Supplementary material

Functional and taxonomic spatial structure of vascular epiphytes in a neotropical montane cloud forest

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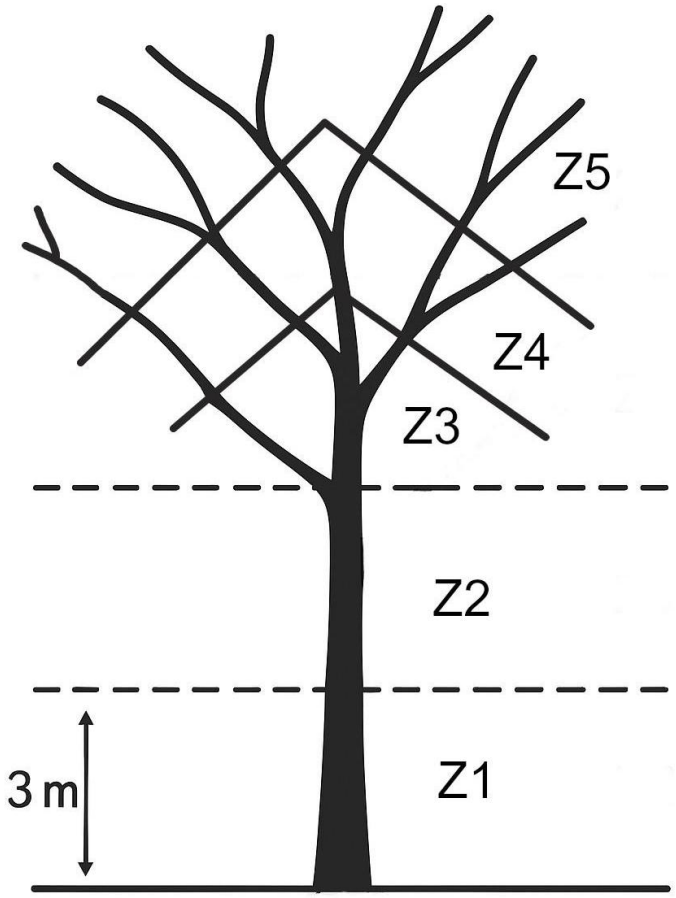
Table S1. Functional traits, trait categories, data type, and main information sources used to assign traits to species.

Functional trait	Categories	Data type	Source
Life form	True epiphyte	Yes/No	Zotz et al. (2021); field observations; consultations with experts in certain families.
	Hemiepiphyte	Yes/No	
	Nomadic vine	Yes/No	
Clonality	-	Presence/Absence	Observation of five individuals per species; literature search in Sciencedirect and Google Scholar.
Spinescense	-	Presence/Absence	Observation of five individuals per species.
Nutrient uptake strategy	-	Presence/Absence	Literature search in Sciencedirect and Google Scholar.
Dispersal syndrome	Anemochory	Yes/No	Literature search in Sciencedirect and Google Scholar.
	Endozoochory	Yes/No	
Photosynthetic metabolism	CAM	Yes/No	Literature search in Sciencedirect and Google Scholar.
	C3	Yes/No	

Table S2. References used to assign categories of functional traits.

Functional trait	**Source**
Life form	Zotz et al. (2021)
Clonality	Morton (1967); Luer (1975); Wilder (1988); Ray (1987); Kato et al. (1990); Smith (1993); Carnevali (1996); Luther & Kress (1996); Kvist & Skog (1992); Holtzmeier et al. (1998); Sanso & Xifreda (2001); Stenzel (2002); Ebihara et al. (2003); Smith et al. (2006); Lüttge (2007); Souza et al. (2009); Manzanares & Gouda (2010); Clark et al. (2012); Ertelt (2013); Kolanowska (2013); Li et al. (2013); Engels & Canestraro (2017); Silva et al. (2018); Sun et al. (2019)
Nutrient uptake strategy	Benzing & Renfrow (1974); Bradley et al. (1982); Newman & Reddell (1987); Bermudes & Benzing (1989); Michelsen (1993); Rains et al. (2003); Schneider et al. (2004); Rowe & Pringle (2005); Setaro et al. (2006); Kesseler et al. (2011); Lara-Pérez et al. (2015); Lehnert et al. (2017)
Dispersal syndrome	Tiffney (1986); Kvist & Skog (1992); Smith (1933); Luteyn (1989); Bremer & Eriksson (1992); Holst (1994); Yang et al. (2005); Hoffmann et al. (2006); Dosch et al. (2007); Vittoz & Engler (2007); Cascante-Marín et al. (2009); Pedraza-Peñalosa (2008); Tepe & Bohs (2011); Cogollo et al. (2013); Croat & Hannon (2015); Kellogg & Kubitzki (2015); Beavon & Kelly (2015); Gutiérrez et al. (2016); Mora & Clark (2016); Gamba et al. (2017); Zotz (2016); Castaño et al. (2018); Cedeño-Fonseca et al. (2020); Shee et al. (2020); Messenger et al. (2021)
Photosynthetic metabolism	Guralnick et al. (1986); Smith & Winter (1996); Zotz & Ziegler (1997); Reinert et al. (2003); Holtum et al. (2007); Lüttge (2007); Benzing (2008); Silvera et al. (2010)

