

# EPIPHYTE DIVERSITY IN PRIMARY AND FRAGMENTED FORESTS OF CAMEROON, CENTRAL AFRICA: A PRELIMINARY SURVEY

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**ABSTRACT.** In this study our objectives were to compare the diversity of epiphytes in undisturbed and fragmented forests, to identify the most abundant host tree species, and to collect specimens for the University of Yaounde. To protect epiphytes in villages where these plants are often perceived as parasites (especially of fruit trees), the senior author organized conservation classes for local villagers who participated in data collection at each site. Preliminary results showed that epiphytic flora was rich in disturbed forests of Cameroon and that preservation of forest fragments may benefit epiphyte conservation. The most abundant host tree species differ in both intact and disturbed habitats at each site. Human disturbance, despite reducing epiphyte population sizes, serves as a catalyst for promoting change (and perhaps a short-term increase) in diversity by increasing habitat diversity.

*Key words:* Africa, biodiversity, Cameroon, epiphyte, forest, orchid, tropics

## INTRODUCTION

Epiphytes are components of tropical rain forests. Much information on their relative diversity and abundance exists for major equatorial forests in Mexico (Williams-Linera et al. 1995, Guevara et al. 1998) and Central America, for instance Costa Rica (Nadkarni 1986), Panama (Croat 1978), and Ecuador (Gentry & Dodson 1987). Information is very poor for Africa. Evidence suggests that forest fragments in the Neotropics may benefit epiphyte conservation (Williams-Linera et al. 1995, Guevara et al. 1998), and we speculate that this also may be true for African epiphytes.

Very little ecological information exists on epiphytes of Africa, but see Johansson (1974) on Nigeria. Preliminary epiphyte surveys carried out in Cameroon during the Radeau de Cimes Mission demonstrated that most epiphytes are located in the mid-canopy (Barthelemy 1992). A subsequent investigation at this site (Campo, Cameroon) has shown that 65% of epiphytic species are orchids and 26% are pteridophytes (Zapfack et al. 1996).

The objectives of our study follow:

- Survey the diversity of epiphytes, hemi-epiphytes, and their phorophytes in three tropical rain forests that differ in rainfall and species composition.
- Compare the epiphytic species composition in

natural and disturbed forest tracts within the three tropical forests.

- Note large and conspicuous epiphytes.
- Collect voucher specimens for herbaria in Europe, Africa, and America with the first set deposited at the University of Yaounde Herbarium (YA).
- Communicate conservation needs of epiphytes to villagers in control of forest maintenance.

## MATERIALS AND METHODS

### Study Areas

Sites were selected in the tropical humid zone of southwestern Cameroon, including forests of three physiognomic types: evergreen, mixed, and semi-deciduous. These were the Campo Fauna Reserve, Eseka, and Mbankomo. At each station, seasonal drought occurs during two periods: November to March and July to August. The Campo Fauna Reserve, with coastal evergreen forest close to sea level (2°36'N, 10°53'E), has minimum-maximum temperatures of 23.1°C and 31.3°C. Eseka, a mixed forest with evergreen and semi-deciduous species, is located between a very humid littoral plain and dryer south plateau (3°40'N, 10°34'E) at ca. 240 m elev. Minimum and maximum temperatures of this area are 24.5°C and 29°C. Mbankomo, containing a semi-deciduous forest, is located on the south plateau (3°49'N, 11°24'E) at ca. 650 m

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TABLE 1. Epiphyte diversity at Campo, contrasting evergreen forest with open plot. Asterisk (\*) denotes an epiphytic species common to both habitats.

