



FLORA
YAXHA



FLAAR
MESOAMÉRICA

AQUATIC ORCHIDS?

Bletia purpurea

Yaxha, Petén, Guatemala

DR. NICHOLAS **HELLMUTH**



AQUATIC ORCHIDS?

December 2018

MAIN AUTHOR

Nicholas Hellmuth
FLAAR (USA)
FLAAR Mesoamérica
(Guatemala)

BIBLIOGRAPHY

Nicholas Hellmuth
Marcella Sarti

EDITORS

Marcella Sarti
Flor Setina

COVER PHOTOGRAPH

Nicholas Hellmuth

INTERNAL PHOTOGRAPHS

Nicholas Hellmuth

ART DIRECTION

Andrea Sánchez

This report was made in cooperation with the administrators of Yaxha-Nakum-Naranjo National Park to help locate and describe the Neotropical flora and fauna that have mostly not been noted for this area of Guatemala so that students, professors, and scholars around the world can see material that documents this park is a great place to do research and for interested lay people around the world to realize this park is definitely worth visiting. A parallel goal is to provide documentation for local people, especially in schools and local organizations, of the importance to protect the plants, birds, and other creatures of the biodiverse ecosystems that are now being discovered throughout his park.

COVER PHOTOGRAPH:

Bletia purpurea

Nikon D810. Lente Nikon 200mm f/4 AF-D Macro, f/16, 1/640, ISO 1250. Yaxha, Petén, Guatemala. Photography by: Nicholas Hellmuth, FLAAR Mesoamérica.

INDEX PHOTOGRAPH:

Bletia purpurea

Nikon D810. Lente Nikon 200mm f/4 AF-D Macro, f/16, 1/640, ISO 1000. Yaxha, Petén, Guatemala. Photography by: Nicholas Hellmuth, FLAAR Mesoamérica.





FLAAR Mesoamérica (Foundation for Latin American Anthropological Research), is a nonprofit Guatemalan institution founded under the direction and enthusiasm of Biologist Eduardo Sacayon and Dr. Nicholas Hellmuth, a specialist of Classic Mayan iconography and architecture who then evolved his research to focus on edible and utilitarian plants, with the aim of wanting to see our country be recognized throughout the world for its biodiversity of plants, cultures, and natural resources.

One of our main objectives at FLAAR Mesoamerica is to increase consciousness about caring and protecting Mesoamerican natural diversity. By utilizing high-resolution photography, we can better showcase the remarkable flora and fauna of Guatemala. These photographs, and the accompanying information, will awake the admiration and desire in those who follow our work. Thus, the FLAAR Mesoamerica teams create educational material about the biodiversity that deserves recognition and protection.

The work done at FLAAR Mesoamerica consists of the methodological compilation of facts about nature, flora, fauna, history, and cultures of Mesoamerica, and disseminate it to the largest audience both in Guatemala and around the world. We also are inspired to provide for all our readers plenty of annotated suggestions of lots of other reports, articles, theses, dissertations, and web sites via our bibliographies of suggested additional reading. So our focus is by generating materials that are easy to read, educational, reliable, and visually pleasing by using lots of full-color photographs, -just like this report!

We also prepare illustrated books and animations for primary school children and Mayan families in Guatemala to have access to information about the need to protect the fragile ecosystems and flora and fauna throughout this Central American republic.

We are open to work with, share, and, expand our accomplishments with other organizations, institutions, or companies that share our vision.

You can find more of our work throughout the different digital platforms of our directory:



www.FLAAR-mesoamerica.org
www.digital-photography.org
www.maya-ethnozoology.org
www.maya-ethnobotany.org

FLAAR_mesoamerica@flaar.org



NATIONAL PARK

YAXHA NAKUM NARANJO

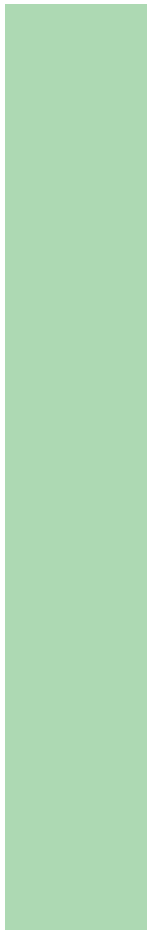
The Yaxha-Nakum-Naranjo National Park is a site of great natural importance and cultural heritage for our country. Because of the diversity of species that live here, both flora and fauna result in this park area being classified as a RAMSAR site since it comprises three types of wetlands identified by the Convention on Wetlands: temporary lagoons, karst systems and peat bogs. Of these systems, the lakes of Yaxha and Sacnab, the lagoons Lankaja, Champoxte and Juleque form an east-west chain of Yaxha open water areas. The Rio Ixtinto is another ecosystem as is the Rio Holmul (flowing past Nakum towards Naranjo). Plus the FLAAR Mesoamerica research teams have discovered previously unlisted, undocumented, and unexpectedly biodiverse ecosystems west of Lake Yaxha and east of Nakum. Most of these newly found ecosystems include bogs, water areas, and humid savannas of ferns.



