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## 5. WESTERN ISLANDS

Isabela

Volcan Sierra Negra

Volcan Alcedo

Caleta Tagus

Volcan Darwin

Volcan Azul

Fernandina

Table 5.1 Mixed woodland of *Bursera graveolens* and *Opuntia* sp. on the lava field at Puerto Villamil, Isla Isabela. Feb. 25, 1970.

No.	1	2	3
Record no.	22504	22506	22507
Altitude (m)	40	20	20
Topography	Flat	Flat	Flat
Percentage of lava (%)	100	100	100
Tree layer: height (m)	7	6	3
total cover (%)	20	10	5
Shrub layer: height (m)	1.5	1.5	1.5
total cover (%)	30	40	10
Herb layer: height (m)	0.6	0.5	0.7
total cover (%)	30	20	40
(Tree layer)			
<i>Opuntia</i> sp.	1.1	1.1	1.1
<i>Bursera graveolens</i>	2.2	+	.
<i>Acacia</i> sp.	+ .2	.	.
(Shrub layer)			
<i>Waltheria ovata</i>	<b>1.2</b>	<b>3.2</b>	2.2
<i>Opuntia</i> sp.	1.1	+	+
<i>Chiococca alba</i>	1.2	+ .2	1.2
<i>Acacia</i> sp.	+ .2	+ .2	.
<i>Scalesia affinis</i> ssp. <i>gummifera</i>	1.2	.	+ .2
<i>Castela galapageia</i>	.	1.2	1.2
<i>Bursera graveolens</i>	1.1	.	.
<i>Lippia rosmarinifolia</i>	<b>1.2</b>	.	.
<i>Croton scoulerii</i>	<b>1.2</b>	.	.
<i>Cordia anderssonii</i>	+ .2	.	.
<i>Zanthoxylum fagara</i>	2.2	.	.
<i>Cordia lutea</i>	.	+ .2	.
(Herb layer)			
<i>Cyperus anderssonii</i>	<b>1.2</b>	<b>+ .2</b>	+ .2
<i>Alternanthera</i> sp.	+	.	+ .2
<i>Asclepias curassavica</i>	+	.	+ .2
<i>Chamaesyche viminea</i>	.	2.2	3.2
<i>Scutia spicata</i>	.	+ .2	+ .2
<i>Plumbago scandens</i>	<b>1.2</b>	.	.
<i>Acacia</i> sp.	+ .2	.	.
<i>Maytenus octagona</i>	+ .2	.	.
<i>Commicarpus tuberosus</i>	+ .2	.	.
<i>Acalypha parvula</i>	<b>+</b>	.	.
<i>Trachypteris pinnata</i>	+	.	.
<i>Galactia velutina</i>	+ .2	.	.
<i>Rhynchosia minima</i>	.	<b>+ .2</b>	.
<i>Boerhaavia caribaea</i>	.	<b>+ .2</b>	.
<i>Tournefortia psilostachya</i>	.	.	+ .2

Plants seen in the nearby area, other than those listed above, were *Macraea loricifolia*, *Phoradendron henslovii*, *Pisona floribunda*, *Prosopis juliflora* and *Cryptocarpus pyriformis*.

Feb. 25, 1970

Woodland of *Pisonia floribunda*, between Villamil and Santo Tomas.

(Record no. 22502): Alt. 200 m., Percentage of Lava 95 %.

(Tree layer: 10 m, 20 %) *Pisonia floribunda* 2.2.

(Shrub layer: 2.5 m, 80 %) *Zanthoxylum fagara* 2.3, *Tournefortia psilostachya*\* 3.3, *Tournefortia rufo-sericea* 2.2, *Chiococca alba* 1.2, *Clerodendrum molle* 2.2, *Psidium galapageium* 1.1.

(Herb layer: 0.5 m, 60 %) *Commicarpus tuberosus*\* 2.3, *Polypodium dispersum*\* 1.2, *Chiococca alba* 1.2, *Pilea baurii*\* 1.1, (Hereafter +.2) *Asplenium formosum* var. *carolinum*\*, *Doryopteris pedata*, *Plumbago scandens*\*, (Hereafter +) *Commelina diffusa*, *Trachypteris pinnata*\*.

(Epiphyte) *Peperomia* sp.

(Record no. 22503): Alt. 150 m, Percentage of lava 95 %.

(Tree layer: 7 m, 10 %) *Pisonia floribunda* 1.2, *Psidium galapageium* 1.1, *Bursera graveolens* 1.2, *Opuntia* sp. +.

(Shrub layer: 2.5 m, 40 %) *Waltheria ovata* 2.2, *Zanthoxylum fagara* 2.2, *Psidium galapageium*\* 1.2, *Croton scoulerii* var. *grandifolius*\* 1.1, *Chiococca alba* 1.2, *Clerodendrum molle* 1.2, *Darwiniothamnus lancifolius* var. *glandulosus*\* +.2, *Croton scoulerii* var. *grandifolius* +.2, *Maytenus octagona* +, *Scalesia cordata* +, *Cassia picta*\* +.

(Herb layer: 0.5 m, 30 %) *Alternanthera filifolia* subsp. *filifolia*\* 1.2, *Plumbago scandens* 1.2, *Zanthoxylum fagara* 1.1, (hereafter +.2) *Commicarpus tuberosus*, *Galactia velutina*, *Polypodium dispersum*, *Cheilanthes microphylla*, *Asplenium* sp., (hereafter +) *Trachypteris pinnata*, *Opuntia* sp., *Asclepias curassavica*, *Desmodium* sp., *Cissampelos pareira*\*, *Lychopersicon cheesmanii*\*, *Acalypha* sp.

Feb. 23, 1970.

*Scalesia cordata* on Cerro Verde, north of Santo Tomas, Isla Isabela.

*Scalesia cordata* was infrequent in the Santo Tomas area in 1970, due to exploitation of agricultural land. Well developed and remnant stand of *S. cordata* forest, which was already invaded by some introduced plants, was seen only at the west foot of Cerro Verde during my field trip in the Santo Tomas area (Santo Tomas, west of Santo Tomas down to Los Tanquez, up to the caldera rim of Volcan Sierra Negra, and trip to Cerro Verde and

Cerro Grande).

Location: West foot of Cerro Verde, NE of Santo Tomas, Isla Isabela.

(Record no. 22305) Altitude 400 m, flat topography.

No lava blocks seen on the ground surface.

(Tree layer: height 8 m, total cover 40 %) *Scalesia cordata* 3.3, *Zanthoxylum fagara* 1.2.

(Shrub layer: 2.5 m, 30 %) *Tournefortia rufo-sericea* 1.1, *Psidium guajava* 1.2, *Zanthoxylum fagara* 1.1, *Tournefortia psilostachya* +.

