

FERNS OF THE REPUBLIC OF EL SALVADOR

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EL SALVADOR is the only one of the Central American countries which does not have an Atlantic coast line. It is the smallest and the most densely populated of the Central American countries. The surface and subsoil of most of the country shows its volcanic origin.

The country, as is to be expected of one situated on the dry Pacific slope, has a rather homogeneous fern flora with the species of the wetter Atlantic coast of Central America mostly missing.

The dry season extends from October to April in most of El Salvador. The limited rainfall during these months also limits the development of a typical tropical rain forest (Dickey & Van Roseem 1938, Lötshert 1953).

The natural vegetation of large part of El Salvador has disappeared, largely due to the action of the large population on a limited area. Agriculture is still being extended into the hot, dry "tierra caliente" of the coast. The overgrazed lands are being cleared for pastures and for cotton and cane plantations. In the cooler highlands of El Salvador the natural forests of oaks and pines have long since given way to the shade trees of the coffee plantations, on which many epiphytic ferns grow.

Large parts of El Salvador are covered with volcanic ash (Weyl 1953). The subsoil is homogeneous and lime is rare, so that ferns inhabiting limy soils are almost lacking.

Although el Salvador is limited in area and in habitats it does have a comparatively rich fern flora. In addition to the ferns of the hot lowlands, there are species native to the lava fields which go as far north as Guatemala and Mexico. The cool forests and especially the few cloud forests contain a great many ferns. The Hymenophyllaceae

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and tree ferns are abundant on Cerro Miramundo and Cerro Montecristo.

The cloud forests have all sorts of ferns, from terrestrials to epiphytes and such species as *Rhipidopteris peltata* and *Trichomanes radicans* may be found on the ground as well as epiphytic.

Salvadoran ferns follow seasonal changes, as do plants everywhere. During the dry season many disappear or are inconspicuous (*Adiantum concinnum*, *A. philippense*, *Cheilanthes Kaulfussii*) while the leaves of some of the species of dry hot habitats roll their leaves (*Notholeana brachypus*). New leaves appear on all kinds soon after the first rains. Sori are commonly produced from July through September, although some ferns have sori through the year (*Polypodium angustifolium*), while some Elaphoglossums rarely produce sporangia.

Even though the population is dense and almost all the land is in use, the fern flora is still incompletely known. The Lista Preliminar de Plantas de El Salvador contains 97 pteridophytes. The ferns of the cloud forests were essentially unknown at the time that list was written. The present list includes many pteridophytes of the cloud forests of Cerro Miramundo and Cerro Montecristo, from the Volcano of San Vicente and from the Laguna de las Ranas in the Department of Ahuachapán. A total of 174 species of pteridophytes are now known from the country.

I collected ferns in El Salvador from October 1952 until August 1953, while I was resident at the Instituto Tropical de Investigaciones Científicas in San Salvador.¹ The specimens collected were determined at the Herbarium of the Escuela Agrícola Panamericana and an almost complete set is deposited there.²

The list also includes the Salvadoran ferns collected by Dr. O. Rohweder in 1950-1951, which were determined

¹ I thank the Instituto Tropical in San Salvador, especially Dr. A. Palacios, for the chance to work in the tropics and for assistance and hospitality.

² The staff of the Escuela Agrícola Panamericana in El Zamorano (Honduras) especially Dr. L. O. Williams and Mr. P. C. Standley, I thank for their friendly attention.

by Dr. A. H. Alston, London, at the British Museum (Natural History). ³ Specimens seen in the Herbarium of the Escuela Agrícola Panamericana in Honduras have been cited also. Specimens of my pteridophytes have been deposited in the herbarium of the Naturmuseum und Forschungsinstitut Senckenberg, Frankfurt am Main; others are at Botanisches Institut der Universität, Frankfurt am Main.

LYCOPODIACEAE

LYCOPODIUM CLAVATUM L.

Between shrubs in the cloud forest on Montecristo, 2300-2400 m., Lotschert 396.

LYCOPODIUM PITHYOIDES C. & S.

Between the shrubs (Ericaceae) on the top of Miramundo, 2400 m., Lotschert 379.

LYCOPODIUM SKUTCHII Maxon.

On a wet shaded rock in the cloud forest on Miramundo, 2250 m., Lotschert 400.

LYCOPODIUM SP.

Epiphytic in cloud forest on Miramundo, 80-100 cm. long, 2300 m., Lotschert 370.

SELAGINELLACEAE

SELAGINELLA CONVOLUTA (Arn.) Spring.

Frequent on steep rocks, Cerro Chulo near Los Planes, Department San Salvador, 1100 m., and east of La Libertad, Lotschert 340.

SELAGINELLA SP.