View of Lake Yaxha from the temple 216, one of the wetland ecosystems declared by RAMSAR.

Nikon D5. Lente 100mm f/2, f/11.0, 1/80, ISO 125. Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth, FLAAR Mesoamérica.

The equally important and diverse cultural importance of the protected area lies in the heritage of the Mayan pre-Hispanic period, which includes 292 recognized sites of which four are monumental archaeological sites: Yaxha, Nakum, Naranjo and Topoxte Island. Other six intermediate archaeological sites: Naranjito, El Carmen, La Pochitoca, Poza Maya, El Bajón and El Pital, as well as 282 other smaller archaeological sites within their limits (Master Plan PNYNN, 2006). So this national park is worth visiting for its pyramids, temples, acropolises, ballcourts, sacbe (causeways) and for the remarkable diversity of vines, bushes, water plants, trees of every shape and size (from red-barked to white lichen-covered, to giant tall-growing trees in the hillsides and hilltop forests). Photogenic stingless bees, remarkable engineering and architecture of nests of wasps, termites, and ants, plus popular crocodiles, multiple fish species, and flocks of happy water birds, shore birds, wading birds, and diving water birds (also the rare King Vulture and bright colored toucans and their relatives) all await you to see, experience, and photograph them in Parque Nacional Yaxha Nakum Naranjo.



AQUATIC ORCHIDS?

While returning in a boat from a field trip in the month of ..., from the northeast side of Lake Yaxha, I noticed a pinkish to light purple flower along the shore. At the time I wasn't inspired to stop and look at the flower up close since we had to return to Guatemala City that afternoon (we had only a few minutes to get back to the dock at the Yaxha camp area and leave to the city) While moving forward, about 20 meters ahead, I saw more of these pinkish-purplish flowers in the entangled tall grass-like reeds again. Something told me that I couldn't let pass the chance of getting close to check whether we knew this plant from previous visits earlier in this year (2018). So I asked the *lanchero* to stop the boat and give us a moment to check them out. Quickly, together with Teco, the tour guide that was with us, we realized it was an orchid.

The first thing that came to my mind was: WOW! An orchid growing on the water, away from the shore!? (an expression that any tourist and flower enthusiast could have thought).



Bletia purpurea. The first approach with the plant, I can easily realize we were in front of an orchid. Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF.2. f/14. 1/320, ISO 4000. At Yaxha, Petén, Guatemala.
Photograph by: Nicholas Hellmuth

Noticing, then stopping, then photographing this rare off-shore orchid started a new chapter in my life of botanical studies. The primary orchids that I have been doing research on in the recent years are the diverse species of wild vanilla orchid vines (especially in Izabal and Alta Verapaz areas of Guatemala). Today was the first time I was face to face with an orchid associated with water. So let's follow the steps we took to figure out what genus, what species, and what history this orchid had to past generations of orchidologists.

- DR. NICHOLAS HELLMUTH



Bletia purpurea.

Every photograph of any flower in every Yaxha report must have month, day, and year, since botanists need to know in what month these plants bloom.

Juleque, Lankaja etc are lagoons; but Yaxha is best called (in English) a lake. You may use the word laguna in Spanish, but not in English for Yaxha

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4e FL ED VR. f/13, 1/320, ISO 1600. At Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea. Sighting of the light-pink flower at the shore
 Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/60, ISO 100.
 At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez.



Bletia purpurea.
 Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/50, ISO 100. At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez.



Bletia purpurea.
 Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/50, ISO 100. At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez.

DISCOVERING EVEN MORE OF THESE ORCHIDS FLOATING ON REED MASSES OVER THE LAKE

After the first stop where we observed these “orchids”, about 30 meters later, we saw more of these same size, shape, and colored flowers in the middle of more groups of reeds. We stopped once more and managed to take additional photographs, risking not arriving in time to the dock and maybe not to return to the city. We also had the commitment to return the boat at a certain time. But to have these remarkable orchid flowers in front of me every five minutes, in a lake that I have traveled around for many years (but never before noticed them), encouraged me to study them even as our boat had to return to the dock. I was also amazed that most of the park rangers in the boat had also not previously noticed these particular water-associated orchids.



Bletia purpurea. Sighting of the light-pink flower at the shore
Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. f/16, 1/640, ISO 2500. At Lake Yaxha, Petén,
Guatemala. Photograph by: Nicholas Hellmuth

For my part, I was sure that the orchid I have found in this lake is at least “semi-aquatic” in habitat because:

- ✔ They look very comfortable growing in the water. All their parts and buds are in great conditions and they look fully adapted.
- ✔ There are not always trees so close to the lake as to make it seem that they have “fallen from a tree limb and landed on the reeds over the water.”
- ✔ Even more importantly, all the plants were found in an ecosystem very similar. It looks like the communities of this orchid always choose reed and grass within the water to grow upon. There was no indication they fell by chance in the water and merely accidentally anchored to the first plant they found.



