1/2 meters through.

Many of the finest trees had a circle of vigorous suckers at the base. A heavy growth of moss covers the trunks and branches. (see photo.) We meet many men and women carrying this moss to Hermigua for packing bananas.

We climb the slopes. The soil becomes dryer. *Erica arborea* gradually increases in number and finally, near the top, is the dominant tree. I have never seen such noble specimens. They alone are worth a trip to the Canary islands. The trunks average a diameter of 45 to 60 centimeters, and are

and are 20 metres high. Some even reach 30 metres (see also photo further on)

A surprise awaited me. High up surrounded by a tangle of smaller trees, stands the grandfather of his race. This *Erica* had the habitus of a laurel. The trunk was only 2 metres high, then sprang forth a dozen

fine erect branches. A candelabra shape. A most unusual growth for this species. The main trunk was a meter in diameter. I had exposed all of my plates and shall always regret it.

The trail now follows the uppermost ridges. We got fine views of the miles of laurel woods, that cover all of the northern half of Gamera. At the elevation we are at, the stand is almost exclusively *Erica arborea*. It is now much reduced in size. Occasional *Myrica Faya* are still met with. On the top of the crest a "Faya" shows a trunk a meter thick.

Open land on the summit, has pasture for the cows; *Trifolium* campestre, grasses and others already familiar. Most of the land is still densely clothed with low *Erica*, which prevents any pasture growth.

With the water shed comes the influence of the hat, southern half of the island. *Erica* dwindles in size and its stands become more open. At 1150 meters the heath is more and more decrepit and its place is gradually taken by *Cistus monspeliensis*. It is possible, of course, (but not probable) that much of this heath has been cut out, to supply the south with fuel. At all events, *Erica arborea* is the last element which remains of the laurel forest.

We now have :

Cistus menspeliensis

Asphedellus ramesus

Adenocarpus viscosus

On the south slope at 1000 meters; a variety of *Euphorbia Regis Juba* e, is probably *The Euphorbia Berthele* ti of Belle. This species soon becomes dominant on the mountain slopes as far as the eye can reach.

It's a long way to Chipude. Although we left at 6 A. M. it was I w when we got to this miserable village. The latter consists of a church and a dozen houses. We find had the great est difficulty to get food. Finally, everything passed off well.

The hills here about are b bare. The vegetation a "dry" one; but there is some pasture, as much cheese is produced from cow's milk.

Deep barrances lead to the sea. Down one we had to go. It was an aw ful trail; steep, rocky, dangerous. H Horses pass however. As there is no church in Val Gran Ray the people olt mb up here, to hear mass.

The moisture of these shady (n north exposure) cliffs, offers a refu ge to some of the "laurel" group.

Androsænum Webbianum

Ranunculus certusaeifolius

Cistus menspeliensis

Acenium canariense

Senecio gomeraeus

Carex divulsa

Davallia canariensis

With these we find various endemic species, whose vocation I ignore

Spartecytisus filipes
Genespermum fruticosum (multiflorum)
Messerschmidia florida
Rhoderrhiza florida
Cedrenella canariensis (lanceolate form)

Sisymbrium millefolium and *Salvia canariensis* are possibly? close to the dry vocation.

The most conspicuous feature of these cliffs, however is the little *Aichrysen punctatum*. Many rock faces are a literally yellow with it's pretty flowers.

In spots the beautiful racemes of *Greenewia aurea* appear, a sure laurel indicator. A "hotter" factor, however is *Acenium urbicum*.

The general floral stock of this cliff region is however decidedly that of the coastal region.

Lebularia intermedia
Psoralea bituminosa (rare)
Inula viscosa
Anthemis cutila
Kleinia nerekifolia
Galactites tomentosa
Echium plantagineum (rare)
Micromeria lasiophylla
Plantago lagopus
Asphodelus albus
Cynosurus echinatus
Avena fatua
Bromus maximus
Aegyleps macrochaete

These are associated with mere moisture loving plants, such as
Trifolium campestre
Lotus arabicus
Cenium maculatum
Rumex bucephalophorus
Juncus maritimus
Briza maxima

The entire valley of Gran Rey, now stretches out before us. All available land is terraced. There is plenty of water for irrigation. Grain is the main crop. Many hundreds of Phoenix are the most conspicuous feature of the landscape. These palms with little white flat roofed huts give a truly african stamp to the landscape.

In the gravels of the lower reaches of the creek, isolated *Senchus* spines announce the proximity of the coast. Night fell, as we reached our goal. My guide set out at 9 o'clock with a lantern for Valher mesa (He arrived next morning at 8 o'clock in Hermigua). This fellow is the son of my landlord at Hermigua. He has not fully reached 19 years and is the father of a baby 4 months old.

Val Gran Rey ;; --Bum Fenda!
 Dining contains 2 beds. In case of emergency another is made up on the table. Floor has not been swept for a week. The smoke drifts in from the kitchen. These houses have no chimneys. The smoke works its way out, under the tiles and through the doorway. The kitchen; the manners, all: are primitive. Fleas of course, are abundant. I had a poor night. Overtired!

The place has an abominable pavement. Watercloset are wanting. I had diarrhoea. In the darkness, I had to feel my way and climb down to reach the gulch.

spinesus. *Pseralea bituminea* was only seen washed down in the gravels.
CLIFFS

COMMON

Plocama pendula with (*Cuscuta Epithymum*)

Kleinia nereifolia (localize)
Euphorbia balsamifera

LEVEL DEEP SOIL

Oenlis reclinata
Lotus arabicus
Phagnalon umbelliferme
Senecio crassifolius
Amberbea Lippia (1193) P.
Picridium (tingitanum)
Lavandula abrotanoides (rare)
Suaeda fruticosa
Trichelaena teneriffae
Avena fatua
Bremus rubens

DUNES (amongst)

Zygophyllum Fontanesii (abundant)

ROCKS OF COAST

Eragrostis Barrelieri
Dichreanthus plocameides
Lycium (afrum)
Bystropegen origanifolius
Stipa tortilis Desf.
Cynesurus echinatus L.

Some moist bottoms and sands show a vigorous stand of *Tamarix canariensis*. Underneath only *Oenlis reclinata* and (*Aristida adscensionis*?) can grow.

The landscape is strikingly uniform in its appearance. The vegetation is sparse and consists of low-lying shrubs and grasses. The soil is sandy and the climate is arid. The vegetation is adapted to these conditions and is characteristic of the region. The landscape is typical of the coastal area and is well-suited to the local environment. The vegetation is a mix of native and introduced species, reflecting the history of the area. The landscape is a beautiful example of coastal ecology and is a valuable resource for study and conservation.

