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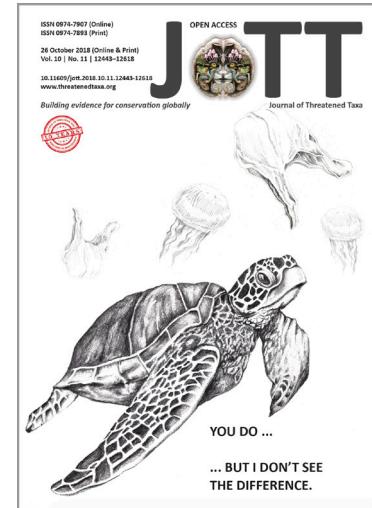
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SHORT COMMUNICATION

A CHECKLIST OF VASCULAR EPIPHYTES OF EL COMETA LAGOON, PANTANOS DE CENTLA BIOSPHERE RESERVE, MEXICO

Derio Antonio Jiménez-López, Candelario Peralta-Carreta, Jonathan V. Solórzano, Gerardo Luis Cervantes-Jiménez & Marco Antonio Domínguez-Vázquez

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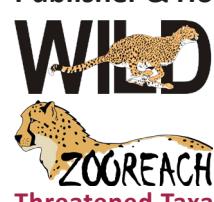
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A CHECKLIST OF VASCULAR EPIPHYTES OF EL COMETA LAGOON, PANTANOS DE CENTLA BIOSPHERE RESERVE, MEXICO

Derio Antonio Jiménez-López¹ , Candelario Peralta-Carreta² , Jonathan V. Solórzano³ , Gerardo Luis Cervantes-Jiménez⁴ & Marco Antonio Domínguez-Vázquez⁵

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Abstract: This study presents an updated checklist of vascular epiphytes found in the highly-conserved mangrove forest surrounding El Cometa Lagoon inside Pantanos de Centla Biosphere Reserve, Mexico. In order to perform this task, 25 sampling units were established at the study site and were visited at two stages, once in 2014 and next in 2016. Inside each sampling unit, all the epiphyte species found on host trees with a diameter at breast height 10cm were recorded. The complete epiphyte species list included 25 species belonging to 18 different genera. The richest family was Orchidaceae with nine species and the richest genus was *Tillandsia* with seven species. Additionally, the total epiphyte richness found in this study was among the highest reported for mangrove forests in Mexico. Epiphyte studies in mangrove forests are uncommon; therefore, this list is the first step to identify vascular epiphytes in the region and contribute to its proper conservation.

Keywords: Floristics, mangrove forest, Orchidaceae, Tabasco, *Tillandsia*.

Abbreviations: Pantanos de Centla Biosphere Reserve - PCBR, diameter at breast height - DBH.

Vascular epiphytes are represented by 27,614 species worldwide, which constitute 9% of the total vascular plant diversity (Benzing 1990; Zott 2013). Some of the most important angiosperm epiphyte families are Orchidaceae, Bromeliaceae, Araceae, and Piperaceae, while the most important fern-allies families are Polypodiaceae, Aspleniaceae, and Dryopteridaceae (Zott 2013). Mexico harbours approximately 1,650 vascular epiphyte species (Espejo-Serna 2014) and about 8.8% of them (146 species) are found in mangrove ecosystems (Carmona & Hernández 2015). It has been suggested that epiphytes are uncommon in mangrove forests due to: 1) the characteristics of the dominant host trees (e.g., type of bark, architecture, and presence of alkaloids and tannins), 2) the high temperatures frequent in

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these ecosystems, and 3) the exposure to brackish conditions (Benzing 1990; Zimmerman & Olmsted 1992; Zott & Reuter 2009). Several studies, however, have reported exactly the opposite, i.e., a high epiphytic diversity in certain mangrove forests (Carmona-Díaz et al. 2004). In Mexico, from the six mangrove species that can be found (i.e., host trees), the most common are *Rhizophora mangle* L., *Laguncularia racemosa* (L.) C.F. Gaertn., *Avicennia germinans* (L.) L. and *Conocarpus erectus* L. (Tomlinson 2016).

Mangrove forests are ecosystems of great economic and ecological importance in the tropical and subtropical coasts of the world (Tomlinson 2016). These ecosystems also harbour high functional diversity and productivity (Zaldívar-Jiménez et al. 2004; Rog et al. 2017). Mangrove forests are also very important ecosystems for carbon cycling dynamics because they are among the highest carbon sinks in terrestrial ecosystems (an average of 937tC ha⁻¹) (Donato et al. 2011; Alongi 2012).