Bletia purpurea. The first approach with the plant, I can easily realize we were in front of an orchid.
Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF.2. f/14, 1/320, ISO 4000. At Lake Yaxha, Petén. Guatemala.
Photograph by: Nicholas Hellmuth



Bletia purpurea. This plant presents its flowers in a bunch-shape.
Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4.e FL ED VR. f/16, 1/320, ISO 4000.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.
Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. f/16,
1/320, ISO 4000. At Lake Yaxha, Petén, Guatemala.
Photograph by: Nicholas Hellmuth



Bletia purpurea.
Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. f/16,
1/320, ISO 4000. At Lake Yaxha, Petén, Guatemala.
Photograph by: Nicholas Hellmuth



Bletia purpurea. This plant presents its flowers in a bunch-shape. Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. F/16, 1/640, ISO 2000. At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

Many orchids similar to this one are known as “swamp orchids”, especially those of the genus *Habenaria*. The strange thing is that here, in the Yaxha-Nakum-Naranjo National Park, there are only a few swamps since in the main area all the water is in two open lakes (although it is true that at the height of the rainy season, as the water rises into wooded areas along the shores, then these shore areas become like a swamp).

When we first found this plant, we had no idea of their genus, much less the species of this orchid. While I back in the office, doing library research, I found abundant mention of semi-aquatic orchids in lakes, riverbanks and bogs in Guatemala. I appreciate the comments by many orchid specialists that they felt these orchids at Yaxha were simply fallen from tree limbs and grew on the water by accident. This inspires me to keep doing field work to document the true ecosystem where these orchids thrive. Plus I’ve talked to a Guatemalan botanical specialist in orchids, Fredy Archila, who clearly has said that in Guatemala there are orchids related to water.

I have even learned that in Guatemala there exist terrestrial orchids that can be expected in Peten (now we know what to look for in our next exploration to Yaxha).



Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4.e FL ED VR. f/14, 1/320, ISO 4000. At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

Your donations can make it possible for us to find more (terrestrial and more water associated) orchids. If your donation can cover the cost of an upcoming field trip or some of the resources we need for each field trip you would be welcome to join us at Yaxha-Nakum-Naranjo National Park to find more orchids, bromeliads, birds and pollinators (birds, ants, insects and here even mammals are pollinators). Plus of course you can experience the archaeological aspect of this extensive national park.



Sighting of the *Bletia purpurea* within the aquatic grass blocks near the shore of lake Yaxha. Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4.e FL ED VR. f/16, 1/320, ISO 4000. At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF2. f/14, 1/320, ISO 4000. At Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

IT WAS FINALLY IDENTIFIED!

While undertaking the field research, we asked the people from the community if they knew the name of this unexpected orchid, but no one did. As it happens, after a few days upon having returned from Yaxha, our friend and orchid expert, Alejandro Sagone, visited our FLAAR office and said that he also never had heard of any orchid with aquatic habits. After several days trying to identify the plant, two of our research assistants found the scientific name of the orchid independently. Elena Siekavizza got the contact of one orchid expert, Maria Silvia Palmieri, through our friend Sagone.



It turns out that the name of this orchid is *Bletia purpurea* (Lam.) D.C. In Mesoamerica this orchid is also known as Orquidea de Candelaria and “Pine Pink.” Some reports list this as a terrestrial orchid native from the south of the USA going through Central America up to northern Brazil.



Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4,e FL ED VR. f/13, 1/320, ISO 1600.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4,e FL ED VR. f/13, 1/320, ISO 1600.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4,e FL ED VR. f/13, 1/320, ISO 1600.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

Silvia received the photos of FLAAR Mesoamerica and suggested that the genus of the species could be *Bletia*. This tip helped Elena to search within all the species of this genus which was the correct one. On the other hand, Senaida Ba, found in a book about the River Usumacinta the same genus *Bletia*. So thanks to having a library of physical books on diversity of the Mesoamerican area, Senaida was able to reach this conclusion. So independently, several researchers coincided with the conclusion that the “aquatic” orchid that we had found in Yaxha was about *Bletia purpurea*.

The finding of these orchids by Nicholas Hellmuth is a great contribution for botanical research in the Yaxha area of the park. Even more than just finding these plants, we now have a series of photographs of high resolution of this beautiful plant within its unusual habitats. We are sure that, with the photographs that we have captured and with the debate that can be generated as to whether there are “aquatic orchids” or not, many people like botanists, students and experts in orchids, will be interested in visiting the Yaxha-Nakum-Naranjo National Park.



Bletia purpurea. Clusters of the plant inside the mass of reeds. Their roots are anchored to the stems of the aquatic grass and then the orchid roots often go straight down to touch the water. Nikon D810. Zeiss Makro-Planar T* 2/100 ZF.2 lens. F/14, 1/320, ISO 3200. At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

BIBLIOGRAPHIC MENTIONS ***OF BLETIA PURPUREA***

In the early years of botanical research the botanists used plant names which today are no longer used. Our research team has prepared a list of scientific documents (see the Bibliographies section at the end of this report) where you can find more information about this species. In the case of the book of Ames & Correll (1985), where *Bletia purpurea* is mentioned in Guatemala, they have records of this species in the departments of Alta Verapaz, Guatemala, Petén and Quiché, but there is no mention of in which ecosystem(s) this orchid lives. At no time is it mentioned if the plant was found in the branch of a tree over a river, or floating or on the shore of some body of water (page 751).



