

Ecology of epiphytes

Orchids and Bromeliads of Livingston, Izabal, Guatemala

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What are epiphytes?

- ❖ Epiphytes are defined as plants that grow on other plants. Mainly on shrubs and the trunks and branches of trees.
- ❖ epi = "on" phyte = "plant".
- ❖ The host or also called "phorophyte" is the place where an epiphyte grows and is used only as a support, that is, an epiphyte is not a parasitic plant because it does not obtain water or nutrients from the host. Instead, they use mechanisms to obtain it.

*Catasetum
integerrimum*
presents
psudobulbs or
modified stems to
store water



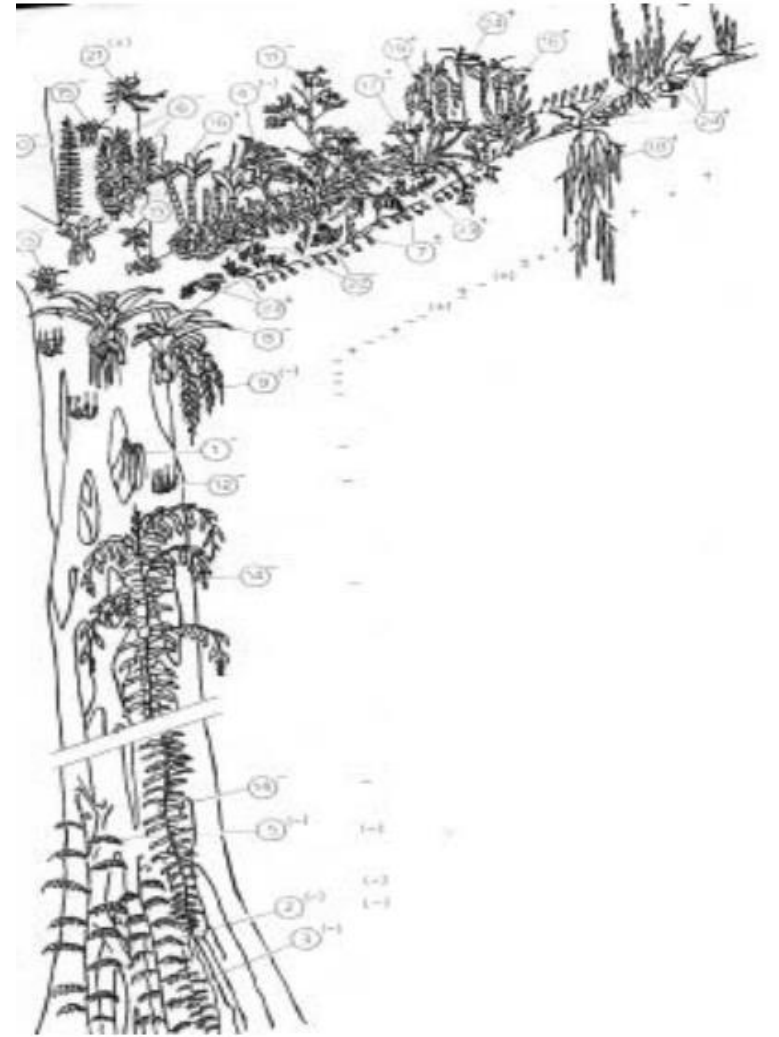
Photography: Cola de pato (*Catasetum integerrimum*)
Reserva Tapon Creek

- Some crevices or holes are sites of easy colonization for epiphytes, and they use very varied mechanisms to acquire water and nutrients from the environment, without taking them from the phorophyte. Such specialization sometimes involves mutualistic interactions with microorganisms, arthropods and some groups of vertebrates, in addition to very special morphoanatomic (plant shape and structure) and functional characteristics.
- **Mutualism:** Biological interaction, between individuals of different species, where both benefit and improve their biological aptitude.

Use of water and nutrients

- Of all life forms, epiphytes depend most directly on precipitation for water and nutrients transported by this medium.
- Many epiphytes have reservoirs for storage or other adaptations.
- The limiting factors for the development of epiphytes are:
 1. The shadow
 2. Drought
 3. Infertile substrate

- Epiphytes are so numerous that in some cases, their green zone can exceed the one of the tree in which they are living.
- They compete for light and nutrients, which can contribute to the death of the host when the density of epiphytes is very high.
- Trees can also change their bark or lose branches to free themselves from epiphytes.