Figure S1. Vertical zonation of host trees according to Johansson (1974).



Details and considerations regarding Johansson host stratification

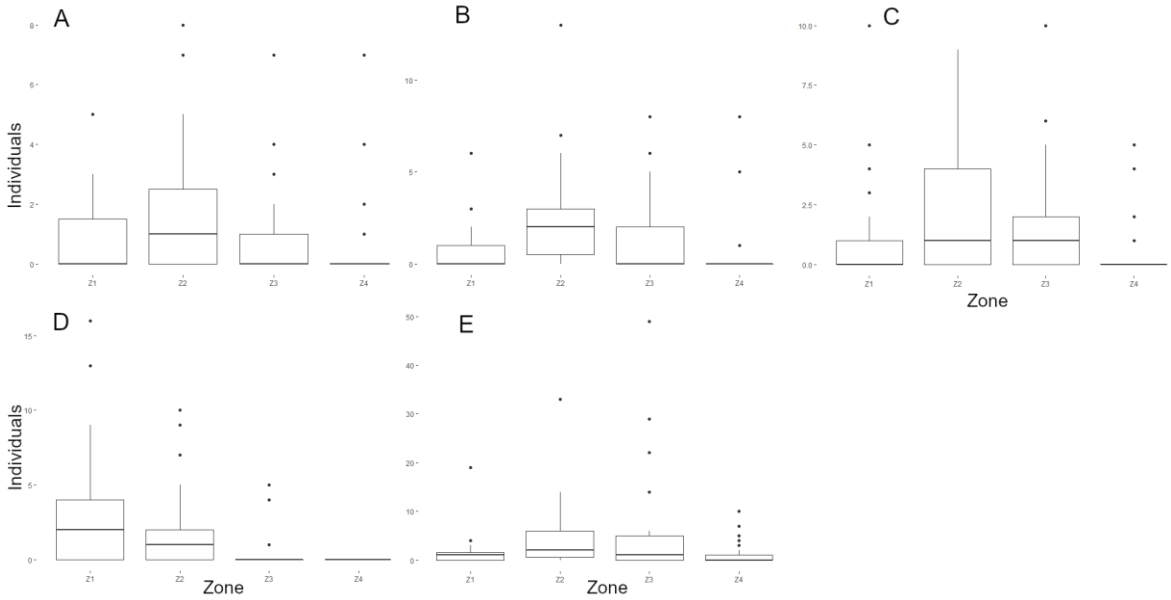
Johansson's Zone 1 corresponds to the base of the tree and extends from ground level up to 3 m. Zone 2 extends from the upper limit of Zone 1 to the first major branching point. Zone 3 comprises the basal portions of the larger branches, Zone 4 corresponds to their middle sections, and Zone 5 includes the outermost parts of the larger branches.

This vertical stratification has been widely used in epiphyte studies (Zotz 2007). However, several considerations have been raised regarding this scheme, since it is based on host structure rather than its absolute tree height. Attempts to develop alternative stratifications based on epiphyte composition or absolute phorophyte height have so far not produced consistent results (Zotz 2007).

Zotz (2007) proposed an alternative classification recognizing six zones defined by height above ground, substrate slope, and substrate diameter. Although not directly equivalent, these zones show partial correspondence with Johansson's system, particularly between the upper canopy zones and between the two lowest zones of Zotz and Zones 1 and 2 of Johansson.

Despite its limitations, Johansson's stratification continues to be widely adopted due to the absence of a more robust alternative. For a detailed discussion of the host vertical structure, see Zotz (2016, pp. 184–186).