Bletia purpurea.

Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF2. f/14, 1/640, ISO 3200.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4.e FL ED VR. f/14, 1/320, ISO 1250.
At Lake Yaxha, Petén, Guatemala. Fotografía por: Nicholas Hellmuth.



Bletia purpurea.

Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/50, ISO 100. At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez.



Bletia purpurea.

Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/50, ISO 100. At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez.



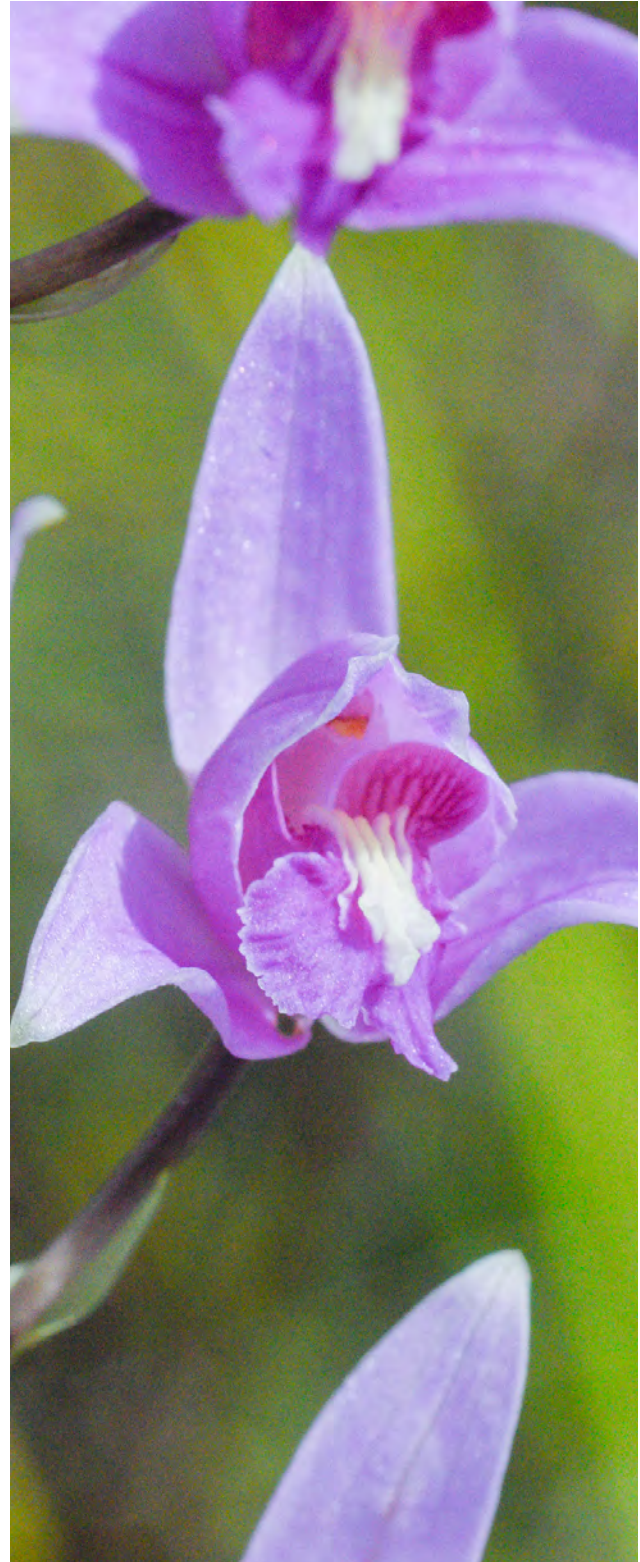
Bletia purpurea.

Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF.2. f/14, 1/320, ISO 4000.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth.

On the other hand, in one of the reports of Reyes (2008) that author clearly mentions the difference between plants with aquatic habits. This report does not include *Bletia purpurea* within the aquatic vegetation photos but is included in the aquatic plant poster next to Zapoton, *Pachira aquatica*. We also know that *P. aquatica* can be an off-shore plant (especially along the San Pedro River and Lake Izabal) where we have found these trees' roots growing in the water when the water level rises. In many areas the zapoton (also known as pumpo). You could almost call it "an aquatic tree" (when water is available). This tree however can also thrive far from water: we grow it in our FLAAR Mayan Ethnobotanical Research garden, at 1500 meters elevation, and no river anywhere nearby. We planted seeds from fruits provided to us from the Costa Sur and they are now flowering after about eight years in our garden.



Bletia purpurea possesses a corm (underground stem) with a 2 to 3 cm diameter and possesses up to 3 apical, lanceolate, acute and folded leaves that can measure up to 90 cm of length. Its flowers are lilac to purple and are arranged in a bunch of 3 to 40 flowers of 5 cm of width.



