

A FIRST REPORT ON THE VEGETATION OF CELAQUE

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ABSTRACT

A first report on the natural vegetation of Celaque mountain is presented. The isolated nature of this volcanic peak has contributed to the evolution of a unique flora and fauna, aspects of which are here discussed. The biological value and watershed significance are arguments in favor of preserving the natural vegetation of the Celaque high forest. *Oreopanax lempiriana* Hazlett, an edemic tree of the Celaque upland is described. The geographical distribution of the *Oreopanax* genus in Central America is reviewed.

INTRODUCTION

The mountain called Celaque is situated at approximately 14 30" north latitude and 88 40" west longitude in the Lempira Department of the Honduran republic. The indigenous names given to the department and preserved for the mountain commemorate the home area of the legendary Indian Lempira, chief of a last group of unconquered indians (Wendell, 1976). Celaque mountain is of volcanic origin with steep mountain sides that surround a summit plateau. The upland plateau begins at approximately 2600 meters elevation and covers more than 10 square kilometers. This plateau is not level, but rather has occasional hills that rise to altitudes slightly greater than 2800 meters. The highest Celaque elevation ties this mountain with Santa Bárbara as the second highest peak in the Republic (± 50 meters), the highest being Cerro Pacayas (2865 m.) However, the upland plateau easily places Celaque as the Honduran mountain with the most land area above 2600 meters.

The relief pattern of the Celaque upland area allows meandering, slow moving streams which cascade into steep ravines upon leaving the plateau. The amber-colored water in

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the Celaque streams at elevations greater than 2600 meters can still be detected after the streams descend to 1500 meters. This color presumably results from leaching of incompletely decomposed organic compounds in the relief water. Several underground streams, warmed by the volcanic center of Celaque, surface between 1000 and 1500 meters elevation.

The plants listed and discussed here were seen and collected on Celaque during 2 N.E. face ascents of the mountain (in November 1974 and June 1978).

VEGETATION

The changes in the woody vegetation of Celaque that were noted to occur from the Gracias electric plant (1500 meters) to the Celaque summit (2800 meters) are listed on Table 1. Although herbs, epiphytes and ferns were also collected, a listing of these plants has been tabled until their determinations are more complete. It is certain that the Table 1 list can be amplified considerably if further collecting is done.

The forest around the town of Gracias (1000 - 1300 meters) is composed of frequently burnt and sparsely scattered stands of *Pinus oocarpa* Schiede. The herbaceous flora of these pine stands is generally similar to that listed by Clewell (1973) for a *P. oocarpa* stand near Siguatepeque (1100 meters elevation). From the town of Gracias to about 1400 meters various species of oak, especially *Quercus oleoides* S. & C., and other trees such as *Clethra mexicana* A. DC. and *Perymenium grande* Hemsl. are occasionally abundant among the pines. However, the occurrence of the woody *Dodonaea viscosa* (L.) Jacq., *Achimenes erecta* (Lam.) Fuchs, and *Aeschynomene falcata* (Poir.) DC. in the pine forests near Gracias but not in the Siguatepeque area indicates that floristic differences do exist between the Gracias and the more intensively collected Siguatepeque pine forests.

Table I. The elevation and species determination of woody plants from Celaque. Plants with one asterisk were previously known in Honduras only from Santa Barbara (Allen, 1955). Plants with two asterisks are new additions to the Flora of Honduras.

1400-1900 METERS ABOVE SEA LEVEL

<i>Arbutus xalapensis</i> H. B. K.	<i>Myrica cerifera</i> L.
<i>Befaria guatemalensis</i> Camp	<i>Oreopanax liebmanhii</i> Marchal
<i>Clethra suaveolens</i> Turcz.	<i>Pinus maximoi</i> H. E. Moore
<i>Cleyera theaeoides</i> (Sw.) Choisy	<i>Rhus striata</i> Ruiz & Pavon
<i>Gualtheria odorata</i> Willd.	<i>Rondeletia hondurensis</i> D. Sm.
<i>Ilex discolor</i> Edwin	<i>Rubus</i> sp. (various species)
<i>Lippia substrigosa</i> Turcz.	<i>Saurauia villosa</i> DC.
<i>Liquidambar styraciflua</i> L.	<i>Ternstroemia tepapapote</i> S. & C.
<i>Lisianthus auratus</i> Standl.	<i>Vismia mexicana</i> Schlecht.
<i>Miconia humilis</i> Cogn.	