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[illegible]

Thermoister bottoms offer a variety of common weeds:

Trifolium campestre
Lotus arabicus
Gnaphalium luteo album
Bidens (pilesa)
Anthemis cotula
Tolpis barbata
Sonchus oleraceus
Cichorium (divaricatum)
Picridium (tingitanum)
Anagallis arvensis blue (rar
Carex (vulpina)
Lilium (rigidum)
 Here also we find *Mesembryanthemum m*
mediflerum, and more rarely on the rock
 s of the coast *M. crystallinum*
 In the creek beds
Alcea vera
Tetraglen villosus
Bromus rubens
Brachypodium sylvaticum

EXCURSION 67

MAY 1, 1916

VALLE GRAN REY.....	VALHERMOSA
VALLE GRAN REY.....	R
VALHERMOSA	H
ARULE.....	A

We climb the steep side of the canyon, exposed south.

Pleocoma pendula
Senecus spinesus

250 METERS

Euphorbia a forme close to the
forme Berthelotii of E. Regis Jub
ae.

300 METERS

This *Euphorbia* gives place to
Euphorbia balsamifera. Here is mu
ch *Trichelaena tenerrifae*.

Cliffs (south) here we can compare the ~~sh~~ flora with that of the shady cliffs at Chipude.

Usual "hot"

Lebularia intermedia
Pteralea bituminosa
Aconitum urbicum
Pleocoma pendula
Argyranthemum frutescens
Kleinia noreifolia (rare but
 seen at 500 meters)

Lavandula abretanoides (rare)

Euphorbia Regis Jubae (form
Berthelotii)
Asphodelus tenuifolius*

WEEDS

Sinapis arvensis
Medicago minima
Calendula arvensis (rare)
(Picridium tingitana)
Linaria scaberrima
Yulpia sciureides

AND THE MORE ATTRACTIVE GROUP

Matthiella parviflora
Tricholaena teneriffae
Mesembryanthemum nodiflorum
Genespermum frutescens (multiflorum)
Atractylis cancellata L.
Amberbea Lippia
Peripleca laevigata
Echium (aculeatum)

Cynaragardum cesp. ferociusculum.
Huelo. Domest.

Euphorbia Berthelotti EXETER 308

[illegible]

THAT THE LEVANTINE AGENCY (L.A.)

Supplemental Record (form)

Department of Mathematics

and by Hunt Institute I

(101st St) 101st St & 102nd St
(102nd St) 102nd St & 103rd St

1947

THE ATTORNEY GENERAL

Matthews perverts

1. Содержание

(AMTOLITOL)

...сталинского Византизма...

SECRET
SECRET

1940



The rocks are covered with the
lichen *Crochilla*.
IN THE SC

Lamarckia aurea (rare)

Briza maxima

Arule Gomera
Euphorbia Bertheletii.

109 43



Arule Gomera - Vallehermosa

Arule Gomera - Vallehermosa



Erica arborea

239

We pass a miserable squalid village Arule. (Many houses are abandoned). Lots of goats and sheep are seen. On the precipices I notice a few straggling Phoenix, probably subsp. aneus.

The entire plateau, where not wooded and the soil is good, is planted to grain. A poor crop this year. Galactites and Raphanus Raphanistrum are abundant, but at 850 meters; Andryala pinnatifida forms dense patches. Here also Cistus monspeliensis comes over to the sunny side.

A few hundred yards further on a sprinkling of Erica arborea mingles with the Cistus, and finally we have the typical "cut out" forest, with Erica and Myrica Faya. Once more we are in full laurel vegetation.

In the seed, Trifolium campestre then is common, as is seen Helianthemum guttatum. Trifolium campestre is then our faithful companion; in the forest, wherever the sunlight is sufficient. Cistus monspeliensis and Pteris Aquilina are abundant and a few Euphorbia Bertheletii persist.

The tree growth becomes denser although still modified by the axe.
950 METERS

SCD

- Viola(sylvestris)
- Helianthemum guttatum
- Silene gallica
- Trifolium arvense
- campestre
- Lotus arabicus
- Sherardia arvensis

Erica arborea, *Valhermoso*



Valhermoso, *Go for*



Teyde in distance,
note evolution
region, *Erica*

240

Senecio generaeus
Andryala pinnatifida
Rumex bucephalophorus
Lusula purpurea
Vulpia sciureoides

Now we have a dense covering of *Erica arborea*. The stands is of the dwarf form of the higher crests; but it is a true forest. Occasionally a big trunk attracts attention. (5 photo)

The dense shade usually kills off the undergrowth. If open, *Sherardia arvensis* grows in profusion, with abundant *Hypochaeris glabra*. *Myosotis macrocalycina* and *Ranunculus acris* are common in the shade; but the darkest places which still bear undergrowth are reserved exclusively for *Pteris aquilina*.

As we advance a few "laurels" appear; but man has severely cut out the stand. In open spots we collect.

Geranium anemonae-folia
melle

We reach the basin of Valhermoso. Unfortunately only straggling bushes remain of the ancient woods. Only on the flanks of the highest ridges (especially at the heads of canyons) too far from settlements for exploitation, we still find remnants of the woods.

It is said that they contain a abundant

Visnea Moenara
Apollonias canariensis
Laurus canariensis

If this is true they differ from the forest of El Gredre and Arramaque, with their dominant *Persea indica*?

Personally today, I only note

Ilex canariensis

I now admired again the finest view of the Teyde in all the islands.

at times when laborers get 2 pasetas
to get it. I refuse to give people
buy a watch for 10 pasetas, and hoped
coffee and a good dinner. He wanted to
me. I treated him to excellent coffee.
He was not content as he made a 10
to are furnished. I gave my guide 8 pasetas
We go down. The hillside once more
abundant, and the "hot" plants appear.
Now Arctostaphylos cannastrum becomes a

243
 I new share my room with a pharmaceut
 ical drummer. Same I met in Adeje. I n
 oticed cotton on the floor. As a prec
 aution I go to the creek to wash. I want
 to be sure

 EXCURSION 69
 MAY 4.5 ... 1916
 AROUND THE Island of Gomera by steame
 R. Stop for the night at val Gran Rey. T
 hen 3 hours at S. Sebastian.
 I sat waz at the pier at 5 1
 5 1/2 A. M. We get started at 10 .
 Ocean calm, Pref 1 ate all meals. In
 spite of the smooth surface, a heavy s
 well prevented the landing at Val Gran
 REY. (see preceeding photo of town)
 There is an extensive but open
 growth of Juniperus phoenicea on the
 north coast of Gomera. On this north
 coast, however only one or two cliffs
 show Euphorbia canariensis. Further on
 this species was not seen until half wa
 y between Santiago and San Sebastian.
 The "Organes" (see commercial p
 hoto) are pretty, but little of it:
 although the tendency to prismatic form
 ation is marked on this coast.
 With San tiago on the south coast we
 reach the center of the " dry" region.
 HERE
 DOMINANT
 Plocama pendula

243
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 reach the center of the " dry" region.
 HERE
 DOMINANT
 Plocama pendula

South Coast, probably Santiago 113



Photo of Geographical Society 15. VII



S. Sebastian, Light house
Euphorbia Bertheletii Light houses
canariensis
Euphorbia canariensis & E. Bertheletii

244

COMMON

Euphorbia Bertheletii

SHADY SLOPES AND BOTTOMS

Euphorbia Bertheletii
balsamifera

WASH

TAMARIX CANARIENSIS

CROPS

Bottoms a few bananas
Tops ;;; Tomatoes

After Santiago some Senecus sp.
spinosus, and in spots Phagnalon umbel-
lifolium. Bottoms are always green with
Pleocoma pendula. The dominant plant is
always Euphorbia Regis Jubae and on shady
slopes Euphorbia balsamifera.

