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FLORA OF THE EL TRIUNFO BIOSPHERE RESERVE, CHIAPAS, MEXICO: A PRELIMINARY FLORISTIC INVENTORY AND THE PLANT COMMUNITIES OF POLYGON I

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RESUMEN

Se presenta una lista florística preliminar, así como las comunidades de vegetación, del Polígono I de la Reserva de la Biósfera El Triunfo, en la región del Soconusco de la Sierra Madre de Chiapas. La lista incluye 138 familias, 407 géneros y 751 especies de plantas vasculares, incluyendo pteridófitas. Se describen siete comunidades vegetales *(Gaultheria-Ugni-Vaccinium, Quercus-Matudaea-Hedyosmum-Dendropanax, Liquidambar-Quercus-Pinus, Cupressus-Pinus, Ficus-Coccoloba-Dipholis-Sapium, Garcinia-Inga-Desmopsis* y *Quercus salicifolia)*, proporcionando información acerca de la fisonomía general y las especies características de las diferentes formas de vida para cada comunidad. Las comunidades vegetales están enmarcadas en sistemas de clasificación conocidos, especialmente en el bosque mesófilo de montaña sensu Rzedowski (1978). Se hacen comparaciones con otros trabajos sobre la Sierra Madre de Chiapas.

Palabras clave: Chiapas, México, comunidades vegetales, flora.

ABSTRACT

A preliminary floristic inventory and the vegetation communities are given for Polygon I of the El Triunfo Biosphere Reserve, Chiapas, Mexico, which is located in the Soconusco region of the Sierra Madre de Chiapas. The floristic list comprises 138 families, 407 genera and 751 species of vascular plants including pteridophytes. A total of seven natural plant communities are described *(Gaultheria-Ugni-Vaccinium, Quercus-Matudaea-Hedyosmum-Dendropanax, Liquidambar-Quercus-Pinus, Cupressus-Pinus, Ficus-Coccoloba-Dipholis-Sapium, Garcinia-Inga-Desmopsis* and *Quercus salicifolia)* and for each community information is given on general physiognomy and characteristic species for the various life forms. The plant communities are related to several well known vegetation classifications systems with special reference to bosque mesófilo de montaña (mesophilous montane forest) *sensu* Rzedowski (1978) and comparisons are made with past botanical work conducted in the Sierra Madre de Chiapas.

Key words: Chiapas, Mexico, plant communities, flora.

INTRODUCTION

There are over 8 248 species recorded for Chiapas (Breedlove, 1981), making it one of the floristically richest states in Mexico. In comparison with some of the other

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Mexican states it is botanically well collected, with a high number of plant specimens stored in national and foreign herbaria. However, some large areas within its boundaries still lack coverage and it is proposed that the total flora will be between 9000 and 10000 species (Breedlove, 1981).

General works dealing with the flora of the entire state are presented in Miranda (1952) and Breedlove (1981, 1986), and smaller regions of Chiapas are examined in more detail in Matuda (1950b) and Miranda (1957). Surprisingly though, there are few publications that address the plant communities of discrete areas; notable exceptions being the studies of Matuda (1950a), Zuill and Lathrop (1975), Carlson (1954), and Pérez and Sarukhán (1970).

This paper presents an area specific study with a preliminary floristic inventory and descriptions of plant communities for a mountainous area of mainly intact vegetation in the "El Triunfo Biosphere Reserve". The plant communities found are also treated with respect to various vegetation classification systems that are available for the region, with special attention given to bosque mesófilo de montaña (mesophilous montane forest) *sensu* Rzedowski (1978), which it is hoped will be especially useful to the growing number of researchers interested in this vegetation type.

STUDY AREA

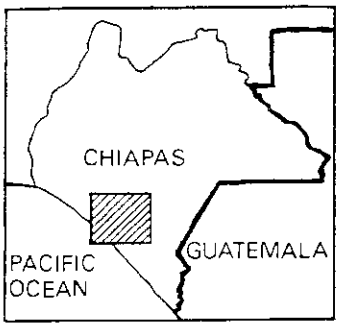
The El Triunfo Biosphere Reserve, created by presidential decree in March 1990 (Figure 1), is located in the mountains of the Sierra Madre de Chiapas, just within the northern limits of the Soconusco region. It encompasses a total area of 119000 hectares and is managed by the *Instituto de Historia Natural* (IHN), in liaison with the *Secretaría de Desarrollo Urbano y Ecología* (SEDUE). Five core areas or 'polygons' totalling 30000 hectares have been identified for key protection, with the intention that the forests remain intact and free from human disturbance. The remainder of the reserve is a buffer zone *(zona de amortiguamiento)* which encompasses farms *(ranchos)* and coffee plantations *(fincas),* private small holdings and cooperative *ejidos.* In this zone, it is hoped that with the support of the local people the remaining forests can be conserved and used sustainedly.

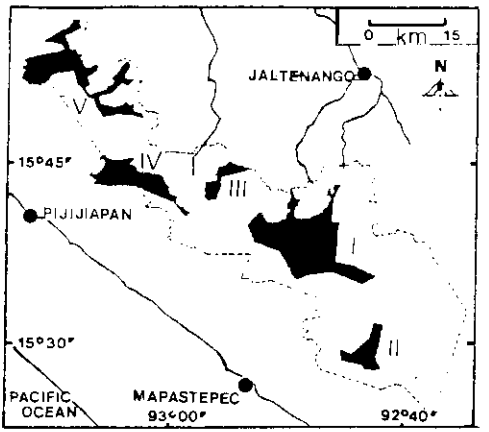
Polygon I, the most accessible and largest of the five polygons, with an extension of 10000 hectares, was selected as the study area. Nevertheless, the nearest roads end at Santa Rita and Finca Prusia to the north, and entrance to the area is on foot or mule. The reserve headquarters, consisting of two houses in a clearing, are located in this polygon at 15° 37′ N, 92° 48′ W (Fig. 1).

GEOLOGY AND TOPOGRAPHY

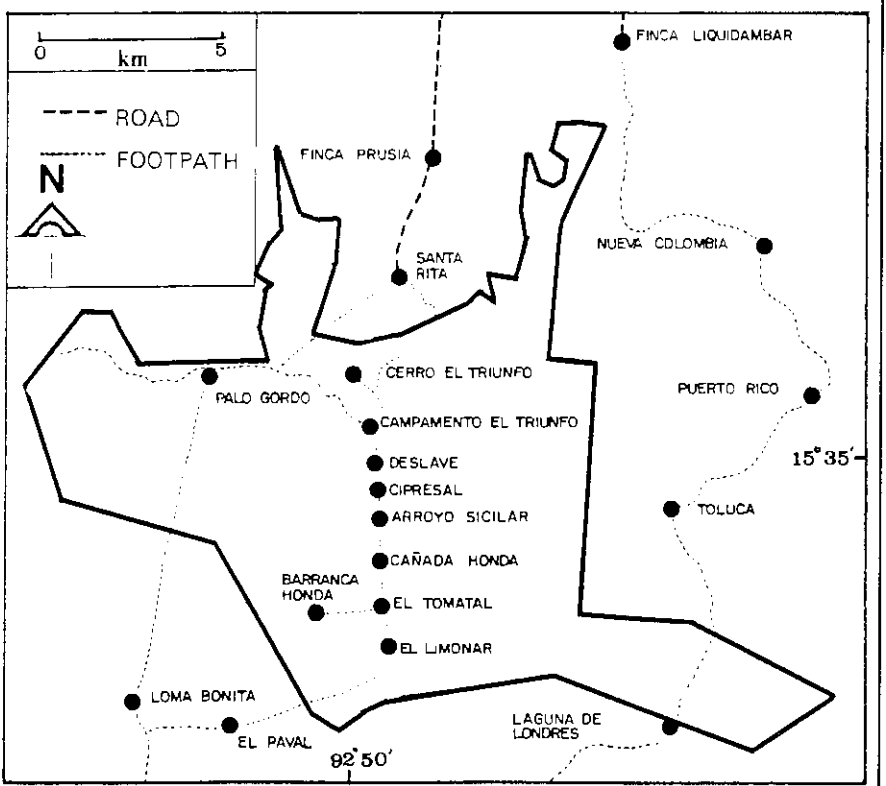
The geology of the Sierra Madre de Chiapas mountain range is complex, consisting of a main igneous formation fractured by metamorphic intrusions. According to geological maps for southern Chiapas (published by the Instituto Nacional de Estadística, Geografía e Informática, INEGI) and Müllerried (1957), the main rock

A. The location of the El Triunfo Biosphere Reserve in Chiapas.





B. The five polygons and buffer zone of the El Triunfo Biosphere Reserve.



C. The footpaths and landmarks of Polygon I.

Fig. 1. The El Triunfo Biosphere Reserve.

formations in Polygon I are of Precambrian and Palaeozoic origin.

Polygon I encompasses land within an altitudinal range of 1 000-2 450 m above mean sea level and can be sub-divided into four broad topographical zones: mountain peaks, plateau, Gulf (landward) slope and Pacific slope (Fig. 2). Both escarpments of the mountain range are sloped steeply with gradients in excess of 40 degrees and they are deeply incised with large river valleys and numerous smaller streams. At an altitude of approximately 1 900 m on both escarpments, the land becomes less inclined and forms a plateau between the two slopes, from which rise a number of mountain peaks, the highest being Cerro El Triunfo at 2 450 m.

CLIMATE

The climate of Polygon I, following a modification of Koeppen's system by García (1973), falls into two categories. The lower Pacific slope is classified as

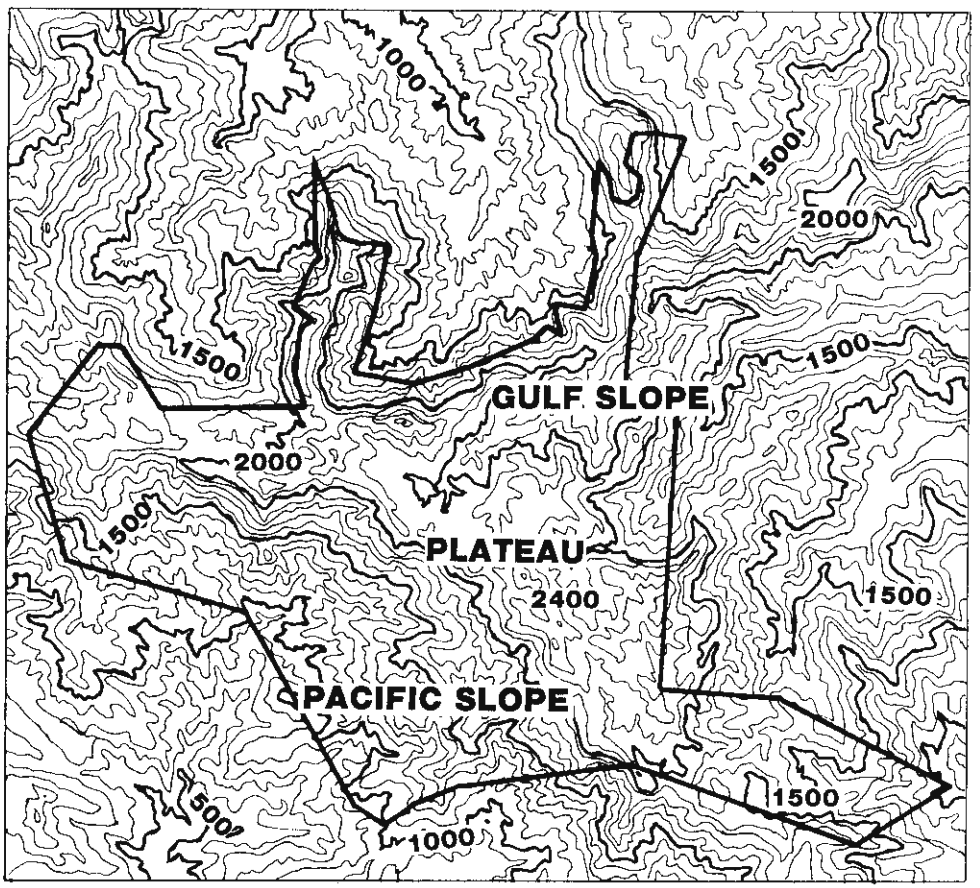


Fig. 2. The topography of Polygon I and adjacent area.

A(C)(m)(w), semi-hot humid with abundant rainfall in summer; the upper Pacific slope, plateau and landward slopes, correspond to a C(m)(w) climate, humid-temperate also with abundant rainfall in summer.

There is no meteorological station in Polygon I, although there are plans for the construction of one at the reserve headquarters. Therefore climatic information published for the area has been extrapolated from data from the few stations located nearby (none of which are above 1 300 m). Such data are shown on climatic maps, published by INEGI, which give mean annual temperatures of between 18-22°C, and the mean rainfall as 2 500-3 500 mm. The nearest meteorological station is Finca Prusia, situated at 1 100 m and records over a ten year period and annual average temperature of 21°C and an average annual precipitation of 2 365 mm. Most of this precipitation falls between May and October, but rain still occurs during the winter months.

On the upper slopes and plateau rainfall is supplemented with horizontal precipitation, formed by the deposition of water droplets as the clouds pass through the vegetation. During the winter months, when rainfall is low, horizontal precipitation makes a significant contribution in maintaining the wet and humid environment of the forest. Much of this cloud is brought by the north-easterly trade winds which are the dominant weather system through much of Mexico and Central America. From November until February they can be particularly strong, blowing at high velocities and producing powerful gusts. Indeed, as Lawton and Dryer (1980) have shown in Costa Rica these winds have the potential to ifluence the structure and floristic composition of montane vegetation.

During the summer, the northerlies are weaker and the winds from the southwest exert a greater influence on the climate of the Pacific escarpment. On occasions, cloud is trapped on the Pacific slope, the opposing northerlies still sufficiently strong to prevent its continuation onto the plateau and landward face. This phenomenon can be observed on the upper reaches of the Pacific slope above Deslave (see figure 1 for location). Here the Pacific slope forest is frequently bathed in cloud, reducing visibility to just a few metres, but on climbing a short distance onto the main plateau the cloud clears completely.

METHODS

Floristic inventory. Plants were collected between April 1989 and June 1990, in all months of the year except July, August and January. Collecting was restricted largely to existing paths (Fig. 1) and although collections were made at all altitudes, extensive portions of Polygon I were not visited as travel and orientation away from the paths were extremely difficult. For each plant specimen, data on the locality, life form and height of the plant were recorded.

The plants were identified in the National Herbarium (**MEXU**), where an excellent collection of Chiapan flora is housed. Help was obtained for difficult families or genera from various specialists (see acknowledgements). The main collections from this project are kept in **MEXU** and **CHIP**, with smaller sets in **BM** and **CAL**. The floristic list and communities are derived mainly from the above sources and supplemented

TABLE 1
QUANTITATIVE BREAKDOWN BY FAMILY, GENERA AND SPECIES OF THE PLANT GROUPS RECORDED FROM POLYGON I OF THE EL TRIUNFO BIOSPHERE RESERVE

Plant Group	Families	Genera	Species
Pteridophyta	17	32	62
Gymnospermae	4	4	4
Dicotyledoneae	103	302	532
Monocotyledoneae	14	69	153
TOTAL	138	407	751

with information from collections made with members of the Flora Mesoamericana Project in Polygon I in November 1989 and February 1990; from the collecting trip made by E. Hernández. and A. J. Sharp in November 1945; and from F. Miranda, who visited El Triunfo in February 1951.