(Herb layer: 0.7 m, 80 %) *Ctenitis sloanei* 4.4, *Zanthoxylum fagara* 2.2, *Triumfeta semitriloba* +.2, *Asplenium auritum* 2.2, *Ichnanthus nemorosus* 1.2, *Blechnum occidentale* 2.2, *Adiantum henslovianum* +, *Peperomia petiolata* +, *Justicia galapagana* +, *Dichondra repens* +, *Doryopteris pedata* +, *Thelypteris tetragona* subsp. *aberrans* +.

(Epiphytes) *Tillandsia insularis*, *Phoradendron henslovii*, *Peperomia petiolata*, *Peperomia galapagensis*, *Polypodium lanceolatum*, *Polypodium dispersum*, *Asplenium praemorsum*, *Lycopodium dichotomum*, green mosses (dominant), brown liverworts.

#### Feb. 24, 1970

Herbaceous vegetation in the Fern-Sedge Zone, NW of Santo Tomas, Volcan Sierra Negra, Isla Isabela. (\* Voucher specimens collected)

Slightly disturbed, or nearly natural, vegetation. (Record no. 22401)

Alt. 550 m.

Vegetation height 1 m, total cover 100 %.

*Pteridium aquilinum* 3.2, Convolvulaceae sp. 2.2, *Ctenitis sloaneii*\* 1.2, *Stachytarpheta cayennensis* +, *Blechnum occidentale*\* 2.2, *Borreria laevis*\* 2.2, *Vigna luteola* 2.3, *Justicia galapagana* 1.2, *Centella asiatica* 1.2, (hereafter +) *Pilea baurii*, *Verbena litoralis*, *Jaegeria crassa*, *Adiantum patens*.

#### Feb. 24, 1970

Disturbed vegetation in the highland.

(Record no. 22402) Altitude 720 m. Guava sparsely scattered below this elevation.

Vegetation height 0.2 m, total cover 100 %.

*Paspalum conjugatum*\* 3.2, *Centella asiatica*\* 2.3, *Vigna luteola*\* 2.2, *Cyperus*

*brevifolius*\* 2.2, *Sporobolus indicus*\* 1.2, *Mecardonia dianthera*\* 1.2, *Borreria laevis*\* 1.2, (hereafter +) *Verbena litoralis*\*, *Stachytarpheta cayennensis*\*, *Apium lacciniatum*\*, *Desmodium limense*\*, *Sonchus oleraceus*.

Feb. 24, 1970

(Record no. 22403) Small pool at Los Tanquez. altitude 490 m.

*Eleocharis mutata*\* 5.5, *Vigna luteola*\* 1.2, *Polygonum* sp. 1.2, *Ludwigia peploides*\* +, *Eclipta alba*\* +, *Jaegeria crassa*\* +.

Feb. 22, 1970.

Vegetation on the caldera rim and basin of Volcan Sierra Negra, Isla Isabela.

(\* Voucher specimens collected)

(Record no. 22204) Caldera Rim. Alt. 995 m.

*Sida rhombifolia*\* 3.3, *Sida acuta*\* 1.2, *Stachytarpheta cayennensis*\* 1.1, *Eclipta alba*\* +, *Borreria laevis*\* 1.1, *Bidens pilosa*\* +, *Physalis angulata*\* 2.2, *Vigna luteola*\* 1.2, *Rhynchospora nervosa*\* +.2, (hereafter +) *Dichondra repens*, *Eleusine indica*\*, *Mecardonia dianthera*\*, *Ageratum conyzoides*\*, *Oxalis corniculata*\*, *Thelypteris pilosula*\*, *Solanum nodiflorum*\*.

(Record no. 22203) Caldera Basin. Alt. 880 m.

*Euphorbia equisetiformis*\*, 0.7-1.5 m high, and *Lippia rosmarinifolia*\*.

*Borreria ericaefolia*\* 2.3, *Polypodium dispersum*\* 2.2, *Polypodium tridens*\* 1.2, *Pityrogramma calomelanos*\* +, *Mildella intramarginata*\* +, Lichen 2.3.

Table 5.2 Trampled habitat at Santo Tomas, Alt. 340 m, Isla Isabela. Feb. 21, 1970.

No.	1	2	3	4	5
Record no.	22102	22103	22104	22107	22108
Vegetation cover (%)	80	90	90	100	100
Vegetation height (cm)	3	3	3	-	-
<i>Axonopus compresus</i>	<b>5.4</b>	5.4	5.4	5.5	5.5
<i>Cyperus brevifolius</i>	+	+ .2	+ .2	.	+
<i>Sida acuta</i>	.	+	+	+	+
<i>Diodia radula</i>	+	+	+ .2	.	.
<i>Eleusine indica</i>	.	.	.	+	+
<i>Dicondra repens</i>	.	+	.	.	.
Amaranthaceae sp.	.	.	.	+ .2	.

Ruderal plants noted and collected (\*) in the nearby area were: *Kalanchoe pinnata*, *Sida rhombifolia*, *Teucrium versicarium*\*, *Pseudoelephantopus spicatus*\*, *Oxalis corniculata*, *Verbena litoralis*\*, *Stachytapheta cayennensis*\*.

Feb. 4, 1978

Plants found on lava field at Puerto Villamil (Fieldnote p.111-113)

(Trees and shrubs)

*Bursera graveolens*, *Scalesia affinis* subsp. *gummifera*, *Tournefortia psilostachya*, *Maytenus octagona*, *Castela galapageia*, *Scutia spicata*, *Waltheria ovata*, *Vallesia glabra*, *Chiococca alba*.

(Herbs and sedges)

*Cyperus anderssonii*, *Borreria ericaefolia*, *Passiflora foetida* var. *galapagensis*, *Sarcostemma angustissima*, *Rhynchosia minima*, *Chamesyce vivinea*, *Boerhaavia caribaea*, *Pectis linifolia*, *Floelichia juncea*.

Feb. 5, 1978

Plants found in the Fern-Sedge zone, Alt. 950 m, on the way to the caldera rim of V. Sierra Negra.

*Darwiniothamnus lancifolius* subsp. *glabriusculus*, *Lycopodium clavatum*, *Nephrolepis cordifolia*, *Jaegeria gracilis*, *Hypericum uliginosum*, *Asplenium serra*, *Bechnum polypodioides*, *Phyllanthus caloriniensis*, *Centella asiatica*, *Hyptis decumbens*, *Mildella intramarginalis*, *Tectaria equatoriensis*.

Alt. 1020 m, on the caldera rim.