Distribution

- Epiphytes can be found in both:
 - Tropical humid forests. Most of the existing epiphytic species are restricted to the humid tropics. They contribute 35 to 65% of all plant species in some rainforests in Central and South America.
 - Mountain and temperate forests where high humidity favors their proliferation and therefore there may be a large number of epiphytes.



Bromeliads Ecosystem in “Finca Black Creek”, Livingston

Classification

Epiphytes can be classified under the following parameters:

- ❖ By its phorophyte or host.
- ❖ For their life form and nutrition.
- ❖ Humidity and tolerance to desiccation.

By its phorophyte or host

Holo-epiphytes

- The "holo-epiphytes" or commonly called "true epiphytes" are those that develop their complete life cycle on the host, from seed germination to flowering and are unable to grow directly on the ground because in their early stages of development they need special conditions to germinate and establish (Casante, 2020).

Hemi-epiphytes

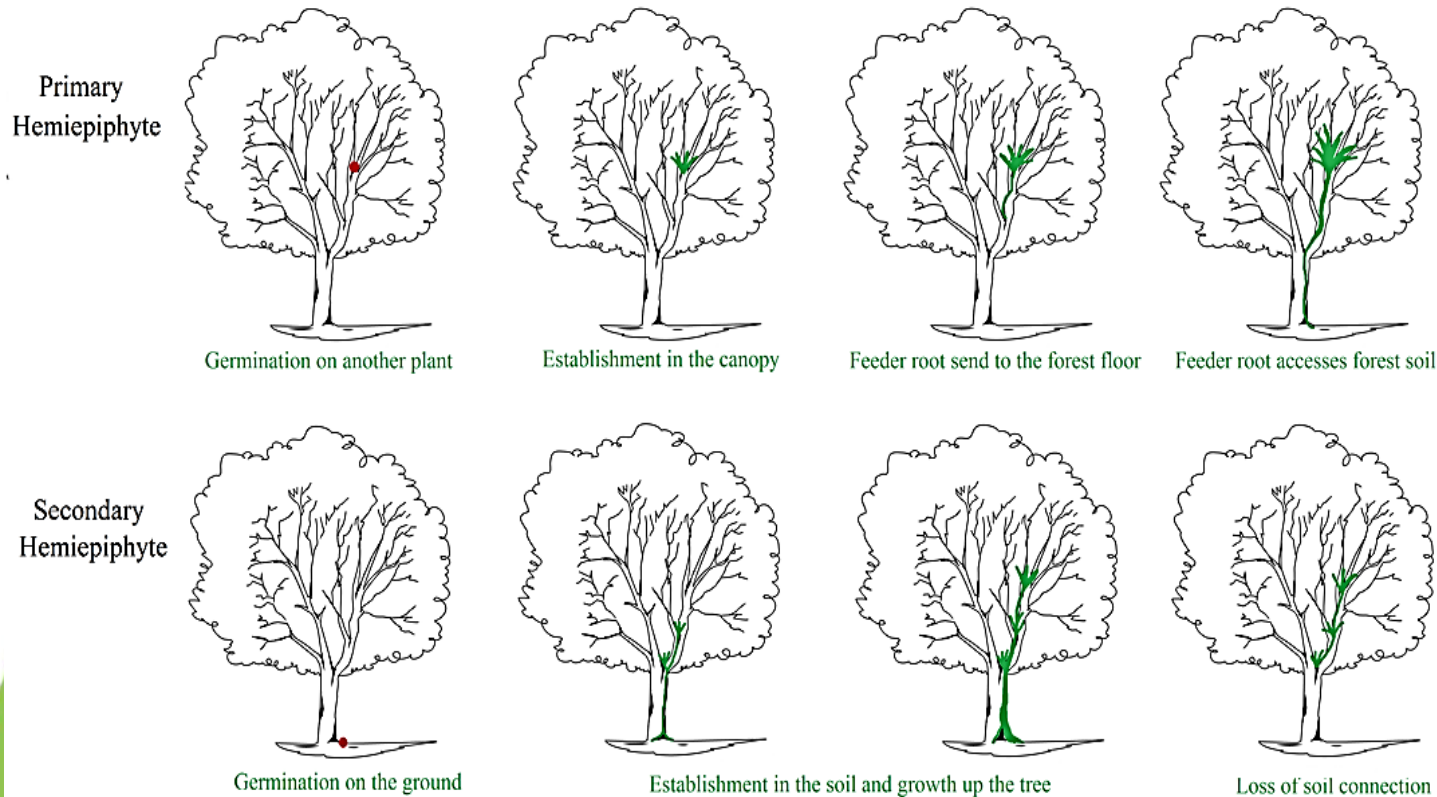
- The "hemi-epiphytes" are those that develop a part of their life on other plants.