Habitat	Orchidaceae	Pteridophytes	Araceae	Cactaceae	Total
Evergreen forest	<i>Ancistrorhynchus straussii</i>	<i>Asplenium africanum</i>	* <i>Rhektophyllum camerunense</i>	* <i>Rhipsalis bacifera</i>	15 species
	<i>Bulbophyllum distans</i>	<i>Drynaria laurentii</i>	* <i>Rhektophyllum mirabile</i>		8 unique
	<i>Bulbophyllum</i> aff. <i>flavidum</i>	* <i>Microgramma owariensis</i>			
	<i>Bulbophyllum fractiflexum</i>	* <i>Microsorium punctatum</i>			
	<i>Bulbophyllum</i> sp. 1	* <i>Nephrolepis biserrata</i>			
	<i>Bulbophyllum</i> sp. 2	* <i>Phymatodes scolopendria</i>			
	<i>Ancistrorhynchus capitatus</i>	<i>Asplenium currori</i>	* <i>Rhektophyllum camerunense</i>	* <i>Rhipsalis bacifera</i>	29 species
Open plot	<i>Ancistrorhynchus clandestinus</i>	<i>Asplenium</i> sp.	* <i>Rhektophyllum mirabile</i>		22 unique
	<i>Bulbophyllum buntingii</i>	* <i>Microgramma owariensis</i>			
	<i>Bulbophyllum</i> cf. <i>calyptratum</i>	* <i>Microsorium punctatum</i>			
	<i>Bulbophyllum congolanum</i>	* <i>Nephrolepis biserrata</i>			
	<i>Bulbophyllum imbricatum</i>	<i>Oleandra distenta</i>			
	<i>Bulbophyllum</i> sp.	* <i>Phymatodes scolopendria</i>			
	<i>Calypstrochilum emarginatum</i>	<i>Platynerium angolense</i>			
	<i>Chamaeangis odoratissima</i>	<i>Platynerium stemaria</i>			
	<i>Chamaeangis</i> sp.	<i>Vittaria schaeferi</i>			
	<i>Diaphananthe pellucida</i>				
	<i>Polystachya laxiflora</i>				
	<i>Polystachya odorata</i>				
	<i>Polystachya polychaete</i>				
	<i>Tridactyle tridactylites</i>				
	<i>Tridactyle</i> sp.				

elev. Minimum and maximum temperatures are 25.6°C and 32.9°C.

### Canopy Access

Two methods were used for canopy access: single rope techniques and employment of Pygmy climbers from local villages, who we trained in plant collection and observation. The senior author used binoculars to observe and control sampling by village climbers.

### Collection and Identification

Voucher specimens were collected and preserved using standard techniques for herbarium collections. Epiphyte identification was facilitated by matching project collections to herbarium specimens at the University of Yaounde Herbarium (YA). To minimize conflicts between old and new name applications, we continued to use the older names, since otherwise comparisons would result in false similarities and differences

TABLE 2. Epiphyte diversity at Eseka, contrasting mixed forest with open plot. Asterisk(\*) denotes an epiphytic species common to both habitats.

Habitat	Orchidaceae	Pteridophytes	Araceae	Cactaceae	Total
Mixed forest	<i>Angraecum</i> sp.	* <i>Asplenium cur- rori</i>	* <i>Rhektophyllum mirabile</i>		18 species 10 unique
	<i>Bulbophyllum distans</i>	<i>Asplenium</i> sp. 1			
	* <i>Bulbophyllum imbricatum</i>	* <i>Microgramma owariensis</i>			
	<i>Bulbophyllum sp. 1</i>	<i>Microsorium punctatum</i>			
	<i>Bulbophyllum sp. 2</i>	* <i>Phymatodes scolopendria</i>			
	<i>Bulbophyllum sp. 3</i>	* <i>Platynerium angolense</i>			
	<i>Polystachya af- finis</i>	* <i>Platynerium stemaria</i>			
	<i>Polystachya odorata</i>	* <i>Vittaria schae- feri</i>			
	<i>Polystachya</i> sp.				
	Open plot	<i>Angraecum bir- rimense</i>	* <i>Asplenium cur- rori</i>	* <i>Rhektophyllum mirabile</i>	<i>Rhipsalis bacci- fera</i>
<i>Angraecum</i> sp. 2		<i>Asplenium</i> sp. 2			
<i>Angraecum</i> sp. 3		<i>Asplenium</i> sp. 3			
<i>Bulbophyllum fuscum</i>		<i>Davallia chae- rophyllodes</i>			
* <i>Bulbophyllum imbricatum</i>		<i>Drynaria volk- ensii</i>			
<i>Bulbophyllum teretifolium</i>		<i>Lomariopsis guineensis</i>			
<i>Bulbophyllum sp. 4</i>		* <i>Microgramma owariensis</i>			
<i>Bulbophyllum sp. 5</i>		<i>Nephrolepis bi- serrata</i>			
<i>Calyptrorchilum emarginatum</i>		<i>Oleandra disten- ta</i>			
<i>Chamaeangis odoratissima</i>		* <i>Phymatodes scolopendria</i>			
<i>Podangis dactyl- oceras</i>		* <i>Platynerium angolense</i>			
<i>Polystachya</i> sp. 1		* <i>Platynerium stemaria</i>			
<i>Polystachya</i> sp. 2		<i>Pleopeltis lan- ceolata</i>			
<i>Vanilla africana</i>		* <i>Vittaria schae- feri</i>			