Mangroves are one of the most studied coastal ecosystems in the world (Rioja-Nieto et al. 2017). Nevertheless, few studies have evaluated the epiphyte ecology and diversity in mangrove forests (Gómez & Winkler 1991; Robertson & Platt 2001; Zott & Reuter 2009; Cach-Pérez et al. 2013; Jiménez-López et al. 2017; Sousa & Colpo 2017). According to these studies, higher epiphyte diversity has been related to: (1) host trees with larger sizes (Jiménez-López. et al 2017; Sousa & Colpo

2017), (2) the lower canopy stratum (Cach-Pérez et al. 2013; Jiménez-López. et al 2017), (3) higher host tree densities (Cach-Pérez et al. 2013; Sousa & Colpo 2017) and (4) areas with higher precipitation (Cach-Pérez et al. 2013; Sousa & Colpo 2017).

The main objective of this study was to enlist the epiphyte species found in one of the most conserved subtropical mangrove forests in southern Mexico. The study was performed in a mangrove forest (Rzedowski 1978) located around El Cometa Lagoon inside Pantanos de Centla Biosphere Reserve (PCBR), Tabasco State, Mexico (Fig. 1). The dominant host trees were *Rhizophora mangle* L. and *Bucida buceras* L. (Jiménez-López et al. 2017; Solórzano et al. 2018). Two different time periods were required to obtain an adequate sampling of the forest, 10 days in July 2014 and 23 days in November 2016. The sampling units were concentrated on the southeast area of the lagoon where one of the most conserved parts of the forest can be found. Twenty 50×25 field plots (1,250m² each) and five transects of 50×5m (250m²) were used to sample the vegetation. The 20 plots were arranged following two gradients, a distance-to-the-lagoon and distance-to-the-biggest-channel, while using a minimal distance of 100m between plots (modified from Sousa & Colpo 2017; Fig. 1). The remaining five transects were located in the vicinity of some of the previous plots in rich epiphyte areas, in order to increase the probability of registering

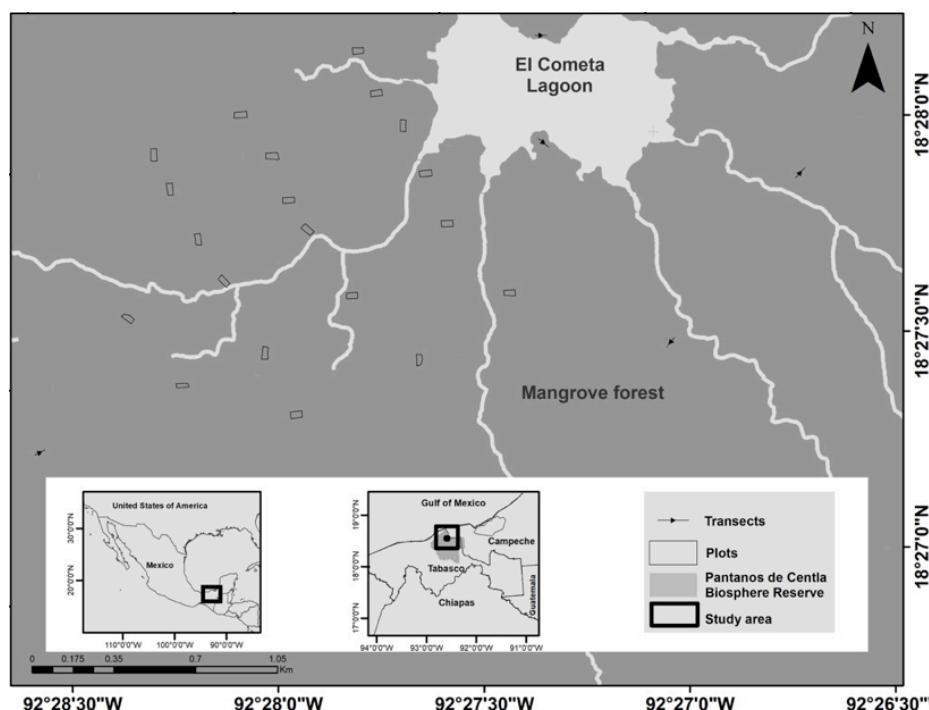


Figure 1. Study site and distribution of plots and transects, El Cometa Lagoon, Pantanos de Centla Biosphere Reserve, Tabasco, Mexico

