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Expo 2024

Cheyan DuVal

This year the Show and Sale Committee, co-chaired by Allison Miller and Bill Rotolante, made the decision to move the annual show and sale indoors to the Miami-Dade County Fair & Exposition, paired with a rebrand to the 'Tropical Plant Expo' to welcome vendors specializing in carnivorous plants, orchids, ferns, succulents, cacti, and more! This new location allowed guests and vendors alike to beat the heat, where we saw a remarkable 146% increase in guest attendance from last year's show, including 425 of the International Aroid Society's members making the trip to Miami, FL. The new location provided the perfect backdrop for an expanded lineup of ninety-two vendors, 12 sponsors, and 17 Members Sales vendors, creating a vibrant and diverse marketplace for tropical plant enthusiasts.

The Tropical Plant Expo's highlights included our annual Member's Dinner and Auction, which was the highest attended to date. It attracted 289 attendees and featured a panel discussion with Marie Nock, Enid Offolter, Paul Marcellini and Rory Antolak. Between the virtual Silent Auctions at the Tropical Plant Expo, and plants auctioned off at the Member's Dinner by current president Jeff Sheng, and vice-president Bill Rotolante, 161 beautiful specimens raised funding for The International Aroid Society's efforts. We appreciate everyone who participated, and hope your winnings are growing well!

The Aroid Awards showcased 74 exceptional plant entries, demonstrating the passion and expertise of our community. Our 10 guest speakers, including

passion and expertise of our community. Our 10 guest speakers, including Orlando Ortiz, Marco Fonseca, Brian Williams, Steve Frank, Michael D'Andrea, and Lester Kallus, delivered engaging presentations to create an immersive and educational experience for all attendees.

None of this would have been possible without the dedicated volunteers of the Show and Sale Committee who worked tirelessly to make this event a reality from all over the country. The committee's efforts resulted in record breaking fundraising for The International Aroid Society's activities, research, education, outreach, and conservation efforts. We extend our heartfelt gratitude to all our members who attended and supported this year's Expo. Your enthusiasm and participation are the driving force behind our community's growth and the continued success of the IAS. Thank you for being part of this extraordinary celebration of tropical plants, and we will see you at the show next year!

A visual tour of Expo 2024

Expo 2021: — Video: Cheyan DeVal, (click to view)

Figure 1: Sales floor — Photo: Cheyan DuVal

Figure 2: Sales floor — Photo: Cheyan DuVal

Figure 3: Sales floor — Photo: Cheyan DuVal

Figure 4: Sales floor — Photo: Cheyan DuVal

Figure 5: Afternoon presentations by Mike D'Andrea — Photo: Cheyan Duval

Figure 6: Sales floor — Photo: Cheyan DuVal

Figure 7: *Monstera deliciosa* **'Medusa'** — Photo: Cheyan DuVal

Figure 8: Expo staff — Photo: Cheyan DuVal

Figure 9: — *Monstera deliciosa* 'Mint Aurea Form'Photo: Cheyan Duval

Figure 10: *Caladium* 'Picasso', competition entry — Photo Debra Rotolante

Figure 11: *Anthurium rotolanteanum* — Photo Debra Rotolante

Figure 12: *Anthurium leuconeurum* — Photo Debra Rotolante

Figure 13: *Adelonema* 'Fire Bird', grown by Bill Rotolante, winner of the Most Unusual Award

Figure 14: — *Alocasia* 'Serendipity' – Pink Variegated — Photo: Debra Rotolante

Figure 15: Monstera God, art by Marco Cedeño-Fonseca — Photo: Debra Rotolante

Figure 16: Jeff Sheng & Bill Rotolante with Joan Saenz, who won the People's Choice award for her submission *Alocasia* 'Serendipity' seen in Figure 14. — Photo: Debra Rotolante

Figure 17: Sales floor — Photo: Debra Rotolante

Figure 18: *Philodendron* 'Fuzzy Petiole' — Photo: Justin Gurski

Figure 19: Sales floor, — Photo: Debra Rotolante

Figure 20: Sales Floor. — Photo: Justin Gurski

Figure 21: Bill Rotolante with Marco Cedeño Fonseca and Orlando O. Ortiz with *Monstera lamersiana*, a newly described species. The first one ever sold was at the Expo's Dinner and Auction.