Figure S2. Abundance of dominant epiphyte families across host zones.



Note. A) Araceae; B) Bromeliaceae; C) Ericaceae; D) Ferns; E) Orchidaceae. Boxplots show mean number of individuals per zone (horizontal line), interquartile ranges (boxes), approximate 95% confidence intervals (vertical lines), and outliers (scattered points).

Figure S3. Abundance of epiphyte families across host zones. The color scale represents increasing abundance from pale yellow to dark red.

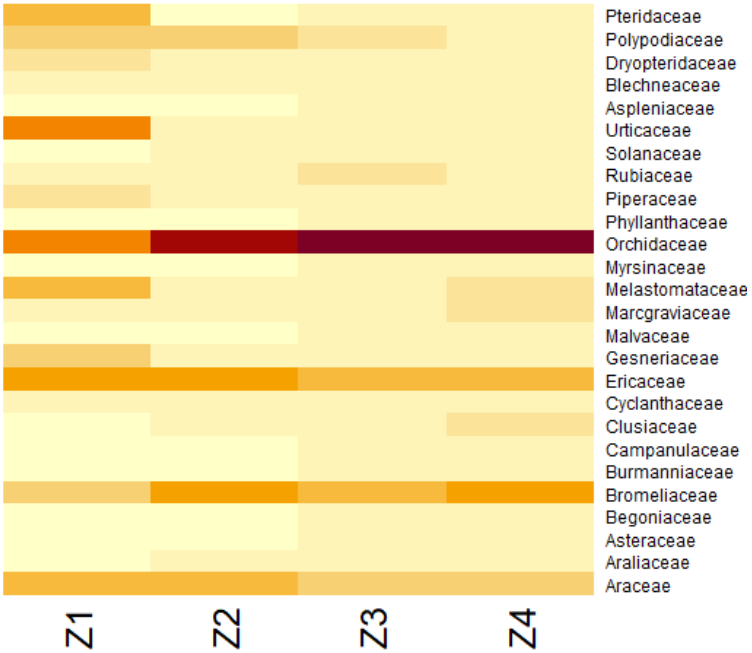