Photo Light House S. Sebastian

Euphorbia canariensis, E. Bertheletii.)

In my opinion Euphorbia Bertheletii is a
simple variation of E. regis Jubae ? In the
creek (S. Sebastian) I collected Salvia
aegyptiaca. On the dry hills Echium
aculeatum.

EXCURSION 70

MAY 5. 1916

SOUTHERN TENERIFFE

S(PORT GULAP°)

The southern end of Teneriffe offers the
typical coastal flora. On the newer lava
flows there is practically no vegetation,
only a little Pleocoma pendula. This then is the

245
dominant in the creeks and with a few *Artemisia canariensis*.

ROCKS OF THE COAST

(P)

DOMINANT

Senecio spinesus DC
Euphorbia Regis Jubae W.B.
Andropogon hirtus L.

COMMON

Phagnalon umbellifolium ^{only here} -
Allagepappus dichotomus L. -
Suaeda fruticosa Forsk.
Euphorbia balsamifera Ait.
(often dominant)
Andropogon foveolatus (new)
Aristida adscensionis L.

SCATTERING

Frankenia pulverulenta L.
(often covers flats)
Mesembryanthemum crystallinum L.
- *modiflorum* L.
Justicia hyssepifolia L.

INCIDENTALS

Asteriscus spinesus Sch.Bip.
Aegyranthemum frutescens Sch.Bip.
Amberbea Lippia DC.
Anagallis arvensis (blue) L.
Heliotropium (*erosum* ?) L.
Ajuga Iva Schreb.
Ricinus communis L.
Aristida adscensionis L.

Euphorbia canariensis is present on this southern coast, but only on the cliffs near the ocean.

EXCURSION 71

TENERIFFE

MAY 13, 1916

CLIFFS TO THE EAST OF THE FOREST OF
MERCEDÉS

The ridge east of Laguna is almost entirely occupied by pasture. Only in spots are remnants of the ancient weed; such as a dense brush of,

Erica arborea

with

Adenocarpus foetidus (glabrous)

Trifolium

Trifolium campestre

Briza maxima

Pteris aquilina

Already the sunny southern slopes are drying up.

DOMINANT

Plantago lagopus

Stipa tortilis

RARE *Bromus mollis*

Lolium italicum

The shadier (meister) exposures offer a rich, green and varied pasture to many big fat fawn collared cows.

DOMINANT

Trifolium subterraneum

scabrum

campestre

the latter, as we have seen, is found everywhere in the open forest. *Briza maxima* is also a dominant everywhere, with a little *Briza minor* in master spots.

These mountain meadows have been
highly modified by man. It seems
to me each meadow as I have seen
meadows, and I believe have been
introduced.

THEY ARE

Geranium sp.
Geranium sp.
Helleborus viridis
Geranium sp.
Then we still see patches of soil
on the mountain sides the violet
of *Viola blanda* in the fields the
scent of *Phlox* reversa and the
blue of *Delphinium* *triflorum*.
Isolated rocks, scattered here and
there, are good in places. Only a
few *Asplenium* *platyneuron* are found
in the rocks.

Coming west, invariably seen are
the *Delphinium* *triflorum* and
the *Asplenium* *platyneuron*. It
is a good thing to have a good
view of the mountain.

HERE ALSO

Echium *officinale*
Microseris *lasiophylla*
Woodwardia *radicans*
Quercus *laevis*
Polypodium *virginicum*
Asplenium *platyneuron*
Adiantum *capillus* *Veneris*
The small *Asplenium* *platyneuron*
headed the *Asplenium* *platyneuron*, however, after
the next interval. Now we have the
Asplenium *platyneuron* and the *Asplenium* *platyneuron*
When I passed that a month ago, it
flowers were the most beautiful
one of the landscape.

248

On these rocks many pasture plant
s disappear, but *Briza maxima*, *Galacti-*
ites tomentosa and grasses are abundant.
Daucus aureum is common; *Andryala pin-*
atifida is the most conspicuous plant.
The biggest bushes are *Echium bifrons*.
For the first time, here on the divid
e, I find *Adiantum reniforme*. On the
rocks the yellow flowers of a variety
of *Petrophytes brachycaulon* are conspi
cuous. Clear to the top of the ridge
comes *Isamelia Breussenetia*.

Lebularia intermedia

Grambe strigosa

Hypericum intermedium

reflexum

Geranium nicaense

Adenocarpus foliosus *Ait*

Medicago orbicularis

Leonidium urbium

Drusa oppositifolia (shade)

Phyllis nobilis

Ferula Linkii

Galium ellipticum

Asteriscus spinosus

Thrinola hispida

Sonchus leptocephalus

Trixago apua

Phelipaea nana

Leucophaea soluta

Microseris lasiophylla

Rumex pulcher

Carex divulsa

Anthoxanthum odoratum *L*

Piptatherium coerulescens

Polypogon elongatum *Hornb*

Aira caryophylla *L*

On these rocks many beautiful plants
abound, but Hines maxima, Galathea
tota tenuifolia and Xanthus are abundant.
Dendroica autumnalis is common. Andrena
metallica is the most conspicuous plant.
The biggest bushes are Kalmia latifolia.
Near the first shore, here on the divide
I find Adiantum nemorosum. On the
rocks the yellow flowers of a variety
of Petrorhiza fraxinifolia are seen
near the top of the divide.

249.

The rocks are covered with many species of lichens ; of which 1260 LOBARIA PULMONACEA VAR. papillata aris DEL; is the biggest.

The plateau of Laguna is now a perfect picture; with its silverish green waving grain fields; its Eucalyptus avenues; its poppies. The tile roofs and many church towers evoke the scenes of central Europe. There

is certainly nothing "canarian" about it.

Going down; what a change! The grain fields are already yellow. Here *Spartium* is still in bloom amongst the *Opuntia*.

EXCURSION 72

MAY 17, 1916

Guimar to the mountains.

We have studied this flora before. Nearer town, today, today dominant *Mercurialis* is drying up. Later on the predominant species is (*Cynurus echinatus*)

RARE

Euphorbia segetalis

terracina

Linaria cymbalaria (ditches)

Gnaphalium luteo album (---)

Micromeria lachnophylla goes up as far as I went. It descends to the ocean; and is found in creek beds.

