

Introduction & Background:

The “luxuriant” appearance associated with wet tropical forests is due to the presence of *epiphytes*. Epiphytes were once thought to be parasitic although now we realize that they develop and create a unique epiphytic biogeochemical environment in which epiphytes not only receive nutrients from atmospheric water and chemicals (NO_x, SO_x) but also foster the development of *epiphytic soils* (In fact, I have collected Annelids from these canopy soils!).

Often the “host” tree sends out adventitious roots from their canopy branches to tap into these epiphytic soils as well (Which raises the question: “which came first; the epiphytes dependent on host trees OR the trees dependent upon the epiphytic plants?”). The soils develop from decaying plant and animal biomass in the canopy ensnared in roots and leaves of these epiphytic plants. The soils are rich enough to even support tree seedlings which germinate and begin development in the canopy. This may give these tree seedlings a competitive edge in establishing themselves to one day fill the canopy overhead... versus ungerminated tree seeds on the forest floor waiting for a “light gap” to develop and therefore trigger germination.

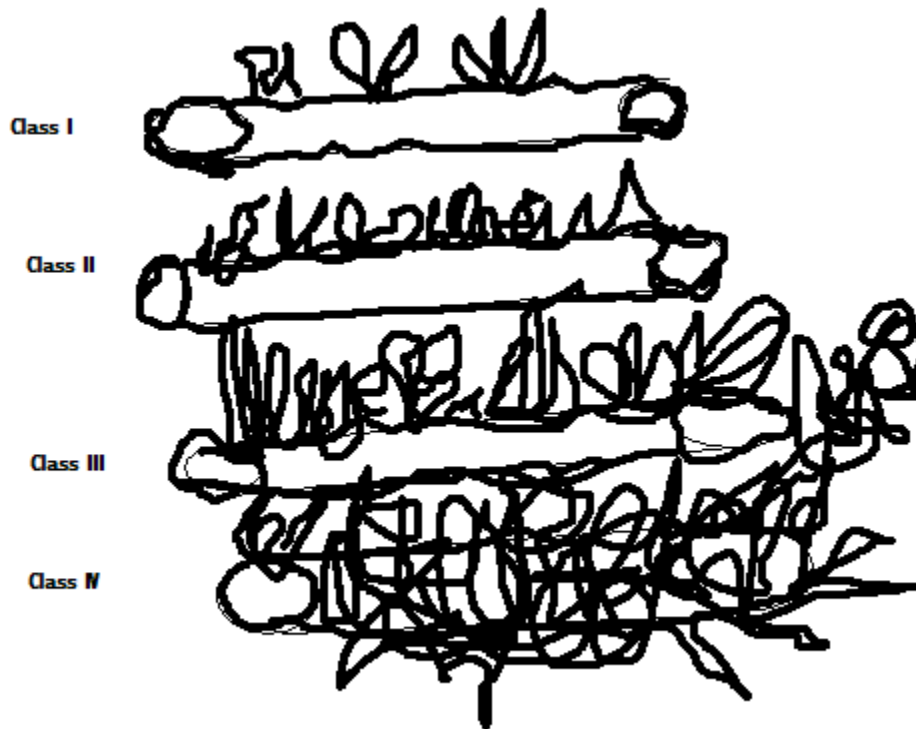
Epiphytes that send roots down to the ground below are known as “hemi-epiphytes”. Examples include: strangler figs and *Monstera* sp. (split leaf philodendron).

Of the 250,000 higher plants that have been scientifically described, 30,000 are epiphytes (Examples include: bromeliads and orchids). In montane cloud forests, epiphytes reach their zenith, accounting for 65% of the higher plant species found and up to 40% of the TOTAL biomass. Species diversity studies have found that a “typical” tropical tree has at least 50 species of epiphytes on it. In some montane cloud forests, the species diversity of epiphytes approaches 100 species per tree.

Field Problems:

- (1) Comparing Epiphytic Loads: Choose two sites with differing abiotic influences (i.e.: sunlight, exposure to wind and/or light, elevation). Describe the epiphytic class loads and relative health/ abundance of epiphytes. Account for the differences observed. See below.

Class Loads:



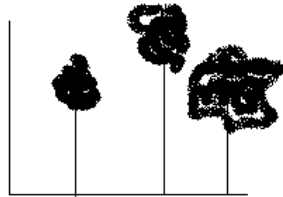
(2) Using Simpson's Species Diversity Index, dissect and mathematically determine the species diversity of a bromeliad that you collect. Be sure to include the abiotic factors that may influence the species diversity. Be sure to determine the pH of the water in the "cup" and time of day that you collected the bromeliad. You may use Recognizable Taxonomic Units (RTU) for the species diversity index.

Tropical Botany Field Problem & Notes:

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- (1) Field Problem: Select an area of forest and sketch a vertical profile to scale.
 - *Identify, by "synusia", the major plants found in each vertical strata.
 - *Identify each strata (forest floor, understory, canopy, emergent layer) on the y-axis.
 - Identify botanical characteristics of leaves, epiphytes, trunk, flowers, & fruits (you may include sketches)
 - Identify abiotic factors that seem to influence the botanical characteristics (develop a chart to organize your observations)
 - Identify any animal species you observe and note the vertical strata it occupies

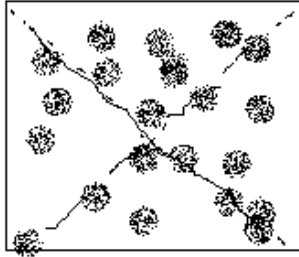
2. Mechanically Dependent
 - a. climbers
 - b. stranglers
 - c. epiphytes & hemiepiphytes



(2) Species Diversity Index By Using “Taxonomic Units” (Bromeliad): Separate Sheet

(3) Computing Canopy Density:

- a. Note location of bromeliad on tree
 - * relative hgt.
 - * aspect with respect to exposure/ sunlight
- b. Note Elevation (mid or upper slope)
- c. Calculate Canopy Density
 - * two (2) 10 meter transects; perpendicular with the tree as origin
 - * at one meter intervals, using densitometer, record + (cover) or 0 (sky)
 - * % cover = no. of + / total points



**Aerial View:
20M by 20M
Quadrat**

Adaptations, Structures, & Conditions To Look For:

- * xeromorphic leaf structure
- * epiphyllic plants (epiphylls)
- * cauliflory
- * epiphytic soils
- * CLASS LOADS (epiphytes)
- * apogeotropism
- * skototropism
- * smooth bark
- * canopy shyness & light gaps
- * buttresses, pneumatophores,
trunk / branch spine