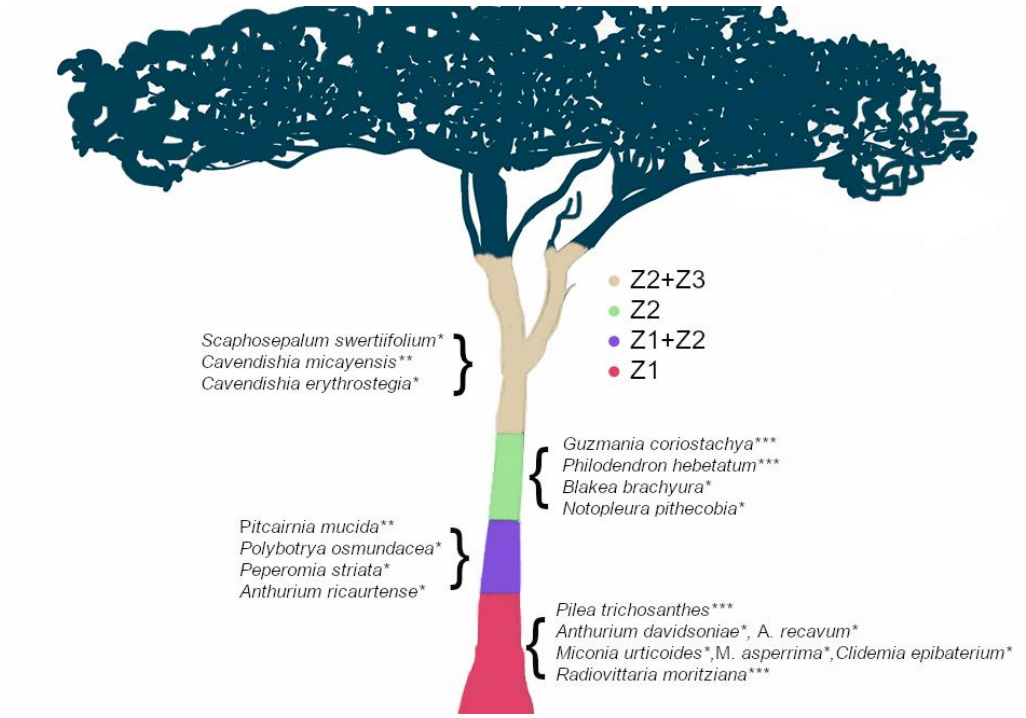
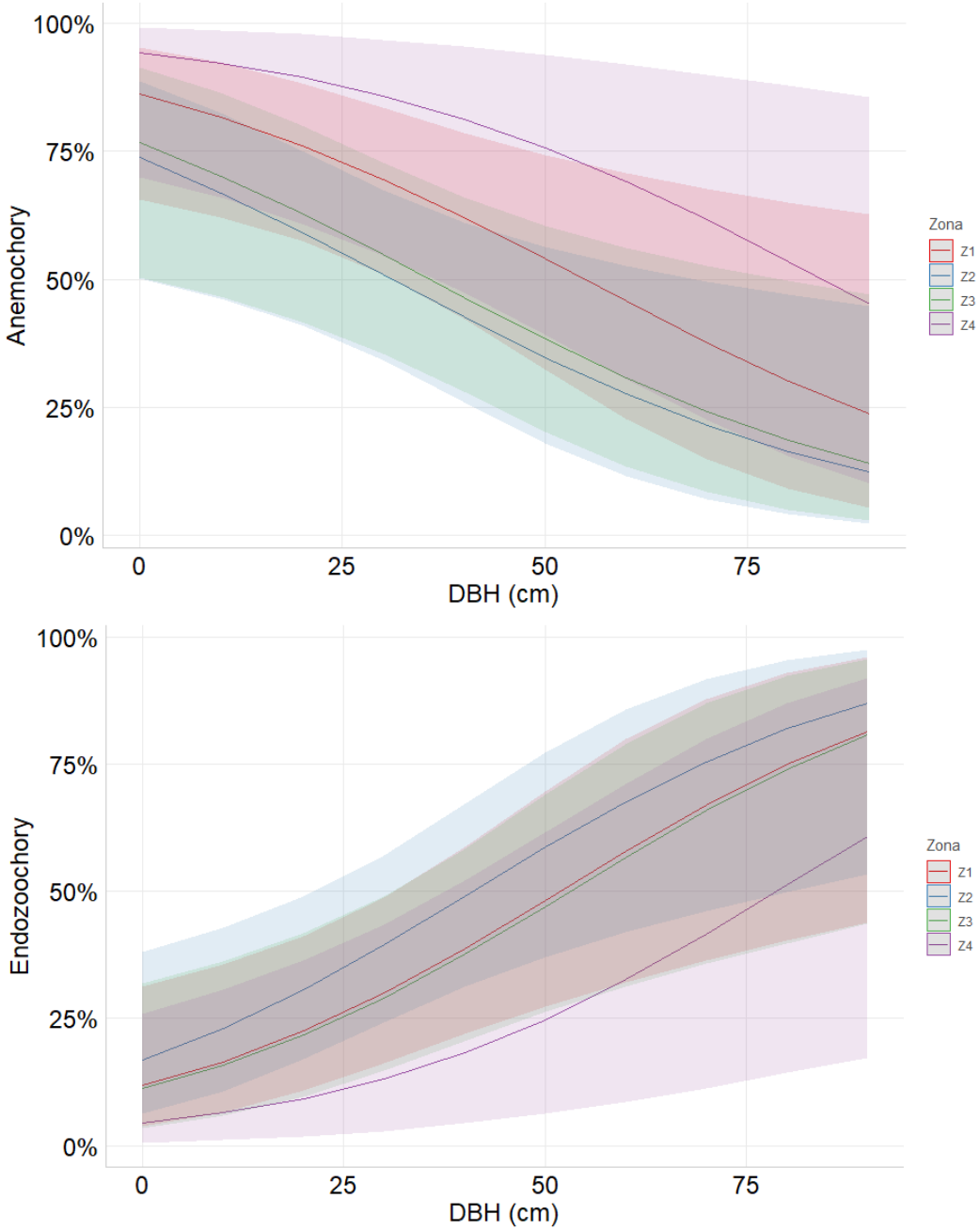


Figure S4. Species showing significant fidelity to different host zones.



Note. Significance levels: *** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$.

Figure S5. Partial effect plot showing variation in the proportion of dispersal types across host zones and DBH.



Note. Lines represent zones: Z1 (red), Z2 (blue), Z3 (green), and Z4 (purple).

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