Figure 22: Marie Nock, Enid Offolter, Paul Marcellini and Rory Antolak, Expo Dinner & Auction Panel — Photo: Lester Kallus

Figure 23: Evening Speaker Steve Frank, — Photo Lester Kallus

Aroids: An Introduction to Leaves

Karyn Tapley, monsteraetc@gmail.com

In our ongoing series on aroid anatomy, we have explored the vital roles of roots and stems. Now, we turn our attention to the leaves, the photosynthetic powerhouses of these captivating plants. Leaves are not only essential for energy production but also play a significant role in the aesthetic appeal of aroids, making them highly popular among plant enthusiasts. This article delves into the anatomy and functions of aroid leaves.

Leaves: The Photosynthetic Powerhouses

Leaves are the most recognizable and diverse feature of aroids. These plants often showcase large, heart-shaped, or deeply lobed leaves with striking patterns and colors. The structure of aroid leaves typically includes three main parts: the blade, the petiole, and the sheath.

Leaf Blade

The blade, or lamina, is the broad, flat part of the leaf responsible for capturing sunlight. Its size, shape, and color vary greatly among different aroid species.

1. **Shape and Size:**
   Aroid leaves can be heart-shaped, arrow-shaped, or deeply lobed. For example:
   - Alocasia species: Typically large, arrow-shaped leaves.
   - Monstera deliciosa: Noted for their characteristic splits and perforations.
     These variations are not only visually appealing but also reflect adaptations to specific natural habitats.

2. **Color and Patterns:**
   Many aroids display vivid colors and patterns, ranging from deep green to variegated white, yellow, or pink.
   - **Caladiums:** Known for vibrant hues and intricate patterns, making them highly sought-after ornamental plants.

3. **Venation:**
   The arrangement of veins in the blade, known as venation, is a key feature of aroids. Prominent veins provide structural support and facilitate the transport of water, nutrients, and photosynthetic products.
   - Alocasia 'Amazonica': Features striking white veins, adding to its ornamental appeal.

Petiole

The petiole connects the leaf blade to the stem, playing a crucial role in supporting the leaf and optimizing light capture.

1. **Support and Flexibility:**
   The petiole elevates the leaf blade, orienting it toward light. Its flexibility allows movement in the wind, reducing damage risk.

2. **Transport:**
   It contains vascular tissues (xylem and phloem) that transport water, nutrients, and photosynthetic products between the leaf and the plant.

3. **Adaptations:**
   Some aroids have unique petiole adaptations:
   - **Floating aroids (e.g., Pistia stratiotes):** Their buoyant petioles help the provide additional buoyancy to the air-filled structures present in the leaves

Sheath:
The sheath is a leaf-like structure that encases the stem, offering additional support and protection.

1. **Protection:**
   It shields young leaves and stems from physical damage and herbivory.

2. **Support:**
   The sheath provides structural support, especially important for aroids with large, heavy leaves.

3. **Transitional Role:**
   In some species, the sheath transitions into the petiole, forming a continuous support structure.

Photosynthesis and Respiration
Leaves are the primary site for photosynthesis, the process that converts light energy into chemical energy.

1. **Light Absorption:**
   Chlorophyll in chloroplasts captures light energy. The large surface area of aroid leaves maximizes light absorption, enhancing energy production.

2. **Gas Exchange:**
   Stomata on the leaf surface facilitate gas exchange, allowing carbon dioxide in and releasing oxygen. They also regulate water loss through transpiration.

3. **Energy Production:**
   The energy captured during photosynthesis produces glucose, the plant's primary energy source, supporting growth, reproduction, and other functions.