➤ Primary Hemi-epiphytes:

Initially they germinate and grow on the host, later they develop long roots that descend and make contact with the soil.

➤ Secondary Hemi-epífitas

They germinate in the ground and develop stems that rise adhering to the trunk of the host by means of modified roots. These plants can remain connected to the ground for a long time, but they can eventually lose contact with the ground and become definitively established on the host.





Philodendrom radiatum, Playa Quehueche, Livingston
By: Vivian Hurtado

Facultative Epiphytes

- The "Facultative Epiphytes" are those species that have the ability to grow epiphytes or terrestrial and it is possible to find in the same place individuals growing on trees or on the ground, or in one place the species grows preferentially in an epiphytic way, while in another it does so in a terrestrial way, due to the particular ecological conditions of each place.

Accidental Epiphytes

- Predominantly terrestrial plants that accidentally germinate on the tree trunk.

Diversity of epiphytes

- According to Benzing (1989) the evolution of epiphytes in their relationship with vascular plants dates from the Pliocene-Pleistocene and was from aquatic ancestors during the conquest of the land. This caused stress, regarding the availability of water and nutrients in the terrestrial environment.
- Among the families best known as epiphytes are: Araceae, Piperaceae, Orchidaceae and Bromeliaceae.

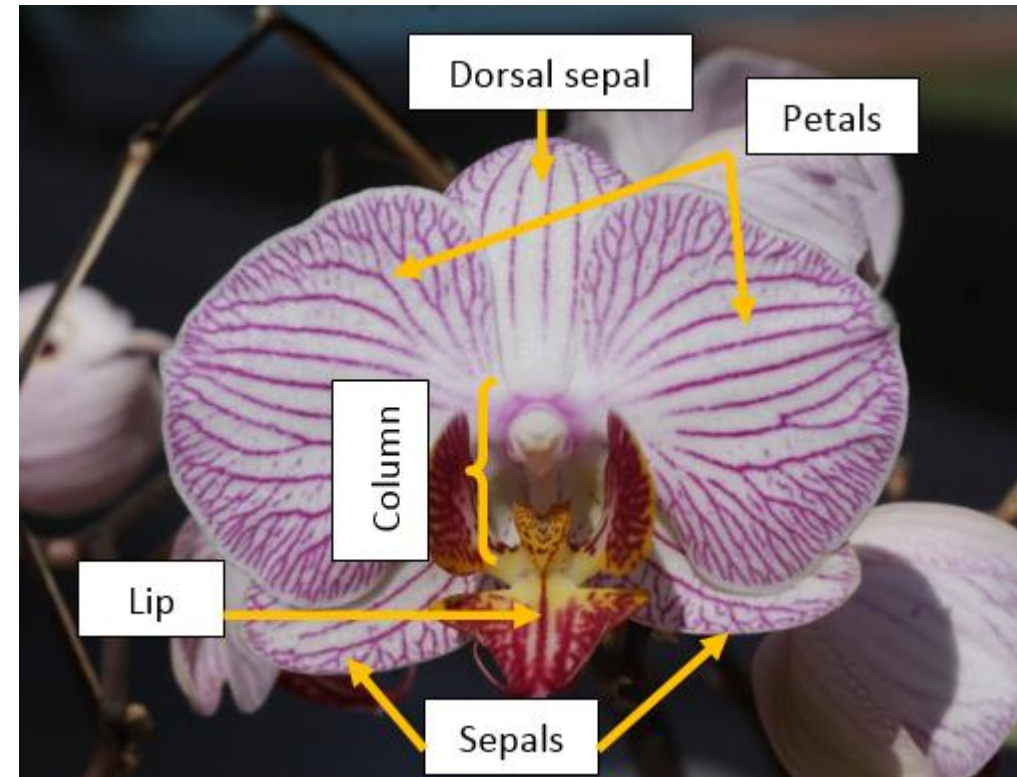
CUADRO 1. Diversidad taxonómica de las epifitas (Gentry & Dodson, 1987).