between study sites. All specimens at available herbaria in Cameroon need to be reviewed in the light of modern revisions. Relatively well-known host trees were field identified, and others were identified using manuals. A list of 58 manuals and papers that served as identification aids is available on request. The main voucher collection was deposited at YA (APPENDIX).

### Sampling Methods

Two 1-ha plots were established at each study area (except at the disturbed Campo plot): one

plot was selected in the undisturbed forest and the other within a plantation or disturbed area. At Campo, phorophytes were selected randomly within the village, because the available fragments were substantially smaller than 1 ha. Only phorophytes with diameters of 5 cm or more were sampled.

Epiphytes and hemi-epiphytes were sampled in accessible zones of phorophytes according to techniques described by Johansson (1974). A checklist of identified epiphytes was made and also a list of their phorophytes. We determined absolute abundance of each phorophyte species

TABLE 3. Epiphyte diversity at Mbankomo, contrasting semideciduous forest with open plot. Asterisk (\*) denotes an epiphytic species common to both habitats.

Habitat	Orchidaceae	Pteridophytes	Araceae	Cactaceae	Begoniaceae	Total
Semideciduous forest	<i>Angraecum</i> sp. 1	* <i>Asplenium currori</i>	<i>Rhektophyllum camerunense</i>			20 species 9 unique
	<i>Bulbophyllum</i> sp. 1	<i>Asplenium</i> sp. 1	* <i>Rhektophyllum mirabile</i>			
	<i>Chamaeangis</i> sp. 1	<i>Davalia chaerophylloides</i>				
	* <i>Polystachya odorata</i>	* <i>Drynaria laurentii</i>				
	<i>Polystachya</i> sp.	<i>Drynaria volkensii</i>				
	* <i>Tridactyle tridactylites</i>	<i>Lomariopsis</i> sp.				
		* <i>Microsorium punctatum</i>				
		* <i>Nephrolepis biserrata</i>				
		* <i>Oleandra distenta</i>				
		* <i>Phymatodes scolopendria</i>				
		* <i>Platycterium angolense</i>				
		* <i>Platycterium stemaria</i>				
	Open plot	<i>Angraecum birrimense</i>	<i>Arthropteris palisoti</i>	* <i>Rhektophyllum mirabile</i>	<i>Rhipsalis baccifera</i>	<i>Begonia polygonoides</i>
<i>Angraecum</i> sp. 2		* <i>Asplenium currori</i>				
<i>Ansellia africana</i>		<i>Asplenium</i> sp. 2				
<i>Bulbophyllum buntingii</i>		<i>Davallia chaerophylloides</i>				
<i>Bulbophyllum</i> sp. 2		* <i>Drynaria laurentii</i>				
<i>Calypstrochilum chris-tyanum</i>		<i>Microgramma owariensis</i>				
<i>Calypstrochilum emarginatum</i>		* <i>Microsorium punctatum</i>				
<i>Chamaeangis vesicata</i>		* <i>Nephrolepis biserrata</i>				
<i>Chamaeangis</i> sp. 2		* <i>Oleandra distenta</i>				
<i>Cyrtorchis</i> cf. <i>chailluana</i>		* <i>Phymatodes scolopendria</i>				
<i>Podangis</i> sp.		* <i>Platycterium angolense</i>				
<i>Polystachya adansoniae</i>		* <i>Platycterium stemaria</i>				
<i>Polystachya alpina</i>						
<i>Polystachya coriscensis</i>						

TABLE 3. Continued.

Habitat	Orchidaceae	Pteridophytes	Araceae	Cactaceae	Begoniaceae	Total
	<i>Polystachya elegans</i>					
	<i>Polystachya fractiflexa</i>					
	* <i>Polystachya odorata</i>					
	<i>Polystachya paniculata</i>					
	<i>Polystachya</i> cf. <i>tenuissima</i>					
	<i>Polystachya tessellata</i>					
	<i>Rangaeris muscicola</i>					
	<i>Rangaeris</i> sp.					
	<i>Summarhaysia laurentii</i>					
	<i>Tridactyle anthomaniaca</i>					
	* <i>Tridactyle tridactylites</i>					

by counting individuals of conspecifics encountered within the sample areas.