most of the epiphyte richness of the site. Due to the reported correlation between host tree size and epiphyte richness in mangrove forests (Cach-Pérez et al. 2013), the biggest host tree individuals were expected to harbor most of the epiphyte richness. Therefore, epiphyte individuals were collected only from the host trees that had a diameter at breast height (DBH, breast height=1.30m) \geq 10cm (modified from Flores-Palacios & García-Franco 2006, 2008).

In order to identify the species, one to three epiphyte individuals that had a visible reproductive structure (i.e., either flower or fruit) were collected. When the individuals did not show any reproductive structure, they were collected and then grown ex situ in controlled conditions until they developed reproductive structures. Only afterwards the species was identified. Unfortunately, one species, *Myrmecophila* aff. *tibicinis*, did not show any type of reproductive structure during the study period; thus, its identity was not confirmed.

Every collected individual was pressed following conventional techniques (Lot & Chiang 1986) and was deposited in the HEM Herbarium of the Universidad de Ciencias y Artes de Chiapas. The species identity of every plant was determined using the specialized literature of Araceae (Croat 1983; Díaz-Jiménez et al. 2015), Cactaceae (Korotkova et al. 2017), Bromeliaceae (Ramírez-Morillo et al. 2004), Orchidaceae (Hágsater et al. 2005), and Polypodiaceae (Christenhusz et al. 2011; PPG I 2016) families and consulted with specialists (see Acknowledgements). Additionally, in order to obtain information about the vegetation types where each species can be found and their geographic distribution, the epiphyte collections at MEXU, HEM, CSAT, and UJAT herbaria were consulted. The scientific names of each recorded species followed Soto et al. (2007), while all species authors followed tropicos.org (<https://www.tropicos.org>) criteria.

In total, 25 epiphyte species (Appendix 1, Images 1 & 2) were reported. In terms of plant families, Orchidaceae was the richest family with nine species, followed by Bromeliaceae with eight species, and Polypodiaceae with four species (Appendix). The richest genus was *Tillandsia* L. with seven species, followed by *Trichocentrum* Poepp. & Endl. with two species. The number of species found in El Cometa Lagoon is equivalent to 17.13% of all the species reported in mangroves in Mexico (Carmona-Díaz & Hernández 2015). This means that in terms of vascular epiphyte richness, El Cometa Lagoon is currently ranked as the second richest mangrove forest in Mexico, after Sontecomapan (Magaña 1999; Valdez-Hernández 2000; Carmona-Díaz et al. 2004; Díaz-Jiménez 2007).

Currently, our checklist is the most complete epiphyte richness list of a mangrove forest inside Pantanos de Centla Biosphere Reserve (PCBR) and Tabasco. In previous efforts, a maximum of 23 species were reported inside PCBR (Gómez-Domínguez et al. 2014; Guadarrama-Olivera & Ortiz-Gil 2000; INE 2000); however, our checklist added nine more species to this list (Guadarrama-Olivera & Ortiz-Gil 2000; Gómez-Domínguez et al. 2014; Jiménez-López & Domínguez-Vázquez 2017; Jiménez-López et al. 2017). Additionally, our checklist added eight more species to the mangrove epiphyte richness of Tabasco State (Magaña 1999; Díaz-Jiménez 2007; Noguera-Savelli & Cetral-Ix 2014).