Número de taxas con epifitas vasculares		Porcentaje de epifitas del total de plantas vasculares
Especies	23 466	10 %
Géneros	879	7 %
Familias	84	19 %
Órdenes	44	45 %

Family Orchidaceae

- They have 3 petals (corolla) and 3 sepals (calyx).
- The lip is a modified petal so that insects can perch.
- The column is an elongation in the floral structure that contains the sexual organs.
- Mainly epiphytes, but can also be lithophytes (on rocks) and terrestrial.

❖ It is the biggest family of flowering plants, between 25,000 to 35,000 species.



Reproduction

A capsule is formed containing millions of orchid embryos. When they open, they fall to the substrate and their development depends on forming unions with fungi that help them feed..



“Keikis” or baby plants. A stem o pseudobulb that grows its own roots.



Velamen

- Their reproduction can be sexual (with the help of pollinators) or asexual (through keikis).
- Orchids produce the **smallest seeds of all angiosperms** and their pods can spread thousands of seeds that are often dispersed over great distances.
- The roots of many orchids extend outside the host. This allows them to adapt very well because they have a special fabric called “velamen” with a great capacity to absorb water during the rainy season and in the dry season it fills with air and acts as an insulator.

- Angiosperms: Flowering plants.

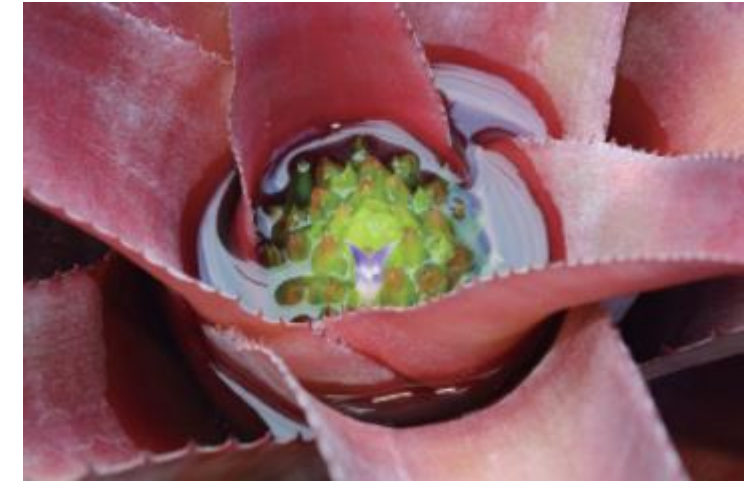
Family Bromeliaceae

- It has traditionally been divided into three subfamilies
 - Pitcairnioideae (terrestrial),
 - Tillandsioideae (epiphyte)
 - Bromelioideae (epiphyte and terrestrial)Although its been proposed new subfamilies: Brochinioideae, Lindamnioideae, Hechtioideae y Puyoideae

- Some can also be lithophilic
- Rosette-shaped growth without stem.
- The inflorescences generally emerge from the center of the rosette.
- "Tank" type structure, succulent leaves or peltate foliar trichomes.



Tricomas foliares peltados.