Checklists of epiphytes and hemi-epiphytes were prepared for comparison within each pair of sample areas. The senior author educated villagers by organizing meetings and reinforcing conservation principles by involving local people in specimen and data collection.

## RESULTS

TABLES 1–3 summarize the results of the epiphyte surveys at each site. Orchids and ferns were the main groups of epiphytes, and epiphyte flora was relatively diverse in open disturbed areas at each site. Considerable overlap was apparent among pteridophytes and non-orchids in both intact and disturbed plots, but no or little overlap was observed among the orchids. These results initially suggested that human disturbance actually enhances epiphyte diversity, but see the discussion below. Orchids and ferns were the main components of the epiphytic flora in each of the six plots sampled, but two massive species of Araceae, *Rhektophyllum mirabile* N.E. Br. and *R. camerunense* Ntepe-Nyame, were the largest and most conspicuous epiphytes in both the intact and fragmented forests at Esekaka and Mbankomo. Neither the taxonomically diverse Orchidaceae nor the pteridophytes were conspicuous elements.

TABLES 4–6 show host tree dominance differ-

ing greatly from site to site. Within each area, the most abundant host species of intact and disturbed plots were totally different. Only a single species from all three areas common to both intact and disturbed plots exhibited an absolute abundance above one in more than one plot, i.e., *Cola acuminata* Schott & Endl. at Mbankomo.

Meetings organized at the three sites produced an average attendance of 50 villagers, who learned the importance of biodiversity and sustainable forest products. They also learned to distinguish between epiphytes and harmful parasites. Some of the phorophytes have local uses such as *Erythrophloeum suaveolens* (Guillem. & Perrott) Brenan used to "test truth." *Irvingia gabonensis* Baill. Ex Lauener, *Uapaca guineensis* Müll. Arg., and *Cola acuminata* are used for food. Medicines prepared from *Alstonia boonei* De Wild, *Bombax buonopozense* Beauv., and *Celtis mildbraedii* Engl. provide further incentive for protecting these epiphytes. When villagers requested follow-up meetings, we left the region convinced that the local host trees and their epiphytes would be better protected.

## DISCUSSION

Results showing that orchids and ferns predominate in the epiphytic flora are consistent with other studies in Africa. Biedinger and Fisher (1996) found that epiphytic floras in the Democratic Republic of the Congo (formerly Zaire)

TABLE 4. Survey of phorophytes at Campo, in order of absolute abundance. Asterisk (\*) denotes a species common to both intact evergreen forest and open plot.