Conclusion
Understanding the anatomy and functions of aroid leaves enhances our ability to care for and appreciate these fascinating plants. From the diverse shapes and vibrant colors of the leaf blade to the supportive roles of the petiole and sheath, each part contributes to the plant's overall health and beauty. By recognizing these unique characteristics, you can provide optimal care and ensure the vitality and appeal of your plants.

In the next article, we will explore the distinctive flower structures of aroids, focusing on their inflorescences. Stay tuned for more in-depth explorations of aroid anatomy and care!

Aroids: An Introduction to Inflorescences

Karyn Tapley, monsteraetc@gmail.com

In our ongoing series on aroid anatomy, we have explored the vital roles of roots, stems, and leaves. Now, we turn our attention to the unique and fascinating inflorescences of aroids. The inflorescence, consisting of the spadix and spathe, is not only a key feature for reproduction but also adds to the ornamental value of these plants. In this article, we will delve into the anatomy and functions of aroid inflorescences and how botanists use them to identify distinct species.

Inflorescence: The Unique Flower Structure

Aroid flowers are distinctive and intriguing. The inflorescence is composed of two main parts: the spadix and the spathe. This structure can be highly ornamental, with some aroids producing strikingly colorful spathes and unusual spadices. The inflorescence plays a crucial role in attracting pollinators and facilitating sexual reproduction through seed production.

Spadix

The spadix is a fleshy spike covered in numerous tiny flowers. It is the reproductive core of the inflorescence and is usually divided into three sections: the female flowers at the bottom, the male flowers at the top, and sterile flowers or appendices in between:

1. **Female Flowers:** Located at the base of the spadix, the female flowers are responsible for seed production. These flowers produce ovules that, when fertilized, develop into seeds. The placement of female flowers at the bottom ensures that they are the first to be receptive to pollen, maximizing the chances of successful fertilization.

2. **Male Flowers:** Situated above the female flowers, the male flowers produce pollen. They typically release pollen after the female flowers have become receptive, reducing the likelihood of self-pollination and promoting cross-pollination, which enhances genetic diversity.

3. **Sterile Flowers and Appendices:** In some aroid species, sterile flowers or appendices are found between the male and female flowers. These structures can have various functions, such as producing scents or heat to attract pollinators. For example, the Titan Arum (Amorphophallus titanum) generates heat and emits a strong odor to mimic decaying flesh, attracting carrion beetles and flies for pollination.

Spathe

The spathe is a leaf-like bract that often encloses or surrounds the spadix. It can be highly ornamental and serves several important functions:

1. Protection: The spathe protects the developing flowers from physical damage and herbivory. It can enclose the spadix completely when the flowers are immature, opening gradually as they mature.

2. Attraction: The spathe may have vibrant colors and patterns that attract pollinators. For example, the bright red spathes of Anthurium species are highly attractive to pollinators such as bees and hummingbirds. The spathes' showiness is also a prized attribute for collectors and the floral industry, with Anthurium hybrids being purposefully bred for the spathe color.

3. Support: The spathe provides structural support to the spadix, helping to hold it upright and ensuring that the flowers are well-positioned for pollination

Pollination and Reproduction
Pollination is a critical process for aroids, and their inflorescences are adapted to attract a variety of pollinators:

1. Scent and Heat Production: Many aroids produce scents and heat to attract specific pollinators. For instance, the Titan Arum emits a foul odor resembling rotting flesh and generates heat to spread the scent further, attracting carrion beetles and flies. This strategy ensures that the plant receives adequate pollination despite its infrequent blooming.

2. Visual Attraction: The colors and patterns of the spathe can attract visual pollinators like bees, butterflies, and birds. The bright spathes of Anthuriums and the striking patterns of Caladiums are examples of such adaptations.

3. Nectar Production: Some aroids produce nectar to reward pollinators. The presence of nectar guides pollinators to the flowers, ensuring effective pollen transfer.