Plant communities. To supplement the information obtained from the plant collections, and to help distinguish between different plant communities, data on the physiognomic characteristics of the vegetation were taken from many localities within the polygon. Tree species present were identified and their heights estimated and separated into broad height classes. Information was also taken on the compo-

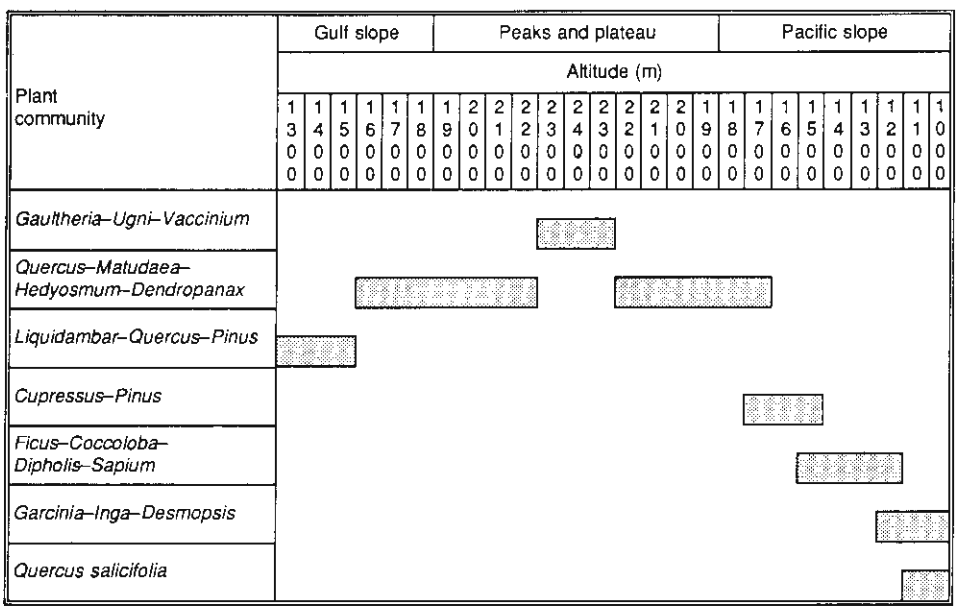


Fig. 3. The general location and altitudinal ranges of the natural plant communities found within Polygon I of the El Triunfo Biosphere Reserve.

sition of the shrub and herb layers, vines and epiphytes, and the presence of tree ferns, palms and aroids was noted.

RESULTS

Floristic inventory. A total of 1 250 plant collections were made during the study period, and from these and additional collections a total of 751 species are recognised for Polygon I. The information is summarized in Table 1, and a full species list with the communities in which they occur is given in Appendix 1.

Seven climax and one secondary plant communities were identified, and their broad altitudinal ranges with respect to the topographical zones in Polygon I are shown in Figure 3. The species composition and physiognomic characteristics of these communities are described below.

(1) *Gaultheria-Ugni-Vaccinium* community. On the mountain peaks such as Cerro El Triunfo, which are exposed to the full force of the trade winds and immersed in dense, humid cloud, exists a low-lying microphyllous vegetation composed entirely of shrubs and herbs. The shrub layer is up to 2 m tall and very dense. It is dominated by three species, *Gaultheria acuminata, Vaccinium matudae* and *Ugni myricoides.*

A creeping shrub, *Sphyrospermum majus* on the mentioned species is common and below the bushes are mats of spongy moss and *Lycopodium.* In open parts, a bamboo (*Chusquea* sp.) grows abundantly, and at the limits of this plant community small trees such as *Viburnum acutifolium* ssp. *blandum, Weinmannia pinnata, Persea* sp., *Miconia glaberrima, Rhamnus capraeifolia* var. *grandifolia, Ternstroemia lineata* ssp. *chalicophila* and *Fuchsia microphylla* ssp. *aprica,* intergrade with the shrubs.

(2) *Quercus-Matudaea-Hedyosmum-Dendropanax* community. On the gently undulating ground of the plateau area, the sides of the mountain peaks, the upper part of the Gulf slope and the valleys of the Pacific slope above 1 650 m, the forest is tall, dense and dark. This effect is accentuated when low mists and clouds envelop the land, which is often the case between May and October and in the early mornings and afternoons throughout the year.

In spite of the forest having an overall continuous canopy cover, gaps are frequently created by tree falls and dead but erect trees without foliage and falling (rotten) tree limbs, cause smaller gaps. The former occurs more often during early winter when the winds are strongest and rainfall heavy, and other limb falls are more frequent in May and June when the first rains arrive. Large quantities of water can become trapped in the leaves of epiphytic bromeliads, and through the increase in weight branches densely laden with them can snap and fall.

The forest is evergreen, broadleaved, with luxuriant growth at all levels and a very high density of epiphytes. However, from December onwards some trees lose their leaves for short periods. This is most obvious in February and March, when the red and brown foliage of individual trees of the canopy layer forms visible patches in the overall green tones of the forest. In some sheltered parts, such as the south side of Cerro El Triunfo, the trees can grow to 40 m. However, they are more commonly

lower at about 25 to 30 m tall, with many other individuals of various heights between 6 m and the canopy emergents. In more exposed situations, especially towards the landward escarpment, the canopy layer can be as low as 10-12 m, although the species found are the same. Presumably, the strong winds that such sites receive, place great mechanical stress on the vegetation and consequently tree growth is stunted, with buttress roots and thicker trunks giving greater support.

The species diversity of the larger trees is perhaps lower here than in the forests on the lower slopes. The more common tall trees include several species of *Quercus (Q. oocarpa, Q. sapotifolia and Quercus* sp. *(crispinifolia ?)), Matudaea trinervia, Dendropanax populifolius, Perrottetia longistylis, Ocotea chiapensis, Morus* sp., *Trophis cuspidata, Symplocos hartwegii* and *Symplococarpon flavifolium.* Probably the most abundant medium-sized tree species throughout this community is *Hedyosmum mexicanum.* The melastome *Conostegia volcanalis* is also abundant, but notably absent from land above 2 100 m. Conversely, *Weinmannia pinnata, Eugenia chiapensis* and *Drimys granadensis* var. *mexicana,* were not collected below this altitude. Other tree species present include *Podocarpus matudae, Ilex belizensis, Spathacanthus parviflorus, Amphitecna montana, Brunellia mexicana, Bernardia interrupta, Persea liebmannii, Phoebe siltepecana, Guarea glabra, Ardisia neomirandae, Myrsine juergensenii, Gentlea tacanensis, Parathesis nigropunctata, Synardisia venosa, Eugenia citroides, Picramnia matudae, Meliosma* sp., *Styrax glabrescens* var. *glabrescens, Ternstroemia lineata* ssp. *chalicophila, Daphnopsis selerorum, Heliocarpus donnell-smithii, Lozanella enantiophylla, Boehmeria ulmifolia* and *Citharexylum mocinnii.*

The shrub and small tree species are well represented by the Compositae, Piperaceae, Rubiaceae and Solanaceae. Composites include *Ageratina conspicua, Archibaccharis androgyna, Bartlettina pinabetensis, Eupatorium (Bartlettina) tenejapanum, Podachaenium pachyphyllum, Schistocarpha longiligula* var. *longiligula* and var. *seleri, Senecio greenmanii* and *S. uspantanensis.* From the other families mentioned are: *Piper* aff. *hispidum, P. pseudoasperifolium, P.* aff. *yzabalanum, Hoffmannia lineolata, H. macrosiphon, H. quadrifolia, Omiltemia filisepala, Psychotria skutchii, Psychotria* spp., *Rondeletia albida, R. pyramidalis, Cestrum elegantissimum, Cestrum* aff. *formosum, Lycianthes tricolor, Physalis* aff. *angulata, Solanum chrysotrichum* and *Witheringia cuneata.*

The understorey is further characterized by the abundance of arborescent ferns such as *Alsophila salvinii, Cyathea fulva* and *C. valdecrenata* which usually grow to between 2-4 m tall, but some individuals reach up to 8 m. In some areas the palm *Geonoma seleri,* and other species of the genus *Chamaedorea* are common, but they are noticeably scarce in the vegetation near to the reserve headquarters. This is probably the result of cattle grazing between 1970 and 1983; apparently, the herd would roam freely and enter the forest, browsing and trampling the understorey cover (R. Solís, pers. com).

The herb layer is dominated by *Smilacina flexuosa, S. paniculata* and many species of ferns, including *Marattia excavata, Adiantum concinnum, Pityrogramma tartarea* var. *tartarea, Pteris quadriaurita, Asplenium auriculatum, A. monanthes, Arachniodes denticulata, Botrychium virginianum, Ctenitis subincisa, Ophioglossum crotalophoroides, Blechnum occidentale, Thelypteris pilosula, Diplazium fran-*

conis, and *Eriosorus hirtus* var. *hirtus.* The frequency and diversity of species from the Dicotylodeneae are relatively low but include *Pseuderanthemum praecox, Hydrocotyle mexicana, Begonia bettinae, B. oaxacana, Lobelia plebeja, Cardamine fulcrata, Monotropa uniflora, Salvia membranacea, Lycianthes connata, Solanum trizygum* and *Pilea quercifolia.* In some places scandent species such as *Lycopodium clavatum, L. thyoides, Galium* sp., *Viola scandens* and *Sibthorpia repens* can form extensive mats. Also present and locally common are *Isachne arundinacea,* and *Conopholis alpina* var. *alpina,* the latter being a parasite on oak roots.

Epiphytes are abundant and diverse throughout all levels of the forest. The emergent trees can support literally thousands of other plants, particularly fern, bromeliad and orchid species, and mosses cover the trees and even hang off the foliage. Fern species include *Antrophyum ensiforme, A. lineatum, Campyloneurum xalapense, Cochlidium rostratum, Grammitis* sp., *Pleopeltis macrocarpa* var. *trichophora, Polypodium aureum, P. lindenianum, P. loriceum, P. plesiosorum, Trichomanes capillaceum, T. radicans,* and *Vittaria graminifolia.* Perhaps the most common epiphyte throughout this plant community is *Elaphoglossum peltatum,* occurring in high densities on virtually all trunks and branches.

Epiphytic orchids are plentiful, encompassing many genera with species such as *Arpophyllum giganteum, Dichaea graminoides, Elleanthus cynarocephalus, Encyclia varicosa* spp. *leiobulbon, E. vitellina, Epidendrum chlorocorymbos, E.* aff. *clowesii, E. pseudoramosum, E. trachythece, Isochilus aurantiacus, Lemboglossum rossii, Maxillaria cucullata, Pleurothallis dolichopus, P. hirsuta, P. pachyglossa, P. tuerckheimii, Ponthieva* aff. *maculata, Prescottia stachyodes, Stelis* aff. *aprica, Trichosalpix greenwoodiana* and *Trigonidium egertonianum.*

Other families with epiphytic representatives are Piperaceae, with several species of *Peperomia (P. collocata, P. galioides, P. limana, P. obtusifolia* and *P. tetraphylla),* Cactaceae *(Nopalxochia ackermannii* f. *candida),* Compositae *(Neomirandea araliaefolia),* Ericaceae *(Cavendishia bracteata),* Gesneriaceae *(Pentadenia matudae),* Liliaceae *(Smilacina amoena),* Scrophulariaceae *(Gibsoniothamnus cornutus),* Araceae *(Monstera siltepecana* and *Anthurium* spp.*)* and Araliaceae *(Oreopanax sanderianus).* The most common hemi-parasitic species is *Phoradendron nervosum* of the Loranthaceae.

The presence of vines and creepers tends to indicate recent disturbances from tree falls. Amongst the species found are *Matelea* aff. *velutina, Metastelma angustifolia, Celastrus vulcanicola, Sechium compositum, Rytidostylis ciliata, Banisteriopsis argentea, Passiflora filipes, P. ornithoura* var. *chiapensis, Cobaea pachysepala, Lycianthes chiapensis, Solanum appendiculatum, S. wendlandii, Dioscorea racemosa, Smilax jalapensis* and *S. mollis.* Vines and creepers are also frequent in steeper valleys and in open situations along streams, with *Cyclanthera langaei* and *Sicyos* aff. *motozintlensis* forming dense walls of tangled herbage. Several low tree and shrub species, such as *Justicia aurea, Solenophora toucana, Urera alceifolia* and *Pothomorphe umbellata* were found only along stream sides.

(3) *Liquidambar-Quercus-Pinus* community. On the landward slope of the mountain, from the upper limits of the coffee plantations at 1 400 m (the northern boundary of Polygon 1) to about 1 700 m, a *Liquidambar*-oak-pine community is dominant. The canopy cover is variable but never as dense as in the *Quercus-Matu-*

daea-Hedyosmum-Dendropanax community. The larger trees reach to 40 m and species diversity is quite high with *Pinus oocarpa* var. *ochoterenae, Tapirira mexicana, Dendropanax pallidus, Oreopanax echinops, O. xalapensis, Alchornea latifolia, Cleidion oblogifolium, Quercus segoviensis, Quercus* spp., *Hasseltia guatemalensis, Liquidambar styraciflua, Pseudolmedia simiarum, Trophis mexicana, Coccoloba* sp., *Peltostigma pteleoides, Solanum chiapense, Turpinia paniculata, Symplocos flavifolia* and *Belotia mexicana.* The intermediate layer between 6-12 m tall is well developed, with species including *Vernonia polypleura, Vaccinium leucanthum, Nectandra reticulata, Phoebe siltepecana, Siparuna andina, Ardisia siltepecana, Parathesis chiapensis, Rapanea myricoides, Eugenia* aff. *mexicana, Prunus tetradenia, Psychotria costinervia* and *Rondeletia amoena.*

In sheltered, more humid valleys, a slightly different formation exists, where *Liquidambar styraciflua* is less abundant, pine almost absent and species such as *Ficus cookii, Sterculia mexicana* and *Ulmus mexicana* are the notable canopy emergents. These wetter valleys share many floristic and physiognomic characters with forests at a similar altitude on the Pacific slope.

Throughout the community, the coverage of shrubs is variable. In some places the understorey is luxuriant and diverse in species, including *Moussonia deppeana, Cuphea ignea, Abutilon purpusii, Miconia desmantha, Piper pseudo-lindenii, Deppea inaequalis, Hoffmannia cryptoneura, H. quadrifolia, Psychotria* sp., *Lycianthes tricolor* and *Heliconia adflexa.* Isolated individuals of *Ceratozamia matudae,* a rare member of the Cycadophyta, also occur and are notably absent from the plant communities of higher altitudes.

In other locations within the *Liquidambar-Quercus-Pinus* community, past fires have affected the forest composition and structure. For the Finca Prusia area Wagner (1930) described how fire, employed to clear secondary vegetation for maize cultivation, frequently spread into pristine forest on the slopes above, causing extensive damage and left the valley filled with smoke for several days afterwards. In such areas today, the upper stratum is mainly dominated by pine and *Liquidambar styraciflua* reaching 20-25 m tall, with there being little variation in the tree heights and the *Liquidambar* having noticeably small trunk diameters. Generally, the understorey is open, with a shrub layer and herbaceous vegetation consisting mainly of grasses, *Begonia fusca* and *B.* aff. *sartorii.* In less disturbed areas, Araceae species are well represented with *Anthurium andicola, A. lucens* and *A. microspadix* all being abundant. Other herb species present are *Adiantum fructuosum, Anemia phyllitidis, Elaphantopus mollis, Spigelia palmeri, Carex* spp., *Smilacina paniculata, Isachne arundinacea* and *Renealmia mexicana.*

Vines are common in more open situations, and species include *Mandevilla* aff. *rosana, Prestonia grandiflora, Thenardia galeottiana, Gonolobus* aff. *macranthus, Canavalia dura, Dioscorea floribunda* and *Smilax subpubescens.* Epiphytic growth is lighter than on the plateau region, but the canopy emergents can support large numbers of epiphytic plants including *Catopsis hahnii, Tillandsia* spp., *Brassia verrucosa, Epidendrum mixtum, Juanulloa mexicana* and *Philodendron tripartitum.*

(4) Cupressus-Pinus community. Along the upper ridges and crests of the Pacific slope from about 1 600 m to 1 900 m occurs a forest dominated by *Cupressus benthamii* var. *lindleyi* and *Pinus oocarpa* var. *ochoterenae.* The soils are thin

and very stony with little or no surface humus and during the dry season, the ground becomes hard and fissured. The cypresses and pines grow to 25 m, and occasionally to 30 m tall. Generally the canopy is discontinuous and amongst the taller tree species encountered are *Ilex liebmannii, Clethra suaveolens, Clusia guatemalensis, C. salvinii, Senecio cobanensis, Verbesina apleura, Vernonia polypleura, Rhacoma standleyi, Cojoba donnell-smithii, C. matudae, Quercus lancifolia, Saurauia matudae, Miconia mexicana, Myrica cerifera, Osmanthus americanus, Rondeletia apricа, Ternstroemia oocarpa* and *Triumfetta speciosa.* The shrub layer resembles the vegetation found on the summit of Cerro El Triunfo, with species of Ericaceae such as *Gaultheria acuminata, Lyonia squamulosa, Vaccinium confertum* and *V. leucanthum* being dominant. Other shrub species include *Lobelia laxiflora, Bidens squarrosa* var. *atrostriata, Chromolaena collina, Critonia morifolia, Eupatorium collinum, Stevia chiapensis, Desmodium cordistipulum, Xylosma quichense, Rondeletia albida, R. strigosa* and *Russelia sarmentosa.*

The herb layer is well developed, species diversity being especially high during the rainy season and *Arenaria guatemalensis, Ageratum microcephalum, Gnaphalium roseum, G. silvicola, Zexmenia* sp., *Clitoria mexicana, Salvia infuscata, Cuphea appendiculata* var. *appendiculata, Oxalis dimidiata, Lopezia racemosa, Polygala aparinoides, Carex* sp., *Cyperus hermaphroditus, Rhynchospora* sp., *Scleria* sp., *Orthrosanthus chimboracensis, Habenaria novemfida, Malaxis salazarii, Maxillaria cucullata, Sobralia macrantha, Aegopogon cenchroides* and *Lasiacis procerrima* being notable components. The understorey vegetation is often tangled with vines including several species of *Smilax (S. jalapensis, S. mollis* and *S. purpusii);* also, *Mandevilla* aff. *rosana, Canavalia hirsuta, Oxalis rhombifolia, Passiflora sexflora, Cissus cacuminis* and *Bomarea hirtella.*

Epiphytic bromeliads and orchids are abundant, especially on the pines, and include *Encyclia pseudopygmaea, Pleurothallis segoviensis, Stelis ovatilabia, S. rubens, S. tenuissima,* and *Tillandsia argentea, T. guatemalensis, T. punctulata* and *T. tricolor.* There are some epiphytic fern species present, but noticeably fewer than in the forests found at higher altitudes and epiphytic shrubs, trees, or cacti are not well represented.