1800-2300 METERS ABOVE SEA LEVEL

<i>Alnus arguta</i> (Schlecht.) Spach.	<i>Hedyosmum mexicanum</i> Cordemoy
<i>Ardisia</i> sp.	<i>Ilex chiapensis</i> Standl.
<i>Bocconia glaucifolia</i> Hutch.	<i>Juglans olanchana</i> Standl. & L. Wms.
<i>Bunchosia lanceolata</i> Turcz.	** <i>Oreopanax echinops</i> (S.a.C.) Dcne. a Planch
<i>Brunellia mexicana</i> Standl.	<i>Ostrya virginiana</i> var.
<i>Carpinus caroliniana</i> var. <i>tropicalis</i>	<i>guatemalensis</i> (Winkl.) Macbride
Donn Smith	<i>Palicourea galeottiana</i> Mart.
<i>Cassia guatemalensis</i> Donn Smith	<i>Pithecolobium vulcanorum</i> Standl. &
<i>Cedrela tonduzii</i> C. DC.	Steyerm.
<i>Conostegia volcanalis</i> Standl. & Steyerm.	<i>Quercus</i> sp.
<i>Eugenia</i> aff. <i>yunckerii</i> Standl. (No.2820)	<i>Rubus</i> sp.
<i>Fuchsia arborescens</i> Sims	

2200-2600 METERS ABOVE SEA LEVEL

** <i>Amphitecna montana</i> L. Wms.	<i>Phyllonoma laticuspis</i> (Turcz.) Engler
<i>Casearia</i> sp.	* <i>Pinus ayacahuite</i> Ehrenberg
<i>Chamaedora</i> sp.	<i>Rubus</i> sp.
<i>Hoffmannia</i> sp.	<i>Saurauia kegeliana</i> Schlecht.
<i>Monnina xalapensis</i> H. B. K.	<i>Trophis chorizantha</i> Standl.
<i>Nectandra</i> sp.	<i>Turpinia occidentalis</i> (Sw.) G. Don
<i>Olmediella betschleriana</i> (Goeppl.) Loes.	

2500-2850 METERS ABOVE SEA LEVEL

* <i>Abies guatemalensis</i> Rehder	<i>Persea vesticula</i> Standl. & Steyerm.
* <i>Cupressus lusitanica</i> Miller	<i>Pinus</i> sp. (2 species?)
<i>Drimys granadensis</i> var. <i>mexicana</i> (DC.) A.C.Sm.	<i>Quercus costaricensis</i> Liebm.
<i>Fuchsia splendens</i> Zucc.	<i>Quercus</i> sp. (various species)
<i>Ilex liebmannii</i> Standl.	<i>Symplocos vernicosa</i> L. Wms.
<i>Ilex standleyana</i> A. Molina	* <i>Taxus globosa</i> Schlecht.
<i>Mahonia glauca</i> Standl. & L. Wms.	<i>Ternstroemia megaloptycha</i> Kobuski
<i>Miconia</i> sp.	<i>Ungi disterigmoides</i> A. Molina
** <i>Oreopanax lempiriana</i> Hazl.	<i>Ungi montana</i> (Benth.) Berg
<i>Persea americana</i> var. <i>nubigena</i> (L. Wms.) Kopp.	<i>Weinmannia tuerckheimii</i> Engler

On the ridges and slopes up to approximately 2200 meters the migratory farmers are actively removing the original vegetation. From 1974 to 1978 astonishing progress in forest clearing had been made by these pioneering farmers. For this reason, the portion of slope area below 2200 meters that is covered by weedy or "guamil" vegetation is constantly increasing. However, many of the upper slope and ridge areas between 1400 and 2000 meters are still covered by *Pinus maximinoi* (higher elevations) and *Pinus oocarpa* trees. Charcoal and fire scarred trees provide evidence that fire does occur in these stands.