Habitat	Species	Family	Absolute abundance	
Evergreen forest	<i>Dialium pachyphyllum</i>	Caesalpinaceae	11	
	<i>Anthonotha fragrans</i>	Caesalpinaceae	10	
	<i>Hymenostegia afzelii</i>	Caesalpinaceae	9	
	* <i>Uapaca guineensis</i>	Euphorbiaceae	6	
	<i>Strombosia pustulata</i>	Olacaceae	4	
	<i>Pachypodanthium staudtii</i>	Annonaceae	3	
	<i>Strombosiopsis tetrandra</i>	Olacaceae	3	
	<i>Coula edulis</i>	Olacaceae	3	
	<i>Dichostemma glaucescens</i>	Euphorbiaceae	3	
	* <i>Erythrophloeum suaveolens</i>	Caesalpinaceae	2	
	<i>Santaloidella gillettii</i>	Connaraceae	2	
	<i>Sacoglottis gabonensis</i>	Humiriaceae	2	
	<i>Drypetes afzelii</i>	Euphorbiaceae	1	
	<i>Tabernaemontana crassa</i>	Apocynaceae	1	
	<i>Afzelia bipindensis</i>	Caesalpinaceae	1	
	<i>Gilbertiodendron preussii</i>	Caesalpinaceae	1	
	<i>Gillettiodendron pierreanum</i>	Caesalpinaceae	1	
	<i>Garcinia kola</i>	Clusiaceae	1	
	<i>Mammea africana</i>	Clusiaceae	1	
	<i>Symphonia globulifera</i>	Clusiaceae	1	
	<i>Neuropeltis acuminata</i>	Convolvulaceae	1	
	<i>Angylocalyx pynaertii</i>	Fabaceae	1	
	* <i>Irvingia gabonensis</i>	Irvingiaceae	1	
	<i>Guarea cedrata</i>	Meliaceae	1	
	<i>Trichilia</i> sp. 1	Meliaceae	1	
	<i>Trichilia</i> sp. 2	Meliaceae	1	
	<i>Aubrevillea kerstingii</i>	Mimosaceae	1	
	<i>Anisophyllea</i> sp.	Rhizophoraceae	1	
	<i>Pausinystalia yohimba</i>	Rubiaceae	1	
	<i>Cola pachycarpa</i>	Sterculiaceae	1	
	Open plot	<i>Mangifera foetida</i>	Anacardiaceae	7
		* <i>Irvingia gabonensis</i>	Irvingiaceae	5
		<i>Avicennia africana</i>	Avicenniaceae	2
<i>Sterculia tragacantha</i>		Sterculiaceae	2	
<i>Monodora</i> sp.		Annonaceae	1	
<i>Cocos nucifera</i>		Arecaceae	1	
<i>Spathodea campanulata</i>		Bignoniaceae	1	
<i>Anthonotha</i> sp.		Caesalpinaceae	1	
* <i>Erythrophloeum suaveolens</i>		Caesalpinaceae	1	
<i>Lebrevillea klainei</i>		Caesalpinaceae	1	
<i>Terminalia superba</i>		Combretaceae	1	
<i>Bridelia micrantha</i>		Euphorbiaceae	1	
* <i>Uapaca guineensis</i>		Euphorbiaceae	1	
<i>Anthocleista</i> sp.		Loganiaceae	1	
<i>Lophira alata</i>		Ochnaceae	1	
<i>Citrus sinensis</i>		Rutaceae	1	

and Rwanda include 52% orchids and 33% ferns. Zapfack et al. (1996) similarly found 65% orchids and 26% ferns.

These results suggest that epiphyte diversity is greater in open disturbed areas than in intact forests. Although orchids are usually regarded as denizens of undisturbed habitats, at least some orchids are opportunistic in disturbed sites (Gillespie 2002). Light availability created from disturbance may foster a larger number of sun-lov-

ing and perhaps weedy epiphytes. Our results, however, may reflect short-term observations in the wake of relatively recent clearing. It is uncertain whether these epiphyte populations will persist over time, particularly if their seed sources for colonization decline with further degradation of the intact forest. Although epiphytes may be fostered through human disturbance, they are imperiled through the intense destruction of bush fires and tree felling. With human-

TABLE 5. Survey of phorophytes at Eseka, in order of absolute abundance. Asterisk (\*) denotes a species common to both mixed forest and open plot.

Habitat	Species	Family	Absolute abundance	
Mixed forest	<i>Panda oleosa</i>	Pandaceae	5	
	<i>Drypetes capillipes</i>	Euphorbiaceae	3	
	<i>Drypetes gossweileri</i>	Euphorbiaceae	3	
	<i>Polyathia suaveolens</i>	Annonaceae	2	
	<i>Strombosia pustulata</i>	Olacaceae	2	
	<i>Strombosiopsis tetrandra</i>	Olacaceae	2	
	<i>Poga oleosa</i>	Rhizophoraceae	2	
	<i>Afrosersalisia cerasifera</i>	Sapotaceae	2	
	<i>Gambeya lacourtiana</i>	Sapotaceae	2	
	<i>Trichoscypha acuminata</i>	Anacardiaceae	1	
	<i>Mammea africana</i>	Clusiaceae	1	
	<i>Amphimas pterocarpoides</i>	Caesalpinaceae	1	
	<i>Diospyros crassiflora</i>	Ebenaceae	1	
	<i>Diospyros</i> sp. 1	Ebenaceae	1	
	<i>Diospyros</i> sp. 2	Ebenaceae	1	
	<i>Diospyros</i> sp. 3	Ebenaceae	1	
	<i>Diospyros</i> sp. 4	Ebenaceae	1	
	<i>Diospyros</i> sp. 5	Ebenaceae	1	
	<i>Uapaca</i> sp.	Euphorbiaceae	1	
	<i>Angylocalyx pynaertii</i>	Fabaceae	1	
	<i>Entandrophragma cylindricum</i>	Meliaceae	1	
	* <i>Pycnanthus angolensis</i>	Myristicaceae	1	
	<i>Manilkara argentea</i>	Sapotaceae	1	
	<i>Cola rostrata</i>	Sterculiaceae	1	
	Open plot	<i>Alstonia boonei</i>	Apocynaceae	5
		<i>Desbordesia glaucescens</i>	Irvingiaceae	2
<i>Bridelia</i> sp.		Euphorbiaceae	1	
<i>Sacoglottis gabonensis</i>		Humiriaceae	1	
<i>Irvingia gabonensis</i>		Irvingiaceae	1	
<i>Nesogordonia papaverifera</i>		Sterculiaceae	1	
* <i>Pycnanthus angolensis</i>		Myristicaceae	1	