(5) *Ficus-Coccoloba-Dipholis-Sapium* community. The vegetation on the Pacific slope, between 1 200 and 1 600 m is a medium height, broadleaved community rich in species. The canopy level is at about 25 m with emergent trees up to 35 m. The forest is dense, although in many places the canopy can appear open and discontinuous. The terrain is varied allowing heavily shaded, humid valleys and well exposed land to lie only a short distance apart. Tree falls and landslides are common; in the vicinity of Cañada Honda during 1989, there were two major landslips opening up large (2 ha or more) gaps in the forest. In some parts of the forest, there is evidence of older landslides, with rocks and boulders (some as large as 5 m in diameter) littering the ground.

This forest marks the upper limits of the distribution on the Pacific slope of *Ficus cookii,* a notable tree in this community because of its high relative frequency, large basal area, height and extensive spreading canopy. Other tall tree species comprising this community include *Podocarpus matudae, Saurauia madrensis, Stemmadenia galeottiana, Dendropanax pallidus, Oreopanax xalapensis, Zinowiewia matu-*

dae, Sloanea ampla, Sapium schippii, Cojoba donnell-smithii, C. escuintlensis, Quercus skinneri, Casearia tacanensis, Billia columbiana, Alfaroa aff. *mexicana, Phoebe chiapensis, P. mexicana, P. trinervis, Guarea glabra, Hyperbaena* aff. *mexicana, Calyptranthes pallens* var. *mexicana, Coccoloba matudae, Roupala montana, Rhamnus mucronata, R. sharpii, Balmea stormae, Zanthoxylum melanostictum, Meliosma matudae, Cupania* aff. *macrophylla, Exothea paniculata, Dipholis minutiflora, Sideroxylon capiri, Picrasma* sp., *Styrax glabrescens* var. *pilosus, Celtis* aff. *caudata, Ulmus mexicana* and *Aegiphila valerii.*

The species diversity of smaller trees (under 15 m) is also high, the most common species being *Saurauia kegeliana, Bunchosia gracilis, Malvaviscus lanceolatus, Mollinedia pallida, Trophis chiapensis, Ardisia siltepecana, Eugenia* aff. *nigrita, Palicourea padifolia, Rondeletia ovandensis, Meliosma matudae, Picramnia antidesma* var. *fessoniana, Cleyera theaeoides, Myriocarpa longipes* and *Urera alceifolia.* Other tree species of varying heights found in this community are *Desmopsis lanceolata, Tournefortia glabra, Forchhammerira matudae, Desmanthodium perfoliatum, Koanophyllon pittieri, Senecio grandifolius, Nectandra coriacea, Bunchosia lanceolata, B. matudae, Centardisia ovandensis, Parathesis* sp., *Eugenia capulioides, Genipa* aff. *americana, Glossostipula concinna, Hintonia lumaeana, Psychotria* sp., *Sommera arborescens, Solanum chrysotrichum* and *Symplococarpon* aff. *flavifolium.*

Tree species with greater affinities to drier, open, or disturbed sites are *Tonduzia longifolia, Ilex quercetorum, Clethra hartwegii, C. obliquinervia, Clusia guatemalensis, Vernonia arborescens, V. patens, Croton reflexifolius, C. xalapensis, Platymiscium pinnatum, Inga calderonii, I. endlicheri, Casearia corymbosa, Nectandra reticulata, Persea liebmannii, Osmanthus americanus, Robinsonella speciosa, Coussapoa purpusii, Trichilia havanensis, Myrsine juergensenii, Hauya elegans* ssp., *barcenae, Chiococca pachyphylla, Chomelia brachypoda, Gonzalagunia chiapensis, Rondeletia intermedia, Solanum chiapasense* and *Trema micrantha.* Towards the end of the dry season in February, several taller tree species shed their leaves and the upper storey is temporarily open, but the new leaves grow quickly and by March the canopy cover is again complete. Deciduous species include *Sapium schippii, Quercus skinneri, Casearia tacanensis, Platymiscium pinnatum, Billia columbiana, Robinsonella speciosa, Coussapoa purpusii, Ficus cookii, Dipholis minutiflora* and *Styrax glabrescens* var. *pilosus.*

The shrub layer varies in appearance and structure according to the local edaphic conditions. In drier or more open parts, the undergrowth is dominated by a bambusoid herb to the exclusion of other herbs and lower shrub species. Other sites are structurally similar to the plateau forests, likewise having many representatives from Acanthaceae, Compositae, Piperaceae, Rubiaceae and Solanaceae. Tree ferns are absent, but palms of the genus *Chamaedorea (C. elegans, C.* aff. *neurochlamys, C.* aff. *nubium)* are locally abundant. Apparently the area around Cañada Honda (and more recently on the trail between Palo Gordo and Loma Bonita) was used by local people for palm extraction (I. Gálvez, pers. com. and Heath and Long, pers. obs.). Also in the understorey *Costus spicatus* and *Heliconia* sp. can be locally common.

The most frequent shrub or small tree species include *Aphelandra schiedeana, Justicia inaequalis, Odontonema glabrum, Ruellia matagalpae, Iresine celosia,*

Rhacoma aff. *riparia, Decachaeta ovandensis, Fleischmanniopsis leucocephalum, Liabum bourgeaui, Onoseris onoseroides, Verbesina turbacensis, Viguiera cordata, Acalypha* aff. *firmula, A. macrostachyoides, Zapoteca protoricensis* ssp. *portoricensis, Lunania mexicana, Moussonia fruticosa, M. rupicola, Miconia glaberrima, M. mexicana, Heisteria acuminata, Piper pseudo-lindenii, Piper sancti-felicis, Bouvardia dictyoneura, Hoffmannia angustifolia, H. cryptoneura, Plocaniophyllon flavum, Psychotria mexiae, Psychotria* aff. *pubescens, Rondeletia albida, Cestrum luteovirescens, Lycianthes arrazolensis, L. orogenes, Solanum diphyllum, Witheringia solanacea, Daphnopsis flavida, Phenax hirtus* and *Pleuropetalum sprucei.*

Herb species that are widespread throughout the community are *Pteris orizabae, Odontosoria schlechtendalii, Thelypteris imbricata, Hydrocotyle mexicana, Eupatoriastrum angulifolium, Synedrella nodiflora, Hyptis urticoides, Salvia misella, S. mocinoi, Scutellaria orizabensis, Cuphea ignea, Spigelia palmeri, Biophytum dendroides, Tripogandra serrulata, Oerstedella myriantha* and *Lasiacis nigra.*

In rocky areas, with thin soils and steep slopes, shrubs and herbs from Piperaceae, Araceae and Commelinaceae are well represented. Species include *Adiantum princeps, Campyloneurum tenuipes, Anemia phyllitidis, Begonia philodendroides, Peperomia collocata, P. obtusifolia, P. peltata, Anthurium chiapasense* ssp. *chiapasense, Anthurium* aff. *seleri, Philodendron scandens, Pitcairnia* aff. *wendlandii, Callisia multiflora, Tradescantia (Campelia) zanonia, T. plusiantha, Cyperus matudae, Smilacina paniculata* and *S. scilloides.* Wet gulleys and stream edges support a different herbaceous community with the exposed rocks being covered in moss and vascular plants including *Begonia calderonii, B.* aff. *strigillosa, Achimenes candida, A. pedunculata, Peperomia asarifolia* and *P. floribunda.*

Several vine species are common, including Prestonia grandiflora, Gonolobus chiapensis, *Marsdenia* aff. *bourgeana, Mätelea inops, M.* aff. *velutina, Metastelma angustifolia, Celastrus vulcanicola, Ipomoea lindenii, I. lutea, I. tiliacea, Melothria pendula, Tragia mexicana, Rhynchosia amabilis, Passiflora membranacea, P. sexflora, Serjania* sp., *Valeriana scandens* var. *candolleana, Dioscorea convolvulacea, D. densiflora, D. floribunda, Smilax mollis, S. ornata* and *S. velutina.*

Epiphytes are prominent but are significantly less abundant than in the *Quercus-Matudaea-Hedyosmum-Dendropanax* community. Mosses characteristic of the forests at higher altitudes, are sparse and are replaced by lichen, which often covers trunks and branches. Hemi-parasites of the Loranthaceae are numerous (e.g. *Phoradendrom falcatum, P. nervosum, P. piperoides* and *Struthantus deppeanus)* and epiphytic trees and shrubs are perhaps commoner than in any other of the forest communities, with *Oreopanax sanderianus, Clusia salvinii, Epiphyllum thomasianum* var. *thomasianum, Pentadenia matudae, Ficus cookii, Balmea stormae* and *Gibsoniothamnus moldenkeanus* being present. The best represented family with epiphytic species is Orchidaceae, including *Encyclia baculus, E. ochracea, Epidendrum polyanthum, Ornithocephalus tripterus, Pleurothallis tribuloides, Restrepia lankesteri, Scaphyglottis crurigera* and *Trichopilia tortilis.* Other epiphytic species are *Asplenium fragrans, Pleopeltis angusta, Polypodium furfuraceum, Peperomia hoffmannii, Syngonium podophyllum, Catopsis nutans* and *Pitcairnia* aff. *heterophylla,* which are all abundant.

(6) *Garcinia-Inga-Desmopsis* community. This plant community occurs below

1 200 m on the Pacific slope in the south of Polygon I. It is structurally similar to the *Ficus-Coccoloba-Dipholis-Sapium* community found at higher altitudes on the Pacific slope sharing several species in common. Overall the floristic composition is, however, quite distinct and probably is related more to the forests found at lower altitudes outside of the Polygon I boundaries, where it mixes with lowland tropical tree species such as *Calophyllum brasiliense, Terminalia amazonia,* and *Brosimum alicastrum* (UEA, 1989, UEA, 1990, Long and Heath pers. obs.).

The canopy is continuous, containing a high but variable proportion of deciduous species, depending on the aridity of the locality. Tree species present that were not seen in communities at higher altitudes include *Rollinia jimenezii, Garcinia intermedia, Erythroxilon* sp., *Cojoba haematoloba, Swartzia simplex* var. *ochnacea, Byrsonima crassifolia, Ficus japonensis, F. padifolia, Parathesis* sp., *Randia grandifolia, Symplocos flavifolia, Belotia mexicana.* Other tree species which are notably common are *Bursera simaruba, Maytenus* sp., *Inga calderonii, Nectandra coriacea* and *Phoebe trinervis.*

Smaller tree species (less than 10 m tall) characteristic of this forest are *Desmopsis lanceolata, Oreopanax peltatus, Viburnum hartwegii, Carica cauliflora, Rhacoma* aff. *riparia, R. standleyi, Critonia morifolia, C. daleoides, Acalypha macrostachya, Cnidoscolus* sp., *Malpighia glabra, Eugenia biflora, Hirtella racemosa* var. *hexandra, Chiococca filipes, Chione chiapensis, Chomelia protracta, Faramea occidentalis, Zanthoxylum microcarpum, Chrysophyllum mexicanum* and *Ternstroemia oocarpa.* The shrub layer is diverse, although quite open in places, with species including *Barleria micans, Justicia inaequalis, Eupatorium heathiae, Zexmenia appressipila, Calliandra houstoniana, Xylosma flexuosum, Piper uspantanense, Hoffmannia excelsa, Psychotria patens, P. quinqueradiata* and *Dodonaea viscosa.* Palms of *Chamaedorea* spp. are also abundant.

Herbs are relatively well developed with terrestrial Araceae such as *Anthurium chiapasense* ssp., *chiapasense* and *A. salviniae* being common. Other herb species encountered are *Tectaria mexicana, Blechnum occidentale, Desmodium skinneri, Peperomia praeteruentifolia, Pinarophyllon flavum, Xiphidium caeruleum, Calathea coccinea* and *Malaxis histionantha.* Small, steep, rocky areas such as on the banks of well worn paths present a distinct herbaceous flora, with several representatives from the Gesneriaceae including *Achimenes candida, A. cettoana, A. longiflora* and *Niphea saxicola,* and mosses and epipetric ferns such as *Adiantopsis radiata* and *Anemia oblongifolia.* During the opening weeks of the wet season, *Helosis cayenensis* var. *mexicana,* a parasite on tree roots occurs in areas with deep soil and was also collected at the same altitude on the Gulf slope.

In more open areas, vines are abundant and include *Thenardia galeottiana, Metastelma schlechtendalii, Canavalia hirsuta, Gouania* sp., *Vitis tiliifolia, Dioscorea convolvulacea* and *Smilax domingensis.* Epiphytes are present but at relatively low densities and species include *Pleopeltis astrolepis, Polypodium polypodioides* var. *aciculare, Tillandsia* aff. *heterophylla, Corymborchis forcipigera, Epidendrum melistagum, Oncidium ornithorhynchum* and *O. suttonii.* Amongst the hemi-parasitic species are *Cladocolea oligantha, Psittacanthus* sp. and *Phoradendron brachystachyum.*

(7) *Quercus salicifolia* forest. Ridges between 1 000 and 1 200 m, support a

forest consociation (one species dominant) of *Quercus salicifolia,* with *Styrax glabrescens* var. *pilosus* and *Quercus skinneri* being the only other tree species usually encountered in this community. The height and structure of the trees is constant at about 20 m, with little other growth between the canopy trees and the shrub layer, apart from immature oaks. The shrub layer is quite open and relatively low in species diversity with *Ilex* sp., *Miconia* sp., *Lysianthus* sp. and *Perymenium gracile.* The ground is covered mainly with grasses, especially *Andropogon glomeratus* but there are also scattered clumps of *Campyloneurum angustifolium* and *Anthurium chiapasense* ssp. *chiapasense.* The horizontal branches of the oaks are covered lightly with epiphytic ferns, orchids and bromeliads.