Natural community dominated by *Pernettya howellii*, alt. 950 m, on the way to the caldera rim of V. Sierra Negra, composed of plants listed below:

*Pernettya howellii*, *Elaphoglossum engelii*, *E. firmum*, *Cyathea weatherbyana*, *Lycopodium clavatum*, *L. thyoides*.

Feb. 6, 1978.

On the south side of the caldera, Alt. 950 m. 9.35 a.m.

(Record no. 78125) Natural vegetation composed of

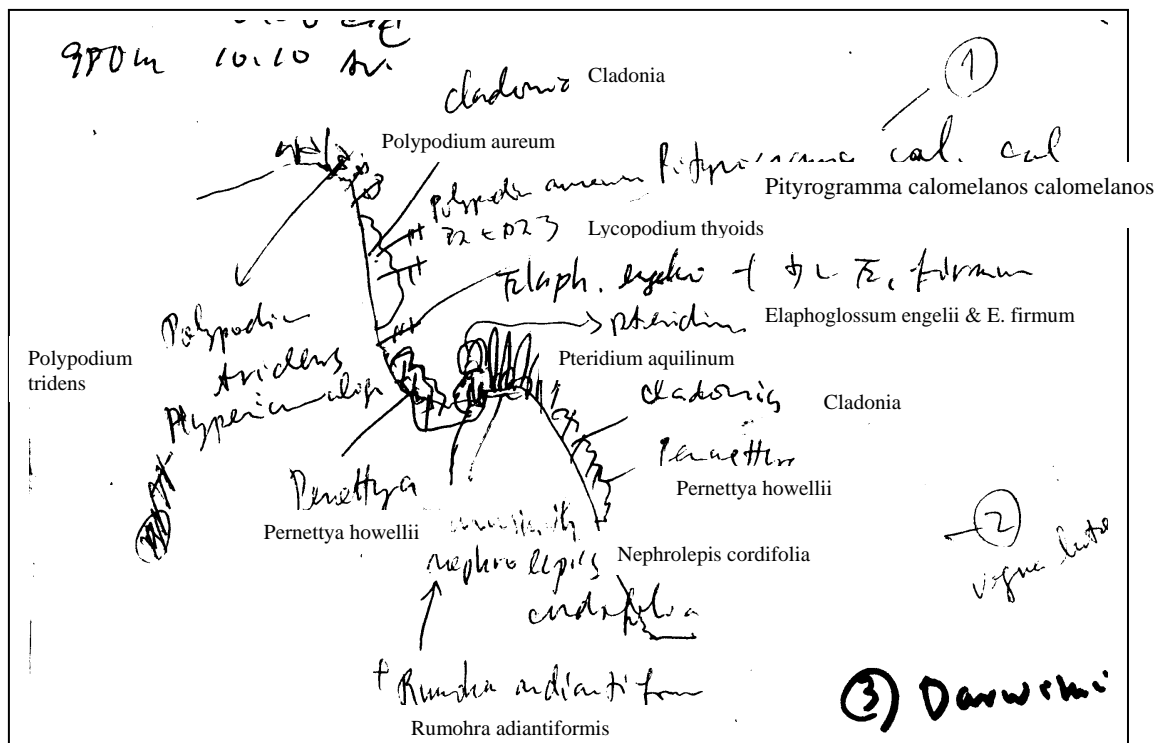
*Pernettya howellii*\* 3.2, *Pteridium aquilinum* 2.2, *Darwiniothamnus*



*lancifolius* subsp. *glabriusculus* 1.2, *Lycopodium thyoides* 1.2, *Polypodium tridens* 1.2, *Blechnum polypodioides* 1.1, *Lycopodium clavatum* 1.1, (hereafter +) *Rumohra adiantiformis*\*, *Thelypteris pilosula*\*, *Asplenium serra*\*, *Pityrogramma calomelanos* var. *calomelanos*, *Elaphoglossum engelii*\*, *Nephrolepis cordifolia*, *Blechnum polypodioides*, *Vigna luteola*, *Panicum* sp.

On the south side of the caldera, Alt. 980 m. 10.10 a.m.

Vegetation on a cliff.



10.35 a.m., Alt. 1000 m.

A wall bog on the cliff of a crater, *Sphagnum erythrocalix* patch with scattered plants of *Cyathea weatherbyana*, *Elaphoglossum engelii* and *E. firmum*.

April 7-9, 1970. Volcan Alcedo.

Record of the Alcedo fieldtrip from the east coast of Alcedo, up to the caldera rim, across the caldera basin, then down from the west side of the caldera rim to Bahía Urvina, accompanied by 2 graduate students from West Germany.

Asterisks are voucher specimens.

2.20 p.m., Altitude 0 m.

*Scutia spicata*, *Waltheria ovata*, *Castela galapageia*, *Cordia revoluta*\*, *Scalesia affinis* subsp. *gummifera*, *Vallesia glabra*, *Heliotropium angiospermum*, *Nicotiana glutinosa*\*, *Scoparia dulcis*\*, *Macraea laricifolia*, *Ipomoea linearifolia*\*.

Alt. 110 m.

*Macraea laricifolia*, *Waltheria ovata*, *Dodonaea viscosa*\*, *Castela galapageia*, *Scutia spicata*, *Chamaesyce vivinea*, *Scalesia affinis* ssp. *gummifera*.

130 m. *Lippia rosmarinifolia*.

15.00 p.m., 160 m. *Cordia revoluta*, *Bursera graveolens*.

Alt. 260 m. Open woodland of *Bursera graveolens*. *Macraea laricifolia*, *Waltheria ovata*, *Cordia revoluta*\*, *Cordia lutea*, *Lantana peduncularis*, *Polygala* sp.

Alt. 350 m. Open woodland of *Bursera graveolens*. *Macraea laricifolia*, *Waltheria ovata*, *Cordia revoluta*\*, *Croton scouleri*\*, *Scutia spicata*, *Lantana peduncularis*.

16.40, Alt. 360 m. *Scalesia microcephala*, *Bursera graveolens*.

Alt. 380 m. *Bursera graveolens*, *Scalesia microcephala*\*, *Cordia revoluta*, *Macraea laricifolia*, *Lantana peduncularis*, *Polygala* sp.

17.15, 510 m. *Bursera graveolens*, *Scalesia microcephala*, *Cordia revoluta*, *Macraea laricifolia*, *Waltheria ovata*, *Darwiniothamnus lancifolius* subsp. *glabriusculus*\*, *Baccharis gnidiifolia*\*, *Dodonaea viscosa* var. *spatulata*\*, *Cordia scouleri*, *Lantana peduncularis*, *Chamaesyce vivinea*.