Adiantum Capillis veneris is common. W. Walls offer *Asplenium palpatum*. *Adiantum reniforme* goes high up.

Cutliers of the laurel association appear

Helianthemum guttatum

Webbia canariense -(in bloom

Androsace Webbii-(-)

Senecio Heretieri

Asplenium nigrum

Cheilanthes pulchella

At present the *Cistus* are in their glory. Below mainly *Cistus Monspeliensis*; above *Cistus Bertholianus*, forme *symphitifolius*.

Guimar

[illegible]

Gummi, Tenuifolia
Arbutus, Viburnum rugosum
Eriobotrya, Vitis Moria

251

I climbed up the ridge and came
back by the canyon already studied.
ADENOCARPUS is in full bloom
and runs up close to the pines.
RIDGE

CUT CUT LAUREL FOREST

DOMINANT

Erica arborea

Common

Cistus monspeliensis (lower
- Berthelotianus (upper
Viburnum rugosum (passed)
OTO

PHOTO

Ilex canariensis is practically the only laurel left. A rare *Visnea Mocanera*. Everywhere climbing is the pretty *V. cirrhosa*.

RARER

ca Pays. *Jasminum odoratissimum* Myr

Abundant herbaceous plants cover the ground. Dominant

DOMINANT *Trifolium* *campestre*
- *minus*

Aira caryophylla

F

COMMEND

Helianthemum guttatum (prett
Geranium y)

Geranium rotundifolium
- dissectum

CNonis dentata

Trifolium arvense

ligusticum

Torilis infesta

Tolpis barbata

Barkhousia foetida

Plantago lagopus (drying)
Fennisetum carolinianum

Pennisetum cenchroides
Vulpia ciliolata

Vulpia sciuroides

Arbutus canariensis, background Pinus,
Viburnum ruscifolium, *Viburnum Mocanera*,
Guimara *canariensis*



Arbutus canariensis 15-20 m. diam.
Guimara *canariensis*
backgr. *Pinus* *Viburnum* *Mocanera*

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Briza maxima is common in moist places below but sparse in the brush. SUNNY ROCKS

Trifolium arvense
 - *stellatum*
Ceterach aureum (highest)
Notochlaena Marantae (high)
Cheilanthes pulchella (low)

We note laurel plants
Senecio Tussilaginis
Wahlenbergia lobeloides

RARE

Dianthus prolifer
Torrilis leptophylla
Tinia intacta
Gynoglossum pictum

These ridges clear up to the the pine stand, present a dense growth of *Arbutus canariensis*. (I estimate the station, from 500 TO 900 METERS) In canyons, it is more scattering, but the trees attain much greater dimensions. One (Photo to be reduced) trunk was a meter in diameter. On the higher slopes, *Arbutus* is generally a small tree but very abundant: (PHOTO)

Sometimes it is the dominant plant on dozens of acres, and therefore *Viburnum* and even *Erica* to take second place; not to mention the few bushes of *Viburnum Mocanera*. All of these are seen on my photo. (reduce photo.)

In the dense stand of *Arbutus*, a few noble pines show that the coniferous belt is not far off. This is confirmed by the decrease of *Cistus monspeliensis* is, now restricted to sunny spots and southern slopes, and there penetrating into the pine forest. *Cistus*



Berthelotianus is now abundant.
 This border, between the story of pines and the former laurel wood, s shows traces of Myrica Faya. Rare, probably through man's influence. The only hardwood really abundant is Ilex canariensis. Adenocarpus foliosus has disappeared. Erica arborea of course is common. The axe has made the pine forest an open stand.
 In a clearing (above the limit of Arbutus) I note two plants of Asphedus ramosus, and a rare Androsace Webbiana. A pasture was violet with Echium plantagineum.

I reached about 1100 meters.
 Down in the barranco with its shade and moisture
 Ranunculus cortusae-folius
 Senecio Heretieri (in bloom Photo)
 Andryala pinnatifida
 Myosotis macrocalycina
 Bystropogon canariense
 Here stands a Visnea Mocanera with a trunk of 30 centimeters.
 Otherwise the gulch offers nothing new. The annuals are drying up.
 Abundant still
 Trifolium minus
 - campestre
 Plantago Lagopus

EXCURSION 73
MAY 17, 1916
GUIMAR TO PUERTO

The country is very dry.

ROADSIDE
DOMINANT

Euphorbia segetalis

COASTAL REGION
DOMINANT

Plocama pendula
Sonchus spinosus
Micropus lasiophylla

SCATTERING

Euphorbia Regis Jubae

CLOSE TO THE SEA

Euphorbia canariensis (abundant photo farther back)

To the south, the dry creek bed covers a large part of the plain. *Plocama pendula* is dominant. If moister *Euphorbia Regis Jubae* comes in. In sands *Sonchus spinosus*. *Micromeria lachnophylla* is abundant everywhere clear to tidewater.

Various grasses are scattered about, but all are dried up. *Tricholaena Tenaxifera* (relationship south Africa) was washed down. With it some *Lotus glaucus sessilifolius*. Here on steep cliffs rising from the sea, for the first time, I met with *Ceropegia dichotoma*. It is rather rare.

Dominant with it are

Euphorbia balsamifera
- *canariensis*

RARE (poor, straggling) *Lotus sessiliflorus* DC

Euphorbia Regis Jubae

A miserable, gnawed leafless *Spartium* like bush turned out to be *Rhodorrhiza scoparia*. W.B

Ceropegia dichotoma Haw. 119



Sonchus spinosus and *Pennisetum cenchroides*
-both of them are common in this region

EXCURSION 74
MAY 18, 1916

PUERTO GUIMAR, NORTH ALONG THE COAST TOWARDS CANDELARI.

The seashore here is formed by a flat dry; barren, jagged lava flow.

Dominant

Plocama pendula

Euphorbia canariensis

Nearer tidewater, localized is abundant *Euphorbia balsamifera*. If the station is sandy we have DOMINANT.

Sonchus spinosus and abundant *Pennisetum cenchroides*. *Sonchus* however common further inland.

On these desert coastal rocks *Ceropegia dichotoma* is common. - Photo

A few *Periploca laevigata* find protection amongst the branches of *Euphorbia canariensis*. *Rubia fruticosa* is very rare.

In spots a shrub is not rare, that seems drying up and dying. It is not only the leaves have withered. *Sonchus leptophyllus* cephalus.

The rest of the vegetation seems mainly the Gramineae. All are sparse and all are withered. I note *Aristida adscencionis*.

We also find an occasional wreck of *Argyranthemum frutescens*. Nevertheless this plant is practically wanting in the entire Guimar region. It is too dry! *Euphorbia Regis Jubae* is also rare on this coast.

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Fish!