Terrestrial in cloud forest on Miramundo and Montecristo, 2200-2300 m., Lotschert 340, 363.

PSILOTACEAE

PSILOTUM COMPLANATUM Swartz.

On a steep and stony place, northern slope of Volcán San Vicente 1750 m., Lotschert 252.

OPHIOGLOSSACEAE

BOTRYCHIUM VIRGINIANUM (L.) Swartz.

On the northern slope of Volcán San Vicente, 1750 m., Lotschert 433, 434.

³ Thanks must be given to the direction of the Herbarium of the Staatsinstitut für Allgemeine Botanik, Hamburg and to Dr. O. Rohweder.

BOTRYCHIUM SP.

In the crater on the eastern top of Volcán San Vicente, 2020 m.,
Lotschert 424.

BOTRYCHIUM SP.

On the northern slope of Volcán San Vicente, 1750 m., Lotschert 435.

MARATTIACEAE

MARATTIA EXCAVATA Underwood.

In cloud forest on Miramundo, 2200-2400 m., Lotschert 3335.

OSMUNDACEAE

OSMUNDA REGALIS var. SPECTABILIS (Willd.) A. Gray.

In the crater on the eastern top of Volcán San Vicente, 2020 m., Lotschert 245.

SCHIZAEACEAE

ANEMIA CORNEA Prantl.

In a pasture of the Hacienda San José, north of Metapán, 850 m., Rohweder 2656, 2658-61.

ANEMIA GUATEMALENSIS Maxon.

In pine forest in the environs of La Palma and the Hacienda San José north of Metapán, 1500 m., Lotschert 179, 357, Rohweder 2665.

ANEMIA PASTINACARIA Moritz.

Finca El Carmen on Volcán San Vicente, 1300 m., and in pine forest in the environs of La Palma, 1000 m., Lotschert 51^a, 178.

GLEICHENIACEAE

DICRANOPTERIS BIFIDA (Willd.) Maxon. (*Sticherus bifidus* (Willd.) Ching).

In cloud forest on Miramundo and Montecristo, 2250-2350 m., Lotschert 129, 346.

DICRANOPTERIS FLEXUOSA (Schrad.) Underwood.

On acid sulphureous soil at the Laguna de Alegría, 1240 m., and on Cerro Blanco in the Finca Las Canarias in the Department Ahuachapán, Lotschert 241, 267.

HYMENOPHYLLACEAE

HYMENOPHYLLUM MAXONII var. ANGUSTIUS Morton.

Epiphytic in very shady habitats in cloud forest on Miramundo and Montecristo, 2200-2300 m., Lotschert 366.

HYMENOPHYLLUM TRAPEZOIDALE Liebmann.

The most frequent of the Hymenophyllaceae on Montecristo, 2200-2400 m., Lotschert 368, 368^a.

TRICHOMANES RADICANS Swartz.

The largest of the Hymenophyllaceae in El Salvador; in cloud forest on the eastern top of Volcán San Vicente, 2000-2100 m., and on Miramundo; on living trees and on rocks, Lotschert 244, 367.

TRICHOMANES ROBINSONII Baker.

Epiphytic at Laguna de las Ranas in the Department Ahuachapán, 1700 m., and on Miramundo, 2200-2300 m., Lotschert 216, 338, 462.

PTERIDACEAE

ACROSTICHUM AUREUM L.

In the manglares of La Herradura in the Department La Paz and of El Triunfo in Department Usulután, Lotschert 165.

ACROSTICHUM DANAEIFOLIUM L. & F.

At the border of a lake in the environs of San Marcos Lempa, Lotschert 456.

BOMMERIA PEDATA (Sw.) Fournier.

In the Finca Santa María in the environs of Las Cruces, 1050 m., Lotschert 455. Finca San Jorge near Las Cruces, 1000 m., Rohweder 2683.

CHEILANTHES ANGUSTIFOLIA H. B. K.

Frequent on walls and steep rocks in the tierra templada, Lotschert 55, 448.

CHEILANTHES AUREA Baker.

On a wall at the Río Sucio near the Chanmico-Opico road, Department La Libertad, 450 m., Rohweder 2672.

CHEILANTHES KAULFUSSII Kunze.

On the border of roads in many parts of the country, Volcán Santa Ana, 1415 m., Volcán San Vicente, 1350 m., Lotschert 77, 315.

CHEILANTHES PYRAMIDALIS Fée.

On the border of roads and on slopes, Volcán San Vicente, 1600 m., and near La Palma, 1000 m., Lotschert 55, 175.

DENNSTAEDTIA RUBIGINOSA (Kaulf.) Moore.

Finca San José, west of Santa Tecla, 950 m., Rohweder 2629.