We suggest that *Laelia anceps* L., a previously reported species (INE 2000), should be eliminated from the epiphyte checklist of the mangroves found in the region. We think this species was misidentified, because it is typically found in oak-forests between 1500–2200 m (Hágsater et al. 2005) and it is not registered in the present orchid list of Tabasco (González-Aguilar & Burelo-Ramos 2017). Additionally, the present checklist updated: 1) three species names of the Orchidaceae family, a) *Epidendrum flexuosum* G. Mey., previously *Epidendrum imatophyllum* Lindl., b) *Specklinia brighamii* (S. Watson) Pridgeon & M.W. Chase, previously *Pleurothallis brighamii* S. Watson, c) *Specklinia grobyi* (Bateman ex Lindl.) F. Barros, previously *Pleurothallis grobyi* Bateman ex Lindl., 2) one species in the Polypodiaceae family, *Microgramma lycopodioides* (L.) Copel, previously *Polypodium lycopodioides* L., and 3) one species in the Cactaceae family, *Hylocereus undatus* (Haw.) Britton & Rose and *Selenicereus undatus* (Haw.) D.R. Hunt, reported as two different species (INE 2000) has been unified as one species: *Selenicereus undatus* (Haw.) D.R. Hunt (Korotkova et al. 2017). It is worth mentioning that *Bromelia pinguin* L. (Bromeliaceae) and *Trigonidium egertonianum* Bateman ex Lindl. (Orchidaceae) were not reported in our study, but were listed in the previous checklists (INE 2000). Finally, the current checklist corrects some misidentifications made in previous studies (Jiménez-López & Domínguez-Vázquez 2017; Jiménez-López et al. 2017).

On one hand, it has been suggested that a higher host diversity results in a higher diversity of substrates, microclimates, and conditions available for the establishment of epiphytes (Cach-Pérez et al. 2013; Stein et al. 2014; Wagner et al. 2015). Therefore, this heterogeneity of conditions result in a higher niche variability that can host a higher epiphyte diversity. On the other hand, communities with highly variable host tree architecture and size have been associated with higher



Image 1. Vascular epiphytes of El Cometa Lagoon: 1 - *Aechmea bracteata*, 2 - View of inflorescence of *Catasetum integrerrimum*, 3 - *Myrmecophila* aff. *tibinicis*, 4 - View of inflorescence of *Trichocentrum oerstedii*, 5 - *Tillandsia balbisiana*, 6 - *Selenicereus grandiflorus*, 7 - *Tillandsia fasciculata*, 8 - *Pleopeltis polypodioides*, 9 - *Anthurium schlechtendalii*, 10 - Flower of *Deamia testudo*, and 11 - Flower of *Encyclia alata*. © Dario Antonio Jiménez-López and Jorge Navarro-Ramos.

epiphyte richness (García-Franco 1996; Flores-Palacios & García-Franco 2006). Structurally homogeneous communities, however, have also been found to harbor high epiphyte richness (Sousa & Colpo 2017). In our study, host diversity was low, as two species, *Rhizophora mangle* L. and *Bucida buceras* L., were highly dominant (Solórzano et al. 2018). Thus, we consider this study as an example of a relatively homogeneous community in terms of diversity that harbors high epiphyte diversity.

Tillandsia was the genus with the highest species number; however, this was not surprising, as this species has been reported as tolerant to dry in high radiation conditions (Cach-Pérez et al. 2013; Chilpa-Galván et al.

2013). Physical conditions in mangrove forests (such as radiation, nutrients, and temperature) can be relatively extreme (Mikolaev et al. 2016). Mangroves usually eliminate salt through their leaves, which provokes a saline environment on the parts that epiphytes usually colonize (Tomlinson 2016). This salt condition can affect some epiphyte survival and growth rates (Zotz & Reuter 2009). Nevertheless, some epiphytes have adapted to survive under the saline conditions found in mangrove forests (Gómez & Winkler 1991).

No species was found to have a protected status under the Mexican legislation NOM-059-SEMARNAT-2010 (SEMARNAT 2010). *Tillandsia brachycaulos*, a frequently



Image 2 . Vascular epiphytes of El Cometa Lagoon: 1 - Flower of *Epiphyllum hookeri* subsp. *guatemalense*, 2 - View of plant of *Epiphyllum hookeri* subsp. *guatemalense*, 3 - *Microgramma nitida*, 4 - *Notylia barkeri*, 5 - View of *Phlebodium decumanum*, 6 - *Phlebodium decumanum* on *Acoelorrhaphis wrightii* H. Wendl. & Becc., 7 - *Microgramma nitida*, 8 - *Prosthechea boothiana*, 9 - *Tillandsia brachycaulos*, 10 - *Tillandsia bulbosa*, 11 - *Tillandsia dasyliriifolia*, and 12 - *Tillandsia streptophylla*. © Derio Antonio Jiménez-López and Jorge Navarro-Ramos.

found species in this study, however, is included under the Least Concern category in the Red List (IUCN 2017). This species was found preferably at low heights (1–2 m over ground height), where lower radiation and temperatures can be found (Mondragón et al. 1999; Cach-Pérez et al. 2013; Jiménez-López et al. 2017).