(8) Clearings. There are two main clearings in the plateau area within the *Quercus-Matudaea-Hedyosmum-Dendropanax* community, both originally created for cultivation: the El Triunfo clearing, location of the reserve headquarters, no longer cultivated, and Palo Gordo, a larger clearing, where until 1990 one family survived as subsistence farmers, growing mainly maize, beans and squash. On the borders of these clearings and in areas of regenerating forest, the most common tree species are *Amphitecna montana, Boehmeria caudata, Saurauia madrensis, S. matudae, Tournefortia acutiflora, Sambucus mexicana, Clethra matudae, Bernardia interrupta, Wigandia urens* var. *caracasana, Leandra subseriata, Miconia glaberrima, M. globulifera, Fuchsia paniculata, Bocconia arborea* and *Rhamnus capraeifolia* var. *grandifolia.*

Understorey shrubs include *Hibiscus uncinellus, Monnina sylvatica, Phytolacca rivinoides, Rubus glaucus, R. urticifolius, Zanthoxylum harmsianum, Jaltomata procumbens, Solanum nigrescens* and *Hybanthus elatus.* In the more open area of the El Triunfo clearing, which is still grazed by mules and horses, larger shrubs and woody herbs include *Chenopodium ambrosioides* var. *ambrosioides, Sticherus bifidus, Iresine celosia, Ageratina conspicua, Bidens odorata* var. *odorata, Dahlia excelsa, Salvia longispicata, Tibouchina longifolia, Alloispermum integrifolium, Conyza bonariensis* var. *leiotheca, C. coronopifolia, Dyssodia papposa, Fleischmanniopsis leucocephala, Gnaphalium viscosum, Senecio oaxacanus, Hyptis mutabilis, Stachys lindenii, Rumex obtusifolius* ssp. *obtusifolius, Borreria laevis, Hemichaena fruticosa, Phenax hirtus, Pilea quercifolia, Verbena carolina,* and *V. litoralis.*

Herb species found are *Diastatea micrantha, Stellaria ovata, Galinsoga parviflora, Gamochaeta americanum, Jaegeria hirta, Sigesbeckia agrestis, S. jorullensis, Brassica juncea, Lepidium virginicum* var. *centrali-americanum, Crotalaria* aff. *quercetorum, Zornia reticulata, Geranium mexicanum, Sida rhombifolia, Oxalis corniculata, Crusea coccinea* var. *breviloba, Richardia scabra, Castilleja arvensis, Hybanthus attenuatus, Commelina diffusa, Tradescantia deficiens, T. guatemalensis, Carex* sp., *Kyllinga* sp., *Cynodon nlemfuensis* and *Pennisetum purpureum.*

Vegetation keys and bosque mesófilo de montaña. The plant communities of Polygon I can be related to a number of vegetation classification systems, the most relevant being the two most widely used for Mexico, those of Rzedowski (1978) and Miranda and Hernández (1963), and those that apply to only Chiapas, namely Miranda (1952) and Breedlove (1981) (see Table 2). The number of vegetation types identified for Polygon I varies according to which key is used; for the classification system of Rzedowski (1978) three of the plant communities are amalgamated under

TABLE 2
A COMPARISON OF THE PLANT COMMUNITIES OF POLYGON I WITH THE VEGETATION CLASSIFICATION SYSTEMS OF RZEDOWSKI (1978), MIRANDA AND HERNÁNDEZ (1963), MIRANDA (1952) AND BREEDLOVE (1981)

Community In Polygon I	México		Chiapas	
	Rzedowski	Miranda & Hernández	Miranda	Breedlove
Gaultheria–Ugni–Vaccinium	matorral xerófilo in part	chaparral	—	evergreen cloud scrub
Quercus–Matudaea–Dendropanax–Hedyosmum	bosque mesófilo de montaña	selva mediana o baja perennifolia	selva baja o mediana siempre verde	montane rain forest
Liquidambar–Quercus–Pinus	bosque mesófilo de montaña	bosque caducifolio	bosque deciduo	pine-oak-liquidambar forest
Cupressus–Pinus	bosque de coniferas	bosque de escuamifolios	bosque de hojas aciculares o escamosas	montane rain forest in part pine forest in part
Ficus–Coccoloba–Dipholis–Sapium	bosque mesófilo de montaña	selva alta o mediana sub perennifolia	selva mediana siempre verde in part selva alta siempre verde in part	montane rain forest in part evergreen seasonal forest in part
Garcinia–Inga–Desmopsis	bosque tropical perennifolio	bosque tropical perennifolio	selva alta siempre verde	lower montane rain forest in part evergreen seasonal forest in part
Quercus salicifolia	bosque de Quercus	encinar	bosque de hojas planas y duras (encinar)	pine-oak forest

the same vegetation type of *bosque mesófilo de montaña* (mesophilous montane forest), whereas following the other systems more vegetation types are distinguished.

The use of the term *bosque mesófilo de montaña* in botanical studies in Mexico is currently very popular and it seems pertinent to present some of the information with respect to this vegetation type, especially in view of recent attempts to compare the floristic composition of different regions within Mexico and Central America (e.g. Luna-Vega *et al.*, 1989, Puig *et al.*, 1983 and Puig 1989). The total number of families, genera and species occurring in *bosque mesófilo de montaña* are shown in Table 3 and approximately 75% of the species listed for Polygon I are represented in this vegetation type. Of the 558 species from 126 families recorded in *bosque mesófilo de montaña*, over half come from just 20 families of which the four largest, Orchidaceae (61 spp.), Rubiaceae (32 spp.), Compositae (28 spp.) and Piperaceae (22 spp.), contain 25% (143) of the species's total (Fig. 4). Of the 331 genera, 18 account for over 25% of the species's total with Peperomia (14 spp.) and Tillandsia (13 spp.), being the two largest (Fig. 5). The numbers of species for the different life

TABLE 3
QUANTITATIVE BREAKDOWN BY FAMILY, GENERA AND SPECIES OF THE PLANT GROUPS RECORDED FROM *BOSQUE MESOFILO DE MONTAÑA* IN POLYGON I OF THE EL TRIUNFO BIOSPHERE RESERVE

Plant Group	Families	Genera	Species
Pteridophyta	16	26	49
Gymnospermae	3	3	3
Dicotyledoneae	96	246	379
Monocotyledoneae	11	56	127
TOTAL	126	331	558

forms that comprise *bosque mesófilo de montaña* are relatively even; epiphytes have the greatest total (120 spp.) and trees (greater than 10 m and below 10 m), shrubs and herbs are all well represented, but there are fewer vines and parasitic species (Fig. 6).

Past published botanical work from the Sierra Madre de Chiapas. Several botanists have worked and collected in the Sierra Madre de Chiapas, the most

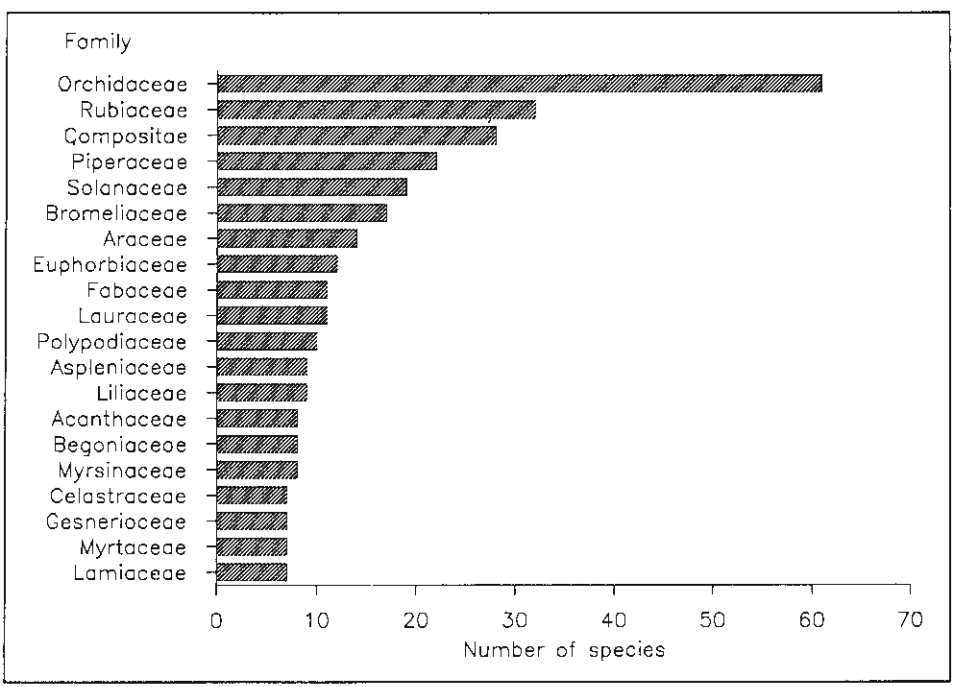


Fig. 4. Families with the largest number of species recorded from *bosque mesófilo de montaña* in Polygon I of the El Triunfo Biosphere Reserve.

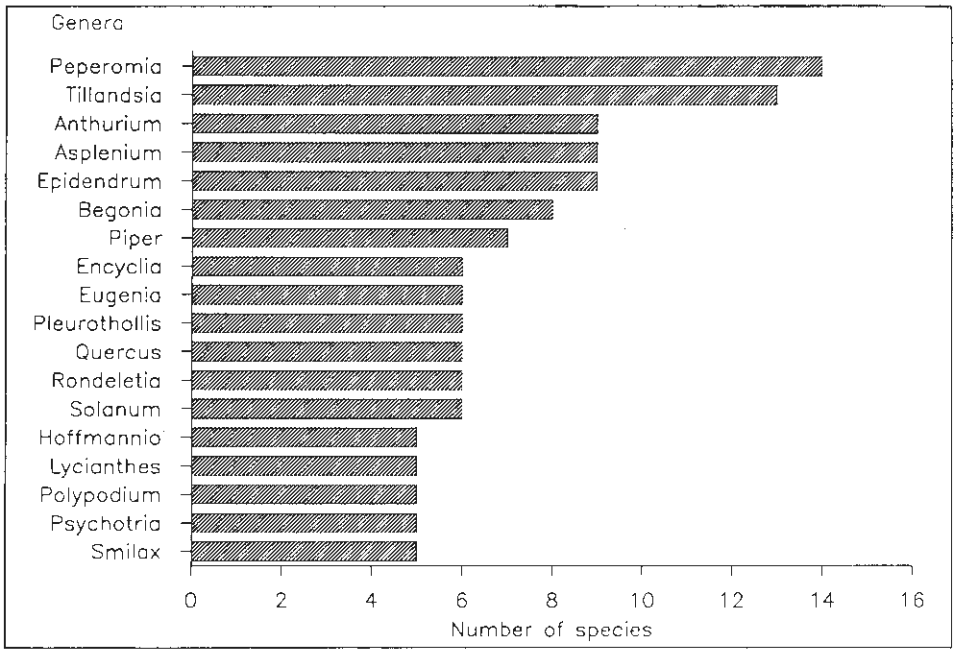


Fig. 5. Genera with the largest number of species recorded from *bosque mesófilo de montaña* in Polygon I of the El Triunfo Biosphere Reserve.

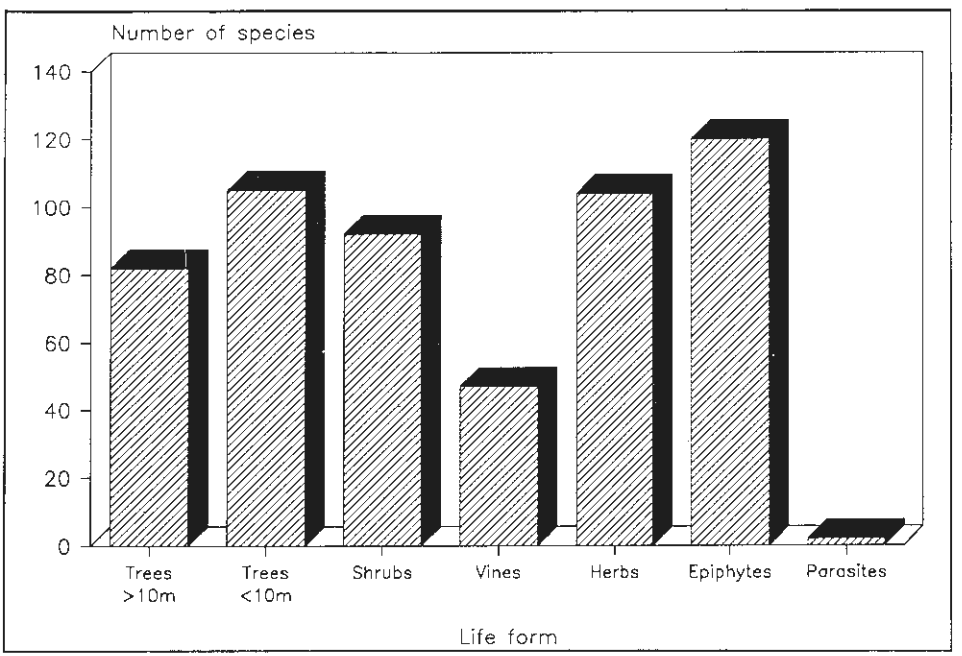


Fig. 6. The number of species comprising different life forms in *bosque mesófilo de montaña* in Polygon I of the El Triunfo Biosphere Reserve.

prominent being Eizi Matuda and Faustino Miranda. Matuda spent over twenty years collecting in the Soconusco and Mariscal regions of Chiapas, which encompass the southern half of the Sierra Madre mountain chain and Miranda visited and collected at numerous localities throughout Chiapas during his work on the vegetation of the state.

Matuda (1950a, b) recorded 2 628 species for the Soconusco and Mariscal regions and notably he collected heavily on the Pacific slope at Monte Ovando (located 37 km west of Cerro El Triunfo), where he registered 791 species of 476 genera and 122 families. A detailed comparison of these collections with those from the present study in Polygon I would be most informative, but a full revision of Matuda's collections would be necessary as there have been various taxonomic changes and, unfortunately, the exact localities of the collections are difficult to decipher and precise altitudes are often missing.

It is clear, however, that Polygon I and Monte Ovando share many common species. These include several that are poorly known in Mexico, or have not been recorded previously away from the latter site. Such species include *Decachaeta ovandensis, Heisteria acuminata, Desmopsis lanceolata, Forchhammeria matudae, Bunchosia matudae, Centardisia (Ardisia) ovadensis, Daphnopsis flavida, Plocanophyllon flavum* and *Rondeletia ovandensis,* and are all found in the *Ficus-Coccoloba-Dipholis-Sapium* community of the Pacific slope in Polygon I, highlighting the importance of this area in terms of species rarity. The *Ficus-Coccoloba-Dipholis-Sapium* community is interesting because it shares features of the mesophilous evergreen forest found at higher altitudes and of tropical evergreen forest of the lowlands, but is not an ecotone between the two as many of the plant species were found only in this community.

Miranda (1957) studied the Pacific slope and mountain peaks of the Sierra Madre and he recognised 10 principal vegetation types, for each describing the physiognomy and the characteristic tree and shrub species. Of the vegetation types listed by Miranda, only *selva mediana siempre verde* shares significant numbers of species and genera with the inventory compiled for Polygon I; a total of 13 of the 28 species mentioned and 24 of the 26 genera were found in our study area. Interestingly, Miranda stresses that this vegetation formation is characteristic of the upper slopes and peaks of the mountains and is typified by the 'almost total absence of species from the genus *Ficus,* which are well represented in other forest types'. However, on the mountain slopes between 1 300 m and 1 600 m on the Pacific slope, species listed by Miranda for *selva alta siempre verde* occur commonly together with *Ficus cookii* in the *Ficus-Coccoloba-Dipholis-Sapium* community.

CONCLUSION

The current species list for Polygon I is preliminary, although it undoubtedly represents a high proportion of the species occurring there. Species from the more inaccessible groups such as epiphytes, together with rarer species found in low densities in the forest remain under-collected and will be discovered only through regular seasonal collecting or thorough quantitative sampling of discrete areas.

Quantitative studies need to be carried out, not only to identify these yet unrecorded species but also to add to the information on the floristic composition and structure of the plant communities identified (but see Williams L. [1991] for preliminary results on studies of the *Quercus-Matudaea-Hedyosmum-Dendropanax* community). Although the communities presented here are perhaps over-simplified, hiding the true complexity of the species's assemblages that exist, they do provide a strong framework on which future more detailed studies can be based.