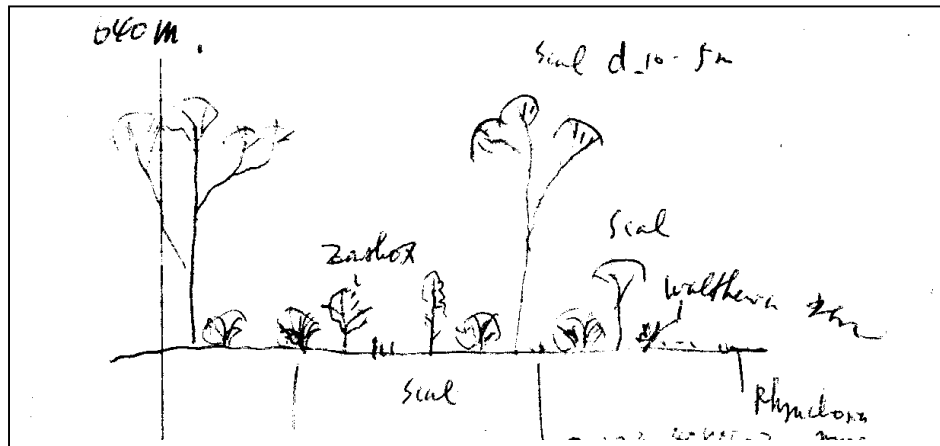
17.30, 570 m. *Bursera graveolens* (very infrequent), *Zanthoxylum fagara*, *Macraea laricifolia*, *Baccharis gnidiifolia*, *Scalesia microcephala*, *Pisona floribunda*, *Cordia scouleri*.

Alt. 600 m. *Bursera graveolens* already disappeared.

Overnight at *Scalesia microcephala* forest, Alt. 610 m.

April 8, 1970.

6.30 a.m., Alt. 620 m. Sparse forest of *Scalesia mirocephala*. *Macraea laricifolia*, *Waltheria ovata*, *Baccharis gnidiifolia*\*, *Phoradendron henslovii* (on *M. laricifolia*).



7.15, 760 m. Filamentous lichen (probably *Ramalina*) on *Zanthoxylum fagara*, *Tournefortia rufo-sericea*, *Scalesia mirocephala*, *Baccharis gnidiifolia*\*, *Bastardia viscosa*\*.

7.15, 850 m. Steep slope. *Psidium galapageium*.

8.25, 920 m.

6.35, 960 m. *Darwiniothamnus lancifolius* subsp. *glabriusculus*\*, *Blainvillea dichotoma*\*, *Cordia leucophlyctis*\*, *Tournefortia rufo-sericea*, *Polypodium tridens*\*, *Bastardia viscosa*\*, *Rhynchosia minima*\*, *Adiantum concinnum*\*.

8.50, 1020 m. Vegetation 1.5 m high. *Pteridium aquilinum*, *Zanthoxylum fagara*, *Psidium galapageium*, *Tournefortia rufo-sericea*, *Cordia leucophlyctis*.

9.00, 1050 m. Arrived on the caldera rim.

Moved to west along the rim.

9.25, 1050 m. (Record no. 40803)

(Shrub layer: 2 m, 60 %) *Zanthoxylum fagara* 3.3, *Tournefortia rufo-sericea* 2.2, *Cordia leucophlyctis* 1.2, *Psidium galapageium*.

(Herb layer: 0.5 m, 70 %) *Scoparia dulcis*\* 2.2, *Sida rhombifolia* 3.4, *Heliotropium angiospermum* 1.2, *Chrysanthelum pusillum*\* 1.2, *Dichondra repens* +.2, *Verbena litoralis* +.

(Epiphyte) Brown liverworts, *Polypodium lanceolatum*\*, *Polypodium steirolepis*\*.

10.30, 1040 m. Rim appeared to come to end. Descend down the end, cross to the right, and climb another rim, where a tall pole stands which teaches correct route.

Plants found here are:

*Polypodium tridens*, *Polypodium dispersum*\*, *Asplenium praemorsum*\*, *Asplenium formosum*\*, *Asplenium serra*\*, *Peperomia galapagensis*\*, *Adiantum concinnum*\*, *Duranta dombeiana*\*, *Doryopteris pedata*\*, *Darwiniothamnus lancifolius* subsp. *glabriusculus*\*, *Cordia anderssonii*\*, *Cordia leucophlyctis*\*, *Jaegeria crassa*\*, *Psidium galapageium*, *Tillandsia insularis*, *Lippia rosmarinifolia*, *Tournefortia rufo-sericea*.

11.45, 1105 m.

14.10. Still walking on the rim.

Descend the inner wall of the rim toward geyser or fumarole.

Overnight at geyser.

April 9, 1970. In the basin of the caldera.

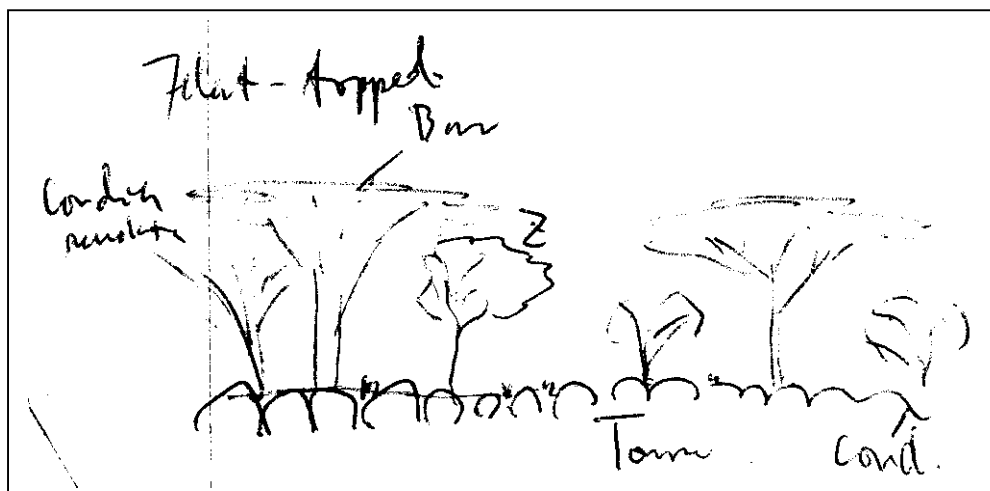
(Record no. 40902) Alt. 720 m, Cover percentage of lava on the ground surface 100 %.

Woodland of *Bursera graveolens*.

(Tree layer: 7 m, 60 %) *Bursera graveolens* 4.3, *Zanthoxylum fagara* 2.2.