The present checklist represents an additional effort to register all the epiphyte diversity in the region. Furthermore, this information highlights the need

to consider epiphytes among the plant diversity of mangrove forests and include them in the conservation strategies inside PCBR and Tabasco, Mexico.

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Appendix 1. Checklist of the epiphyte species found in El Cometa Lagoon, Tabasco, Mexico.**POLYPODIOPSIDA**
Polypodiaceae***Microgramma nitida* (J. Sm.) A.R. Sm.**

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, and Tabasco), Belize, Guatemala, El Salvador, Panama, Nicaragua, and the Honduras.

Distribution: Mangrove forest, freshwater swamp forest, dry deciduous forest, and lowland evergreen rain forest.

Material examined: This study, D.A. Jiménez-López 43 (HEM); Campeche: Calakmul, Demetrio Álvarez M. and C. Jiménez J. 4334 (MEXU); Chiapas: San Fernando, Jorge Martínez-Meléndez 2185 (HEM); Ocosingo: E. Martínez S. 7961 (MEXU) and D.E. Breedlove 33976 (MEXU); Tabasco: Frontera, A. Novelo R. 4419 and 4405 (MEXU), A. Novelo R. and L. Ramos 2501, 2794, & 3078 (MEXU); Huimanguillo: C. Cowan 3257 (CSAT).

***Phlebodium decumanum* (Willd.) J. Sm.**

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, Quintana Roo, and Tabasco), Honduras, and Guatemala.

Distribution: Mangrove forest and lowland evergreen rain forest.

Material examined: This study, D.A. Jiménez-López 49 (HEM); Campeche: Calakmul, E. Martínez R. et al. 30257 (MEXU); Chiapas: Ocosingo, E. Martínez S. 8002 (MEXU); Quintana Roo: Othón P. Blanco, Silvia Torres 43 & 68 (MEXU).

***Pleopeltis polypodioides* (L.) E.G. Andrews & Windham**

Distribution in northern & central America: Mexico (states of Chiapas and Tabasco), Guatemala, Belize, El Salvador, Honduras, Costa Rica, and Panama.

Distribution: Mangrove forest and montane forest.

Material examined: This study, D.A. Jiménez-López 58bis (HEM); Chiapas: La Trinitaria, D. E. Breedlove 22348 (MEXU). Pueblo Nuevo Solistahuacán, A. Reyes-García 1638 (MEXU); Tabasco: Tenosique, Eizi Matuda 3572 (MEXU).

***Vittaria lineata* (L.) Sm.**

Distribution in northern & central America: Mexico (states of Chiapas and Tabasco), Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama.

Distribution: Mangrove forest, lowland evergreen rain forest, and montane forest.

Material examined: This study, D.A. Jiménez-López 50 (HEM); Chiapas: Acacoyagua, María Evangelina López-Molina 411 (HEM); Cacahoatan: Manuel Martínez-Meléndez et al. 5462bis, 5602 and 5539 (HEM); Ocosingo: E. Martínez S. 10121 (MEXU); Tabasco: Teapa, C. Cowan 3079 (CSAT).

MONOCOTYLEDONS**Araceae*****Anthurium schlechtendalii* Kunth**

Distribution in northern & central America: Mexico (states of Chiapas, Tabasco, Quintana Roo, Yucatán), Belize, Guatemala, Nicaragua, Honduras, and Costa Rica.

Distribution: Mangrove forest, dry deciduous forest, lowland evergreen rain forest, and montane forest.

Material examined: This study, D.A. Jiménez-López 40 (HEM); Campeche: Calakmul, J. Calónico Soto and D. Álvarez 23750 (MEXU); Hopelchén, Pascual Alvaro M. and Diego Pérez L. 201 (MEXU); Chiapas: Chicoasén, Angelita López Cruz 866 (HEM); Ocosingo, Gabriel Aguilar and D. Álvarez M. 3679 (MEXU), Gabriel Aguilar and Miguel Méndez M. 10143 (MEXU), Gabriel Aguilar et al. 6937 (MEXU) and G.A. Salazar et al. 8841 (MEXU); Ocozocuautla, I. March and R. Martínez C. 16 (MEXU); San Fernando, R.A. Palestina 1622 (MEXU) and Angelita López Cruz 820 (HEM); Villa Corzo, Emerit Meléndez López 62 (HEM); Tabasco: Frontera, A. Novelo R. and M. A. Ordoñez L. 4406 (MEXU); Tacotalpa, C. Cowan et al. 3421 (CSAT); Quintana Roo: José María Morelos, Demetrio Álvarez et al. 10458 (MEXU); Yucatan: Muna, C. Chan 2375 (MEXU).