Between 1400 and 1800 meters elevation in the Celaque pines as well as in El Achote pine stands by Siguatepeque the woody *Myrica cerifera*, *Lisianthus auratus*, *Miconia humilis*, *Vismia mexicana*, *Conostegia volcanalis* and *Gualtheria odorata* were noted. These woody shrubs appear to be characteristic to this elevation range in many of the Honduran pine forests.

In addition to the guamil and upper slope vegetation, a third vegetation habitat and perhaps the most diverse floristically is that of the riparian communities in the humid, narrow ravines. Trees of *Quercus*, *Trema*, *Saurauia*, *Bunchosia*, *Juglans*, *Pithecolobium*, *Brunellia*, *Cedrela*, *Ilex*, *Alnus*, *Ostrya* and *Carpinus* were collected from riparian situations (Table 1) as were shrubs of *Palicourea* and *Fuchsia*. By one stream near 2000 meters the beautiful *Bomarea hirtella* (H. B. K.) Herb., *Tovaria diffusa* (Macfad.) Fawc. & Rendle, the *Cibotium regale* Versch. & Lem. tree fern and the saprophytic *Monotropa uniflora* L. were collected.

Above 2200 meters the slope vegetation changed to premontane, broadleaf forest. *Pinus ayacahuite* was present, but not in large stands. The ascent from 2200 to 2600 meters was along a very steep ridge and collecting was quite difficult. The *Amphitecna* listed from this zone (Table 1) may be undescribed (Gentry, pers. comm.) and it is believed that further collecting in this zone would be very rewarding. However, it is the lower border of this elevational zone that is being rapidly deforested.

Above 2600 meters the steep ridge levels into the upland plateau forest. Many slowly decaying branches and fallen trees, covered with mosses and ferns made walking difficult in the understory of this forest. Temperature, relative humidity and rainfall data are not existent for this area, but the elevation, abundant litter accumulation and decrease in species diversity indicate that as defined by Holdridge (1967) the area is montane forest.

The tree density per diameter class data from a plot in the Celaque high forest (2650 meters elevation) was compared with similar data from Boraja, Ecuador (Table 2). The Boraja plot was rectangular (200 x 25 ft.), was situated along a ridge top at 1720 meters elevation and was composed mostly of trees with poorly formed boles (Grubb, etc. al., 1963). The average height of the trees was 21 meters and according to Holdridge's system the Ecuadorian forest would be considered a lower montane forest.

Table 2. Tree density per diameter class on the Celaque plateau, Honduras and in Boraja, Ecuador.

No. of trees / 0.093 has. (10,000 ft.²)

Location	Elevation	a		b	
		≥10 cms. d. b. h.	≥20 cms. d. b. h.	≥10 cms. d. b. h.	≥20 cms. d. b. h.
Celaque	2650 m.	53	33	1.6	1.6
Boraja	1720 m.	46	28	1.6	1.6

The square, .093 hectare Celaque plot (100 x 100 ft.) was on essentially level terrain beside a small tributary stream. The impressive trees here were tall, often over 30 meters high with clear, straight boles. Of the 17 trees with diameters greater than 40 cms. d.b.h., *Persea*, *Pinus* and *Quercus* were the most common (Table 1). The absence of low branches made collecting and exact species determinations impossible for many

of the trees in this plot. In the vicinity, but not in the plot, were pine trees greater than 1 meter in diameter. A comparison of the Boraja and Celaque plot showed that both plots had similar large to small tree ratios, but that the Celaque plot had a greater total of trees per given area (Table 2).

The woody species in the understory of the Celaque plot were few. The most frequent were several *Clidemia* species and *Ilex* shrubs. Twenty-two *Dicksonia gigantea* Karst. tree ferns were also tallied in the plot area. Vegetation differences were noted between this measured plot and the areas bordering the major streams as slightly lower elevations.

By the large, winding streams tall *Cupressus* trees and understory *Taxus*, *Drimys*, *Weinmannia* and *Oreopanax* trees (Table 1) were noted frequently, whereas these trees did not occur in the measured plot. This vegetational difference is perhaps due to microclimatic differences such as the slightly lower elevation, more waterlogged soils, a more persistent fog cover near the major streams, etc..