(Shrub layer: 2 m, 40 %) *Zanthoxylum fagara* 2.2, *Croton scouleri* 1.2, *Cordia leucophlyctis* 1.2, *Tournefortia rufo-sericea* 1.2, *T. psilostachya* +.2, *Cordia revoluta*\* +, *Plumbago scandens* +, *Acacia* sp.

(Herb layer: 0.7 m, 10 %) *Trachypteris pinnata*\* 1.1, *Adiantum consinnum* 1.2, (hereafter +) *Sida spinosa*\*, *Blainvillea dichotoma*\*, *Cenchrus platiacanthus*\*, *Salvia occidentalis*\*, *Commelina diffusa*, *Heliotropium angiospermum*, *Cissampelos pareira*, *Phyllanthus caloriniensis*\*.



Alt. 720 m. Still walking in the caldera basin.

(Record no. 40903) Grazed by giant tortoises and feral goats.

*Sida rhombifolia*\* 4.4, *Scoparia dulcis*\* 1.2, *Portulaca oleracea* 1.2, *Chrysanthellum pusillum*\* +.2, *Mollugo crockerii*\* +.2, *Elagostis cilianensis*\* +.2, *Cyperus brevifolius* +, *Bidens* sp. +.

Near the west end of the caldera, alt. 790 m – 940 m. Two sulfur deposits.

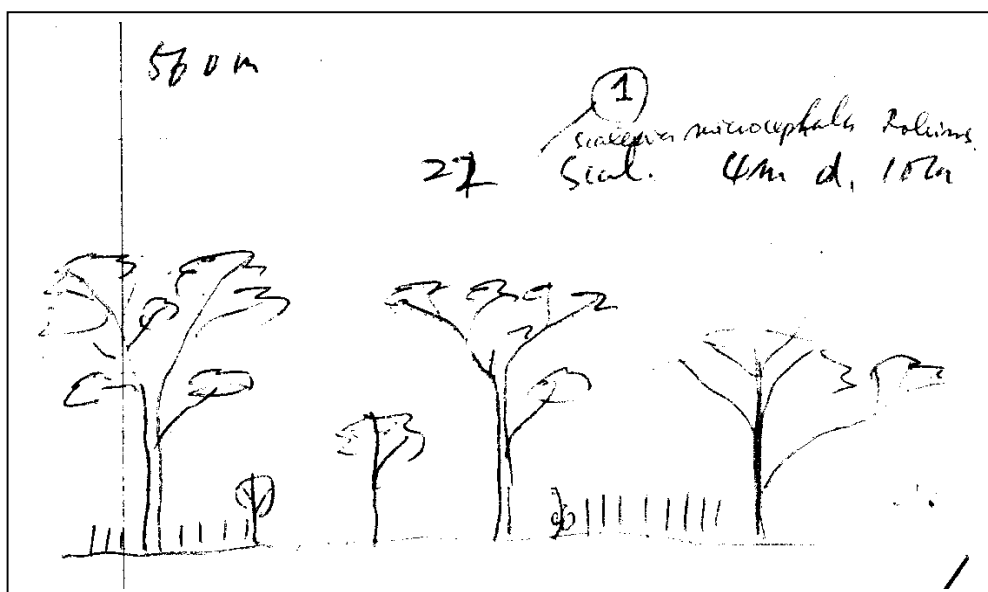
Plants found or collected in this area are :

*Scoparia dulcis*\*, *Mollugo floriana* subsp. *gypsophiloides*\*, *Acalypha sericea* var. *baurii*\*, *Sida rhombifolia*, *Mecardonia dianthera*, *Polypodium tridens*, *Zanthoxylum fagara*, *Tourfortia rufo-sericea*, *Cordia anderssonii*.

Descend on the northwest side of Volcan Alcedo toward Bahia Urvina.

Alt. 560 m. Sparse forest of *Scalesia microcephala*, 4 m high and 10 cm dbh.

*Baccharis gnidiifolia*, *Sida rhombifolia*, *Heliotropium angiospermum*, *Salvia occidentalis*.



13.30 p.m., Alt. 520 m.

*Pisona floribunda*, *Zanthoxylum fagara*. *Scalesia microcephala* very infrequent.

13.40, 490 m. *Zanthoxylum fagara*, 6 m high, *Cordia leucophlyctis*, *Tournefortia pubescens*, *Sida rhombifolia*, *Commicarpus tuberosus*.

13.50, 450m. Steep slope.

14.20, 310 m. Palo Santo woodland continues to lower slope. Plants found there: *Cordia leucophlyctis*\*, *Croton scouleri*\*, *Gossypium barbadense* var. *darwinii*\*, *Lantana peduncularis*\*, *Dodonaea viscosa* var. *galapagensis*\*, *Rhynchosia minima*\*, *Dalea tenuicaulis*\*.

Arrived at the coast of Bahia Urvina, and safely picked up by Julian Fitter's yacht.

Table 5.3 *Bursera graveolens* woodland at Caleta Tagus, Isla Isabela. April 10, 1970

No.	1	2	3	4	5
Record no.	41001	41002	41004	41005	41012
Altitude (m)	190	120	100		
Slope aspect			Flat		
Slope steepness				-	-
Percentage of lava (%)	40	60	0	40	70
Tree layer: height (m)	9	8	10	6	8
total cover (%)	20	40	40	20	40
Shrub layer: height (m)	3	2	2	1	1.5
total cover (%)	40	40	30	70	20
Herb layer: height (m)	0	0.5	0.7	0.5	0.7
total cover (%)	0.8	5	30	10	70
(Tree layer)					
<i>Bursera graveolens</i>	2.2	3.3	3.3	2.2	3.2
<i>Acacia insulae-iacobi</i>	.	.	1.2	1.2	.
(Shrub layer)					
<i>Waltheria ovata</i>	2.2	2.3	2.2	.	1.2
<i>Castela galapageia</i>	1.2	1.2	1.2	.	1.2
<i>Croton scouleri</i>	<b>1.2</b>	+		.	+
<i>Cordia leucophlyctis</i>	<b>1.2</b>	2.2	1.2	.	+ .2
<i>Scutia spicata</i>	+ .2	+	+ .2	.	.
<i>Macraea laricifolia</i>	1.2	.	.	2.2	1.2
<i>Gossypium barbadense</i> var. <i>darwinii</i>	+	.	+ .2	.	.
<i>Cordia revoluta</i>	.	.	.	<b>1.2</b>	1.2
<i>Baccharis gnidiifolia</i>	+ .2	.	.	.	.
<i>Tournefortia psilostachya</i>	1.2	.	.	.	.
<i>Scalesia affinis</i> ssp. <i>gummifera</i>	.	+ .2	.	.	.
<i>Cordia lutea</i>	.	.	1.2	.	.
<i>Chiococca alba</i>	.	.	+ .2	.	.
<i>Opuntia</i> sp.	.	.		.	+
(Herb layer)					
<i>Lantana peduncularis</i>	2.3	.	1.2	.	1.2
<i>Rhynchosia minima</i>	+	.	+ .2	.	+
<i>Chamaesyche punctulata</i>	.	.	1.2	1.2	+
<i>Chamaesyche vivinea</i>	.	.	.	3.3	4.4
<i>Pectis tenuifolia</i>	.	.	.	+ .2	1.2
<i>Scutia spicata</i>	.	+	.	.	.
<i>Heterotropium angiospermum</i>	.	.	+ .2	.	.
<i>Boerhaavia caribaea</i>	.	.	+	.	.
<i>Borreria suberecta</i>	.	.	.	1.2	.
<i>Asclepias angustissima</i>	.	.	.	1.2	.
<i>Acalypha</i> sp.	.	.	.	.	+ .2
<i>Cyperus anderssonii</i>	.	.	.	.	+
Dead grasses	1.1	.	.	.	+