Cactaceae***Deamia testudo* (Karw. ex Zucc.) Britton & Rose**

Distribution in northern & central America: Mexico (states of Chiapas, Tabasco), Guatemala, Belize, El Salvador, Honduras, and Nicaragua.

Distribution: Mangrove forest, freshwater swamp forest, and grassland.

Material examined: This study, D.A. Jiménez-López 41 (HEM); Chiapas: Ocosingo, J.P. Abascal A. et al. 350 (MEXU); Tabasco: Frontera, A. Novelo R. and Ramos V.L. 3011, 2772 and 2453 (MEXU); Tenosique, C. Cowan 3292 (MEXU).

***Epiphyllum hookeri* subsp. *guatemalense* (Britton & Rose) Ralf Bauer**

Distribution in northern & central America: Mexico (Tabasco state), Guatemala, and El Salvador.

Distribution: Mangrove forest.

Material examined: This study, D.A. Jiménez-López 36 (HEM); Chiapas: Acacoyagua, Angelita López-Cruz 296 (HEM).

***Selenicereus grandiflorus* (L.) Britton & Rose**

Distribution in northern & central America: Mexico (states of Chiapas and Tabasco), Honduras, and Nicaragua.

Distribution: Mangrove forest, freshwater swamp forest, and dry deciduous forest.

Material examined: This study, D.A. Jiménez-López 114 (HEM); Chiapas: Ocosingo, E. Martínez S. 21327 (MEXU). Tuxtla Gutiérrez, Héctor Hernández Macías 1684 (MEXU). Tabasco: Frontera, A. Novelo R. y M.A. Ordoñez L. 4400 (MEXU), A. Novelo R. et al. 4212 (MEXU).

Bromeliaceae***Aechmea bracteata* (Sw.) Griseb.**

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, Quintana Roo, Tabasco and Yucatán), Guatemala, Belize,

Honduras, and Nicaragua.

Distribution: Mangrove forest, freshwater swamp forest, semi-evergreen rain forest, dry deciduous forest, and lowland evergreen rain forest.

Material examined: This study, D.A. Jiménez-López 33 (HEM); Campeche: Calakmul, E. Martínez S. et al. 27671 (MEXU); Hopelchén, Demetrio Álvarez et al. 8912 (MEXU); Chiapas: Ocosingo, Gabriel Aguilar and Raúl Arcos M. 11399 (MEXU) and E. Martínez S. 21026 (MEXU); Reforma, Pedro Tenorio et al. 19363 (MEXU); Quintana Roo: Felipe Carrillo Puerto, J. Calónico Soto and E. Martínez S. 22497 (MEXU); José María Morelos, Demetrio Álvarez and A. Ramírez A. 10888 (MEXU); Tabasco: Frontera, M.A. Guadarrama O. and N. Muñiz Ch. 6553 (UJAT) and A. Novelo R. and Ramos V.L. 2510 (MEXU); Jonuta, M.A. Guadarrama O. et al. 6888 (UJAT); Yucatan: Tekax, Guillermo Ibarra Manríquez et al. 4120 (MEXU).

Tillandsia balbisiana Schult. f.

Distribution in northern & central America: Mexico (states of Chiapas, Quintana Roo, Tabasco, and Yucatan), Guatemala, Honduras, and Panama.

Distribution: Mangrove forest, dry deciduous forest, semi-evergreen rain forest.

Material examined: This study, D.A. Jiménez-López 48 (HEM); Chiapas: Ocosingo, E. Martínez S. 18588 (MEXU); Quintana Roo: Puerto Morelos, Edgar Cabrera 22 (MEXU); Tabasco: Frontera, A. Novelo R. et al. 4240 y 4420 (MEXU); Yucatan: Valladolid, Edgar Cabrera 11555 (MEXU).

Tillandsia brachycaulos Schltdl.