***Bletia purpurea*.**
Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF2. f/14, 1/640, ISO 1600. At Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

In page 28 of the Reyes report, the *Bletia purpurea* is listed next to other miscellaneous plants inside the mention “others that are associated with the shore...”. Clearly, in this opportunity, we confirm the fact, since at Lake Yaxha this plant grows always on the floating reeds in the water 1 or 2 meters away from the shore. In this same list is also included *Cucurbita lundelliana* that grows along Rio Ixtinto around Topoxte Island. However this wild relative of squash vine does not grow out atop the water; we find it 100% of the time on the shore, within one to three meters away from the water line. However in most areas of Peten, all rivers and lakes rise and fall in level depending on how much rain falls in that particular year’s rainy season. So most plants are submerged one or more months in most years.

Further on, Reyes explains the situation: «The denomination “associated” refers to species that are not strictly aquatic but that are related to water holes, wetlands, flooded areas...» (p. 35). She includes *Pachira aquatica* (zapoton) and *Haematoxylum campechianum* (Palo de Tinto) with *Bletia purpurea*, making reference that it is found within the water, at the shore of rivers, lakes or water holes.

Now that we have been doing field research in the Yaxha Nakum Naranjo park for many months, we have learned that almost no botanist has found more than a fraction of the plants that we now know grow here. There are two reasons why the list of plants for this part have not been complete:

1st: Capable botanists are also professors, or have positions back home in a botanical garden. So when they come to Yaxha it is only for a few weeks (and thus only in one season of the year). We come one week every month for an entire year: so we experience every flower that blooms the month that we are present.

2nd: most scholars live in a city and although they enjoy field work, they tend to stay in the areas that are easy to reach once they arrive at a park. In distinction, I have already been at Yaxha 3 to 4 months a year over a 5-year period in the 1970's. So I already know the core area. Thus now, decades later, I prefer to explore more intensely in un-visited areas, and look for unexpected ecosystems. So when we returned to Yaxha in subsequent months after first discovering this orchid, we focused on the shore reed ecosystem. During this focus, month after month, we kept finding more of these *Bletia purpurea* plants literally around the entire shore of the lake, and even in some of the water areas south of the lake (at the west end).



***Pachira aquatica*.**
Zapoton seed germinating at the water's edge.
At Rio Dulce, December 2011



***Haematoxylum campechianum*.**
Red dye tree, palo de tinto, at Yaxha, Petén, Guatemala.
Stick on the shore of Laguna Yaxha on the side of
El Sombrero Ecological Reserve.



Bletia purpurea.

Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. f/14, 1/125, ISO 1250.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

But the *Bletia purpurea* that we found were not precisely at the shore of Lagoon Yaxha, but instead over a meter and a half in the water, over the carrizo base. My suggestion so everyone has a clearer idea about the place where we found this orchid is that experts in ecology, biology, limnology could define the stratum of the lagoons of Yaxha and Sacnab to tell the difference between a microhabitat and other. It would be very useful to define the ecosystem that *bletia purpurea* needs to survive and be spectators of a beautiful orchid.

Besides the three species before mentioned Reyes (2008:65) in her “Taxonomical list of aquatic plants associated with water bodies of the Mayan Tikal- Yaxha region” enlists

- ✓ | *Catasetum integerrimum* Hook.
- ✓ | *Chysis bractescens* Lindl.
- ✓ | *Habenaria repens* Nutt
- ✓ | *Laelia tibicinsis* (Bateman) L.O. Williams
- ✓ | *Notylia tridachne* Lindl. & Paxton
- ✓ | *Oncidium adsendens* Lindl.
- ✓ | *Oeceoclades maculate* (Lindl.) Lindl.



Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4.e FL ED VR. F/14, 1/320, ISO 4000. At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

Any book about aquatic plants and riparian plants is of help, obviously, a book that covers both ecosystems would be fantastic. Thanks to the access to a good library with references about plants, animals, insects, etc... and with the access to uncountable digital publications, I think it would be very convenient that a biology or botanical student want to write a scientific article or thesis about “Orchids that grow in the water and not on the shore of the rivers, lakes, lagoons, and wetlands of the lowland Mayan areas” since there is nothing like it.

From the research my team and I did, all the findings we have found and the information that matches with our observations are the following: (Ochoa et al, 2017) on page 2006 mentions:

“Terrestrial plant, over rocks, dry wood on the trunk of trees, on trunks and stumps at swamps or floating in herb clumps and in the pasture over the water”



Bletia purpurea.

Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. f/16, 1/640, ISO 1250.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

THE FINAL DISCOVERY

AFTER DOING MORE RESEARCH

In Endañú-Huerta's Report, et al. (2017) states that the better-represented species in the sites are *Brassavola grandiflora* (8), *Bletia purpurea* (7) y *Habenaria repens* (6).” Since we now had *Bletia purpurea*, a list like this awakens my interest to see that multiple authors mention *Habenaria repens* in their reports, it makes me assume that this orchid is also associated with Maya water filled areas. Besides, in the chart, no 1 (p. 401) of the publication classifies these plants and its way of living as subaquatic and terrestrial. Amazing! This term refers that they grow underwater; my observations have been over the water though. Perhaps makes reference to its underwater roots since they stay submerged in the water!