Estructura tipo "tanque"

- Bromeliads play an important ecological role, since ants, spiders and scorpions use them to make their homes and other types of insects, such as mosquitoes and small frogs, deposit their eggs in the water accumulated at the base of some species and also used for the development of their larvae or juvenile stages. The base of the leaves serves as a reservoir for rainwater, where once a large amount of organic matter accumulates. Many other groups of insects use these sites.
- A widely cultivated species of the Bromelioideae subfamily is the "pineapple."
- *Bromelia karatas* is edible
- "Pita" (*Aechmea magdalenae*) is used as a fiber



Piñuela (*Bromelia karatas*)
Senahú, Alta Verapaz
By: Nicholas Hellmuth



Pita (*Aechmea magdalenae*)
Camino a PN-YNN
By: Nicholas Hellmuth



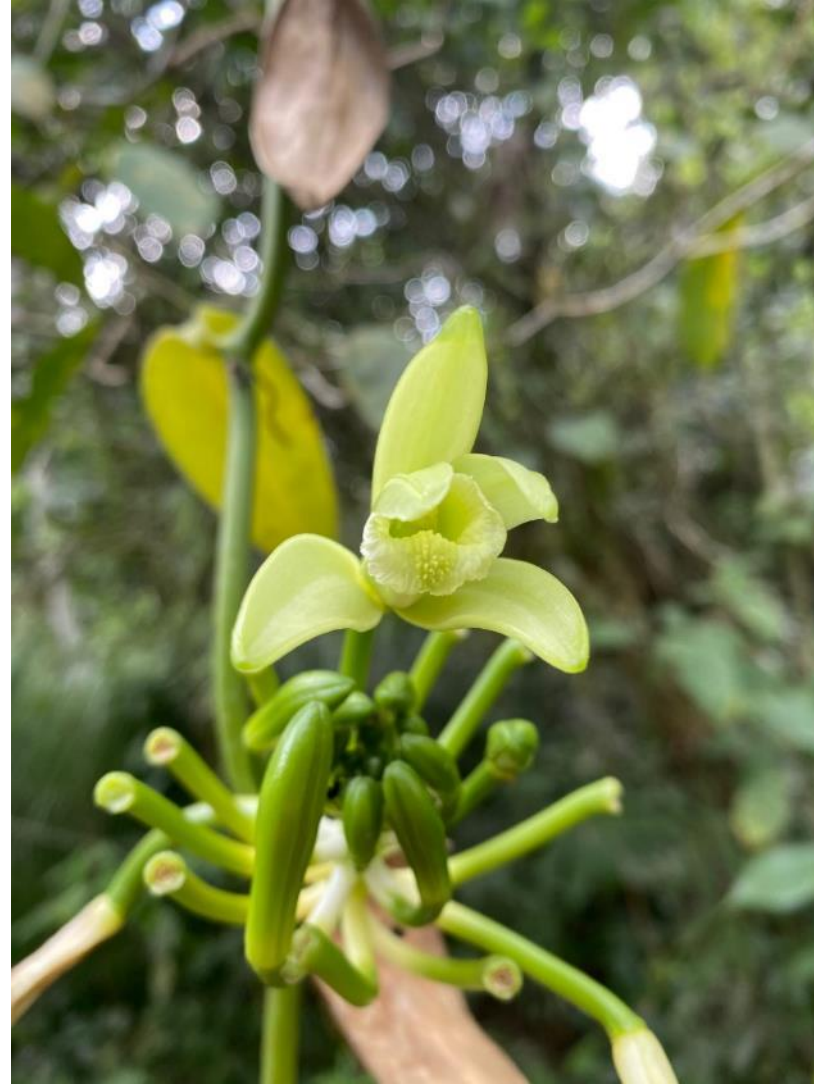
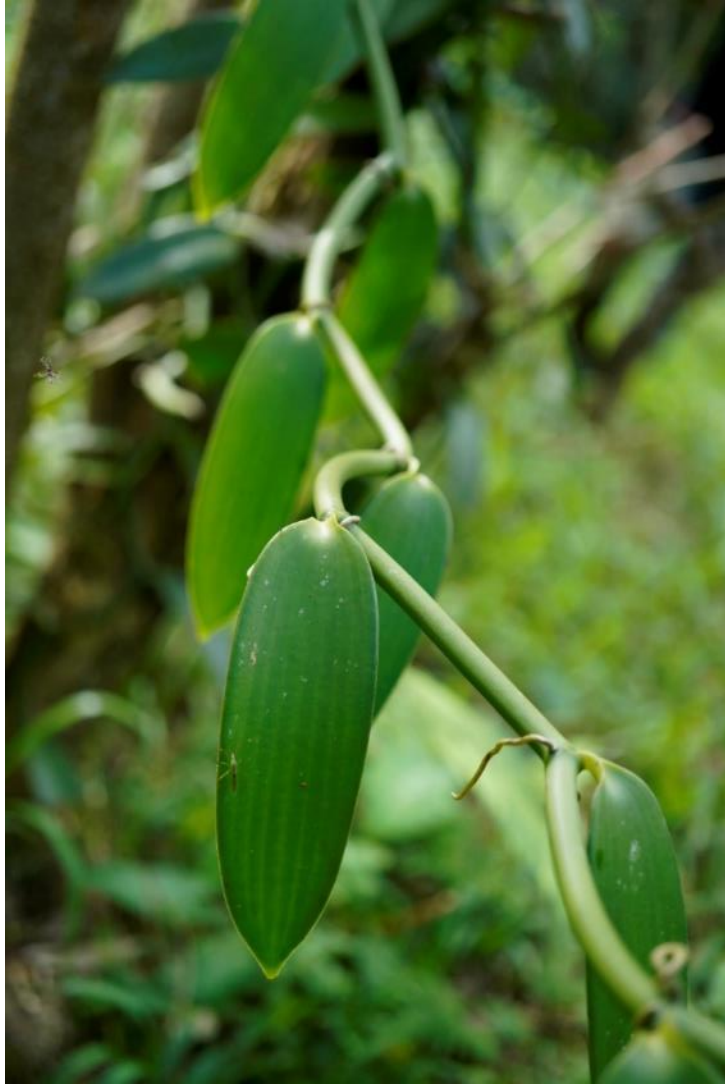
Photography of piñuela (*Bromelia karatas*)
Senahú, Alta Verapaz
By: Nicholas Hellmuth