4. Seed Production: After successful pollination, the female flowers develop into fruits containing seeds. These seeds are often dispersed by animals or environmental factors, allowing the plant to propagate and spread to new areas

5. Reproductive sites for pollinators: Inflorescences attract pollinators, and often serve as reproductive sites for smaller insects, which are sometimes trapped temporarily within the floral chambers of some genera (e.g. Philodendron inflorescences open and close each day)

Botanical Identification Using Inflorescence
Botanists often use the unique characteristics of aroid inflorescences to identify distinct species. The combination of spadix structure, spathe coloration, and flower arrangement provides valuable taxonomic clues. For example:

1. Spadix Structure: The arrangement of male, female, and sterile flowers on the spadix, along with any appendices, helps distinguish between species. The presence of thermogenic (heat-producing) appendices, as seen in some Amorphophallus species, is a notable feature used for identification.

2. Spathe Characteristics: The size, shape, color, and pattern of the spathe are critical for identification. Variations in spathe morphology are often species-specific and provide a reliable means of differentiation.

3. Flower Characteristics: The size, shape, and arrangement of the individual flowers on the spadix are examined in detail. Microscopic examination of floral parts, such as anthers and stigmas, can reveal unique species-specific traits.

These botanical examinations and classifications are well-documented in literature, including resources from the International Aroid Society and comprehensive reviews like "Aroids: Plants of the Arum Family" by Deni Bown

Conclusion
Understanding the anatomy and functions of aroid inflorescences enhances our appreciation of these fascinating plants. The intricate interplay between the spadix and spathe, combined with specialized adaptations for pollination, highlights the remarkable strategies aroids use to reproduce and thrive. By recognizing the unique characteristics of aroid inflorescences, you can better appreciate their beauty and ecological significance.

In our next article, we will conclude our series on aroid anatomy by summarizing key points and discussing practical tips for aroid care and cultivation. Stay tuned for more in-depth explorations of aroid anatomy and care.

Rio Oiapoque: An Aroid Paradise

Photos from an Expedition in October 2024

Text and photos by Joep Moonen, French Guiana - 973ejv@gmail.com

Dedication

This article is dedicated to my friend and boat pilot, Pedro Gabriel da Paixão, and his wife Leila. They accompanied me on many boating tours along the Rio Oiapoque between 2004 and 2015. Pedro passed away in 2020 and rests in the Clevelandia Cemetery, close to the Oiapoque River that he loved so dearly.

Introduction

There are several theories about the origin of the word "Guyana" or "Guiana." My favorite explanation is that it comes from an Amerindian word meaning "Land of Many Streams" or "Land of Water." Indeed, the three Guianas have numerous rivers flowing into the Atlantic, carrying vast amounts of rainwater to the ocean.

In Guyana, the best-known rivers are the Essequibo and Demerara. In Suriname, they include the Corantijn, Coppename, Suriname, and Marowijne. In French Guiana, the notable rivers are the Mana, Sinnamary, Kourou, Mahury, Approuague, and the Oiapoque, which forms the border with Brazil. Numerous smaller rivers and swamps lie between them. Most of the Guiana rivers bear names of Amerindian origin.

Since there are almost no roads in the interiors of the Guianas, these rivers serve as "highways," allowing boats to transport people and goods to remote villages. Navigating these waters is challenging, a result of submerged granite rocks, sandbars, floating hardwood trunks, and treacherous rapids with fast-flowing water, large waves, and rocks.

Ideal Habitats

The banks of main rivers, smaller tributaries, and creeks offer ideal habitats for various plants. Along these waterways, trees benefit from extra light due to the open water, while high humidity arises from the evaporating river waters. The combination of tropical temperatures, light, humidity, and wood creates perfect conditions for epiphytes like ferns, cycads, bromeliads, orchids, mosses, and, of course, aroids.

From our boat, we can spot many of these plants growing on older tree branches or the horizontal surfaces of fallen logs. When we encounter an unusual plant, it's easy to bring the boat closer to take photographs or collect specimens. Many islands along the rivers also allow us to walk and explore the rich flora.

Exploring the Rivers

In the 1970s and 1980s, while living in Suriname, my favorite rivers were the Coesewijne, Coppename, and Kabalebo. Since I worked in Paramaribo, I could visit these rivers only on weekends or during vacations with my friend, Wouter Roorda.