Atop the several windswept hills that rise to elevations over 2800 meters *Symplocos* and several *Ungi* species (Table 1) were collected. On the slopes of these small hills at approximately 2700 meters is where occasional *Abies guatemalensis* trees were seen.

AN ENDEMIC OREOPANAX

From the Celaque collections an endemic *Oreopanax* was determined and is here described.

Oreopanax lempiriana Hazlett, sp. nov. Araliacearum.

Frutex ad 5–10 m alta; caulis rectus, laevis, \pm 20 cm diametro ad pectoris, rami pauci. Folia inmatura usque ad 25 cm. longa, 8–10 lata, apicem acuta ad basim truncato rotundata, ramuli fertiles ad basim attenuato—descurrentes; maturitatis usque ad 30 cm longa, ca. 21 cm lata, apicem acuta ad basim truncato—rotundata. Folia omnia supra glabra, totam paginam inferiore tomentum aureo-ferrugineum densissime vestita; venis

7 parem, utrimque prominens, supra pilosis. Inflorescentia paniculata usque ad 35 cm longa, 40–50 capitulis pedunculatis (pedunculatis (pedunculus \pm 4 cm longus, 2.5 mm crassus), floris numerosis (35–40 p. capitulus). Flos minutissima, eburnea.

Planta riparia cum *Weinmannia*, *Quercus*, *Ilex*, *Persea* et. caet. in provinciam Lempirae, Honduras, prope Mons Celaque supra 2600 m.s.m. crescit.

Holotype: M. Celaque, Dept. Lempira. **Hazlett** 2227. E.A.P., El Zamorano Honduras, Nov. 1974.

Paratypes: M. Celaque, Dept. Lempira. **Hazlett** 2892 and 3006 E. A. P., El Zamorano y Lancetilla, Honduras, Mo. Bot. Gdn., Field Museum, ESNACIFOR, Honduras.

***Oreopanax lempiriana* sp. nov.**

A tree 5–10 meters tall, trunk straight, bark smooth, 40 cms. d.b.h. or smaller. Immature leaves, ovate, 8–10 cms. wide and 25 cms. long or less. Mature leaves on sterile branches are 24 cms. wide and 30 cms. long or less, with rounded–truncate or nearly cordiform leaf bases in the largest leaves, of fertile branches more elliptical, smaller with an attenuate–decurent base. Petioles sulcate, length quite variable; 30 cms. long in older and less than 1 cm. long on newest foliage. Upper leaf surface glaucous, usually ferruginous along the major nerves, but otherwise glabrous. Leaf undersurface, petioles, young branches and rachis of the inflorescence covered with a matted, golden brown pubescence of overlapping stellate hairs and tomentose. Underleaf venation areolate between the 6–8 pairs of major nerves. Inflorescence a terminal raceme 20–30 cms. long. Each raceme with 40–70 pedicelate heads regularly spaced about the rachis. Pedicels 1–3 cms. long subtended by a triangular bract with 1 or 2 acuminate tips. These bracts graduate into small leaves on the lowest pedicels of the inflorescence. Each pedicel supports a globose head 5–10 mm. in diameter on which are 40–50 fasciculate flowers. Flowers are cream–white with 5 acute petals 2–3 mm. long and 5 exerted stamens 4–6 mm. long. Flowers and fruits are embedded in mats of brown ferruginous tomentose. Flowers collected in November and maturing fruits in February.

Oreopanax lempiriana sp. nov.

