

# CARNIVOROUS PLANTS OF AUYANTEPUI IN VENEZUELA

## Part 1

Photos and text by:

Lorenz Butschi, Allmendstr. 28, CH-3014 Berne

Translation by:

Dorothea Huber, Allmendstr. 28, CH-3014 Berne  
and

Dr. Klaus Ammann, Botan. Inst., Altenbergrain 21, CH-3013 Berne

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Bufot GmbH, Venedigstr. 35, CH-4142 Munchenstein

In February 1988, I climbed the Auyantepui for the third time with some friends in order to study its vegetation and to collect living plants. The ascent was difficult and very exhausting because each time we had to carry all our food and equipment for the duration of our expeditions.

The Auyantepui has a height of 1700-2400 meters and surface area of about 700km<sup>2</sup>, which is the largest of over 100 table-mountains of the Guyana Highlands. The word "Tepui" means mountain in the language of the Pemon-Indians who live in this part of the "Lost World". The Tepuis are relics caused by the partial erosion of a 3,000 meter high quartz-sandstone layer. The age of those sandstones, the so-called Roraima-Formation, is estimated at over 1000 million years. Although the Tepuis are separated from each other by extensive lowland plains, their lower layers often spread out as flat bases into the surroundings. In this way they form the typical terrace-like landscape of the Gran Sabana, as the southeastern Venezuelan Tepui land is called.

The larger parts of the Guayana Highlands are covered by rich seasonal rainforests, interrupted by extensive, wide and barren "savannahs". Like islands in the sea, here and there a Tepui will rise dramatically a thousand meters into the sky. The climate of the lower altitudes differs strikingly from that of the plateau while the lowlands with their changing humidity are stewing in constant heat, the Tepuis are often bathed in cool fog.

Since evolution of plant species took place on each rather isolated Tepui for a very long time, they are predominantly colonized by endemic organisms. The richly structured mesas offer very different biotopes such as bare rocks, alluvial sands, swamps, deep gorges, crevices, etc. resulting in a clear-cut mosaic of biocoenoses. Where there is enough soil, there grows a thick, low mist-forest rich in epiphytes. Due to the acid soil, poor in nutrients, there are particularly many carnivorophytes in this area. Beside the legendary and attractive *Heliamphora*, are a large variety of different *Utricularia*, *Genlisea* and *Drosera* species. Even Bromeliads are represented by at least two carnivorous species.

The notes below on ecology and occurrence of observed carnivorous species may give some useful hints for their cultivation.

*UTRICULARIA*. In addition to the approximately 20 smaller, mostly amphibious species, I discovered 5 tuberous species with especially large and decorative flowers: *U. asplundii*, *U. jamesoniana*, *U. alpina*, *U. quelchii* and *U. campbelliana*. They grow at altitudes of 1000m or more and almost every night are moistened by fog.

*U. jamesoniana* is a small epiphyte which grows on slightly mossy and always shaded trunks and branches between 1000 and 2000m altitude on the slopes and terraces of the Tepui. At the same locations, I also saw *U. asplundii* which prefers vertical, mossy rock faces in half-shade and which dries up quickly after being moistened. Its gracile stalks bear up to 10 showy flowers 2cm. in diameter. It can survive for longer periods of time under dry conditions due to its water-storing

See text VENEZUELA on page 18. Photos pages 16 & 17.



*Utricularia humboldtii*



*Utricularia quelchii*



Flower of *Brocchinia reducta*.



Unidentified *Utricularia* sp.



*Utricularia asplundii*



*Utricularia jamesoniana*

Below: *Brocchinia reducta* with fruits on foot of Auyantepui



tubers and shedding its leaves. *U. jamesoniana* and *U. asplundii* prefer somewhat higher temperatures than the following species: at night about 20°C, during the day up to 30°C.

*U. alpina* was found between an elevation of 1500 and 2000m on mossy tree-trunks in half-shade. *U. campbelliana* and *U. quelchii* are Tepui plants in the strict sense of the word and need to be cultivated at somewhat lower temperatures: at night about 16°C, daytime up to 26°C. Apart from the lower temperatures, *U. campbelliana* demands the same conditions as *U. jamesoniana*.

*U. quelchii* colonizes different habitats: vertical rock faces and tree-trunks covered with algae and mosses, open communities of mosses and lichens, bare peat and sphagnum, for the most part on oblique surfaces in half-shade.

All *Utricularia* species discussed so far have to be cultivated in small amounts of substrate which may occasionally be allowed to dry out slightly. They easily rot when constantly kept wet.

*U. humboldtii* is the largest species of the Genus. Its longstalked leaves are up to 40cm high and the flower scape may reach up to 1m. It has no storage tubers and it is without doubt adapted to live in the cups of Bromeliads, although it also grows in terrestrial populations in coarse peat. But nowhere else did I find them so beautifully developed as in *Brocchinia tatei*, *Brocchinia hechtiodes* and in dense colonies of *Oreocanthe septrum*, an *Abolbodaceae* of bromeliad-like habitus. The fruit of *U. humboldtii* is globular and about 20mm long. At maturity, the stalk of the fruit dries out in its middle section. The capsule moves very easily in the wind, opens by a slit, and releases its large seeds in great numbers. At this stage, the already well-developed, green and folded embryo is enclosed by a transparent and winged membrane. Falling into a pool of water, the embryo unfolds within a few hours to a star-like seedling. The subsequently developed juvenile leaves are irregularly dissected into tender linear lobes, which is an adaptation for the beginning of aquatic life in the cistern of a Bromeliad. You can find all the transitional life-forms between those having juvenile "leaves" and those with "branches", but no transitional forms to the adult leaves. The wirey stolons grow in arches from one cistern into the other where they can develop bladders up to 10mm! This species flowers in my greenhouse every Spring with numerous 6cm large flowers. I grow them in coarse peat in plastic pots which sit constantly in shallow water. Although I found *U. humboldtii* on the plateau at 1800m and higher, it may also be cultivated in warmer conditions.

*GENLISEA*. I found two of the 7 known species of the Guayana Highlands: *G. guayanensis* and *G. roraimensis*.

*G. guayanensis* is an aquatic plant of lower latitudes. At the tips of its 20cm long leaves and at the nodes of its flower stalks, it develops juvenile plantlets. It penetrates its large traps into the mud of puddles, ponds and slowly flowing waters. The water temperature is between 25-35°C.

*G. roraimensis* is a smaller species which populates several Tepuis. Mostly, it grows anchored in mud close under the water surface of shallow ponds and slowly flowing streamlets. The water temperature varies between 16°C at night and 30°C in the daytime. This species is autogamous and spreads only by seeds.

*DROSERA*. Of 11 recorded *Drosera* taxa, I was able to determine only 3 species for certain:

*D. sessilifolia* was found in the lowland savannah in open, sandy places. It looks in habitus and ecology very much like its closely related Asiatic species, *D. burmanni*.

*D. esmeraldae* is very abundant on the first terrace and on the mesa.

*D. roraimae*, often in dense colonies, grown on open, wet places on the mesa.

Most of the species discussed in this report are offered for sale or for an exchange of plants on the basis of equivalent rarity only. A free price-list is available from:

Dorothea Huber, Allmendstr. 28, CH-3014, Bern, SWITZERLAND

We cannot mail any *Genlisea* or *Utricularia* species to countries which only permit import of plants that are free of soil (for example, the U.S.A.)

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This small, night-active frog inhabits the tubes of *Brocchinia reducta* on Auyantepui, Venezuela.