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, Tabasco, and Yucatan), Guatemala, El Salvador, and Honduras.

Distribution: Mangrove forest, semi-evergreen rain forest, and dry deciduous forest.

Material examined: This study, D.A. Jiménez-López 44 (HEM); Campeche: Calakmul, Celso Gutiérrez Báez 5216 (MEXU); Chiapas: Chicoasén, E. Martínez S. 24179A (MEXU); Tabasco: Frontera, A. Novelo R. and L. Ramos 2337 (MEXU) and G. Ortiz 5053 (MEXU); Yucatan: Valladolid, Edgar Cabrera 11556 (MEXU).

Tillandsia bulbosa Hook.

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, Quintana Roo, and Tabasco), Guatemala, and Honduras.

Distribution: Mangrove forest and dry deciduous forest.

Material examined: This study, D.A. Jiménez-López 45 (HEM); Campeche: Calakmul, E. Martínez S. 35007 (MEXU); Chiapas: Ocosingo, E. Martínez S. 18162 (MEXU); Quintana Roo: Cozumel, Edgar Cabrera 3453 (MEXU); Tabasco: Frontera, A. Novelo R. and L. Ramos 2972 (MEXU).

Tillandsia fasciculata Sw.

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, and Tabasco), Guatemala, Belize, El Salvador, and Honduras.

Distribution: Mangrove forest, pine forest, and montane forest.

Material examined: This study, D.A. Jiménez-López 118 (HEM); Campeche: Calakmul, E. Martínez S. 27211 (MEXU), Erika M. Lira C. 160 (MEXU) and Estela Madrid N. 37 (MEXU); Chiapas: Cintalapa, Nayely Martínez-Meléndez 2221 (HEM); La Concordia, Nayely Martínez-Meléndez 121 (HEM); La Trinitaria, Eizi Matuda 38651 (MEXU); Pantepec, J.M. Lázaro Zermeño 678 (MEXU); Siltepec, Nayely Martínez-Meléndez 1151 (HEM); Tabasco: Balancán, Fernando Menendez 295 (MEXU).

Tillandsia streptophylla Scheidw. ex C. Morren

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, Quintana Roo, and Tabasco), Guatemala, and Honduras.

Distribution: Mangrove forest, freshwater swamp forest, and lowland evergreen rain forest.

Material examined: This study, D.A. Jiménez-López 38 (HEM); Campeche: Hopelchén, Demetrio Álvarez M. 8916 (MEXU); Chiapas: Ocosingo, Demetrio Alvarez M. and A. Chambor 4854 (MEXU) and E. Martínez S. 7058 (MEXU); Quintana Roo: Puerto Morelos, G. Davidse 20062 (MEXU); Tabasco: Balancán, Eizi Matuda 3305 (MEXU); Comalcalco, G. Ortiz 2030 (MEXU). Frontera, A. Novelo R. 4426 (MEXU); Huimanguillo, F. David Barlow 30 (MEXU).

Tillandsia dasyliriifolia Baker

Distribution in northern & central America: Mexico (states of Tabasco and Yucatan) Belize, and Guatemala.

Distribution: Mangrove forest and dry deciduous forest.

Material examined: This study, D.A. Jiménez-López 32 (HEM); Campeche: José María Morelos, Demetrio Álvarez M. 11314 (MEXU); Tabasco: Frontera, M. A. Guadarrama et al. 6683 (UJAT); Yucatan: Progreso, C.L. Lundell and A. Lundell 7391 (MEXU).

Tillandsia usneoides (L.) L.

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, Quintana Roo, and Tabasco), Guatemala, Belize, Honduras, Nicaragua, Costa Rica, and Panama.

Distribution: Mangrove forest, dry deciduous forest, oak-pine forest, and dry deciduous forest.

Material examined: This study, D.A. Jiménez-López 115 (HEM); Campeche: Palizada, Eizi Matuda 3828 (MEXU); Chiapas: La Trinitaria, D.E. Breedlove 14496 (MEXU); Mapastepec, Eizi Matuda 2044 (MEXU); Motozintla, Eizi Matuda 5532 (MEXU). Quintana Roo: Othón P. Blanco, G. Carnevali 5151 (MEXU). Tabasco: Cardenas, S. Zamudio 382 (CSAT). Frontera, A. Novelo R. 3253 (MEXU). Jonuta, M.A. Guadarrama O. 6832 (UJAT).