We used a fiberglass Espo canoe powered by a 6hp Evinrude outboard motor. From the low vantage point of the canoe, we often spotted caimans or anacondas on the water's surface and admired orchids and aroid leaves hanging from tree branches.

In the 1990s, when I started ecotourism in French Guiana, I began exploring rivers professionally, guiding naturalists and biologists into the interior. Eastern French Guiana is particularly rich in biodiversity as part of the Amazonian ecosystem. Notable species include the black caiman (*Melanosuchus niger*) and, among aroids, *Philodendron goeldii*.

A New Road Opens the East

In 2003, the final 80 kilometers (50 miles) of road connecting French Guiana and Brazil were completed, cutting through pristine rainforest. Initially, the drive offered breathtaking sights of wildlife, such as spider monkeys with babies swinging through roadside trees. Unfortunately, this paradise didn't last. Poachers quickly killed many animals, including harmless species unafraid of humans.

Today, animals avoid the road entirely. However, the newly accessible rainforest is home to rare and undescribed plant species. On one inselberg, I found at least six species of bromeliads in the genus *Aechmea*—large, spiky terrestrial plants with stunning blooms. Among the aroids, I discovered *Philodendron x marijke*, *Ph. moonenii*, *Ph. x regina* (*bipennifolium x billietiae*), and *Anthurium moonenii var. monolobum*.

The Oiapoque River

In 2004, we embarked on our first expedition along the Oiapoque River, which forms the border between French Guiana and the Brazilian state of Amapá. The river is up to 1.5 kilometers (1 mile) wide in some areas, with numerous islands, rocks, and powerful rapids. Navigating these waters requires deep knowledge of the routes between rocks, sandbars, and rapids—skills often passed down from father to son among local boat pilots.

I worked with a Brazilian team—Pedro and Leila—on many expeditions, primarily for aquarium fish enthusiasts. These trips also gave me opportunities to study plants. After Pedro retired in 2016, I partnered with another family who continues to guide me and naturalists safely along this wild, beautiful river.

Figure 1: - Early morning on the Oiapoque river

Figure 2: - My friend and boatsman Pedro, his wife Leila and Anouschka, 2007.

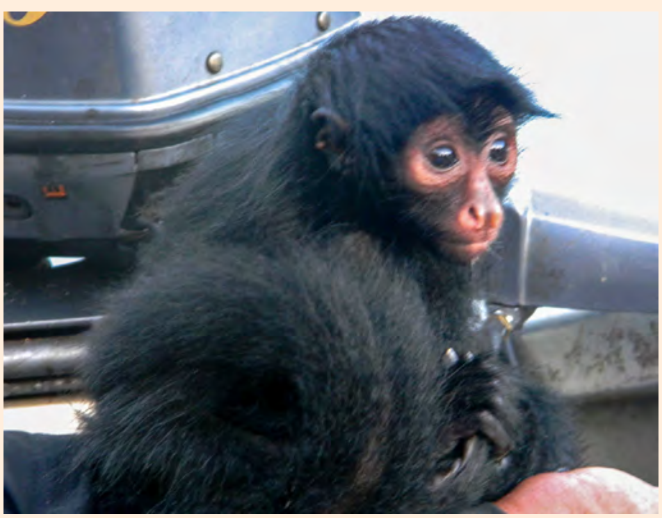

Figure 3: Anouschka, as a toddler, was adopted by Pedro and Leila. Her mother had been executed by animal killers. She was confiscated by IBAMA. Later, she was successfully accepted by a group of wild spider monkeys on the Brazilian site of the Oiapoque river.