Arbol 5—10 metros de altura y hasta 40 cms. d.a.p. con un fuste recto y corteza gris, lisa. Hojas de ramas estériles son ovadas 8—10 cms. de ancho y 25 cms. de largo (hojas inmaduras) y hasta 24 cms. de ancho y 30 cms. de largo en hojas maduras. Las bases de las hojas más grandes son redondeadas truncadas y a veces casi cordiformes, ápice agudo. Hojas de ramas fértiles son más elípticas, más pequeñas y tienen una base atenuada—decurrente, ápice agudo. Pecíolos son sulcados con una longitud variable: 30 cms. de largo en hojas más maduras y menos de 1 cm. en hojas nuevas. El haz de las hojas es glauco con ferrugíneo encima de las venas principales pero de otro modo glabro. El envés de la hoja, los pecíolos, las ramas juveniles, el raquis de la inflorescencia y los pedicelos están cubiertos con un ferrugíneo dorado de pelos estiliformes. La nervadura del envés es areolada con 6—8 pares de venas. La inflorescencia es un racimo terminal, 20—30 cms. de largo. Cada racimo tiene 40—70 cabezas pediceladas, las cuales están ubicadas regularmente alrededor del raquis. Los pedicelos son de 1—3 cms. de largo, subtendido por brácteas triangulares con 1 o 2 puntos acuminados. Estas brácteas gradúan hasta parecer hojas pequeñas en los pedicelos inferiores del raquis. En la terminación de cada pedicelo hay cabezas globosas 5—10 cms. de diámetro con 40—50 flores fasciculadas. Las flores son blancas con 5 pétalos agudos (2—3 mm. largo) y 5 estambres fanerostémonos (4—6 mm. largo). Material coleccionado con flores en Noviembre y con frutos inmaduros en Febrero.



Figure 1. Terminal inflorescence of *Oreopanax lempiriana*.
Note the decurrent leaf bases.



Figure 2. Sterile branches of *O. lempiriana* showing glaucous upper and golden under leaf surfaces.

OREOPANAX DISTRIBUTION IN CENTRAL AMERICA

Oreopanax is an unmonographed neotropical genus that ranges from Bolivia to Mexico. The Kew Botanical Card Index lists over 110 species, mostly described from Colombia (36), Perú (23 species), Ecuador (13 species), Bolivia (10 species) and Guatemala (9 species). The greater number of species described from the highlands of northwestern South America supports the speculation that this is the area of greatest species diversity for the genus. However, countries from which species are first described are functions of collecting intensity and do not necessarily reflect the distribution of species density. For example, the lesser number of type specimens from Bolivia may well be a consequence of the pauperate collections that have been made from Bolivia (Prance, 1977) rather than to the occurrence of fewer **Oreopanax** species there.

The relatively high number of endemic **Oreopanax** species from Costa Rican mountains (Table 3) and the occurrence of endemics on tall peaks in Guatemala, Mexico and Honduras attests to the mountain habit of plants in this genus. Costa Rica, Mexico and Guatemala are also the Central American countries with more extensive high forests areas (elevations greater than 2000 meters), a fact which has apparently favored the establishment and speciation of **Oreopanax**, since more species have been reported from these three countries (Table 3). Although certain species such as *O. liebmannii* grow as low as 200 meters elevation, the majority of Central American species are usually found at elevations greater than 1000 meters.

The 22 Central American **Oreopanax** species considered here to be valid are based on herbarium specimens in the Costa Rican National Museum and in the Paul C. Standley Herbarium at El Zamorano, Honduras. Also, the **Oreopanax** taxa listed by Nevling (1959), Smith (1944), Standley (1923 & 1966), Molina (1975), and Standley and Williams, (1966) were consulted.

The Central American **Oreopanax** species that have to date been synonymized are: *O. guatemalensis* D. & P. ex Hemsl. to *O. obtusifolius*; *O. destructor* Seem to *O. capitatus*; *O. microcephalum* Donn. Sm., *O. meiocephalum* Donn. Sm. and *O. oligocarpum* Donn. Sm. to *O. liebmannii*; *O. thibautii* Hook., *O. taubertianum* Donn. Sm., and *O. loesenerianum* Harms to *O.*

Table III. Distribution by country of the *Oreopanax* species of Central America and Mexico. E = endemic.