***Bletia purpurea*.**

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4.e FL ED VR. F/13, 1/320, ISO 1600.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. f/16, 1/640, ISO 1250.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.

Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/50, ISO 100.
At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez



Bletia purpurea.

Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/60, ISO 100.
At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez.



Bletia purpurea.

Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/60, ISO 100.
At Lake Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez



Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR 600mm f/4.e FL ED VR. F/14, 1/320, ISO 2000. At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth

Another coincidence that I'm glad to have reaffirmed is the mention that these two authors make: *Bletia purpurea*, *Habenaria pringlei* y *H. repens* were found in subaquatic zones with other associated species (p. ej.), *Pistia stratiotes* L., *Salvinia minima* Baker) creating floating blocks scattered in the water streams.. It is clearly what we saw at Lake Yaxha in Peten for *Bletia purpurea*! For our next field trips, we'll pay attention to see if we can find *Pistia stratiotes* y *Salvinia minima*.

I hope this report becomes a motivation for students and researchers about the unexpected number of aquatic orchids (or water related) that can be found at the wetlands and water bodies in the Mayan region, in the south of Mexico as in the rest of Mesoamerica countries.

LET'S GENERATE MORE STUDIES ABOUT AQUATIC ECOSYSTEMS

The research about plants related to water could be a starting point for the investigation about the condition or deterioration of the aquatic ecosystems because of the anthropogenic activities in this part of Guatemala. These kind of studies would be a great contribution to the documentation of biodiversity and its changes through time whether any development of human activity close or inside these ecosystems is registered.

The study of this and other aquatic plants is also a contribution to the studies about the Classical Maya art. A lot of plants related to water were represented in the Mayan and Teotihuacan art and probably by other cultures too. For example, with botanist Charles Zidar we have suggested that the fleur de lis, stylized in many ancestral artifacts, could be the *Pachira aquatica* flower, zapoton. There are other flowers very similar to the zapoton, such as the ones from *Ceiba aesculifolia* (that are found frequently in the dry ecosystems parallel to the Rio Motagua). Another flower of similar shape is that of *Pseudobombax ellipticum* (both are found in the national park Tikal and also the adjacent Yaxha-Nakum-Naranjo).



Bletia purpurea.

Nikon D810. Lente Nikon 200mm f/4 AF-D Macro. f/14, 1/125, ISO 1250. At Lake Yaxha, Petén, Guatemala.
Photograph by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF2. f/14, 1/640, ISO 3200.
At Lake Yaxha, Petén, Guatemala. Photograph by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF2. f/14,
1/640, ISO 3200. At Lake Yaxha, Petén, Guatemala. Photo-
graph
by: Nicholas Hellmuth



Bletia purpurea.

Nikon D810. Lente Zeiss Makro-Planar T* 2/100 ZF2. f/14,
1/640, ISO 3200. At Yaxha, Petén, Guatemala. Photograph
by: Nicholas Hellmuth.

It is ironic that there are literally hundreds of species of orchids in the Maya Lowlands and even more in the humid Cloud Forest areas of the Maya Highlands. But so far few orchids have been suggested for Mayan paintings (and those that have been suggested have not yet been botanically, iconographically, or epigraphically proven. And one of the few orchids known to have been available to eat for the Mayan of the Classic period were wild vanilla orchid vines (which Teco, Senaida, and Nicholas have found in every bajo ecosystem in every part of the Yaxha park).



Nicholas Hellmuth taking photographs from a boat along lagoon Yaxha.

SPECIAL

ACKNOWLEDGEMENTS

We thank Lic. Leonel Ziesse –Coordinador Administrativo del Parque Nacional

Yaxha-Nakum-Naranjo (DGPCyN / MICUDE) Ing. Jorge Mario Vazquez –Jefe del Parque (CONAP)

Biolog. Lorena Lobos (CONAP) and Arq. Jorge Mario Ortiz We appreciate the assistance of all the helpful and knowledgeable park rangers of IDAEH CONAP who accompanied us each day. It is essential to have either an IDAEH and/or CONAP guardabosque or comparable park ranger when doing flora and fauna research. We appreciate the 16 years of knowledge of birds and plants of “Teco” (Moises Daniel Pérez Díaz). We also appreciate the assistance of park ranger Ricardo Herrera.



Bletia purpurea.

Canon EOS-1D X Mark II. Lente Canon EF 300mm f/2.9L IS II USM. F/2.8, 1/50, ISO 100. At Yaxha, Petén, Guatemala. Photograph by: Alejandra Gutiérrez



Nicholas Hellmuth photographing the *Bletia purpurea* from a boat, Senaida holding his shirt to balance the weight of the boat.