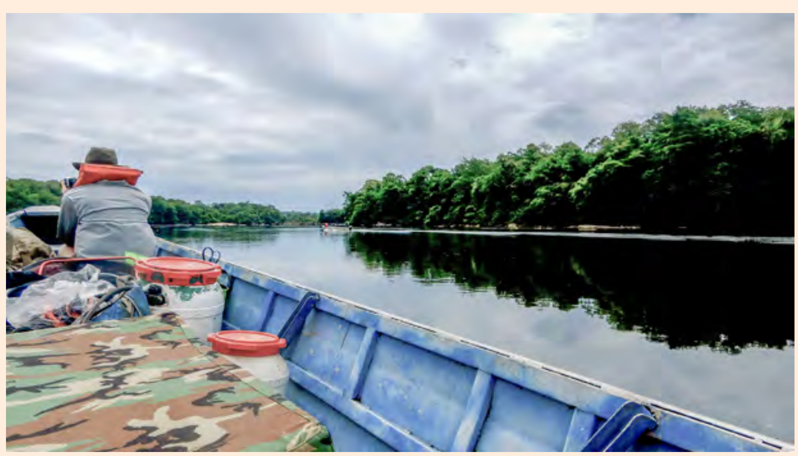

Figure 4: October 2024: another adventure on the Oiapoque river.


Figure 5: The rapids are wild on the Oiapoque and only experienced boatsman can pass them.


Figure 6: *Anthurium jenmanii* growing on the rocks in the river in the hot sun.


Figure 7: Trees on the islands are full of climbing and epiphytic Araceae.


Figure 8: In the dry season, the leaves of *Anthurium jenmanii* turn yellow.

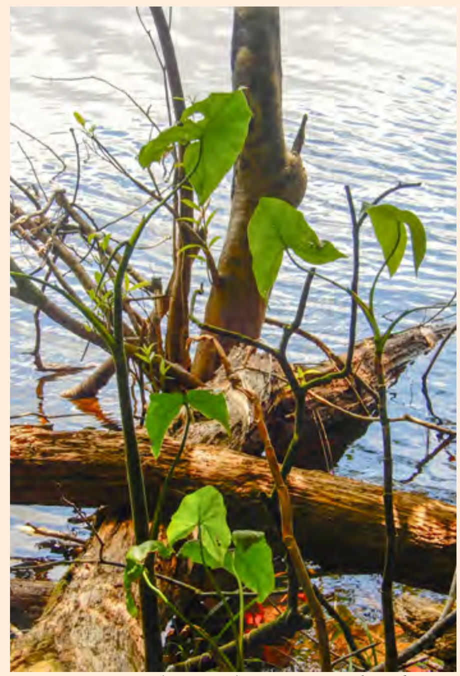
Figure 9: Moko-moko *Montrichardia arborescens* prefers the border between land and water.


Figure 10: *Philodendron pedatum*, *P. acutatum* and *P. linnaei* as well as *Maxillaria* orchids and *Guzmania* bromeliads. Trees on the islands in the Oiapoque river are small botanical gardens

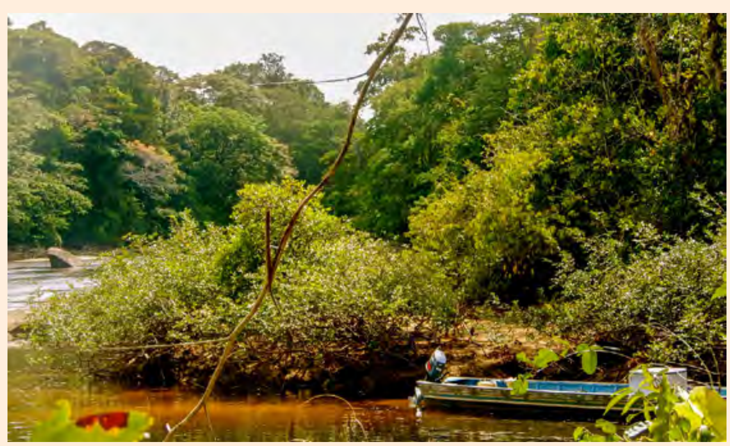
Figure 11: A view between some islands, see the *P. acutatum* in the foreground.

Figure 12: This *Philodendron acutatum* grows more in the shade and has perfect leaves.

Figure 13: This high climbing *Philodendron acutatum* sends aerial roots down to the river.