	Belice	Mexico	El Salvador	Guatemala	Honduras	Nicaragua	Costa Rica	Panamá
1) <i>O. arcanus</i> A.C. Smith				E				
2) <i>O. capitatus</i> (Jacq.) Dcne. & Planch.		X		X	X	X	X	X
3) <i>O. costaricensis</i> Marchal							X	
4) <i>O. donnell-smithii</i> Standl.							X	X
5) <i>O. echinops</i> (Schlecht & Cham.) Dcne. & Planch.		X		X	X		E	
6) <i>O. flaccidus</i> Marchal		E						
7) <i>O. geminatus</i> Marchal						E		
8) <i>O. lachnocephalus</i> Standl.	X		X	X	X	X		
9) <i>O. langlassii</i> Standl.		X		X				
10) <i>O. lempiriana</i> Hazlett					E			
11) <i>O. liebmannii</i> Marchal	X	X	X	X	X	X	X	X
12) <i>O. nubigenum</i> Standl.							E	
13) <i>O. obtusifolius</i> L. Wms.	X	X		X	X	X	X	
14) <i>O. oerstedianum</i> Marchal							E	
15) <i>O. peltatus</i> Linden ex Regel		X		X	X			
16) <i>O. platyphyllum</i> Marchal		E						
17) <i>O. pycnocarpum</i> Donn. Smith							E	
18) <i>O. sanderianus</i> Hemsl.		X		X	X			
19) <i>O. standleyi</i> A. C. Smith							E	
20) <i>O. steyermarkii</i> A. C. Smith				E				
21) <i>O. vestitus</i> A. C. Smith								X
22) <i>O. xalapensis</i> (H. B. K.) Dcne. & Planch.		X	X	X	X	X	X	X
COUNTRY TOTAL	3	10	3	11	9	6	10	5

DISCUSSION

The geographical isolation has provided the setting for the distinctive flora and fauna that exists on Celaque. The sighting of a tapir (*Tapirus bairdii*) and fresh signs of the collared peccary (*Tayassu tajacu*) were evidence that vanishing animal species have found refuge on this mountain. George Powell (pers. comm.) attests to the occurrence of the resplendent Quetzal (*Pharomachrus mocinno*) on Celaque and because the habitat seem appropriate, there is speculation that the rare horned Guan (*Oreophasis derbianus*) may also occur there. The only observation made on animal feeding habits was that in November the ground bromeliad *Greigia steyermarkii* L. B. Smith had been frequently eaten by some animal, presumable the tapir or peccary.

As indicated on Table 3, most of the coniferous species collected from Celaque were previously known in Honduras only from Santa Bárbara. *Pinus hartwegii* and *Pinus ayacahuite* are known from the highest peak in El Salvador (2,800 m.) and may also be on Cerro Pacayas in Honduras, (Little 1977). Little (1977) determined a pine collected from Santa Bárbara as *Pinus hartwegii* and since the upland Celaque pines were not determined with certainty, it is possible that the large pines atop Celaque are *Pinus hartwegii*. An examination of Celaque pine cones by W. Mittak and Jess Perry, men who have worked extensively on Guatemalan pine taxonomy, suggested that certain of the Celaque pine cones may be *P. rudis* (Mittak, pers. comm.), included as *P. hartwegii* by Little. Other of the cones may be different enough to be considered an underscribed pine species (Perry, pers. comm.).

As a result of a study recently published by Mittak and Perry (1979) I report the weeping needle pines collected on Celaque at 1400 - 1900 meters as *Pinus maximinoi* H. E. Moore. If the more northern *P. pseudostrobus* Lindsey does occur in Honduras, Celaque is a likely site and it should be looked for there. More extensive collections are needed to determine which and how many pine species grow on Celaque.

The existence on Celaque of conifer germplasm that is potentially important economically, the habitat preservation for endangered animal species, the existence of endemic plants and the watershed significance are arguments in favor of designating

the Celaque high forest as a forest-wildlife preserve. Also the cultural value of preserving an original forest in the home area of Lempira should not be underestimated. Our responsibility to preserve the flora and fauna of the Celaque high forests and to designate it as a protected forest is most likely to be realized by a joint effort from both Honduran and international conservation organizations. I propose that the name "Reserva Forestal Lempira" is appropriate if a protected Celaque reserve becomes a reality.

The rapid expansion upwards of "cut and slash" agriculture indicates that if the upland Celaque plateau is to be protected, action must soon be taken. It is disheartening to recall that the Indian Lempira (Cacique from the Celaque area) was killed while attending a peace conference, the victim of a breach of truce imposed by the Spaniards (Wendell, 1976), but it is even more depressing to see the real possibility that the flora of the upland Celaque plateau (which includes *O. lempiriana*) is presently in a similar danger of being eliminated. Hopefully, the golden plant named in honor of Lempira will continue to grow on Celaque, but unless present policy is changed its survival is uncertain.

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