Orchidaceae

Campylocentrum micranthum (Lindl.) Rolfe

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, and Tabasco), Guatemala, Belize, Honduras, and Nicaragua.

Distribution: Mangrove forest and dry deciduous forest.

Material examined: This study, D.A. Jiménez-López 116 (HEM); Zona Arqueológica de Becan, Campeche, Edgar Cabrera 8409bis (MEXU); Chiapas: Ocosingo, Gabriel Aguilar M. and Miguel Méndez M. 10139 (MEXU); Tabasco: Tacotalpa, C. Cowan et al. 3485 (CSAT).

Catasetum integrerrimum Hook.

Distribution in northern & central America: Mexico (Tabasco State), Honduras, and Nicaragua.

Distribution: Mangrove forest and lowland evergreen rain forest.

Material examined: This study, D.A. Jiménez-López 35 (HEM); Chiapas: Ocosingo, Gabriel Aguilar 11403 (MEXU); Tabasco: Frontera, Novelo R. and L. Ramos 3127 (MEXU).

***Brassavola grandiflora* Lindl.**

Distribution in northern & central America: Mexico (Tabasco State), Guatemala, and El Salvador.

Distribution: Mangrove forest.

Material examined: This study, D.A. Jiménez-López 46 (HEM).

***Encyclia alata* (Bateman) Schltr.**

Distribution in northern & central America: Mexico (Campeche, Chiapas, and Tabasco) and Honduras

Distribution: Mangrove forest, dry deciduous forest, and lowland evergreen rain forest, grassland, and freshwater swamp forest.

Material examined: This study, D.A. Jiménez-López 37 (HEM); Campeche: Calakmul, D. Álvarez M. 652 (MEXU) and E. Martínez S. 30081 (MEXU); Chiapas: Ocosingo, E. Martínez S. 6380 (MEXU); Tabasco: Cárdenas, M.A. Magaña and R. Curiel 974 (CSAT); Huimanguillo, M.A. Magaña and R. Curiel 970 (CSAT); Tacotalpa, C. Cowan et al. 3420 (CSAT); Teapa, A. Sol et al. 1094 (UJAT) and S. Zamudio 55 (CSAT).

***Myrmecophila aff. tibinicis* (Bateman) Rolfe**

Distribution in northern & central America: Mexico (Tabasco State).

Distribution: Mangrove forest.

Material examined: This study, D.A. Jiménez-López 47 (HEM).

Myrmecophila tibinicis is, however, distributed in Mexico (states of Campeche, Chiapas, Tabasco, and Yucatan), Belize, Nicaragua, and Costa Rica.

***Notylia barkeri* Lindl.**

Distribution in northern & central America: Mexico (states of Chiapas and Tabasco).

Distribution: Mangrove forest, lowland evergreen rain forest, and tropical rain forest.

Material examined: This study, D.A. Jiménez-López 39 (HEM); Chiapas: Ocosingo, Samuel Levi et al. 418 (MEXU).

***Prosthechea boothiana* (Lindl.) W.E. Higgins**

Distribution in northern & central America: Mexico (Tabasco State).

Distribution: Mangrove forest.

Material examined: This study, D.A. Jiménez-López 117 (HEM); Tabasco: Frontera, Novelo R. and L. Ramos 3126 (MEXU).

***Trichocentrum oerstedii* (Rchb. f.) R. Jiménez & Carnevali**

Distribution in northern & central America: Mexico (Tabasco State).

Distribution: Mangrove forest and freshwater swamp forest.

Material examined: This study, D.A. Jiménez-López 34 (HEM); Tabasco: Frontera, Novelo R. and L. Ramos 2802 (MEXU).

***Trichocentrum ascendens* (Lindl.) M.W. Chase & N.H. Williams**

Distribution in northern & central America: Mexico (states of Campeche, Chiapas, Tabasco, and Yucatan), Honduras, Nicaragua, and Belize.

Distribution: Mangrove forest and lowland evergreen rain forest.

Material examined: This study, D.A. Jiménez-López 42 (HEM); Chiapas: Ocosingo, Gabriel Aguilar 9783 (MEXU); Tabasco: Huimanguillo, M.A. Magaña and S. Zamudio 139 (CSAT); Teapa: J. Calólico et al. 34913 (MEXU).

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