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APPENDIX 1
PRELIMINARY FLORISTIC INVENTORY FOR POLYGON I OF THE EL TRIUNFO BIOSPHERE RESERVE

1 *Gaultheria—Ugni—Vaccinium.*
2 *Quercus—Matudaea—Dendropanax—Hedyosmum.*
3 *Liquidambar—Quercus—Pinus.*
4 *Cupressus—Pinus.*
5 *Ficus—Coccoloba—Dipholis—Sapium.*
6 *Garcinia—Inga—Desmopsis.*
7 *Quercus salicifolia*
8 Clearings.

● Present in plant community

PTERIDOPHYTA

	1	2	3	4	5	6	7	8
Adiantaceae								
Adiantopsis radiata (L.) Fée	·	·	·	·	·	●	·	·
Adiantum concinnum Willd.	·	●	·	·	·	·	·	·
A. fructuosum Spreng.	·	·	●	·	·	·	·	·
A. princeps Moore	·	·	·	·	●	·	·	·
Pityrogramma tartarea (Cav.) Maxon var. *tartarea*	·	●	·	·	·	·	·	·
Pteris orizabae M. et G.	·	·	·	·	●	·	·	·
P. quadriaurita Retz	·	●	·	·	·	·	·	·
Aspleniaceae								
Asplenium auriculatum Sw.	·	●	·	·	·	·	·	·
A. fragrans Sw.	·	·	·	·	●	·	·	·
A. monanthes L.	·	●	·	·	·	·	·	·
Asplenium sp. 1	·	·	·	·	●	·	·	·
Asplenium sp. 2	·	●	·	·	·	·	·	·
Asplenium sp. 3	·	·	·	·	●	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Asplenium sp. 4	·	●	·	·	·	·	·	·
Asplenium sp. 5	·	●	·	·	·	·	·	·
Asplenium sp. 6	·	●	·	·	·	·	·	·
Athyriaceae								
Diplazium franconis Liebm.	·	●	·	·	·	·	·	·
Cyatheaceae								
Alsophila salvinii Hook.	·	●	·	·	·	·	·	·
Cyathea fulva (M. et G.) Fée	·	●	·	·	·	·	·	·
C. valdecrenata Domin	·	●	·	·	·	·	·	·
Dryopteridaceae								
Arachniodes denticulata (Sw.) Ching	·	●	·	·	·	·	·	·
Ctenitis subincisa (Willd.) Ching	·	●	·	·	·	·	·	·
Tectaria aff. *mexicana* (Fée) Morton	·	·	·	·	·	●	·	·
Gleicheniaceae								
Sticherus bifidus (Willd.) Ching	·	·	·	●	·	·	·	·
Grammitidaceae								
Cochlidium rostratum (Hook.) Maxon ex C. Chr.	●	·	·	·	·	·	·	·
Eriosorus hirtus (H.B.K.) Copel. var. *hirtus*	·	●	·	·	·	·	·	·
Grammitis sp.	·	●	·	·	·	·	·	·
Hymenophyllaceae								
Hymenophyllum sp.	●	·	·	·	·	·	·	·
Trichomanes capillaceum L.	·	●	·	·	·	·	·	·
T. radicans Sw.	·	●	·	·	·	·	·	·
Lindsaeaceae								
Odontosoria schlechtendalii (Presl) C. Chr.	·	·	·	·	●	·	·	·
Lomariopsidaceae								
Elaphoglossum peltatum (Sw.) Urban	●	·	·	·	·	·	·	·
Elaphoglossum sp. 1	●	·	·	·	·	·	·	·
Elaphoglossum sp. 2	·	·	·	·	·	●	·	·
Lycopodiaceae								
Lycopodium thyoides H. et B. ex Willd.	·	●	·	·	·	·	·	·
L. clavatum L.	·	●	·	·	·	·	·	·
Marattiaceae								
Marattia excavata Underw.	·	●	·	·	·	·	·	·
Ophioglossaceae								
Botrychium virginianum (L.) Sw.	·	●	·	·	·	·	·	·
Ophioglossum crotalophoroides Walter	·	●	·	·	·	·	·	·
Polypodiaceae								
Blechnum occidentale L.	·	●	·	·	·	●	·	·
Campyloneurum amphostenon (Kuntze ex Klotzsch) Fée	·	·	·	·	·	·	·	●
C. angustifolium (Sw.) Fée	·	·	·	·	·	·	●	·
C. tenuipes Maxon	·	●	·	·	●	·	·	·
C. xalapense Fée	·	●	·	·	·	·	·	·
Pleopeltis angusta H. et B. ex Willd.	·	●	·	●	●	·	·	●
P. astrolepis (Liebm.) Fourn.	·	·	·	·	·	●	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
P. macrocarpa var. *trichophora* (Weatherby) Pic. Ser.	●	●	·	·	·	·	·	·
Polypodium aureum (L.) J. Smith	·	●	·	·	·	·	·	·
P. furfuraceum S. et C.	·	·	·	·	●	·	·	·
P. lindenianum Kunze	·	●	·	·	·	·	·	·
P. loriceum L.	●	●	·	·	·	·	·	·
P. plesiosorum Kunze	·	●	·	·	·	·	·	·
P. polypodioides var. *aciculare* Weatherby	·	·	·	·	·	●	·	·
Schizaeaceae								
Anemia phyllitidis (L.) Sw.	·	·	●	·	●	·	·	·
A. oblongifolia (Cav.) Sw.	·	·	·	·	·	●	·	·
Selaginellaceae								
Selaginella sp.	·	●	·	·	·	·	·	·
Thelypteridaceae								
Thelypteris imbricata (Liebm.) Reed	·	·	·	·	●	·	·	·
T. oligocarpa (Willd.) Ching	●	·	·	·	·	·	·	·
T. pilosula (Mett) Tryon	·	●	·	·	·	·	·	·
Vittariaceae								
Antrophyum ensiforme Fée	●	●	·	·	·	·	·	·
A. lineatum (Sw.) Kaulf.	·	●	·	·	·	·	·	·
Vittaria graminifolia Kaulf.	·	●	·	·	·	·	·	·
GYMNOSPERMAE								
Cupressaceae								
Cupressus benthamii S. Endlicher var. *lindleyi* Klotsch	·	·	·	●	·	·	·	·
Pinaceae								
Pinus oocarpa var. *ochoterenae* Martínez	·	·	●	●	·	·	·	·
Podocarpaceae								
Podocarpus matudae Lundell	·	●	·	·	●	·	·	·
Zamiaceae								
Ceratozamia matudae Lundell	·	·	●	·	·	·	·	·
ANGIOSPERMAE								
DICOTYLEDONEAE								
Acanthaceae								
Aphelandra schiedeana C. et S.	·	●	·	·	●	·	·	·
Barleria micans Nees	·	·	·	·	·	●	·	·
Hansteinia glabra (Leonard) D. Gibson	·	●	·	·	·	·	·	·
Justicia aurea Schlecht.	·	●	·	·	·	·	·	·
J. inaequalis Benth.	·	·	·	·	●	●	·	·
Odontonema glabrum Brandegee	·	·	·	·	●	·	·	·
Pseuderanthemum praecox (Benth.) Leonard	·	●	·	·	·	·	·	·
Ruellia matagalpae Lindau	·	·	·	·	●	·	·	·
Spathacanthus parviflorus Leonard	·	●	·	·	·	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Actinidiaceae								
Saurauia kegeliana Schlecht.	·	·	●	·	●	·	·	·
S. madrensis B.T. Keller et Breedlove	·	·	·	·	●	·	·	●
S. matudae Lundell	·	·	·	●	·	·	·	●
S. oreophila Hemsley	·	●	·	·	·	·	·	●
Amaranthaceae								
Iresine celosia L.	·	·	·	·	●	·	·	●
Pleuropetalum sprucei (Hook. f.) Standley	·	·	·	·	●	·	·	·
Anacardiaceae								
Tapirira mexicana Marchand	·	·	●	·	·	·	·	·
Annonaceae								
Desmopsis lanceolata Lundell	·	·	·	·	●	●	·	·
Rollinia jimenezii Standley	·	·	·	·	●	●	·	·
Apiaceae								
Hydrocotyle mexicana C. et S.	·	●	·	·	●	·	·	·
Apocynaceae								
Mandevilla subsagittata (R. et P.) Woodson	·	·	·	·	·	·	●	·
M. aff. *rosana* (J.D. Smith) Woodson	·	·	·	●	●	·	·	·
Prestonia grandiflora L.O. Williams	·	·	●	·	●	·	·	·
Stemmadenia galeottiana (A. Rich.) Miers	·	·	·	·	●	·	·	·
Thenardia galeottiana Baillon	·	·	●	·	·	●	·	·
Tonduzia longifolia (A. DC.) Woodson	·	·	·	·	●	·	·	·
Vinca major L.	·	·	·	·	·	·	·	●
Aquifoliaceae								
Ilex belizensis Lundell	·	●	·	·	·	·	·	·
I. liebmannii Standley	·	·	·	●	·	·	·	·
I. quercetorum I.M. Johnston	·	·	·	·	●	·	·	·
Ilex sp.	·	·	·	·	·	·	●	·
Araliaceae								
Dendropanax pallidus M. et J. Cannon	·	·	●	·	●	·	·	·
D. populifolius A.C Smith	·	●	·	·	·	·	·	·
Oreopanax echinops (S. et C.) Decne. et Planchon	·	·	●	·	·	·	·	·
O. peltatus Linden ex Regel	·	·	·	●	●	·	·	·
O. sanderianus Hemsley	·	●	●	·	●	·	·	·
O. xalapensis (H.B.K.) Decne. et Planchon	·	·	●	·	●	·	·	·
Aristolochiaceae								
Aristolochia sp.	·	·	·	·	●	·	·	·
Asclepiadaceae								
Gonolobus chiapensis (Brandegee) Woodson	·	·	·	·	●	·	·	·
G. aff. *macranthus* Kunthe	·	·	●	·	·	·	·	·
Marsdenia bourgeana (Baillon) Rothe	·	·	·	·	●	·	·	·
Matelea inops Woodson	·	·	·	·	●	·	·	·
M. aff. *velutina* (Schlecht.) Woodson	●	·	·	●	·	·	·	·
Metastelma angustifolia Turey	·	●	·	·	●	·	·	·
M. schlechtendalii Decne.	·	·	·	·	·	●	·	·
Balanophoraceae								
Helosis cayenensis (Sw.) Spreng. var. *mexicana* (Liebm.) B. Hansen	·	·	●	·	·	·	●	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Begoniaceae								
Begonia bettinae Ziesenh.	·	●	·	·	·	·	·	·
B. calderonii Standley	·	·	·	·	●	·	·	·
B. fusca Liebm.	·	●	●	·	·	·	·	·
B. oaxacana A. DC.	·	●	·	·	·	·	·	·
B. peltata Link et Otto	·	●	·	·	·	·	·	·
B. philodendroides Ziesenh.	·	·	·	·	●	·	·	·
B. aff. *sartorii* Liebm.	·	·	●	·	·	·	·	·
B. aff.*strigillosa* A. Dietr.	·	·	·	·	●	·	·	·
Betulaceae								
Carpinus caroliniana Walt.	·	·	·	●	·	·	·	·
Bignoniaceae								
Amphitecna montana L.O. Williams	·	●	·	·	·	·	·	·
Boraginaceae								
Tournefortia acutiflora M. et G.	·	·	·	·	·	·	·	●
T. glabra L.	·	·	·	·	●	·	·	·
Brunelliaceae								
Brunellia mexicana Standley	·	●	·	·	·	·	·	●
Burseraceae								
Bursera simaruba (L.) Sarg.	·	·	·	·	●	·	●	·
Cactaceae								
Epiphyllum thomasianum (Schuman) Britton et Rose var. *thomasianum*	·	·	·	·	●	·	·	·
Nopalxochia ackermannii f. *candida* Alexander	·	●	·	·	·	·	·	·
N. ackermannii var. *conzattianum* (MacDougall) Kimnach	·	●	·	·	·	·	·	·
Campanulaceae								
Diastatea micrantha (H.B.K.) McVaugh	·	·	·	·	·	·	·	●
Lobelia laxiflora H.B.K.	·	●	●	●	·	·	·	●
L. plebeja F. Wimmer	·	●	·	·	·	·	·	·
Capparaceae								
Cleome magnifica Briq.	·	●	·	·	·	·	·	·
Forchhammeria matudae Lundell	·	·	·	·	●	·	·	·
Caprifoliaceae								
Sambucus mexicana Presl	·	·	·	·	·	·	·	●
Viburnum acutifolium spp. *blandum* Morton	●	·	·	·	·	·	·	·
V. hartwegii Benth.	·	·	·	·	●	●	·	·
Caricaceae								
Carica cauliflora Jacq.	·	·	·	·	·	●	·	·
Caryophyllaceae								
Arenaria guatemalensis Standley et Steyerm.	·	·	·	●	·	·	·	·
Stellaria ovata Willd. ex Schlecht.	·	·	·	·	·	·	·	●
Celastraceae								
Celastrus vulcanicola J.D. Smith	·	●	·	·	●	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Maytenus sp.	·	·	·	·	●	●	·	·
Perrottetia longistylis Rose	·	●	·	·	·	·	·	·
Rhacoma aff. *riparia* Lundell	·	·	·	·	●	●	·	·
R. standleyi (Lundell) Standley et Steyerm.	·	·	·	●	·	●	·	·
Wimmeria montana Lundell	·	●	·	·	·	·	·	·
Zinowiewia matudae Lundell	·	·	·	·	●	·	·	·
Chenopodiaceae								
Chenopodium ambrosioides L. var. *ambrosioides*	·	·	·	·	·	·	·	●
Chloranthaceae								
Hedyosmum mexicanum Cordemoy	·	●	·	·	·	·	·	·
Chrysobalanaceae								
Hirtella racemosa var. *hexandra* (Willdenow ex Roemer et Schultes) Prance	·	·	·	·	●	●	·	·
Clethraceae								
Clethra hartwegii Britton	·	·	·	·	●	·	·	·
C. matudae Lundell	·	●	·	·	·	·	·	●
Clethra obliquinervia Standley	·	·	·	·	●	·	·	·
C. suaveolens Turcz.	·	·	·	●	·	·	·	·
Clusiaceae								
Clusia guatemalensis Hemsley	·	·	·	●	●	·	·	·
C. salvinii J.D. Smith	·	·	·	·	●	·	·	·
Garcinia intermedia (Pittier) Hammel	·	·	·	·	·	●	·	·
Compositae								
Ageratum microcephalum Hemsl.	·	·	·	·	●	·	·	·
A. conspicua (Kunth et Bouché) King et Rob.	·	·	·	·	·	·	·	●
Alloispermum integrifolium (D.C.) H. Rob	·	·	·	·	·	·	·	●
Archibaccharis androgyna (Brandegee) Blake	·	·	·	·	·	·	·	●
Baccharis vaccinoides H.B.K.	·	·	·	·	·	·	·	●
Bartlettina pinabetensis (B. Rob.) King et H. Rob.	·	●	·	·	·	·	·	·
Bidens odorata Cav. var. *odorata*	·	·	·	·	·	·	·	●
B. squarrosa var. *atrostriata* Roseman	·	·	·	●	·	·	·	·
Chromolaena collina (DC.) King et H. Rob.	·	·	·	●	·	·	·	·
Conyza bonariensis (L.) Cronq. var. *leiotheca* (Blake) Cuatr.	·	·	·	·	·	·	·	●
C. coronopifolia Kunth	·	·	·	·	·	·	·	●
Critonia daleoides DC.	·	·	·	·	·	●	·	·
C. morifolia (Mill.) King et H. Rob.	·	·	·	·	·	●	·	·
Dahlia excelsa Benth.	·	·	·	·	·	·	·	●
Decachaeta ovandensis (Grashoff et Beaman) King et H. Rob.	·	·	·	·	●	·	·	·
Desmanthodium perfoliatum Benth.	·	·	·	·	●	·	·	·
Dyssodia papposa A. Hitchc.	·	·	·	·	·	·	·	●
Elaphantopus mollis H.B.K.	·	·	●	·	●	·	·	·
Eupatoriastrum angulifolium (B. Rob.) King et H. Rob.	·	·	·	·	●	·	·	·
Eupatorium (Bartlettina) tenejapanum B.L. Turner	·	●	·	·	·	·	·	·
E. heathiae B.L. Turner	·	·	·	·	·	●	·	·
Fleischmanniopsis leucocephala (Benth.) King et H. Rob.	·	·	·	·	●	·	·	●