PITYROGRAMMA FERRUGINEA (Kunze) Maxon.

In the crater of the Volcán San Salvador, Carlson 448.

PITYROGRAMMA SCHAFFNERI (Fée) Weatherby.

On walls of barrancos in the environs of the Instituto Tropical, 690 m., Lotschert 32b.

PITYROGRAMMA TARTAREA (Cav.) Maxon.

On the border of roads, Finca El Carmen on Volcán San Vicente, 1400 m., and Volcán Boquerón, 1750 m., Lotschert 32, 32^a.

PTERIS PROPINQUA Agardh.

Cloud forest at the Laguna de las Ranas, 1700 m., Lotschert 209.

CYATHEACEAE

ALSOPHILA PRUINATA Kaulf.

Tree fern in cloud forest on Miramundo and Montecristo, 2200-2300 m., Lotschert 345.

ALSOPHILA SALVINII Hook.

Tree fern in cloud forest on Miramundo and Montecristo, 2200-2300 m., Lotschert 458.

ASPIDIACEAE

CTENITIS HEMSLEYANA (Baker) Copeland.

Cloud forest on Miramundo 2200-2300 m., Lotschert 351.

CTENITIS INTERJECTA (C. Chr.) Ching.

Volcán San Vicente, Lotschert 81.

CYSTOPTERIS FRAGILIS (L.) Bernh.

Cloud forest on Volcán San Vicente, 2000-2100 m., and on Cerro Verde, 1950 m., Lotschert 323, 422.

DIPLAZIUM CRISTATUM (Desv.) Alston.

Puerta de La Laguna near Santa Tecla, Lotschert 154; Ahuachapán, Standley 2566; Santa Tecla, Williams 15090.

DIPLAZIUM DONNELL-SMITHII Christ.

Near Ahuachapán, Standley 2672.

DIPLAZIUM WERCKLEANUM Christ.

Terrestrial in cloud forest on Volcán San Vicente, 2050 m., and Laguna de las Ranas, 1700 m., Lotschert 211, 249, 429.

DRYOPTERIS KARWINSKYANA (Mett.) Kuntze.

Leaves 1.0-1.5 m. long, in cloud forest on Miramundo, 2300 m., Lotschert 372.

DRYOPTERIS PALEAGEA (Sw.) Hand.-Mzt.

Cloud forest on Volcán San Vicente, 2000-2100 m., Lotschert 80, 413.

DRYOPTERIS PATULA (Sw.) Underwood.

On a wall at Finca Santa María near Las Cruces, Department Santa Ana, 1050 m., Lotschert 452.

ELAPHOGLOSSUM FIRMUM (Mett.) Urban.

Shady slopes of the *Pinus oocarpa* association in the environs of La Palma, 1000 m., Lotschert 184.

ELAPHOGLOSSUM FORMOSUM (M. & H.) Urban.

On the border of the crater of Volcán Santa Ana, 2380 m., growing under shrubs, Lotschert 309.

ELAPHOGLOSSUM HIRTUM (Sw.) C. Chr.

In the upper region of the cloud forest on Miramundo, 2350 m., Lotschert 393.

ELAPHOGLOSSUM LONGIFOLIUM (Jacq.) J. Smith.

Terrestrial in cloud forest on Volcán San Vicente, 2000-2100 m., Lotschert 257.

ELAPHOGLOSSUM PILOSUM (H. & B.) Moore.

On sulphureous soil at Laguna de Alegria, 1240 m., Lotschert 263.

POLYSTICHOPSIS DENTICULATA (Sw.) Morton.

Terrestrial in cloud forests on Miramundo and Montecristo, 2200-2300 m., Lotschert 179, 365, 365^b.

POLYSTICHUM MURICATUM (L.) Fée.

A very frequent terrestrial fern in cloud forests; Laguna Verde in Department Ahuachapán, 1800 m., Volcán San Vicente, 2000-2100 m., Miramundo, 2200 m., Lotschert 196, 197, 254, 334, 364.

RHIPIDOPTERIS PELTATA (Sw.) Schott.

On rotting trunks, but also terrestrial and epiphytic on living trees in cloud forests on Miramundo and Montecristo, 2000-2350 m., Lotschert 138, 353, 353^b; Carlson 882; Rohweder 2647-49.

THELYPTERIS MELANOCHLAENA (C. Chr.) Morton.

Cloud forest on Volcán San Vicente, 2000-2100 m., Lotschert 410.

THELYPTERIS PSEUDOSANCTA (C. Chr.) Morton.

Cloud forest on Volcán San Vicente, 2050 m., Lotschert 460; Sierra Apaneca, Standley 2969.

THELYPTERIS RESINIFERA (Desv.) Morton.