induced disturbance recent among the study sites, the source of all epiphytes in the disturbed sites is ultimately the intact forest where patterns of epiphyte distribution may be quite different. Our study suggests that disturbed sites may play

a role in maintaining epiphytic diversity, especially if neighboring forests are severely degraded, a result consistent with those recorded in Mexico by Williams-Linera et al. (1995) and Guevara et al. (1998).

TABLE 6. Survey of phorophytes at Mbankomo, in order of absolute abundance. Asterisk (\*) denotes a species common to both semi-deciduous forest and open plot.

Habitat	Species	Family	Absolute abundance
Semideciduous forest	Unidentified	Moraceae	8
	<i>Pausinystalia macroceras</i>	Rubiaceae	5
	<i>Polyalthia suaveolens</i>	Annonaceae	4
	<i>Strombosia pustulata</i>	Olacaceae	4
	* <i>Celtis mildbraedii</i>	Ulmaceae	4
	<i>Uapaca palludosa</i>	Euphorbiaceae	3
	<i>Anonidium mannii</i>	Annonaceae	3
	<i>Celtis philippinensis</i>	Ulmaceae	3
	<i>Pachypodanthinum staudtii</i>	Annonaceae	2
	<i>Tabernaemontana crassa</i>	Apocynaceae	2
	<i>Voacanga africana</i>	Apocynaceae	2
	<i>Dacryodes buettneri</i>	Burseraceae	2
	<i>Dacryodes klaineana</i>	Burseraceae	2
	<i>Margaritaria discoidea</i>	Euphorbiaceae	2
	<i>Drypetes gossweileri</i>	Euphorbiaceae	2
	<i>Angylocalyx vermeulenii</i>	Fabaceae	2
	<i>Staudtia camerunensis</i>	Myristicaceae	2
	<i>Trichilia</i> sp. 1	Meliaceae	2
	* <i>Cola acuminata</i>	Sterculiaceae	2
	<i>Cola pachycarpa</i>	Sterculiaceae	2
	<i>Cleistopholis patens</i>	Annonaceae	1
	* <i>Bombax buonopozense</i>	Bombaceae	1
	<i>Anthonotha</i> sp.	Caesalpinaceae	1
	<i>Distemonanthus benthamianus</i>	Caesalpinaceae	1
	<i>Loesenera talbotii</i>	Caesalpinaceae	1
	<i>Sindoropsis letestui</i>	Caesalpinaceae	1
	<i>Diospyros</i> sp. 1	Ebenaceae	1
	<i>Diospyros</i> sp. 2	Ebenaceae	1
	<i>Anthostema aubryanum</i>	Euphorbiaceae	1
	<i>Bridelia</i> sp. 1	Euphorbiaceae	1
	* <i>Bridelia</i> sp. 2	Euphorbiaceae	1
	<i>Drypetes afzelii</i>	Euphorbiaceae	1
	<i>Drypetes capillipes</i>	Euphorbiaceae	1
	<i>Ricinodendron heudelotii</i>	Euphorbiaceae	1
	<i>Uapaca</i> sp.	Euphorbiaceae	1
	<i>Pterocarpus soyauxii</i>	Fabaceae	1
	<i>Rhaphiostylis ferruginea</i>	Icacinaceae	1
	<i>Desbordesia glaucescens</i>	Irvingiaceae	1
	<i>Irvingia gabonensis</i>	Irvingiaceae	1
	<i>Beilschmiedia</i> sp.	Lauraceae	1
	<i>Entandrophragma cylindricum</i>	Meliaceae	1
	<i>Trichilia</i> sp. 2	Meliaceae	1
	<i>Trichilia</i> sp. 3	Meliaceae	1
	<i>Calpocalyx</i> sp.	Mimosaceae	1
	<i>Pentaclethra macrophylla</i>	Mimosaceae	1
	<i>Piptadeniastrum africanum</i>	Mimosaceae	1
	<i>Coelocaryon preussii</i>	Myristicaceae	1
	<i>Pycnanthus angolensis</i>	Myristicaceae	1
	<i>Strombosiopsis tetrandra</i>	Olacaceae	1
	<i>Canthium arnoldianum</i>	Rubiaceae	1
	<i>Pausinystalia johimbe</i>	Rubiaceae	1
	<i>Homalium longistylum</i>	Samydaceae	1
	<i>Chytranthus</i> sp.	Sapindaceae	1
	<i>Donella</i> sp.	Sapotaceae	1
	<i>Gluema ivorensis</i>	Sapotaceae	1
	<i>Leptonychia</i> sp. 1	Sterculiaceae	1