Caleta Tagus. April 10, 1970

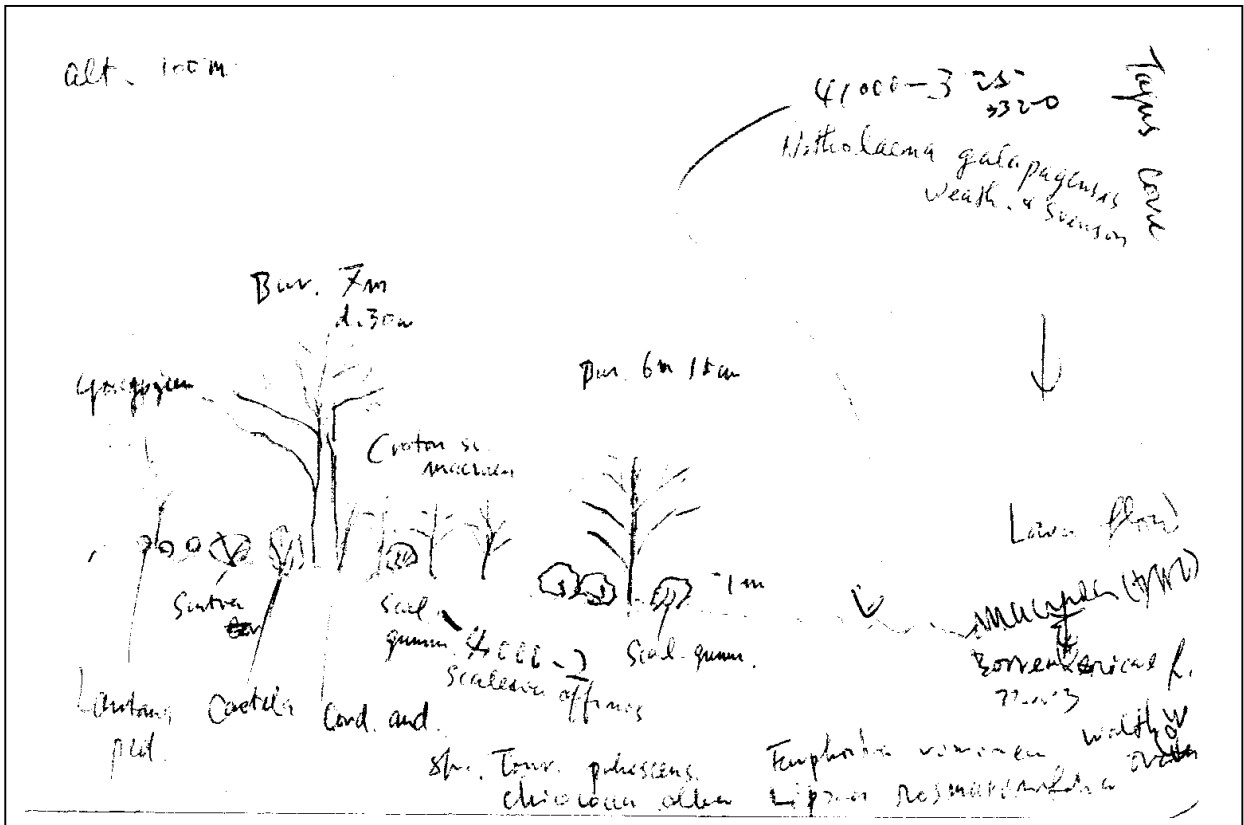




Table 5.4 *Macraea laricifolia* thicket at Caleta Tagus, Isla Isabela. April 10, 1970

No.	1	2	3	4	5	6
Record no.	41007	41008	41009	41010	41011	41003
Altitude (m)	140	160	160	160	160	–
Percentage of lava (%)	0	0	0	40	70	10
Shrub layer: height (m)	1	1	1	1	1.5	1
total cover (%)	20	20	20	20	40	10
Herb layer: height (m)	0.3	0.3	0.7	0.5	0.7	0.5
total cover (%)	.0	20	30	30	30	20
(Shrub layer)						
<i>Lippia rosmarinifolia</i>	1.2	1.2	1.2	1.2	1.2	<b>+ .2</b>
<i>Macraea laricifolia</i>	2.2	1.2	1.2	2.2	1.2	
<i>Waltheria ovata</i>	+ .2	.	.	+ .2	3.2	+ .2
<i>Bursera graveolens</i>	.	.	+	.	.	+
<i>Opuntia</i> sp.	.	.	.	+	+	.
<i>Cordia leucophlictitis</i>	.	.	.	.	.	+ .2
(Herb layer)						
<i>Pectis tenuifolia</i>	2.2	2.1	2.1	1.1	1.1	<b>1.2</b>
<i>Chamaesyche punctulata</i>	1.2	+	+	+	1.2	<b>+</b>
<i>Borreria suberecta</i>	.	<b>2.2</b>	2.2	2.2	1.2	<b>2.2</b>
<i>Cyperus anderssonii</i>	.	<b>+</b>	1.2	2.2	+	.
<i>Chamaesyche vivinea</i>	.	+ .2	.	.	+ .2	2.3
<i>Asclepias angustissima</i>	.	.	.	.	.	2.2
<i>Rhynchosia minima</i>	.	.	.	.	.	<b>+ .2</b>
Dead grasses	+ .2	.	.	.	.	.

## Volcan Darwin

March 21, 1978. Landed at Caleta Black, west foot of Volcan Darwin.

*Rhizophora mangle*, *Laguncularia racemosa*, *Jasminocereus thouarsii*, *Cyperus anderssonii*, *Ipomoea pes-caprae*, *Cacabus miersii*, *Pectis* sp., *Cryptocarpus pyriformis*.