These seashore lavas hold two more species

Micromeria (lachnophylla)

Artemisia canariensis (rare)

On a roadside I collect *Polycarpae teneriffae* var. *aristata*.

As we go inland away from the ocean the entire coastal region is covered with

Plocama pendula

Sonchus spinosus

RARE

Euphorbia Regis Jubae

This latter association follows the coastline from Guimar to Santa Cruz. Only in one spot, on this stretch did I see a patch of *Euphorbia balsamifera* on the mountainside.

RESUME

GUIMAR COAST

NEAR OCEAN

DOMINANT

Plocama pendula

Euphorbia canariensis

Euphorbia balsamifera

COMMON

Sonchus spinosus

Ceropogia dichotoma

Micromeria (lachnophylla)

Grasses

INNER COASTAL BELT

DOMINANT

Plocama pendula

Sonchus spinosus

COMMON

Micromeria (lachnophylla)

Euphorbia Regis Jubae

Near the port I met a crowd of women carrying fish to Guimar. photo



Guimar - Tenerife



Guimar 124

The valley of Guimar has been scooped out of beds of soft pumice stone by erosion. All the slopes, to the very crest, have been terraced. In the lava flows that traverse the plain, level spots have been cleared of rocks, retaining walls built and soil and black sand from the beach packed in. It represents a vast amount of labor. The sacrifice of many generations.

Nothing can grow without irrigation. Not a drop of water is lost. The main crop is tomatoes. They were always. They were already threshing wheat.

Guimar has a port but for some reason the products have to be carted to Santa Cruz. A pity! So all products from the coast are packed to Guimar by mules and there transbordered.

The teams leave at night. The heavy traffick has cut up the roads. I got the full benefit of these ~~roads~~ ruts, during the 5 hours I passed in the horsedrawn diligence. The Auto was out of whack so I had to get up at 3 A. M.

Villa Cratava

June 4; 1916

In company of Mr. Ignacio Larra I visited a number of Gardens, hidden behind the private residences. Many staircases in the latter are of polished Robinia.

These gardens are delightful: with their luxuriant vegetation, running water and singing birds. Their greatest charm however is the view

...a level spots have been observed on
rooms, retaining walls built and set
I and black sand from the beach where
5 in. it represents a vast amount of
of labor. The acquisition of such goods
national.

Nothing can grow without fertilization. Now a crop of wheat is ready. The rain was in the clouds. They were always there. They were always there. They were always there.

Magnolia grandiflora



running water, vegetation, their
r greatest charm however is the view
with their luxuriant vegetation

Here Camellias reach 5 meters in height. Magnolias grandiflora with trunks of a meter. One old codger even reached 2 meters. A (Photo) A dead trunk of Castanea measured 4 meters in diameter. Roses are in bloom everywhere. Fuchsias run riot. Geraniums and Pelargoniums are just covered with flowers. Lobelia also runs wild.

Honeysuckles and every conceivable climber clambers up the trees and covers the walls. Here *Webbia canariensis*, grateful for care, grows -gze into a fine ornamental shrub.

I note fine specimens

Tree ferns (4 meters)
Yucca
Calycanthus
Coffee(fine)
Statice arborea
Araucaria
Pinus
Aguacate
Fraxinus australis
Platanus orientalis

A new trick ! In the ditches run
ning through town, the washing is done
To get deeper water the water- woman
places a stone in the stream . Often t
his washin is but an excuse, to fo
ree more water into a lather canal.

My companion dragged me into the town hospital, a building of many small courtyards (patios).

of the beautiful valley to be had from
their horses.
Hate Camellias reach 3 meters in
height. Magnolia grandiflora with
trunks of a meter. One old cypress even
reached 3 meters. A (photo) A tree to
right of entrance reaches a meters in
height. Roses are in bloom everywhere
as Rubias was not. Geraniums and
Tulipines are just covered with it
everywhere. Lobelia also runs wild.
Honey suckles and every conceivable
climber up the trees and to
the walls. Have little camellias
also. Gratiola here, too. Grow -
into a fine ornamental shrub.
I note this again.

Botanical Garden
Ortaya
Pritchardia difera



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The entire cost to the city council is 1200 pesetas annually. They figure on 65 centimes a day for each sick person. They can not give sufficient food, at such a ridiculous figure, let alone wines and medicines. What suffering there is!

What suffering there is in this world! I can not blame these poor for kicking; after seeing the coldness and selfishness of these rich landowners. (My companion is said to have an income of 15000 dollars.

At nighttime, the main occupation of the town seems to be "Peleando La Pava". There is music now in the Plaza.

Santa Cruz was a tropical city when I left this morning. At Cratava it is cool, the night may be termed cool. Now the stars are out after an afternoon of heavy clouds.

I am preparing my trip to the
Teyde. Guide, mule

Gofio
1/2 Millet
1/2 maize

EXCURSION 75
JUNE 6 1916
ORATAVA

I followed down the gulch north of town; then cut across the banana fields, to the Botanic Gardens. Here M. (Count) Ignacio Larena the Director, and Mr. Boaling, the head

Ficus (Roxburghiana?)

(cont'd. de Larena
Juan Batimaga.



Botanical Garden Oatava



Director and Mr. Batimaga

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gardener awaited my me. In their company I visited the garden. Larena had lunch brought from town and we dined under the trees. Very nice. I photographed the two gentlemen under a *Ficus* (*Roxburghiana*);

The garden is well kept; in fact too much money is spent for pleasing the eye of the public. (politics) The wooden fence good for many years yet, is to be replaced by an iron grating costing 2500 dollars. It would have been wiser, to send a competent man to Kew to determine the trees, for this money.

I notice a fine Camphor tree. Once more I admire the *Pritchardia filifera* 18 meters high in 30 years. A *Ficus* of 35 years has a trunk 1-1/2 meters in diameter. It stands on the spot where the biggest pine in the island was destroyed by a hurricane. It was the Pine that sheltered the Prince of Joinville, when he went to get the remains of Napoleon at St. Helena.

The garden owns abundant water rights. Unfortunately, however, the soil is only 15 centimeters deep. Then comes a sheet of lava. Underneath is another layer of soil. So they dig down to get more soil for the surface.

A beautiful tree was a native species of *Ilex*; it is claimed to be extinct in the islands today. (?!)
To return

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To Return To our native Flora
ROADSIDES . ANNUALS NOW DRY.

ABUNDANT

Rubus ulmifolius
Crepis virens (ground yellow
in spots)

RARER + LOCALIZED.