Appendix 1, continued

	1	2	3	4	5	6	7	8
Galinsoga parviflora Cav.	·	·	·	·	·	·	·	●
Gamochaeta americanum (Miller) Cabrera	·	·	·	·	·	·	·	●
Gnaphalium elegans Kunth	·	●	·	·	·	·	·	·
G. roseum Kunth	·	·	·	●	·	·	·	·
G. silvicola (McVaugh) Nesom	·	·	·	●	·	·	·	·
G. viscosum Kunth	·	·	·	·	·	·	·	●
Jaegeria hirta Less.	·	·	·	·	·	·	·	●
Koanophyllon coulteri (B. Rob.) King et H. Rob.	·	·	·	·	●	·	·	·
K. pittieri (Klatt) King et H. Rob.	·	·	·	·	●	·	·	·
Liabum bourgeaui Hieron.	·	·	·	·	●	·	·	·
Neomirandea aralifolia (Less.) King et H. Rob.	·	●	·	·	·	·	·	·
Onoseris onoseroides (Kunth) B. Rob.	·	·	·	·	●	●	·	·
Perymenium gracile Hemsl.	·	·	·	·	·	·	●	·
Podachaenium pachyphyllum (Schultz-Bip. ex Klatt) R. Jansen, Harriman et Urbatsch	●	●	·	·	·	·	·	·
Schistocarpha longiligula Rydb. var. *longiligula*	·	●	●	·	·	·	·	·
S. longiligula var. *seleri* (Rydb.) B.L. Turner	·	●	·	·	·	·	·	·
Senecio cobanensis J. Coulter	·	·	·	●	·	·	●	·
S. grandifolius Less.	·	·	·	·	●	·	·	·
S. greenmanii (Rob. et Brettell) L.O. Williams	·	●	·	·	·	·	·	·
S. oaxacanus Hemsl.	·	●	·	·	·	·	·	●
S. uspantanensis (Coult.) Greenm.	·	●	·	·	·	·	·	·
Sigesbeckia agrestis Poepp. et Endl.	·	·	·	·	●	·	·	●
S. jorullensis H.B.K.	·	·	·	·	·	·	·	●
Stevia chiapensis Grashoff	·	·	·	●	·	·	·	·
Synedrella nodiflora (L.) Gaertn.	·	·	·	·	●	·	·	·
Verbesina apleura Blake	·	·	·	●	●	·	·	·
V. turbacensis H.B.K.	·	·	·	·	●	·	·	·
Vernonia arborescens (L.) Sw.	·	·	·	·	●	·	·	·
V. patens Kunth	·	·	·	·	●	·	·	·
V. polypleura Blake	·	·	●	●	●	·	·	·
Viguiera cordata (Hook. et Arn.) D'Arcy	·	·	·	·	●	·	·	·
Zexmenia appressipila Blake	·	·	·	·	·	●	·	·
Zexmenia sp.	·	·	·	●	·	·	·	·
Convolvulaceae								
Ipomoea lindenii M. et G.	·	·	·	·	●	·	·	·
I. lutea Hemsley	·	·	·	·	●	·	·	·
I. tiliacea (Willd.) Choisy	·	·	·	·	●	·	·	·
Cruciferae								
Brassica juncea (L.) Coss.	·	·	·	·	·	·	·	●
Cardamine fulcrata Greene	·	●	·	·	·	·	·	·
Lepidium virginicum L. var. *centrali-americanum* (Thell.) C.L. Hitchc.	·	·	·	·	·	·	·	●
Rorippa nasturtium-aquaticum (L.) Hayek	·	·	·	·	·	·	·	●
Cucurbitaceae								
Cyclanthera langaei Cogn.	·	●	·	·	·	·	·	·
Melothria pendula L.	·	·	·	·	●	●	·	·
Rytidostylis ciliata (Cogn.) O. Kuntze	·	●	·	·	·	·	·	·
Sechium compositum (J.D. Smith) C. Jeffrey	·	●	●	·	·	·	·	·
Sicyos aff. *motozintlensis* Lott et Fryxell	·	●	·	·	·	·	·	·
Cunoniaceae								
Weinmannia pinnata L.	●	●	·	·	·	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Elaeocarpaceae								
Sloanea ampla I.M. Johnston	·	·	●	·	●	·	·	·
Ericaceae								
Bejaria aestuans Mutis ex L.f.	·	·	·	●	·	·	·	·
Cavendishia bracteata (Ruiz et Pavón ex Saint-Hilaire) Hoerold	·	●	·	·	·	·	·	●
Comarostaphylis arbutoides Lundell spp. *arbutoides*	·	·	·	·	·	·	·	●
Gaultheria acuminata S. et C.	●	·	·	●	·	·	·	·
Lyonia squamulosa M. et G.	·	·	·	●	·	·	·	·
Monotropa uniflora L.	·	●	●	·	·	·	·	·
Sphyrospermum majus Griseb.	●	·	·	·	·	·	·	·
Vaccinium confertum H.B.K.	·	·	·	●	·	·	·	·
V. leucanthum C. et S.	·	·	●	●	·	·	·	·
V. matudae Lundell	●	·	·	·	·	·	·	·
Erythroxylaceae								
Erythroxylon sp.	·	·	·	·	·	●	·	·
Euphorbiaceae								
Acalypha aff. *firmula* Muell. Arg.	·	·	·	·	●	·	·	·
A. macrostachya Jacq.	·	·	·	·	·	●	·	·
A. macrostachyoides Muell. Arg.	·	·	·	·	●	·	·	·
Alchornea latifolia Sw.	·	·	●	·	·	·	·	·
Bernardia interrupta (Schlecht.) Muell. Arg.	·	●	·	·	·	·	·	●
Cleidion oblongifolium (Standley) Croizat	·	·	●	·	·	·	·	·
Cnidoscolus sp.	·	·	·	·	●	·	·	·
Croton reflexifolius H.B.K.	·	·	·	·	●	●	·	·
C. xalapensis H.B.K.	·	·	●	·	●	·	·	·
Euphorbia scabrella Boiss.	·	·	●	·	·	·	·	·
Phyllanthus purpusii Brandegee	·	·	●	·	·	·	·	·
Sapium schippii Croizat	·	·	·	·	●	·	·	·
Tragia mexicana Muell. Arg.	·	·	·	·	●	·	·	·
Fabaceae								
Calliandra hirsuta (G. Don) Benth.	·	·	·	●	·	·	·	·
C. houstoniana (Miller) Kuntze	·	·	·	·	·	●	●	·
Canavalia dura Sauer	·	●	●	·	·	·	·	·
C. hirsuta (Mart. et Gal.) Standley	·	·	·	●	·	●	·	·
Clitoria mexicana Link	·	·	·	●	·	·	·	·
Cojoba donnell-smithii Britton et Rose	·	·	·	●	●	·	·	·
C. escuintlensis Lundell	·	·	·	·	●	·	·	·
C. haematoloba L. Rico ined.	·	·	·	·	·	●	·	·
C. matudae (Lundell) L. Rico	·	●	·	·	●	·	·	·
Crotalaria aff. *quercetorum* Brandegee	·	·	·	·	·	·	·	●
Desmodium cordistipulum Hemsley	·	·	·	●	·	·	·	·
D. helleri Peyr.	·	·	·	●	●	·	·	·
D. skinneri Benth. ex Hemsley	·	·	·	·	·	●	·	·
Desmodium sp.	·	·	·	·	●	·	·	·
Inga calderonii Standley	·	·	·	·	●	●	·	·
I. endlicheri (Kuntze) MacBride	·	·	·	·	●	·	·	·
Mimosa albida H. et B. ex Willd.	·	·	·	●	·	●	·	·
Platymiscium pinnatum (Jacq.) Dug.	·	·	·	·	●	·	·	·
Rhynchosia amabilis Grear	·	·	·	·	●	·	·	·
R. discolor M. et G.	·	·	·	·	·	·	·	●

Appendix 1, continued

	1	2	3	4	5	6	7	8
Swartzia simplex (Sw.) Spreng. var. *ochnacea* (A.P. D.C.) Cowan	·	·	·	·	·	●	·	·
Zapoteca portoricensis (Jacq.) H. Hern. spp. *portoricensis*	·	·	·	·	●	·	·	·
Zornia reticulata Sm.	·	·	·	·	·	·	·	●
Fagaceae								
Quercus acatenangensis Trel.	·	●	·	·	·	·	·	·
Q. aff. *benthamii* Liebm.	·	●	·	·	·	·	·	·
Q. lancifolia S. et C.	·	·	·	●	·	·	·	·
Q. oocarpa Liebm.	·	●	·	·	·	·	·	·
Q. salicifolia Née	·	·	·	·	·	·	●	·
Q. sapotifolia Liebm.	·	●	·	·	·	·	·	·
Q. segoviensis Liebm.	·	·	●	·	·	·	·	·
Q. skinneri Benth.	·	·	·	·	●	·	·	·
Quercus sp. (*crispifolia*?)	●	·	·	·	·	·	·	·
Flacourtiaceae								
Casearia corymbosa H.B.K.	·	·	·	·	●	●	·	·
C. tacanensis Lundell	·	·	·	·	●	·	·	·
Hasseltia guatemalensis Warb.	·	·	●	·	·	·	·	·
Lunania mexicana Brandegee	·	·	·	·	●	·	·	·
Xylosma flexuosum (H.B.K.) Hemsley	·	·	·	·	·	●	·	·
X. quichense J.D. Smith	·	●	·	●	●	·	·	·
Gentianaceae								
Lisianthius sp.1	·	·	·	·	●	·	·	·
Lisianthius sp. 2	·	·	·	·	·	●	·	·
Geraniaceae								
Geranium mexicanum H.B.K.	·	·	·	·	·	·	·	●
Gesneriaceae								
Achimenes candida Lindley	·	·	·	·	●	●	·	·
A. cettoana H. E. Moore	·	·	·	·	●	·	·	·
A. longiflora A. DC.	·	·	·	·	·	●	·	·
A. pedunculata Benth.	·	·	·	·	●	·	·	·
Moussonia deppeana (S. et C.) Hanst.	·	●	●	·	·	·	·	·
M. fructicosa (Brandegee) Wiehler	·	·	·	●	·	·	·	·
M. rupicola (Standley et L.O. Williams.) Wiehler	·	·	·	·	●	·	·	·
Niphea saxicola (Brandegee) Gibson	·	·	·	·	●	·	·	·
Pentadenia matudae Wiehler	·	●	·	·	●	·	·	·
Solenophora toucana Denham et Gibson	·	●	·	·	·	·	·	·
Hamamelidaceae								
Liquidambar styraciflua L.	·	·	●	·	●	·	·	·
Matudaea trinervia Lundell	·	●	·	·	·	·	·	·
Hippocastanaceae								
Billia columbiana Planchon et Linden	·	·	·	·	●	·	·	·
Hydrophyllaceae								
Wigandia urens var. *caracasana* (H.B.K.) Gibson	·	·	·	·	·	·	·	●
Juglandaceae								
Alfaroa aff. *mexicana* Stone	·	·	·	·	●	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Lamiaceae								
Hyptis mutabilis (L. Rich.) Briq.	·	·	·	·	·	·	·	●
H. urticoides H.B.K.	·	·	·	·	●	·	·	·
Salvia infuscata Epling	·	·	·	●	·	·	·	·
S. karwinskii Benth.	·	·	·	●	·	·	·	·
S. longispicata M. et G.	·	●	·	·	·	·	·	●
S. membranacea Benth.	·	●	·	·	·	·	·	●
S. misella H.B.K.	·	·	·	·	●	·	·	·
S. mocinoi Benth.	·	·	·	●	●	·	·	·
Scutellaria oriazabensis Epling	·	·	●	●	·	·	·	·
Stachys lindenii Benth.	·	·	●	·	·	·	·	●
Lauraceae								
Lauraceae sp. 1	·	·	·	·	●	·	·	·
Nectandra coriacea (Sw.) Griseb.	·	·	·	·	●	·	·	·
N. reticulata (R. et P.) Mez	·	●	·	●	●	·	·	·
N. sinuata Mez	·	·	·	·	●	·	·	·
Ocotea chiapensis (Lundell) Standley et Steyerm.	·	●	·	·	·	·	·	·
Persea americana L.	·	·	·	·	●	·	·	·
P. liebmannii Mez	·	●	·	●	●	·	·	·
Persea sp. 1	●	·	·	·	·	·	·	·
Phoebe chiapensis Lundell	·	·	·	·	●	·	·	·
P. mexicana Meissn.	·	·	·	·	●	·	·	·
P. siltepecana Lundell	·	●	●	·	·	·	·	·
P. trinervis Lundell	·	·	·	·	·	●	·	·
P. aff. *trinervis* Lundell	·	·	·	·	●	·	·	·
Loganiaceae								
Buddleia americana L.	·	·	·	●	●	·	·	·
Spigelia palmeri Rose	·	·	●	·	●	·	·	·
Loranthaceae								
Cladocolea oligantha (Standley et Steyerm.) Kuijt	·	·	·	·	·	●	·	·
Phoradendron brachystachyum Nutt.	·	·	·	·	·	●	·	·
P. falcatum (C. et S.) Trel.	·	·	·	·	●	·	·	·
P. nervosum Oliver	·	●	·	·	●	·	·	·
P. piperoides (H.B.K.) Trel.	·	·	·	·	●	·	·	·
Psittacanthus sp.	·	·	·	·	·	●	·	·
Struthanthus deppeanus Blume	·	·	·	·	●	·	·	·
Struthanthus sp.	·	·	·	·	●	·	·	·
Lythraceae								
Cuphea appendiculata var. *appendiculata* Koehne	·	·	·	●	●	·	·	·
C. ignea A. DC.	·	·	●	·	●	·	·	·
Malpighiaceae								
Banisteriopsis argentea (H.B.K.) C. Robinson	·	●	·	·	·	·	·	·
Bunchosia gracilis Niedenzu	·	·	·	·	●	·	·	·
B. lanceolata Turcz.	·	·	·	·	●	●	·	·
B. matudae Lundell	·	·	·	·	●	·	·	·
Byrsonima crassifolia (L.) H.B.K.	·	·	·	·	·	●	·	·
Malpighia glabra L.	·	·	·	·	●	●	·	·
Malvaceae								
Abutilon purpusii Standley	·	·	●	·	·	·	·	·
Hibiscus uncinellus DC.	·	·	·	·	·	·	·	●