TABLE 6. Continued.

Habitat	Species	Family	Absolute abundance
Open plot	<i>Leptonychia</i> sp. 2	Sterculiaceae	1
	<i>Duboscia macrocarpa</i>	Tiliaceae	1
	<i>Theobroma cacao</i>	Sterculiaceae	39
	<i>Dacryodes edulis</i>	Burseraceae	10
	<i>Triplochiton scleroxylon</i>	Sterculiaceae	4
	<i>Trichoscypha acuminata</i>	Anacardiaceae	3
	<i>Combretodendron macrocarpum</i>	Lecythidaceae	3
	* <i>Cola acuminata</i>	Sterculiaceae	3
	<i>Alstonia boonei</i>	Apocynaceae	2
	<i>Newbouldia laevis</i>	Bignoniaceae	2
	<i>Terminalia superba</i>	Combretaceae	2
	<i>Phyllanthus discoides</i>	Euphorbiaceae	2
	<i>Albizia adianthifolia</i>	Mimosaceae	2
	<i>Ficus mucosa</i>	Moraceae	2
	<i>Elaeis guineensis</i>	Arecaceae	1
	* <i>Bombax buonopozense</i>	Bombacaceae	1
	* <i>Bridelia</i> sp. 2	Euphorbiaceae	1
	<i>Croton oligandrus</i>	Euphorbiaceae	1
	<i>Tetrapleura tetraptera</i>	Mimosaceae	1
	<i>Persea americana</i>	Lauraceae	1
	<i>Ongokea gore</i>	Olacaceae	1
	<i>Pogo oleosa</i>	Rhizophoraceae	1
	<i>Gambeya beguei</i>	Sapotaceae	1
	<i>Gambeya</i> sp.	Sapotaceae	1
	<i>Sterculia tragacantha</i>	Sterculiaceae	1
	* <i>Celtis mildbraedii</i>	Ulmaceae	1

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## APPENDIX. Epiphyte Vouchers Deposited at the University of Yaounde Herbarium (YA)