Figure 14: In the dry season the roots of *P. acutatum* sleep on the rocks.

Figure 15: A beautiful caterpillar shows its bright colours.

Figure 16: A juvenile *P. melinonii* with purple backside leafs and a young *P. callosum* with a dorsal stripe on the litle leafs.

Figure 17: A nice adult *P. callosum* with red petioles.

Figure 18: Juvenile *Philodendron melinonii*.

Figure 19: *Philodendron brevispathum* likes to grow in the shade.

Figure 20: *Philodendron billietiae* came down when a tree fell.

Figure 21: *Philodendron 'oiapoquense'* JM a nice little rare undescribed species from the Oiapoque river.

Figure 22: *Anthurium sinuatum*, a rare medium size species with palmate leaves.

Figure 23: An adult *P. bipennifolium* hybrid #10, collected as a seedling in 2022.

Figure 24: Juvenile plant of *P. fragrantissimum*.

Figure 25: This looks like a hybrid (#11) of *P. fragrantissimum* and *P. ushanum*. Note the ovale pioneer leaves that have the same shape as young *P. ushanum* leaves. The adult leaves have the form of *P. fragrantissimum*. See photo 26.

Figure 26: Camp assistant Kelly shows a collected Philodendron hybrid #11 with both young and adult leaves.

Figure 27: *Monstera spruceana* growing on a tree near the river.

Figure 28: A young *Philodendron* that looks as if it is a *P. bipennifolium* hybrid #10.

Figure 29: The inflorescence of *Anthurium sinuatum*.

Thanks - Obrigado
A heartfelt thanks to all the naturalists over the past 20 years who have explored the Oiapoque River and its ecosystem, flora, and fauna. Special thanks to my Brazilian teams, recommended by my friend Rona Lima: Pedro and Leila (until 2016) and Chon, Josyane, and their children (from 2017 onward). Muito obrigado por tudo!

Literature

- 1980: *Woorden Lijst Sranang* - Marga Werkhoven, Pieter Teunissen - VACO
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- 2021: *The Discovery of Philodendron x joepii* - IAS Newsletter Vol. 44/2

Typhonodorum lindleyanum Schott Propagation

Chloe McGiveron, Horticulturist, The Living Rainforest

Introduction to The Living Rainforest

The Living Rainforest is located near the village of Hampstead Norreys, approximately 10 miles north of Newbury, UK. It occupies the grounds and buildings that once housed Wyld Court Orchids, one of Europe's leading orchid nurseries. In the early 1990s, Keith Bromley transformed the site into the Wyld Court Rainforest visitor center.

In 2000, after a brief period under the management of the World Land Trust, Karl Hansen took over the center, rebranding it as The Living Rainforest. The site now features exhibits on tropical rainforest ecosystems and sustainability. The Living Rainforest is wholly owned by the Trust for Sustainable Living, a global educational charity collaborating with schools worldwide.

The site comprises three interconnected glasshouses, home to both enclosures and free-roaming animals. The horticulture team strives to create an immersive rainforest experience by blending enclosure boundaries with the natural environment. Their work includes curating a collection of plants that are educational, vulnerable, or uniquely interesting, and collaborating with animal keepers to design habitats.

A 2009 report by Miles Challis, the former Head of Horticulture, highlighted the rich aroid collection at The Living Rainforest. Reflecting on this, the 2024 audit documented 142 species from the Araceae family, including 49 Anthurium species, although it remains incomplete due to unidentified plants.

Since joining The Living Rainforest in November 2023 as an orchid specialist with the Writhlington School Orchid Project, I have become captivated by aroids, particularly *Typhonodorum lindleyanum* Schott, commonly called water bananas. This species has since become a focus of my work.

Typhonodorum lindleyanum Schott

Typhonodorum lindleyanum Schott is a large aroid species, reaching up to 4 meters in height. Native to Madagascar, it thrives in marshy habitats and is pollinated by beetles and flies (*Plants of the World Online*, 2024).