GLOSSARY

WORD

Ripario

DEFINITIONS

“A habitat that is strongly influenced by water and that occurs adjacent to streams, coasts and wetlands.” www.AmericanTrails.org In the search via Google I found an illustration that defines riparian as the ecosystem that starts where the water ends and continues 2-3 meters inside the mainland. This definition rules out that the riparian is within a body of water. Another definition that I have come across is where “riparian is defined as the vegetation, habitats and ecosystems that are associated with bodies of water (streams or lakes) or that depend on the perennial, intermittent or ephemeral existence of surface water. In simpler terms, the riparian areas are the corridors of trees, shrubs and grasses that grow along the course of the water. “ <https://articles.extension.org/pages/62490/what-is-a-riparian-area> This definition, however, does not give me any specific reference of the specific site where we find these orchids on the northern and southern shores of the Yaxha lake. However, it does not rule out that it may belong to a riparian ecosystem in other parts of Peten, Alta Verapaz, or Izabal (or Chiapas, Tabasco, Campeche, Quintana Roo or Belize, which are the areas surrounding Peten).

The *Bletia purpurea* orchids surrounding Lake Yaxha are never on the shore or above the shore. These orchids, around the lake, are one to two meters away from the shore (on reeds which float over the water): always. Along the south coast there are areas with reed masses up on dry land (because the lake used to cover these areas in past recent years, but 2018 was an unusually dry year so the lake level has gone down well over a meter (or more)). There is not one single solitary *Bletia purpurea* growing in any reed bunch away from the water.

GLOSSARY

WORD

Ripario

Nothing would surprise me for other watery areas in Peten: all the other lakes in the chain to the west, plus all the lakes and swamps around Rio San Pedro (towards the border with Mexico). My comments are specifically on the ecosystems where *Bletia purpurea* grows around Lake Yaxha. In Alta Verapaz botanists have listed *Bletia purpurea* for areas not associated with any river or lake. Senaida Ba found *Bletia purpurea* growing along the road from Senahu to Chipemech, up in the mountains. The soil is moist much of the year in this part of Alta Verapaz but there is no river or lake anywhere near where these orchids have adapted to between Senahu and Chipemech. So I would not be surprised if *Bletia purpurea* has adapted to other ecosystems elsewhere in Guatemala and especially in the many other countries for which it is listed.

Gradually we will produce an illustrated glossary to help clarify additional pertinent terms that are commonly a challenge to understand because each discipline uses the word slightly differently. An example of the terms that we believe should be clarified in the glossary is the term “Mesoamerica.” If you ask for a definition an archaeologist will get an answer based on cultural and linguistic aspects, and if you ask a botanist, your definition will probably be based on plants or ecosystems or geography. We define Mesoamerica as the area occupied by or influenced by trade or migrations from the core area inhabited by the Olmecs, Teotihuacan, Maya, Toltec, and Aztec civilizations. These cultures are the ones of Mexico and Guatemala which spread their languages and cultural heritage down as far as northern Costa Rica. Obviously the areas inhabited by the Mixtec, Zapotec and comparable cultures are also in the core of Mesoamerica (in this case in Oaxaca), and they traded with Teotihuacan to the north and the Costa Sur of Guatemala to the south. But it’s the Olmecs, Teotihuacans, Maya, Toltec and especially the Aztec whose culture and languages spread the furthest to the south.






MUCH MORE THAN A PARK

The Yaxha-Nakum-Naranjo National Park raises within its objectives the protection and conservation of the natural resources of the area, as well as the conservation of the ancient Mayan cities. Thanks to its natural beauty, the aspiration is for this place to be attractive to visitors and a source of income for the communities. It also aims to be a tool for environmental education, scientific research and ecotourism, leveraging the natural potential that exists in this protected area.

That is why our organization FLAAR Mesoamerica, with the support of the authorities that manage the park, has created the material you have in your hands, to generate interest among students, researchers and tourists visiting the area. FLAAR Mesoamerica has specialized in the photographic documentation of species of flora and fauna, and in the compilation of biological, botanical, ethnobotanical and ethnozoological research to make known the variety of natural resources that exist in the region

FOR MORE INFORMATION

-  www.destinoyaxha.com
-  www.flaar-mesoamerica.org
-  [@PN_YNN](https://twitter.com/PN_YNN)
-  [/pnynn.guatemala](https://www.facebook.com/pnynn.guatemala)
-  [/FLAARM](https://www.facebook.com/FLAARM)

HOW TO GET TO YAXHA?

MAP LEGEND

-  Archaeological sites
-  Airports
-  Earthworks
-  Highway



PROTECTED AREA



INDICATIONS

Go to the Mundo Maya airport in Santa Elena and then you will find a services of tourist vehicles to go to the archaeological site.

If you want to go by car from Guatemala City, take the following route: Río Dulce - Poptún - Flores. At the junction further on you will find on the left the route to Tikal. Go straight on to the right towards Yaxha (towards Melchor de Mencos). In km. 521 at the village La Maquina, turn left to the site.

Ecolodge El Sombrero is 50 meters before the entrance to National Park Yaxha - Nakum - Naranjo.

BIBLIOGRAPHY

CITED

Ames, O., & Correll, D. (1985). *Orchids of Guatemala and Belize*. Courier Corporation.