March 22, 1978. Leave the camp site, ascending to the caldera rim of the volcano.

6.55 a.m., Sunrise. Alt. 0 m. Traverse vast *aa* lava field. *Jsasminocereus thouarsii*, *Brachycereus nesioticus* and *Cyperus anderssonii* are very infrequent on the lava field.

7.30, Alt. 70 m.

7.45, Alt. 140 m. Lava a little weathered. Vegetation patches 5 m to 20 m diameter in size. *Borreria suberecta*\*, *Mollugo* sp., *Darwiniothamnus* sp., *Bursera graveolens*, *Scalesia affinis* subsp. *gummifera*, *Sarcostemma angustissima*, *Macraea laricifolia*, *Vallesia glabra*, *Cordia revoluta*, *Polypodium tridens*, *Notholaena galapagensis*.

8.00, 215 m. *Darwiniothamnus* sp., *Scalesia affinis* subsp. *gummifera*, *Cordia revoluta*, *Jasminocereus thouarsii*, *Mcraea laricifolia*.

8.25, Alt. 360 m. *Macraea laricifolia*, *Sarcostemma angustissima*, *Mollugo* sp., *Cordia revoluta*, *Bursera graveolens*, *Chiococca alba*, *Acalypha parvula* var. *parvula*\*, *Darwiniothamnus* sp., *Borreria ericaefolia*, *Opuntia* sp., *Clerodendrum molle*, *Scalesia affinis* subsp. *gummifera*, *Notholaena galapagensis*, *Polypodium tridens*, *Froelichia nudicaulis*\*. *Phoradendron henslovii* on *Scalesia affinis*, *Clerodendrum molle*, *Cordia revolute* and *Macraea laricifolia*.

8.55, Alt. 500 m. Well weathered lava. *Scalesia microcephala*\*, *Macraea laricifolia*\*, *Cordia revoluta*, *Cordia anderssonii*\*, *Chiococca alba*, *Notholaena galapagensis*\*, *Polypodium tridens*, *Darwiniothamnus* sp., *Dodoniaea viscosa* var. *spatulata*\*, *Bursera graveolens*, *Baccharis gnidiifolia*\*, *Trachypteris pinnata*, *Alternanthera filifolia* subsp. *filifolia*\*, *Sarcostemma angustissima*, *Acalypha* sp., *Opuntia* sp.

9.20, Alt. 550 m. Flora nearly the same as Alt. 500 m. *Lippia rosmarinifolia*.

9.30, Alt. 640 m. Yellow lichen and *Cladonia* infrequent. *Adiantum consinnum*\*, *Scalesia microcephala*. No trees of *Bursera graveolens*.

Alt. 700 m. Densely vegetated. *Scalesia microcephala*, *Dodoniaea viscosa* var. *galapagensis*\*, *Duranta mutisii*\*, *Cordia revoluta*, *Cordia anderssonii*, *Macraea laricifolia*, *Lippia rosmarinifolia*, *Darwiniothamnus* sp., *Croton scoulerii*, *Zanthoxylum fagara*, *Chiococca alba*, *Opuntia* sp., *Polypodium tridens*.

10.00 a.m., Alt. 750 m.

10.10, Alt. 800 m.

10.25, Alt. 810 m. (Record no. 78226) Vegetation cover 30 %. *Darwiniothamnus* sp. 1.2, *Dodonaea viscosa* var. *galapagensis*\* 1.1, *Cordia revoluta* 1.1, *Polypodium trindens* 1.2, (hereafter +) *Scalesia microcephala*, *Macraea laricifolia*\*, *Cordia anderssonii*\*, *Duranta mutisii*\*, *Opuntia* sp., *Lippia rosmarinifolia*, *Chicocca alba*, *Acalypha* sp., *Phoradendron henslovii*, *Alternanthera filifolia*.

10.45, Alt. 950 m. Nearly the same vegetation as above.

11.05, Alt. 980 m.

11.20, Alt. 1050 m.

12.05, Alt. 1160 m. An orchid.

12.15, Alt. 1200 m. Well vegetated. *Darwiniothamnus* sp., *Croton scouleri* var. *scouleri*\*, *Desmodium limense*\*, *Adiantum henslovianum*\*, *Plumbago scandens*\*, *Scalesia microcephala*\*, *Froelichia nudicaulis*\*, *Acalypha parvula* var. *parvula*, *Liparis nervosa*\*

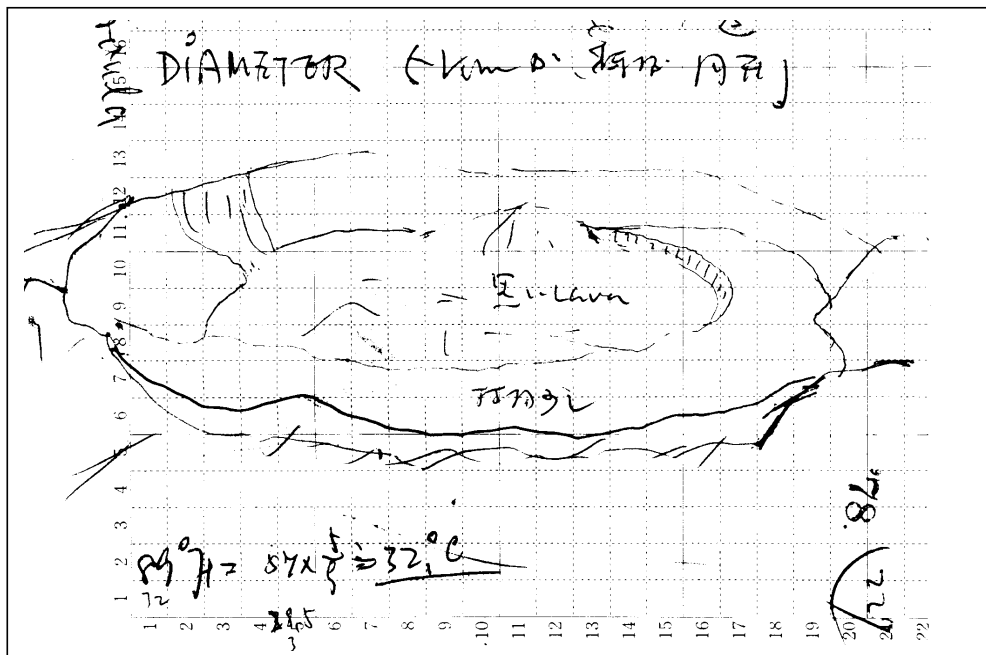
12.30, Alt. 1250 m. Arrived at caldera rim of Volcan Darwin. The caldera ca. 5 km in diameter.