Hirschfeldia
incana
Kleinia neriifolia (leaves
withered)
Tolpis barbata
Echium plantagineum
Plantago lagopus
Davallia canariensis
Dry creekbed (steep walls)

COMMON

Gonospermum fruticosum
(common throughout the island
northern coast)
Rumex Lunaria
Euphorbia Regis Jubae (trunk
4 inches diameter)

SCATTERING

Hypericum reflexum myrtifolia
Webbia canariensis
Androsæum Webbianum
Eupatorium adenophorum
Lavandula abrotanoides

MOIST SHADE

Linaria Cymbalaria
Adiantum Capillis Veneris
Certain favored a Rocks
Aichryson dichotomum
Gymnogramme leptophylla

1100 meters *Vicinia* W
Adenocarpus foetidus
Cytisus proliferus

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Oratava ridge



1300 meters *Oratava*
Cytisus proliferus

EXCURSION 76

CRATAVA TO THE TOP OF THE TRYDE

June -; 6 .1916

It was 6 1/2 A. M. before we started; mule, packanimal, guide, little yellow dog and me. On the way young Bethencourt (descendant of the conqueror) induced a mongrel fox terrier, a neighbor of his, to come along. So we had two curs for companionship.

The dogs kept up a continual chase after lizards. They were worn out; in the evening. The next day they could hardly walk. They did not come to life again until, with the end of the Retama región, lizards became more common.

Our mules were not shod. Still after these keen cutting rocks, the hoofs showed no damage. The guide said they prepared the hoof in the following manner.

First rubbed with cheese and a hot iron passed. Then a little "Podriego" and again a hot iron. If too brittle the hoof is rubbed with butter.

At first *Rubus ulmifolius* and a *Vicia* (*cirrrosa*?) are common along walls. *Rosa luteola* in the fields.

In this lower story man has completely reclaimed the soil. *Lupinus*, maize, and potatoes are the crops. Gradually however, the familiar signs of the laurel vocation show themselves. A lichen hanging from the limbs tells of the moist cloud that hovers all summer long over Cratava.

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28 1/2 Day break
 looking towards Gomera (Crales)
 Gran Canaria.



Shadow of Leyda Terrace



Sunset, Towards Gran Canaria

28 1/2
 The forest however has disappeared.
 ABUNDANT

Helianthemum guttatum (Shaw)
 yellow, pretty)

Rare

Pasture (rich valley)

Geranium (Robertianum)

Trifolium arvense

glomeratum
 filiforme

Avena fatua

(*Aira caryophyllaea*)

Briza maxima

Bromus mollis

Moist

Viola sylvestris

Senecio Tussilaginis

Myosotis macrocalycina

We are still in the laurel vegetation, as only isolated pines are seen. Yet already *Cistus Berthelotianus* is common and *Cistus monspeliensis* very rare.

Top of first ridge

Helianthemum guttatum

Adenocarpus foliolosus

Erica arborea

Micromeria thymoides

Gramineae

Pteris aquilina

1100 METERS

First *Cytisus proliferus*

This soon becomes dominant with *Adenocarpus proliferus* *foliolosus* mingling.

1300 METERS

Almost pure stand *Cytisus proliferus* with trunks 45 centimeters thick. (PECTC)

Spartocytisus nubigenus 199



Spartocytisus nubigenus (photo on right)
Spartocytisus nubigenus (photo on left)



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This plant favors the more endowed slopes and so still a few Erica arborescens occur. Then up the 1600 metr level; the sterile slopes also show Adenocarpus foliolosus and a frail form of Micromeria thymoides is abundant (this may be the Micromeria Teydensis) 1600 METERS

The first Spartocytisus nubigenus. The plant is rather sparse; but a few favored ridges are white with its blossoms. It is the only vegetation of the Canadas (Three photos)

However a few other interesting species are found in the crags, which jut out above the drifting sands. These bear some rare and interesting plants, such as

Sisymbrium Bourgeanum
 Nepeta Teydensis

The Canadas at 2000 meters are composed of dry sterile sands and pumice. This is the base of an immense ancient crater, from which (center) rises the modern cone of the Teyde.

The surface of the Canadas is parched and swept bare by the wind. Only under the bushes of Spartocytisus the soil is carpeted with dead, white twigs.

There are two forms of this plant here. One has white flowers and the other pink. Both are said to be very fragrant. This species goes to 2800 meters, it would go further if the soil was deeper; but higher up, naked jagged lava flows and boulders forbid life to all but a few lichens.



Spartocytisus nubigenus

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The black tongues of these basalt flows extend far down the cone and spread out into the white pumice field, and sometimes over the Cañadas.

The pumice is here quarried for export. 30 men are employed. It is in this pumice, amongst the pebbles and stones that the last *Spartocytisus* occurs. Now also the beautiful *Viola cheiranthifolia* is able to run down its roots to moisture. This violet is found on the north slope between 2350 and 2600 meters.

At a distance these white pumice hills seem absolutely barren. Great blocks of black basalt (with obsidian) are strewn about on the sand. Boulder 57 meters high (most of them broken) have been thrown here by the eruption of ~~Chachorra~~ Chachorra, south of the central cone, and two miles away.

Photos

We meet numerous caravans of mules and donkeys, bringing down sulphur from the top of the peak.

Before leaving the last *Spartocytisus nubigenus* the guide gathered firewood to cook his potatoes and coffee. Dead branches are rare here; as so many people do the same.

At 5 o'clock we arrived at the stop; a cabin erected for the protection of travellers. The furniture consists of a chair or two, a table bunks and straw mattresses. The kitchen is an outhouse and not locked. Here the sulphur gatherers have already torn out the wooden supports of the roof as firewood. The roof will now fall in if new supports are not put in.

Human nature is the same the world over. Here also, the entire neighborhood is strewn with broken glass. Ma



Photograph of the Teyde shadow on the Grand
Canarias. Taken from the observatory on the
ridge to the east (Tirana?)



Photograph of the Teyde shadow on the Grand
Canarias. Taken from the observatory on the
ridge to the east (Tirana?)

cannot leave a bottle alone.

We started out after water. After a twenty minutes climb we found the water hole. The guide then led us for the cave. He came back with the cold insipid stuff of which he warmed 2 Quarts for the mules. He declared that more was dangerous.

I returned in haste to get a photo of the Teyde shadow on the Grand Canarias. Then I sat a long time admiring the view. Below me all those desolate lava flows. The caw of a rare crow was the only sound that broke the stillness.

In the bottom of the greater (Canadas) the Germans have erected two small houses as an observatory. Now this is closed by the local authorities, on account of the war. On the top of the ridge to the east (Tirana?) however the Spaniards themselves have established an observatory.

A feeling of dullness gradually developed into a headache. I was unable to finish my supper; and went to bed. A sleepless night! High nervous tension. I tossed from one side to the other. In the morning I was a Wreck.

I took the greatest precaution in climbing the peak; as I feared my fluttering heart might be the cause of the sickness. Today I believe that it was all a simple nervous depression; as after my return to Cratava I still suffered from aches and pains in the body.

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The barking of our purp and the snatches of song, set my nerves on edge. It was pitch dark(3 A. M.) Then 20 mules and donkeys pattered by; mengoing to collect sulphur. They have travelled all night.