Backyard Nature. (9 de Octubre de 2011). *Orchid at mangrove's edge*. Obtenido de <https://www.backyardnature.net/yucatan/bletia.htm>

González, A. (2013). *Polinización*. Obtenido de Cleistogamia y casmogamia: <http://www.biologia.edu.ar/botanica/tema23/poliniza.htm>

Huamani, D. (2016). *Distribución altitudinal de orquídeas terrestres como indicador del cambio climático en el Cerro Uyuca*. Zamorano: Escuela agrícola Panamericana.

McVean, A. (2007). *Arboretum Universidad Francisco Marroquín*. Obtenido de Bletia purpurea: <https://arboretum.ufm.edu/plantas/bletia-purpurea/>

North American Orchid Conservation Center. (2019). *Bletia purpurea (Lam.) DC*. Obtenido de Facts about: <https://goorchids.northamericanorchidcenter.org/species/bletia/purpurea/>

Pfahl, J. (2018). *Internet Orchid Species Photo Encyclopedia*. Obtenido de Bletia purpurea: <http://www.orchidspecies.com/bletpurpurea.htm>

The Plant List. (2010). *Bletia purpurea (Lam.) DC*. Obtenido de <http://www.theplantlist.org/tpl/record/kew-22583>

BIBLIOGRAPHY CONSULTED

- Archila, Y. (2015). *Sistematización del modelo de restauración ecológica del centro de conservación orquígonia: Cobán, Alta Verapaz*. Guatemala: Universidad Rafael Landívar.
- De MacVean, L., & Monzón, J. (2016). *Estudio preliminar de la flora de la estación científica "Refugio del quetzal", volcán Atitlán, Guatemala*. Guatemala: Universidad del Valle de Guatemala.
- Dutra, D., Johnson, T., Kauth, P., Stewart, S. K., & Richardson, L. (2008). Asymbiotic seed germination, in vitro seedling development, and greenhouse acclimatization of the threatened terrestrial orchid *Bletia purpurea*. *Plan Cell Tiss Organ Cult*, 11-21.
- Ecobiosis. (2013). *Ficha especie: Bletia purpurea (Lam.) DC*. Obtenido de <http://ecobiosis.museocostarica.go.cr/especies/ficha/1/4015>
- GBIF. (2017). *Bletia purpurea DC*. Obtenido de <https://www.gbif.org/species/2794604>
- Johnson, T. R., & Kane, M. E. (2013). Differential germination and developmental responses of *Bletia purpurea* (Orchidaceae) to mannitol and sorbitol in the presence of sucrose and fructose. *Journal of Plant nutrition*, 702-716.
- Johnson, T., Kane, M., & Pérez, H. (2011). Examining the interaction of light, nutrients and carbohydrates on seed germination and early seedling development of *Bletia purpurea* (Orchidaceae). *Plant Growth Regul.*, 89-99.
- Mó, E., & Ruiz, E. (2012). Estudio de la orquídeoflora de la reserva privada Chicacnab, Alta Verapaz, Guatemala. *Lankesteriana*, 175-190.
- Morales, E. (2012). *Propagación in vitro de Bletia purpurea Lam.* para la producción de semillas sintéticas. Jalisco: Centro de Investigación y Asistencia en tecnología y diseño del estado de Jalisco.
- Noguera, E., & Cetzal, W. (2014). Revisión e integración del conocimiento de las Orchidaceae en Tabasco, México. *Botanical Sciences*, 519-540.
- Palestina, R., & Sosa, V. (2002). Morphological variation in populations of *Bletia purpurea* (Orchidaceae) and description of the new species *B. riparia*. *Brittonia*, 99-111.
- Parrales, M., & Van den Bergue, E. (2016). Diversidad y distribución altitudinal de orquídeas terrestres del Cerro Uyuca, Honduras. *Revista Nicaraguense de Biodiversidad*, 73.
- Soto, M., Hágater, E., Jiménez, R., & Solano, R. (2007). *Orquídeas de México*. Oaxaca: Herbario AMO-Instituto Chinoín, A.C. y Centro interdisciplinario de investigación para el desarrollo integral regional-unidad-Oaxaca.

This Photographic Report can be cited in the following way or with the following information:

Hellmuth, N. (2019). Aquatic orchid: *Bletia purpurea* (Lam.) DC. (Orchidaceae) Guatemala: FLAAR Mesoamérica.

SERIE



* FLAAR Mesoamérica es creador del diseño y autoría del documento. Al momento de compartir información o diseños del mismo en redes sociales se debe etiquetar a la página de FLAAR Mesoamérica, sus autores y fotógrafos. En el caso de los documentos escritos, utilizar la cita correspondiente.

© Copyright 2019 FLAAR Mesoamerica



BACKPOT PHOTOGRAPHY:

Bletia purpurea.

Nikon D810. Lente Nikon AF-S NIKKOR
600mm f/4.e FL ED VR. F/14, 1/640.
ISO 4000. At Yaxha, Petén, Guatemala.
Photograph by: Nicholas Hellmuth



FLAAR
MESOAMÉRICA