Genus species	Collector and number
<i>Ancistrorhynchus clandestinus</i> (Lindl.) Schltr.	Nkongmeneck 3115, 3337
<i>Ancistrorhynchus straussii</i> (Schltr.) Schltr.	Nkongmeneck 3074
<i>Angraecum</i> sp. 1	Nkongmeneck 3156
<i>Angraecum</i> sp. 2	Nkongmeneck 3159
<i>Angraecum</i> sp. 3	Nkongmeneck 3176
<i>Asplenium africanum</i> Desv.	Nkongmeneck 3072
<i>Asplenium currori</i> Hook.	Nkongmeneck 3269
<i>Asplenium</i> sp. 1	Nkongmeneck 3175
<i>Begonia polygonoides</i> Hook.f	Nkongmeneck 3153, 3387
<i>Bulbophyllum buntingii</i> Rendle	Nkongmeneck 3089, 3183
<i>Bulbophyllum calyptratum</i> Kraenzl.	Nkongmeneck 3116
<i>Bulbophyllum congolatum</i> Schltr.	Nkongmeneck 3093, 3133
<i>Bulbophyllum distans</i> Lindl.	Nkongmeneck 3076, 3080, 3132
<i>Bulbophyllum aff. flavidum</i> Lindl.	Nkongmeneck 3081
<i>Bulbophyllum fractiflexum</i> Kraenzl.	Nkongmeneck 3077
<i>Bulbophyllum fuscum</i> Lindl.	Nkongmeneck 3134
<i>Bulbophyllum imbricatum</i> Lindl.	Nkongmeneck 3119
<i>Bulbophyllum</i> sp. 1	Nkongmeneck 3089
<i>Bulbophyllum</i> sp. 2	Nkongmeneck 3118, 3214
<i>Bulbophyllum</i> sp. 3	Nkongmeneck 3124
<i>Bulbophyllum</i> sp. 4	Nkongmeneck 3169, 3234
<i>Bulbophyllum</i> sp. 5	Nkongmeneck 3212
<i>Calyptrochilum christyanum</i> (Rchb.f.) Summerh.	Nkongmeneck 3154, 3345
<i>Calyptrochilum emarginatum</i> Schltr.	Nkongmeneck 3100, 3275, 3320
<i>Chamaeangis vesicata</i> Schltr.	Nkongmeneck 3145
<i>Chamaeangis</i> sp. 2	Nkongmeneck 3090, 3901, 3902, 3101
<i>Cyrtorchis cf. chailluana</i> (Hook.f.) Schltr.	Nkongmeneck 3166
<i>Diaphanthe pellucida</i> (Lindl.) Schltr.	Nkongmeneck 3103
<i>Microgramma owariensis</i> (Desv.) Alst.	Nkongmeneck 3073, 3105, 3121
<i>Microsorium punctatum</i> (L.) Copeland	Nkongmeneck 3084, 3348
<i>Phymatodes scolopendria</i> (Burm.f.) Ching	Nkongmeneck 3070
<i>Platyserium stemaria</i> (P.Beauv.) Desv.	Nkongmeneck 3123
<i>Podangis dactyloceras</i> (Rolfe) Schltr.	Nkongmeneck 3352, 3358, 3563, 3377, 3381, 3393, 3396, 3397
<i>Podangis</i> sp.	Nkongmeneck 3178
<i>Polystachya adansoniae</i> Rchb.f	Nkongmeneck 3149, 3187, 3260, 3344, 3565, 3566, 3372, 3379, 3390
<i>Polystachya affinis</i> Lindl.	Nkongmeneck 3131, 3250
<i>Polystachya alpina</i> Lindl.	Nkongmeneck 3148, 3186, 3188, 3190, 3193
<i>Polystachya cf. coriscensis</i> Rchb.f.	Nkongmeneck 3361
<i>Polystachya elegans</i> Rchb.f	Nkongmeneck 3147
<i>Polystachya fractiflexa</i> Summerh.	Nkongmeneck 3152, 3161
<i>Polystachya laxiflora</i> Lindl.	Nkongmeneck 3094, 3097
<i>Polystachya odorata</i> Lindl.	Nkongmeneck 3102, 3164, 3331
<i>Polystachya paniculata</i> (Sw.) Rolfe	Nkongmeneck 3180, 3303, 3355
<i>Polystachya polychaete</i> Kraenzl.	Nkongmeneck 3110
<i>Polystachya tenuissima</i> Kraenzl.	Nkongmeneck 3157, 3172
<i>Polystachya cf. tenuissima</i> Kraenzl.	Nkongmeneck 3354
<i>Polystachya tessellata</i> Lindl.	Nkongmeneck 3162, 3245, 3265, 3332, 3567, 3374, 3398
<i>Polystachya</i> sp. 1	Nkongmeneck 3107
<i>Polystachya</i> sp. 2	Nkongmeneck 3150
<i>Rangaeris muscicola</i> (Rchb.f) Summerh.	Nkongmeneck 3173, 3184
<i>Rangaeris</i> sp.	Nkongmeneck 3163
<i>Rangaeris</i> sp.	Nkongmeneck 3181
<i>Rhipsalis baccifera</i> (J.S. Mill.) Stearn	Nkongmeneck 3113
<i>Summerhaysia laurentii</i> (De Wild) Cribb	Nkongmeneck 3160
<i>Tridactyle anthomaniaca</i> (Rchb.f.) Summerh.	Nkongmeneck 3191
<i>Vanilla africana</i> Lindl.	Nkongmeneck 3136, 3300