The brimstone is not worth the labor. Up to the cabin(3000 meters) the trail is passable. From here onto the summit, the path is only blazed over sharp cutting boulders. A false step would break the legs of the beast. Here pass in the night horses donkeys and mules. Poor beasts!!

We got started at 3 1/2 A. M.

A faint clearness on the Horizon, enables us to just distinguish our way. UP; UP; across this broken ground we went. Finally we struggled up the sliding cinder cone of the summit.

Owing to my slowness, the sun had risen when we arrived. I hurried to get a picture of the shadow of Teyde on Gomera. It had already retreated from Hierro. Photo

The ocean was hidden by a sea of clouds; but the entire island lay before me. Only the valley of Cratava was hidden by its usual summer cloud bank. The other islands were visible, all excepting Lanzarote and Fuerteventura.

Teneriffe showed it's extensive pine forests. The awful desolation of these lava flows! From here it would seem that the greater part of Teneriffe is, in reality, a barren lava field. This may be an optical delusion. Certainly this region occupies a great part.

Above 2000 meters, I do not believe any portion was ever wooded.

region and vegetation is very different from that of the Retama region. I have not been able to find a person who has been to the Retama region and who has not been to the Retama region. I believe that the Retama region is a very different region from the Retama region.

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There is a very different vegetation in the Retama region. I have not been able to find a person who has been to the Retama region and who has not been to the Retama region. I believe that the Retama region is a very different region from the Retama region.

The ground was rocky and sterile. The trail villainous. I walked most of the way.

After leaving the Retama region, we first see a of *Adenocarpus foliolosus*. Gradually it becomes dominant and is the only plant on thousands of acres. A little further down a little *Micromeria thymoides* appears. The edaphic conditions are too unfavorable here for other plants.

Then at 1500 metres these same plants show a sprinkling of *Erica arborea*. They are said to have been planted; but the *Erica* certainly once grew here. *Adenocarpus* however, is still the dominant.

Gradually the *Erica* stands are denser. On the shady, moist mountain side, to the south, *Pteris* appears. *Adenocarpus* now dwindles and disappears along our sunny trail. It is succeeded by *Pteris*. Here a few pines are lost amongst the *Erica*.

With a lower altitude, deeper soil and more moisture, it is then that *Ilex canariensis* (but isolated specimens) appears. All the other "laurels" have probably been cut out.

With the *Erica*, for some time *Cistus Berthelotianus*, is present; but no *Cistus monspeliensis*.

The upper stretches of Cratave valley, brings to rich irrigated fields. Here the fine grain, is still green. abundant maize gives promise of good. Vines are extensive.

The ground was very low and the
to the bottom of the valley.
The ground was very low and the
to the bottom of the valley.

After leaving the station we
to the bottom of the valley.
The ground was very low and the
to the bottom of the valley.

Then at 1800 metres there was
a small stream of water.
The ground was very low and the
to the bottom of the valley.

Gradually the water became
a small stream of water.
The ground was very low and the
to the bottom of the valley.

With a low and more
the water became a small stream.
The ground was very low and the
to the bottom of the valley.

With the water the ground
became a small stream.
The ground was very low and the
to the bottom of the valley.

The water then became a
small stream of water.
The ground was very low and the
to the bottom of the valley.

We have thus the evidence of the co-
ciness of these upper regions (valley)
Bananas do not produce well.

Another abundant crop are r
the spring annuals, withered elsewhere
I even noticed a red *Anagallis arvens*
sis.

On walls *Aichryson dichotomum*
grows but the most abundant is a littl
e yellow flowered *Crassulaceae*
(*Aichryson punctatum*). The roofs are
of thatch or soil, and one of these bo
re a dense yellow carpet of this *A-*
(*Aichryson punctatum*). The *thatch*
of *thatch* *soil*.

Whilst *Aeonium urbicum* was already
withered.

Here *Dracunculus canariensis*
is not rare.

This evening torchlight process
ion, rockets, band. Viva Salazar et C
Cologan. 5 A real Irish mug by the
way. True to his name). This newly ele
cted senator has put through a law or
eating a road over the *Canadas*
Canadas, from Gratava to Villafior.

It will take at least 10 years, to
finish the job. Besides, politics!
Cosas de España!

Aeonium urbicum (cochinillo)
Santa Cruz

2 1/2
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Santa Cruz, Tenerife



Aeonium lindleyi
Euphorbia Regis Jubae

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EXCURSION 77

JUNE 9, 1916

WEST OF SANTA CRUZ

The hills are covered with *Cypripedium* (photo) with more or less *cochinillo* (photo *Aeonium urbicum* and *cochinillo*). Amongst the cactus is a great deal of *Kleinia neriifolia* (Photo) next page) On one cliff *Aeonium urbicum* is common. (Photo)

SHADY BARRANCAS

Aeonium Lindleyi

Sonchus oleraceus

(Photo *Aeonium Lindleyi* and *Cypripedium*).

Higher up *Spartium junceum* is still in bloom.

SANTA CRUZ

JUNE 11, 1916

Tomorrow I leave the Canary Islands, for Sevilla; by the steamer *Reina Victoria*. I leave my table companions *Laurenz Badina*, the merchant, who now proposes to me to buy 30,000 Argentine hides. I suspect, on the German liners, that have found refuge here *Badina* is a nice chap, a good merchant. Remember him for the future.

I also leave the parrot across the street, who is always crying like a child or coughing like a consumptive. There are so many of these unfortunates in the island. I saw blood in the streets today.