Appendix 1, continued

	1	2	3	4	5	6	7	8
Malvaviscus lanceolatus Rose	·	·	·	·	●	·	·	·
Malvaviscus sp.	·	●	·	·	·	·	·	●
Robinsonella speciosa Fryxell	·	·	·	·	●	·	·	·
Sida acuta Burm. f.	·	·	·	·	·	·	·	●
S. rhombifolia L.	·	·	·	·	·	·	·	●
Melastomataceae								
Clidemia sp.	·	·	·	·	·	●	·	·
Conostegia volcanalis Standley et Steyerm.	·	●	·	·	·	·	·	·
Leandra subseriata (Naud.) Cogn.	·	●	●	·	·	·	·	·
Miconia argentea (Sw.) DC.	·	·	·	·	·	●	·	·
M. desmantha Cogn.	·	·	●	·	·	·	·	·
M. glaberrima (Schlecht.) Naud.	●	●	●	●	●	·	·	●
M. globulifera Naud.	·	●	·	·	·	·	·	·
M. ibaguensis (Bonpl.) Triana	·	·	·	·	·	●	·	·
M. mexicana (Bonpl.) Naud.	·	·	·	●	●	·	·	·
Miconia sp.	·	·	·	·	·	·	·	●
Tibouchina longifolia (Vahl) Baillon ex Cogn.	·	·	·	●	●	·	·	●
Meliaceae								
Cedrella sp.	·	●	·	·	·	·	·	·
Guarea glabra Vahl	·	●	·	·	●	·	·	·
Trichilia havanensis Jacq.	·	●	·	·	●	·	·	·
Menispermaceae								
Hyperbaena aff. *mexicana* Miers	·	·	·	·	●	·	·	·
Monimiaceae								
Mollinedia pallida Lundell	·	·	·	·	●	·	·	·
Siparuna andina (Tul.) A. DC.	·	·	●	·	·	·	·	·
Moraceae								
Brosimum sp.	·	·	·	·	·	●	·	·
Cecropia sp.	·	·	·	·	·	●	·	·
Cousssapoa purpusii Standley	·	·	·	·	●	·	·	·
Ficus cookii Standley	·	·	●	·	●	●	·	·
F. japonensis Desv.	·	·	·	·	·	●	·	·
F. padifolia H.B.K.	·	·	·	·	·	●	·	·
Morus sp.	·	●	·	·	·	·	·	·
Pseudolmedia simiarum Standley et Steyerm.	·	·	●	·	·	·	·	·
Trophis chiapensis Brandegee	·	·	·	·	●	·	·	·
T. cuspidata Lundell	·	●	·	·	·	·	·	·
T. mexicana (Liebm.) Bureau	·	·	●	●	·	·	·	·
Myricaceae								
Myrica cerifera L.	·	·	·	●	·	·	·	·
Myrsinaceae								
Ardisia compressa H.B.K.	·	·	·	·	·	●	·	·
A. neomirandae Lundell	·	●	·	·	·	·	·	·
A. siltepecana Lundell	·	·	●	·	●	·	·	·
Ardisia sp. 1	·	●	·	●	●	·	·	·
Ardisia sp. 2	·	·	·	●	·	·	·	·
Centardisia ovandensis (Lundell) Lundell	·	·	·	·	●	·	·	·
Gentlea tacanensis (Lundell) Lundell	·	●	·	·	·	·	·	·
Myrsine juergensenii (Mez) Lundell	·	●	●	·	●	·	·	·
Parathesis chiapensis Fern.	·	·	●	·	·	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
P. nigropunctata Lundell	·	●	·	·	·	·	·	·
Rapanea myricoides (Schlecht.) Lundell	·	●	●	·	·	·	·	·
Synardisia venosa (Mast.) Lundell	·	●	·	·	·	·	·	·
Myrtaceae								
Calyptranthes pallens var. *mexicana* (Lundell) McVaugh	·	·	·	·	●	·	·	·
Eugenia biflora (L.) DC.	·	·	·	·	·	●	·	·
E. capulioides Lundell	·	·	·	●	●	·	·	·
E. chiapensis Lundell	·	●	·	·	·	·	·	·
E. citroides Lundell	·	●	·	·	·	·	·	·
E. aff. *mexicana* Steud.	·	·	●	·	·	·	·	·
E. aff. *nigrita* Lundell	·	·	?	·	●	·	·	·
Eugenia sp.	·	·	●	·	·	·	·	·
Ugni myricoides (H.B.K.) Berg	●	·	·	·	·	·	·	·
Olacaceae								
Heisteria acuminata Benth. et Hook. f.	·	·	·	·	●	·	·	·
Oleaceae								
Osmanthus americanus (L.) Benth. et Hook.	·	·	●	●	●	·	·	·
Onagraceae								
Fuchsia microphylla H.B.K. spp. *aprica* (Lundell) Breedlove	●	●	·	·	·	·	·	·
F. paniculata Lindley	·	●	·	·	●	·	·	·
Hauya elegans H.B.K. ssp. *barcenae* (Hemsley) Breedlove et Raven	·	·	·	·	●	●	·	·
Lopezia racemosa Jacq.	·	·	·	●	·	·	·	·
Ludwigia peruviana (L.) Hara	·	·	·	·	·	·	·	●
Orobanchaceae								
Conopholis alpina var. *alpina* Liebm.	·	●	·	·	·	·	·	·
Oxalidaceae								
Biophytum dendroides (H.B.K.) DC.	·	·	·	·	●	·	·	·
Oxalis corniculata L.	·	·	·	·	·	·	·	●
O. dimidiata J.D. Smith	·	·	·	●	·	·	·	·
O. rhombifolia Jacq.	·	●	●	●	·	·	·	·
Papaveraceae								
Bocconia arborea S. Watson	·	●	·	·	·	·	·	●
Passifloraceae								
Passiflora filipes Benth.	·	●	·	·	·	·	·	·
P. membranacea Benth.	·	·	·	·	●	·	·	·
P. ornithoura var. *chiapensis* MacDougal	·	●	·	·	·	·	·	●
P. sexflora Juss.	·	·	·	●	●	·	·	·
Phytolaccaceae								
Phytolacca icosandra L.	·	●	·	·	·	·	·	●
P. rivinoides Kunth et Bouche	·	●	·	·	·	·	·	●
Piperaceae								
Peperomia asarifolia S.et C.	·	·	·	·	●	·	·	·
P. collacata Trel.	·	●	·	·	●	·	·	·
P. floribunda (Miq.) Dahlstedt	·	·	·	·	●	·	·	·
P. galioides H.B.K.	·	●	·	·	·	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
P. hoffmannii C. DC.	·	·	·	·	●	·	·	·
P. limana Trel.	·	●	·	·	·	·	·	·
P. obtusifolia (L.) A. Dietr.	·	●	·	·	●	·	·	·
P. peltata C. DC.	·	·	·	·	●	·	·	·
P. quadrifolia (L.) H.B.K.	·	●	·	·	·	·	·	·
P. tetraphylla (G. Forst.) H. et A.	·	●	·	·	·	·	·	·
Peperomia sp. 1	·	●	·	·	·	·	·	·
Peperomia sp. 2	·	●	·	·	·	·	·	·
Peperomia sp. 3	·	●	·	·	·	·	·	·
Peperomia sp. 4	·	●	·	·	·	·	·	·
Piper auritum H.B.K.	·	·	·	·	●	●	·	·
P. glabrescens (Miq.) C. DC.	·	·	·	·	●	·	·	·
P. aff. *hispidum* Sw.	·	●	·	·	·	·	·	·
P. praeteruentifolia Trel.	·	·	·	·	·	●	·	·
P. pseudo-lindenii C. DC.	·	·	●	·	●	·	·	·
P. pseudoasperifolium C. DC.	·	●	·	·	·	·	·	·
P. sancti-felicis Trel.	·	·	·	·	●	·	·	·
P. uspantanense C. DC.	·	·	·	·	·	●	·	·
P. aff. *yzabalanum* J.D. Smith	·	●	·	·	·	·	·	·
Pothomorphe umbellata (L.) Miq.	·	●	·	·	●	·	·	·
Plantaginaceae								
Plantago australis ssp. *hirtella* (H.B.K.) Rahn	·	·	·	·	·	·	·	●
P. major L.	·	·	·	·	●	·	·	·
Platanaceae								
Platanus mexicana Moricand var. *mexicana*	·	●	●	·	·	·	·	·
Polemoniaceae								
Cobaea pachysepala Standley	·	●	·	·	·	·	·	·
Polygalaceae								
Monnina sylvatica S. et C.	·	●	·	·	·	·	·	●
Polygala aparinoides H. et A.	·	·	·	●	·	·	·	·
Polygonaceae								
Coccoloba matudae Lundell	·	·	·	·	●	·	·	·
Coccoloba sp. 1	·	·	·	·	●	·	·	·
Coccoloba sp. 2	·	·	●	·	·	·	·	·
Rumex obtusifolius L. ssp. *obtusifolius*	·	·	·	·	·	·	·	●
Proteaceae								
Roupala montana Aublet	·	·	·	·	●	·	·	·
Rhamnaceae								
Gouania sp.	·	·	·	·	·	●	·	·
Rhamnus capraeifolia var. *grandifolia* M.C. et L.A. Johnston	●	●	·	·	·	·	·	●
R. mucronata Schlecht.	·	·	·	·	●	·	·	·
R. sharpii M.C. Johnston	·	·	●	·	●	·	·	·
Rosaceae								
Alchemilla pectinata H.B.K.	·	·	·	·	·	·	·	●
A. pringlei Fedde	·	·	·	·	·	·	·	●
Prunus tetradenia Koehne	·	·	●	·	·	·	·	·
Rubus glaucus Benth.	·	·	·	·	·	·	·	●

Appendix 1, continued

	1	2	3	4	5	6	7	8
R. urticifolius Poiret	·	·	·	·	·	·	·	●
Rubiaceae								
Balmea stormae Martínez	·	·	·	·	●	·	·	·
Borreria laevis (Lam.) Griseb.	·	·	·	·	·	·	·	●
Bouvardia dictyoneura Standley	·	·	·	●	●	·	·	·
Chiococca filipes Lundell	·	·	·	·	·	●	·	·
C. pachyphylla Wernham	·	·	·	·	●	·	·	·
Chione chiapensis Standley	·	·	·	·	·	●	·	·
Chomelia brachypoda J.D. Smith	·	·	·	·	●	●	·	·
C. protracta (Bartling) Standley	·	·	·	·	·	●	·	·
Crusea coccinea DC. var. *breviloba* Loes.	·	·	·	·	·	·	·	●
Deppea inaequalis Standley et Steyerm.	·	·	●	·	●	·	·	·
Deppea sp.	·	·	·	·	●	·	·	·
Faramea occidentalis (L.) A. Rich.	·	·	·	·	·	●	·	·
Galium sp.	·	●	·	·	·	·	·	●
Genipa americana L.	·	·	·	·	●	·	·	·
Glossostipula concinna (Standley) D. Lorence	·	●	●	·	●	·	·	·
Gonzalagunia chiapensis (Standley) Standley et Steyerm.	·	·	●	·	●	·	·	·
Hamelia barbata Standley	·	·	·	·	●	●	·	·
H. patens Jacq. var *patens*	·	·	·	·	·	●	·	·
Hintonia lumaeana (Baillon) Bullock	·	·	·	·	●	·	·	·
Hoffmannia angustifolia Standley	·	·	●	·	●	·	·	·
H. cryptoneura Standley	·	·	●	·	●	·	·	·
H. excelsa (H.B.K.) Schum.	·	·	·	·	·	●	·	·
H. lineolata J.D. Smith	·	●	·	·	·	·	·	·
H. macrosiphon Standley	·	●	●	·	·	·	·	·
H. quadrifolia Standley et Steyerm.	·	●	●	·	·	·	·	·
Omiltemia filisepala (Standley) Morton	·	●	·	·	·	·	·	·
Palicourea padifolia (Willd. ex R. et S.) Taylor et Lorence	·	●	●	·	●	·	·	·
Pinarophyllon flavum Brandegee	·	·	·	·	●	●	·	·
Plocaniophyllon flavum Brandegee	·	·	·	·	●	·	·	·
Psychotria costinervia Griseb.	·	·	●	·	·	·	·	·
P. mexiae Standley	·	·	·	·	●	·	·	·
P. patens	·	·	·	·	·	●	·	·
P. aff. *pubescens* Sw.	·	·	·	·	●	·	·	·
P. quinqueradiata Polak.	·	·	·	·	·	●	·	·
P. skutchii Standley	·	●	·	·	·	·	·	·
Psychotria sp.	·	·	·	·	●	·	·	·
Randia grandifolia (J.D. Smith) Standley	·	·	·	·	·	●	·	·
Richardia scabra L.	·	·	·	·	·	·	·	●
Rondeletia albida Lundell	·	●	●	●	●	·	·	·
R. amoena (Planchon) Hemsley	·	·	●	·	·	·	·	·
R. aprica Lundell	·	·	·	●	·	·	·	·
R. intermedia Hemsley	·	·	·	·	●	·	·	·
R. ovandensis Lundell	·	·	·	·	●	·	·	·
R. pyramidalis Lundell	·	●	·	·	·	·	·	·
R. strigosa (Benth.) Hemsley	·	·	·	●	·	·	·	·
Rondeletia sp.	·	·	·	●	●	·	·	·
Sommera arborescens Schlecht.	·	·	●	·	●	·	·	·
Rutaceae								
Peltostigma pteleoides (Hook.) Walp.	·	·	●	·	·	·	·	·
Zanthoxylum harmsianum (Loes.) P. Wilson	·	●	·	·	·	·	·	●
Z. melanostictum C. et S.	·	●	·	·	·	●	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Z. microcarpum Griseb.	·	·	·	·	·	●	·	·
Sabiaceae								
Meliosma matudae Lundell	·	·	·	·	●	·	·	·
Meliosma sp.	·	●	·	·	·	·	·	·
Sapindaceae								
Cupania aff. *macrophylla* A. Rich.	·	·	·	·	●	·	·	·
Dodonaea viscosa (L.) Jacq.	·	·	·	·	·	●	·	·
Exothea paniculata (Juss.) Radlk.	·	·	·	·	●	·	·	·
Serjania sp.	·	·	·	·	●	·	·	·
Sapotaceae								
Chrysophyllum mexicanum Brandegee ex Standley	·	·	·	·	·	●	·	·
Dipholis minutiflora Pittier	·	·	·	·	●	·	·	·
Sideroxylum capiri Pittier	·	·	·	·	●	●	·	·
Scrophulariaceae								
Castilleja arvensis C. et S.	·	·	·	·	·	·	·	●
Gibsoniothammus cornutus (J.D. Smith) A. Gentry	·	●	·	·	·	·	·	·
G. moldenkeanus (Standley) L.O. Williams	·	·	·	·	●	·	·	·
Hemichaena fruticosa Benth.	·	·	·	●	·	·	·	●
Leucocarpus perfoliatus (Kunth) Benth.	·	·	·	·	·	·	·	●
Russelia sarmentosa Jacq.	·	·	·	●	·	·	·	·
Sibthorpia repens (Mutis ex L.) O. Kuntze	·	●	·	·	·	·	·	·
Stemodia sp.	·	·	·	●	·	·	·	·
Simaroubaceae								
Picramnia antidesma var. *fessoniana* (DC.) Thomas	·	·	·	·	●	·	·	·
P. matudae Lundell	·	●	·	·	·	·	·	·
Picrasma sp.	·	·	·	·	●	·	·	·
Solanaceae								
Cestrum elegantissimum Morton	·	●	·	·	·	·	·	·
C. aff. *formosum*	·	●	·	·	·	·	·	·
C. luteovirescens Francey	·	·	·	·	●	·	·	·
Jaltomata procumbens (Cav.) J.L. Gentry	·	●	·	·	·	·	·	·
Juanulloa mexicana (Schlecht.) Miers	·	·	●	·	·	·	·	·
Lycianthes arrazolensis (Coult. et J.D. Smith) Bitter	·	·	·	·	●	·	·	·
L. chiapensis (Brandegee) Standley	·	●	·	·	·	·	·	·
L. connata J.L. Gentry	·	●	·	·	·	·	·	·
L. orogenes Standley et Steyerm.	·	·	·	·	●	·	·	·
L. tricolor (Sessé et Moc. ex Dunal) Bitter	·	·	●	·	·	·	·	·
Physalis aff. angulata L.	·	●	·	·	·	·	·	·
Solanum apendiculatum H.B.K. ex Dunal	·	●	·	·	·	·	·	·
S. chiapense Roe	·	·	·	·	●	·	·	·
S. chrysotrichum Schlecht.	·	●	·	·	●	·	·	·
S. cordovense S. et M.	·	·	·	·	·	●	·	·
S. diphyllum L.	·	·	·	·	●	·	·	·
S. nigrescens M. et G.	·	·	·	·	·	·	·	●
S. nudum H.B.K.	·	·	·	·	·	·	·	●
S. trizygum Bitter	·	●	·	·	·	·	·	·
S. wendlandii Hook. f.	·	●	·	·	·	·	·	·
Witheringia cuneata Hunz.	·	●	·	·	·	·	·	·
W. solanacea L'Hér.	·	·	●	·	●	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Staphyleaceae								
Turpinia paniculata Vent.	·	·	●	·	·	·	·	·
Sterculiaceae								
Sterculia mexicana R. Br.	·	·	●	·	·	·	·	·
Styracaceae								
Styrax glabrescens Benth. var. *glabrescens*	·	●	·	·	·	·	·	·
S. glabrescens var. *pilosus* (Perkins) Standley	·	·	·	·	●	·	·	·
Symplocaceae								
Symplocos flavifolia Lundell	·	·	·	·	·	●	·	·
S. hartwegii A. DC.	·	●	·	·	·	·	·	·
Theaceae								
Cleyera theaeoides (Sw.) Choisy	·	·	·	·	●	·	·	·
Symplococarpon flavifolium Lundell	·	●	·	·	●	·	·	·
Ternstroemia lineata ssp. *chalicophila* (Loes.) Bartholomew	●	●	·	·	·	·	·	·
T. oocarpa (Rose) Melchior	·	·	·	●	●	·	·	·
Thymelaeaceae								
Daphnopsis flavida Lundell	·	·	·	·	●	·	·	·
D. selerorum Gilg.	·	●	·	·	·	·	·	·
Tiliaceae								
Belotia mexicana (DC.) Schum.	·	·	●	·	·	●	·	·
Heliocarpus donnell-smithii Rose	·	●	·	·	·	·	·	·
Triumfetta dumetorum Schlecht.	·	·	·	●	●	·	·	·
T. speciosa Seem.	·	·	●	●	●	·	·	·
Ulmaceae								
Celtis aff. *caudata* Planchon	·	·	·	·	●	·	·	·
Lozanella enantiophylla (J.D. Smith) Killip et Morton	·	●	●	●	·	·	·	·
Trema micrantha (L.) Blume	·	·	·	●	●	●	·	·
Ulmus mexicana Liebm.	·	·	●	·	●	·	·	·
Urticaceae								
Boehmeria caudata Sw.	·	·	·	·	·	·	·	●
B. ulmifolia Wedd.	·	●	·	·	·	·	·	·
Myriocarpa longipes Liebm.	·	·	·	·	●	·	·	·
Phenax hirtus var. *minor* Wedd.	·	·	·	·	●	·	·	·
P. hirtus (Sw.) Wedd.	·	●	·	·	·	·	·	●
Pilea aff. auriculata Liebm.	·	●	·	·	·	·	·	·
P. quercifolia Killip	·	●	·	·	·	·	·	●
Urera alceifolia Gaud.	·	·	·	·	●	·	·	·
Valerianaceae								
Valeriana scandens L. var. *candolleana* (Gard.) Muell.	·	·	·	·	●	·	·	·
Verbenaceae								
Aegiphila valerii Standley	·	·	·	·	●	·	·	·
Citharexylum mocinnii D. Don	·	●	·	·	·	·	·	●
Verbena carolina L.	·	·	·	·	·	·	·	●
V. litoralis H.B.K.	·	·	·	·	·	·	·	●