(Record no. 78228) Cover percentage of lava on the ground surface, 10 %.

Vegetation, 1 m high, 40 % in total cover.

(Shrubs) *Scalesia microcephala*\* 1.1, *Cordia anderssonii*\* 1.1, *Dodonaea viscosa* var. *galapagensis* 1.1, *Cordia revoluta* 1.1, *Macraea laricifolia* 1.1, *Tournefortia rufo-sericea*\* +, *Duranta mutisii*\* +, *Darwiniothamnus* sp. 2.1, *Opuntia* sp. +, *Borreria* sp. +.

(Herbs) *Acalypha parvula* var. *parvula*\* 1.1, *Cyperus anderssonii* +, *Polypodium tridens* +, *Adiantum* sp. +.



Arrived at Caleta Black, alt. 0 m, 5.30 p.m.

Vegetation records at Pta. Moreno and Caleta Iguana, 1978.

March 25, 1978. Pta. Moreno, Volcan Azul, Isla Isabela:

Plants found on lava field: *Opuntia* sp., *Jasminocereus thouarsii*, *Brachycereus nesioticus*, *Cyperus anderssonii*, *Borreria ericaefolia*\*, *Pectis tenuifolia*\*, *Darwiniothamnus* sp., *Scutia spicata*, *Vallesia glabra*, *Hippomane mancinella*, *Bursera graveolens*.

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 March 26, 1978. Caleta Iguana.

Lemon tree. Feral cow.

Alt. 10 m. *Hippomane mancinella*, *Pisonia floribunda* (8 m high), *Croton scouleri* var. *grandifolius*, *Tournefortia psilostachya*, *T. rufo-sericea*, *Stictocardia tiliaefolia*, *Adiantum henslovianum*, *Polypodium dispersum*, *Trachypteris pinnata*, *Clerodendrum molle*.

Alt. 20 m. *Bursera graveolens* and *Opuntia* sp., each one specimen. *Zanthoxylum fagara*, *Waltheria ovata*, *Pisonia floribunda*, *Chiococca alba*, *Plumbago scandens*, *Sida acuta*.

Alt. 75 m on a broad ridge. *Hippomane mancinella*, *Cordia* aff. *anderssonii*, *Waltheria ovata*, *Zanthoxylum fagara*, *Phoradendron henslovii* on *Z. fagara*.

Alt. 90 m. *Psidium galapageium*, *Croton scouleri* var. *grandifolius*, *Waltheria ovata*, *Zanthoxylum fagara*, *Tournefortia rufo-sericea*, *T. psilostachya*. No pendent filamentous lichens here.

Alt. 90 m. *Scalesia cordata*, *Justicia galapagana*, *Trachypteris pinnata*, *Clerodendrum molle*, *Pisonia floribunda*, *Croton scouleri* var. *grandifolius*, *Gossypium* sp.

No pendent filamentous lichens here.

Alt. 130 m. *Scalesia cordata*, *Doryopteris pedata*, *Trachypteris pinnata*, *Ctenitis sloanei*.

Alt. 140 m. 11.05 a.m.

Alt. 170 m. *Tillandsia insularis*.

Alt. 200 m, 11.25 a.m. *Pleuropetarum darwinii*, grove of *Hippomane mancinella*.

Alt. 220 m, 11.30 a.m. Open vegetation. *Caealpinia bonduc*, *Pteridium aquilinum*, *Vigna luteola*, *Conyza bonariensis*, *Centella asiatica*, *Dichondra repens*, *Borreria laevis*.

Alt. 270 m. *Scalesia cordata* forest, *Tournefortia rufo-sericea*, *Cordia anderssonii*, *Zanthoxylum fagara*.

Alt. 340 m, 12.00. Brown liverwots on *Z. fagara*.

Alt. 440 m, 12.20. Brown liversorts on *Z. fagara*.

Open vegetation (Record no. 78242) *Pteridium aquilinum* 3.2, *Centella asiatica* 2.2, *Borreria laevis* 1.2, Gramineae sp. 1.2, (hereafter +.2) *Paspalum conjugatum*, *Justicia galapagana*, *Tournefortia rufo-sericea*, *Ctenis sloanei*, *Rhynchospora rugosa*, (hereafter +) *Drymaria cordata*, *Hyptis* sp., *Verbena litoralis*, *Salvia* sp., *Alternanthera halimifolia*, *Zanthoxylum fagara*, *Jaegeria crassa*, *Vigna luteola*, *Solanum nigrum*, *Triumfetta semitriloba*, *Sonchus oleraceus*, *Blechnum polypodioides*, *Phyllanthus caloriniensis*, *Gnaphalium purpureum*, *Cuphea carthagenensis*.

Descent.

Alt. 380 m. *Scalesia cordata*.

Alt. 300 m. *Scalesia cordata* forest.

Alt. 280 m. *Pisonia floribunda* and *Psidium galapageium* scattered.

Alt. 240 m. *Pisonia floribunda* forest.

3.40 p.m. Arrived at Caleta Iguana

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March 27, 1978.

Cerro Ballena, East end of Volcan Sierra Negra, opposite coast of Islas Quatro Hermanos.

(Trees) *Opuntia* sp., *Bursera graveolens*, *Cordia lutea*, *Acacia rorudiana*.

(Shrubs, herbs and sedges) *Lycium minimum*, *Lantana peduncularis*, *Heliotropium angiospermum*, *Tiquilia galapagoa*\*, *Pectis subsquarrosa*\*, *Mollugo* sp., *Amaranthus sclerantoides*\*, *Tribulus cistoides*, *Acalypha parvula* var. *parvula*\*, *Chamaesyche punctulata*\*, *Cyperus anderssonii*, *Boerhaavia caribaea*, *Physalis galapagensis*\*, *Merremia aegyptica*, *Rhynchosia minima*\*.

Vegetation records at Cabo Hammond, Isla Fernandina,  
March 25, 1978.

Fur seal and marine iguana abundant around landing place.

Vegetation patch in the lava field: *Cryptocarpus pyriformis*, *Cyperus anderssonii*, *Scutia spicata*, *Boerhaavia caribaea*, *Tiquilia* sp.

Plants on reddish lava patch. *Borreria ericaefolia*\*, *Cyperus anderssonii*, *Tiquilia galapagoa*\*, *Chamesyche puntulata*\*, *Sarcostemma angustissimum*, *Scalesia affinis* subsp. *gummifera*\*, *Cordia revoluta*, *Castela galapageia*, *Mollugo* sp., *Jasminocereus thouarsii*, *Bursera graveolens*, *Lycopersicon cheesmanii*\*, *Pectis tenuifolia*\*.