Kleinia neriifolia
background *Dracaena*

San Carlos, Sonora

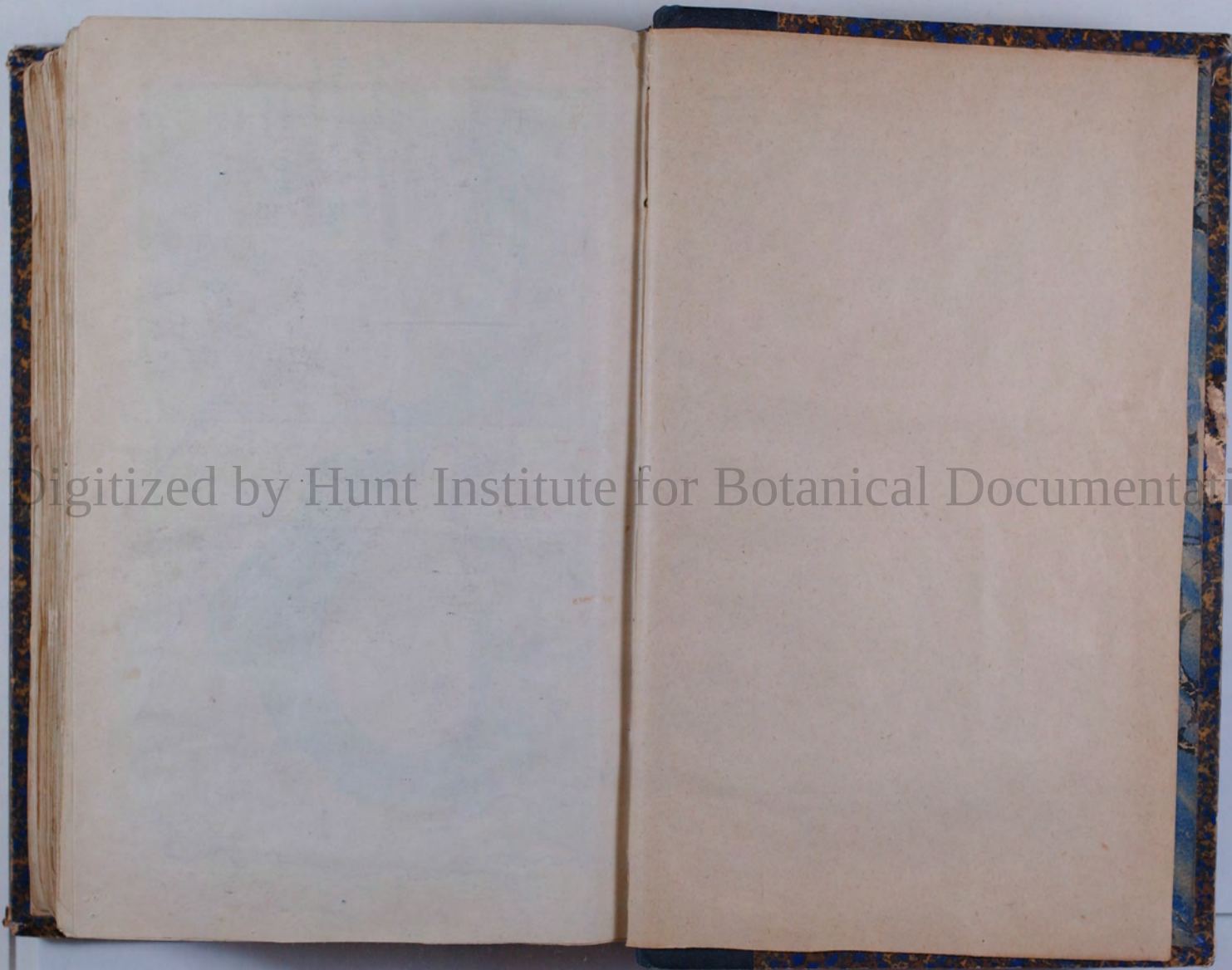
Kleinia neriifolia (Lam.) DC.
 This plant is very common in the
 arid regions of the Sonoran Desert.
 It is a small, bushy shrub with
 many small, white flowers.
 The leaves are small and narrow.
 It is often found growing in
 sandy soil or on rocky slopes.
 The plant is very hardy and
 can survive in very dry conditions.
 It is a very common sight in
 the desert landscape.



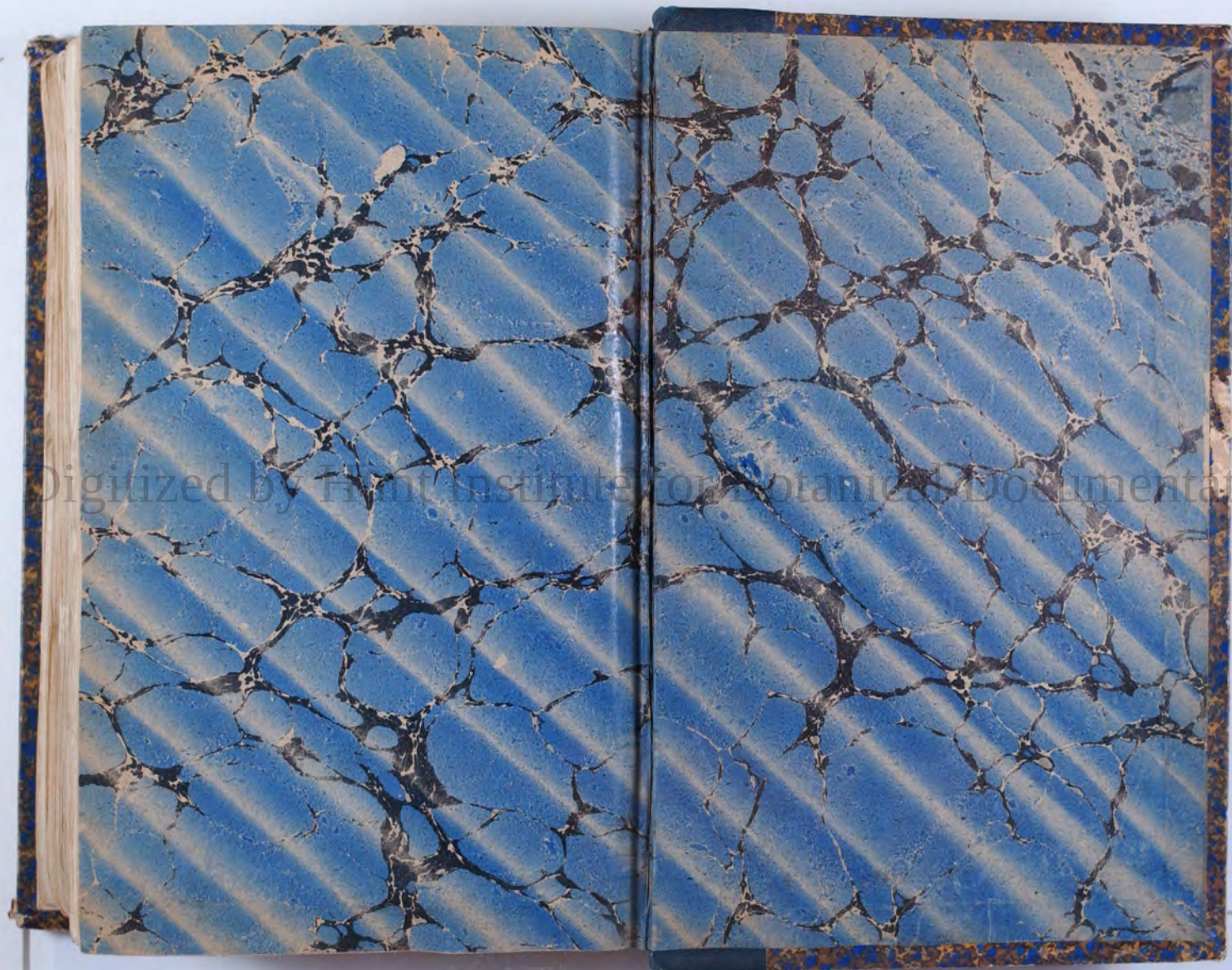
Spain.

+ area
comprehended

11 = *juniperus phoenicea*.



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