Orchids and Bromeliads documented in Livingston



FAMILY ORCHIDACEAE



Vanilla sp
Finca where pirates hide
By: Victor Mendoza



Mormolyca hedwigiae
Finca Black Creek
By: Alejandra Gutiérrez



Ochidaceae
Cañon de Río Dulce
By: David Arrivillaga





Ochideaceae
Finca Where The Pirots Hide
By: Víctor Mendoza





Epidendrum flexuosum
Río Lámpara
By: Alejandra Gutiérrez

FAMILY BROMELIACEAE



Androlepis skinneri
Aldea Buena Vista
By: Nicolas Hellmuth





Aechmea tillandsioides
Río Tantín
By: Nicholas Hellmuth



Catopsis berteroniana
Lagunita El Salvador, El Golfete
By: Víctor Mendoza



Guzmania scherzeriana
Tapon Creek Reserva, Aldea Buena Vista
By: Nicholas Hellmuth y María Alejandra Gutiérrez



Tillandsia bulbosa
Rio Sarstun Laguna Grande Livingston
By: David Arrivillaga



Tillandsia Sp.
Aldea Buena Vista.
By: Nicholas Hellmuth



Tillandsia-streptophylla
Rio Sarstun Laguna Grande Livingston
By: María Alejandra Gutiérrez



Werauhia sp
Finca Black Creek
By: Nicholas Hellmuth

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Suggested readings

- Guía de identificación de Tillandsias <http://www.caftadr-environment.org/wp-content/uploads/2016/04/guia-de-Reconocimiento-de-Tillandsia-2.pdf>
- Catálogo de orquídeas y trífoliar informativo sobre orquídeas, elaborado por el IARNA <http://www.infoiarna.org.gt/orquideario-landivariano/orquideario/catalogo-de-orquideas/>
- <http://www.infoiarna.org.gt/wp-content/uploads/2019/02/tifoliar-orquideas-guatemala.pdf>
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- Importancia del dosel de los bosque tropicales <https://flaar-mesoamerica.org/wp-content/uploads/2020/09/Importancia-dosel-bosques-tropicales-Erica-Garcia-Boris-Llamas-FLAAR-Mesoamerica-Jan-2020-XA-DA.pdf>
- What did the Mayans eat? What about bromeliad fruit? <https://www.maya-archaeology.org/pinuela-edible-bromeliad-fruit/what-did-the-mayans-eat/pinuela-bromelia-karatas-bromelia-pinguin-edible-bromeliads.php>

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