Appendix 1, continued

	1	2	3	4	5	6	7	8
Violaceae								
Hybanthus attenuatus (H. et B.) G.K. Schulze	·	·	·	·	·	·	·	●
H. elatus (Turcz.) Morton	·	·	·	·	·	·	·	●
Viola scandens Willd. ex R. et S.	·	●	·	·	·	·	·	·
Vitaceae								
Cissus cacuminis Standley	·	·	·	●	●	·	·	·
Vitis tiliifolia H. et B. ex R. et S.	·	·	·	·	·	●	·	·
Winteraceae								
Drimys granadensis var. *mexicana* (DC.) A.C. Smith	·	●	·	·	·	·	·	·
MONOCOTYLEDONEAE								
Araceae								
Anthurium andicola Liebm.	·	·	●	·	·	·	·	·
A. chiapasense Standley ssp. *chiapasense*	·	·	·	·	●	●	●	·
A. lucens Standley ex Yuncker	·	·	●	·	·	·	·	·
A. microspadix Schott	·	·	●	·	·	·	·	·
A. montanum Hemsley	·	●	●	·	·	·	·	·
A. salviniae Hemsley	·	·	·	·	·	●	·	·
A. scandens (Aublet) Engl.	·	●	·	·	·	·	·	·
A. aff. *seleri* Engler	·	·	·	·	●	·	·	·
Anthurium sp. 1	·	●	·	·	·	·	·	·
Anthurium sp. 2	·	·	·	·	●	·	·	·
Monstera siltepecana Matuda	·	●	·	·	·	·	·	·
Philodendron scandens C. Koch et Sello	·	·	·	·	●	·	·	·
P. tripartitum (Jacq.) Schott	·	·	●	·	·	·	·	·
Spathiphyllum matudae Bunting	·	●	●	·	●	·	·	·
Syngonium podophyllum Schott	·	·	·	·	●	·	·	·
Bromeliaceae								
Catopsis hahnii Baker	·	·	●	·	·	·	·	·
C. nutans (Sw.) Griseb	·	·	·	·	●	·	·	·
Pitcairnia aff. *heterophylla* (Lindley) Beer	·	·	·	●	●	·	·	·
P. aff. *wendlandii* Baker	·	·	●	·	●	·	·	·
Tillandsia argentea Griseb.	·	·	·	●	●	·	·	·
T. brachycaulos Schlecht.	·	·	·	·	●	·	·	·
T. butzii Mez	·	·	●	·	●	·	·	·
T. chlorophylla L.B. Smith	·	●	·	·	·	·	·	●
T. compressa Bertero ex Schultes	·	·	·	·	●	·	·	·
T. filifolia Brongniart	·	·	·	·	●	·	·	·
T. guatemalensis L.B. Smith	·	●	·	●	·	·	·	·
T. aff. *heterophylla* E. Morren	·	·	·	·	●	·	·	·
T. lampropoda L.B. Smith	·	●	·	●	·	·	·	·
T. punctulata Schlecht.	·	●	·	●	·	·	·	·
T. tricolor Schlecht. et Cham.	·	●	·	●	·	·	·	·
Tillandsia sp. 1	·	●	·	●	·	·	·	·
Tillandsia sp. 2	·	●	·	·	·	·	·	·
Commelinaceae								
Callisia multiflora (M. et G.) Standley	·	·	·	·	●	·	·	·
Commelina diffusa Burm. f.	·	·	·	·	·	·	·	●
Tradescantia (Campelia) zononia (L.) Sw.	·	·	·	·	●	·	·	·
T. deficiens Brandegee	·	·	●	●	·	·	·	●
T. guatemalensis C. et B.	·	·	·	·	·	·	·	●

Appendix 1, continued

	1	2	3	4	5	6	7	8
T. plusiantha Standley	·	·	·	·	●	·	·	·
T. zebrina var. *mollipila* D. Hunt	·	·	·	·	●	·	·	·
Tripogandra serrulata (Vahl.) Handlos	·	●	·	·	●	·	·	·
Cyperaceae								
Carex sp.	·	·	·	●	·	·	·	●
Cyperus hemaphroditus (Jacq.) Standley	·	·	·	●	·	·	·	·
C. matudae G.C. Tucker	·	·	·	·	●	·	·	·
Kyllinga sp.	·	·	·	·	·	·	·	●
Rhynchospora sp.	·	●	·	·	·	·	·	·
Scleria sp.	·	·	·	●	·	·	·	·
Uncinia hamata (Sw.) Urban	·	●	·	·	·	·	·	·
Dioscoreaceae								
Dioscorea convolvulacea S. et C.	·	●	·	·	●	●	·	·
D. densiflora Hemsley	·	·	·	·	●	·	·	·
D. floribunda M. et G.	·	·	●	·	●	●	·	·
D. racemosa (Klotzsch) Uline	·	●	·	·	·	·	·	·
Haemodoraceae								
Xiphidium caeruleum Aublet	·	·	·	·	·	●	·	·
Iridaceae								
Orthrosanthus chimboracensis (H.B.K.) Baker	·	·	·	●	·	·	·	·
Liliaceae								
Bomarea hirtella (H.B.K.) Herb.	·	·	·	●	·	·	·	·
Smilacina amoena Wendl.	·	●	·	·	·	·	·	·
S. flexuosa Bertol	·	●	·	·	·	·	·	·
S. paniculata M. et G.	·	●	●	●	●	·	·	·
S. scilloides M. et G.	·	●	·	·	●	·	·	·
Smilax domingensis Willd.	·	·	·	·	·	●	·	·
S. jalapensis Schlecht.	·	●	·	·	●	·	·	·
S. mollis H. et B. ex Willd.	·	●	·	●	●	·	·	·
S. ornata Lemaire	·	·	·	·	●	·	·	·
S. purpusii Brandegee	·	·	·	●	·	·	·	·
S. subpubescens A. DC.	·	·	●	·	·	·	·	·
S. velutina Killip et Morton	·	·	·	·	●	·	·	·
Maranthaceae								
Calathea coccinea Standley et Steyerm.	·	·	·	·	·	●	·	·
Musaceae								
Heliconia adflexa (Griggs) Standley	·	·	●	·	●	·	·	·
Orchidaceae								
Arpophyllum giganteum Hartweg ex Lindley	●	●	·	·	·	·	·	·
Brassia verrucosa Lindley	·	·	●	·	·	·	·	·
Corymborchis forcipigera (Reichb. f.) L.O. Williams	·	·	·	·	·	●	·	·
Dichaea graminoides (Sw.) Lindley	·	●	·	·	·	·	·	·
D. muricatoides Hamer et Garay	·	●	·	·	·	·	·	·
D. cf. *squarrosa* Lindley	·	●	·	·	·	·	·	·
Elleanthus cynarocephalus (Reichb. f.) Reichb. f.	·	●	·	·	·	·	·	·
Encyclia baculus (Reichb. f.) Dressler et Pollard	·	·	·	·	●	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
E. ochracea (Lindley) Dressler	·	·	·	·	●	·	·	·
E. speudopygmaea (A. Finet) Dressler et Pollard	·	·	·	·	●	·	·	·
E. varicosa ssp. *leiobulbon* (Hook.) Dressler et Pollard	·	●	·	·	·	·	·	·
E. vitellina (Lindley) Dressler	·	●	·	·	·	·	·	·
E. cf. *vitellina* (Lindley) Dressler	·	●	·	·	·	·	·	·
Epidendrum chlorocorymbos Schltr.	·	●	·	·	·	·	·	·
E. aff. *clowesii* Bateman ex Lindley	·	●	·	·	·	·	·	·
E. dixorum Hagsater	·	●	·	·	·	·	·	·
E. laucheanum Rolfe	·	●	·	·	·	·	·	·
E. melistagum Hagster	·	·	·	·	·	●	·	·
E. mixtum Schltr.	·	·	●	·	·	·	·	·
E. polyanthum Lindley	·	●	·	·	●	·	·	●
E. pseudoramosum Schltr.	·	●	·	·	·	·	·	·
E. repens Jacq.	·	●	·	·	·	·	·	·
E. trachythece Schltr.	·	●	·	·	·	·	·	·
Goodyera cf. *dolabripetala* (Ames) Schltr.	·	●	·	·	·	·	·	·
Govenia sp.	·	●	·	·	·	·	·	·
Habenaria novemfida Lindley	·	·	·	●	·	·	·	·
Isochilus aurantiacus Hamer et Garay	·	●	·	·	·	·	·	·
Jacquinella cobanensis (Ames et Schltr.) Dressler	·	●	●	·	·	·	·	·
Lemboglossum cordatum (Lindley) Halbinger	·	●	●	·	·	·	·	·
L. rossii (Lindley) Halbinger	·	●	·	·	·	·	·	·
Lemboglossum sp.	·	●	●	·	·	·	·	·
Lepanthes acuminata Schltr.	·	●	·	·	·	·	·	·
L. appendiculata Ames	·	●	·	·	·	·	·	·
L. tenuiloba Schultes et Dillon	·	●	·	·	·	·	·	·
Malaxis histionantha (Link, Klotzsch et Otto) Garay et Dressler	·	·	·	·	·	●	·	·
Malaxis salazarii Catling	·	·	·	●	·	·	·	·
Malaxis sp.	·	·	●	·	·	·	·	·
Maxillaria cucullata (Lindley) Hook.	●	●	·	●	·	·	·	·
M. densa Lindley	·	·	●	·	·	·	·	·
M. hagsateriana Soto Arenas ined.	·	●	·	·	·	·	·	·
Nidema boothii (Lindley) Schltr.	·	·	·	·	●	·	·	·
Oerstedella cf. *aberrans* (Schltr.) Hamer	·	●	·	·	·	·	·	·
O. myriantha (Lindley) Hagsater	·	·	·	·	●	·	·	·
Oncidium bicallosum Lindley	·	●	·	·	·	·	·	·
O. laeve (Lindley) Beer	·	●	·	·	·	·	·	·
O. ornithorhynchum H.B.K.	·	·	·	·	·	●	·	·
O. suttonii Batem. ex Lindley	·	·	·	·	●	·	·	·
Ornithocephalus tripterus Schltr.	·	·	·	·	●	·	·	·
Pelexia funckiana (A. Rich. et Gal.) Schltr.	·	●	·	·	·	·	·	·
Pleurothallis dolichopus Schltr.	·	●	·	·	·	·	·	·
P. hirsuta Ames	·	●	·	·	·	·	·	·
P. pachyglossa Lindley	·	●	·	·	·	·	·	·
P. matudiana C. Schweinf.	·	●	·	·	·	·	·	·
P. segoviensis Reichb. f.	·	·	·	●	·	·	·	·
P. tribuloides (Sw.) Lindley	·	·	·	·	●	·	·	·
P. tuerckheimii Schltr.	·	●	·	·	·	·	·	·
Ponthieva aff. *maculata* Lindley	·	●	·	·	·	·	·	·
Prescottia stachyodes (Sw.) Lindley	·	●	●	·	·	·	·	·
Restrepia lankesteri Ames et Schweinf.	·	·	·	·	●	·	·	·
Scaphyglottis crurigera (Bateman ex Lindley) Ames et Correll	·	·	●	·	●	·	·	·
Sobralia macrantha Lindley	·	·	·	●	·	·	·	·

Appendix 1, continued

	1	2	3	4	5	6	7	8
Stelis aff. *aprica* Schltr.	·	●	·	·	·	·	·	·
S. ovatilabia Schltr.	·	·	·	●	·	·	·	·
S. rubens Schltr.	·	·	·	●	·	·	·	·
S. tenuissima Schlecht.	·	·	·	·	●	·	·	·
Stelis sp.	·	●	·	·	·	·	·	·
Stenorhynchos speciosum Jacq. L.C. Rich. ex Spreng.	·	●	·	·	·	·	·	·
Trichopilia tortilis Lindley	·	·	·	·	●	·	·	·
Trichosalpinx cf. *cedralensis* (Ames) Luer	·	●	·	·	·	·	·	·
T. greenwoodiana Soto Arenas	·	●	·	·	·	·	·	·
Trigonidium egertonianum Batem: ex Lindley	·	●	·	·	·	·	·	·
Palmae								
Chamaedorea elegans Martius	·	·	·	·	●	·	·	·
C. aff. *neurochlamys* Burret	·	·	·	·	●	·	·	·
C. nubium Standley et Steyerm.	·	●	·	·	●	●	·	·
Chamaedorea sp.	·	●	·	·	·	·	·	·
Geonoma seleri Burret	·	●	·	·	·	·	·	·
Poaceae								
Aegopogon cenchroides H. et B. ex Willd.	·	·	·	●	·	·	·	·
Andropogon glomeratus (Walt.) B.S.P.	·	·	·	·	·	●	·	·
Chusquea sp.	●	·	·	·	·	·	·	·
Cynodon nlemfuensis Vanderyst	·	·	·	·	·	·	·	●
Isachne arundinacea (Sw.) Griseb.	·	●	·	·	·	·	·	·
Laciacis nigra Davidse	·	·	·	·	●	·	·	·
L. procerrima (Hackel) Hitchc.	·	·	·	●	·	·	·	·
Pennisetum purpureum Schum.	·	·	·	·	·	·	·	●
Sporobolus indicus (L.) R. Br.	·	·	·	·	●	·	·	·
Zingiberaceae								
Costus spicatus D. Don	·	·	·	·	●	·	·	·
Renealmia mexicana Klotzsch ex Peterson	·	·	●	·	·	·	·	·