In the Pinus oocarpa association near La Palma, 1000 m., Lotschert 177; Finca San José west of Santa Tecla, 1050 m., Rohweder 2630.

THELYPTERIS SPRENGELII (Kaulf.) Morton.

Near Ahuachapán, Standley 2449.

WOODSIA MOLLIS (Kaulf.) J. Smith.

On a wall in the Finca Las Cruces, Department Santa Ana, 1000 m., Rohweder 2685.

BLECHNACEAE

BLECHNUM FALCIFORME (Liebm.) C. Chr.

Terrestrial on Volcán San Vicente, 2020 m., on Miramundo and Montecristo, 2200-2400 m., in cloud forest and on unshaded habitats, Lotschert 253, 394.

BLECHNUM UNILATERALE Swartz.

On shaded slopes in the *Pinus oocarpa* association in the environs of La Palma, 1000 m., Lotschert 174; Rohweder 2666.

WOODWARDIA SPINULOSA M. & G.

Terrestrial in cloud forest on Volcán San Vicente, 2050 m., and at Laguna de las Ranas, 1700 m., Lotschert 57, 210, 417.

ASPLENIACEAE

ASPLENIUM ABCISSUM Willd.

Terrestrial in cloud forest at Laguna de las Ranas, 1700 m., Lotschert 211.

ASPLENIUM COMMUTATUM Mett.

Cloud forest on Volcán San Vicente, 2000-2100 m., Lotschert 251.

ASPLENIUM HARPEOIDES Kunze.

Epiphytic in cloud forest on Miramundo, 2300 m., Lotschert 391.

ASPLENIUM MONANTHES L.

Terrestrial in cloud forest on Volcán San Vicente, 2000 m., and on Miramundo, 2300 m., Lotschert 143, 410; Carlson 724.

POLYPODIACEAE

POLYPODIUM DELITESCENS Maxon.

Epiphytic in the upper region of the cloud forest on Montecristo, 2300-2400 m., Lotschert 378^a.

POLYPODIUM HETEROMORPHUM H. & G.

In very shady habitats in cloud forests on Miramundo and Montecristo, 2200-2400 m., Lotschert 373, 373^a.

POLYPODIUM INDUENS Maxon.

Epiphytic in the upper region of the cloud forest on Miramundo, 2250-2400 m., Lotschert 378.

POLYPODIUM LANCEOLATUM L.

Epiphytic in cloud forest on Miramundo, 2200 m., Lotschert 347.

POLYPODIUM LANCEOLATUM var. *TRICHOPHORUM* Weatherby.
Volcán Santa Ana, Williams 15144.

POLYPODIUM LORICEUM L.

Epiphytic in cloud forest on Montecristo, 2200-2300 m., Lotschert 390, 390^a.

POLYPODIUM MONTIGENUM Maxon.

Terrestrial in cloud forest on Volcán San Vicente, 2000-2100 m., Lotschert 255, 416.

POLYPODIUM TRISERIALE Swartz.

On the lava field of the Boquerón, leg. Utermohl, Lotschert 322.

VITTARIACEAE

ANTROPHYUM ENSIFORME Hook.

A very frequent epiphytic plant in the cloud forests on Cerro Verde, 1950 m., on Volcán San Vicente, 2050 m., and on Miramundo, 2200 m., Lotschert 331 386, 407.

VITTARIA FILIFOLIA Fée.

A very small grasslike fern in cloud forests on Cerro Verde, 1950 m., on Volcán San Vicente, 2050 m., and on Miramundo, 2200-2300 m., Lotschert 328, 361, 406.

MARSILEACEAE

MARSILEA MEXICANA A. Braun.

In a pond near the road, Sonsonate-Acajutla, 70 m., Lotschert 218.

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LITERATURE

ATLAS ESTADISTICO DE COSTA RICA.—Dirección General de Estadística y Censos, Ministerio de Economía y Hacienda, San José, 1953.—The present statistical atlas is certainly one of the best of its kind that we know of for any Central American area. The atlas is essential not only to Costa Ricans but also to anyone who must have the best available information about this progressive Central American republic.

The atlas is divided into ten sections: (1) on Central America with a short description of the area, four good maps showing political divisions, relief, climate and natural vegetation; comparative commercial data is offered. (2) General information on Costa Rica with a general, a forest, a rainfall, and a climate map. (3) Populations of the country with several maps and charts. (4) Education. (5) Agriculture a large section of the atlas with much statistical information, many maps and charts. (6) Commerce and industries. (7) International trade. (8) Fiscal and monetary statistics. (9) Transportation and communications. (10) The provincial capitals, with maps of each one of them.

The Dirección General de Estadística y Censos and the director Wilburg Jiménez C. are to be complimented on this fine atlas.—*L. Wms.*