Propagating _Typhonodorum lindleyanum_ Schott at The Living Rainforest

Historically, *Typhonodorum* seeds were left to germinate naturally in the nutrient-rich pond at the base of the parent plants. My goal for this project was to optimize propagation methods to produce healthy specimens for display in different sections of the glasshouses.

The Glasshouse Ponds

The Amazonica glasshouse contains two ponds:

1. A 250-liter pond.
2. A larger 10,000-liter pond with a 2.5-meter-deep central pit surrounded by shallower areas of 0.5 meters.

Figure 1: The main pond past (1992) and present (2024) with mature Feburary 2024 germinated *Typhonodorum lindleyanum* Schott seedlings. C McGiveron 11/13/2024.

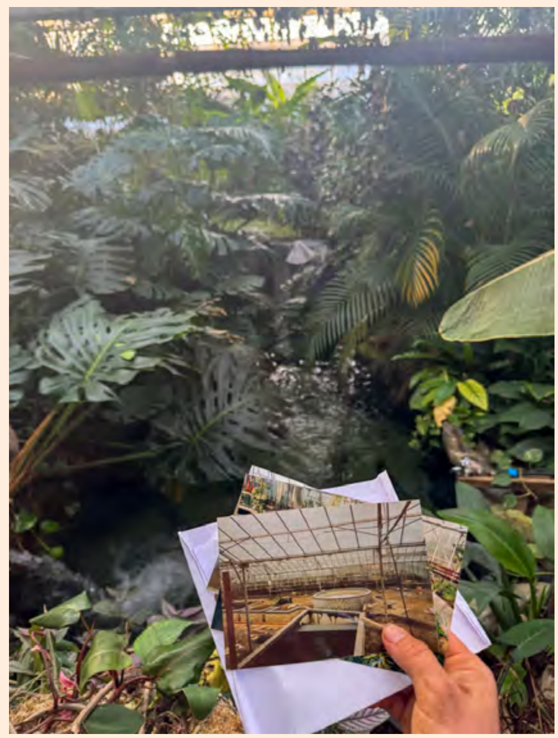

Figure 2: The main aquarium and small pond construction in 1992, now unrecognizable with a 20-year-old Monstera deliciosa and various palms obscuring the edge. C McGiveron, 11/13/2024.

Originally constructed in 1992 for *Euryale ferox*, the larger pond has since been repurposed. This deep, bright, and visitor-visible area became the ideal location for the delicate water banana seedlings.

Initial Propagation

The two original *Typhonodorum* specimens were purchased as germinated seeds in 2016 and planted in 2018. By 2024, these plants had grown from 50 cm tall and 5 cm wide to 3 meters tall and 18 cm wide. They began producing seed pods in June

2022, with five pods maturing between April and August 2024. Pollination was not observed, but the dominant ant species in the glasshouses (*Paratrechina longicornis*) is suspected to have facilitated the process. Mesh bags were used to protect the seedpods until they naturally split, releasing seeds approximately 2-3 months after flowering.

Figure 3: The small pond past and present, previously used to grow Euryale ferox this pond was half filled in 16 years ago to grow Cyperus papyrus, to be used in educational tours. C McGiveron, 11/13/2024.

Seed Propagation Techniques

To determine the best germination conditions, seeds were propagated in a controlled off-show space with the following variables:

- Pericarp intact or removed.
- Seeds partially buried or left floating in substrate.

The pond temperature was maintained at 28°C, and gloves were worn during pericarp removal due to calcium oxalate crystals that can irritate the skin. Germination results indicated higher success rates for seeds floating on the water surface, with minimal difference between those with or without the pericarp.

Growth Observations

The most vigorous growth occurred in seedlings potted in a mix of aquatic and bark chip compost. Transitioning seedlings from the heated, low-light off-show pond to the cooler, high-light on-show pond after two months promoted robust development.

Seedlings planted with their petioles partially submerged rotted, highlighting the importance of keeping this area above water. By November 2024, February-germinated seedlings had grown over a meter tall and were planted in the main pond pit.

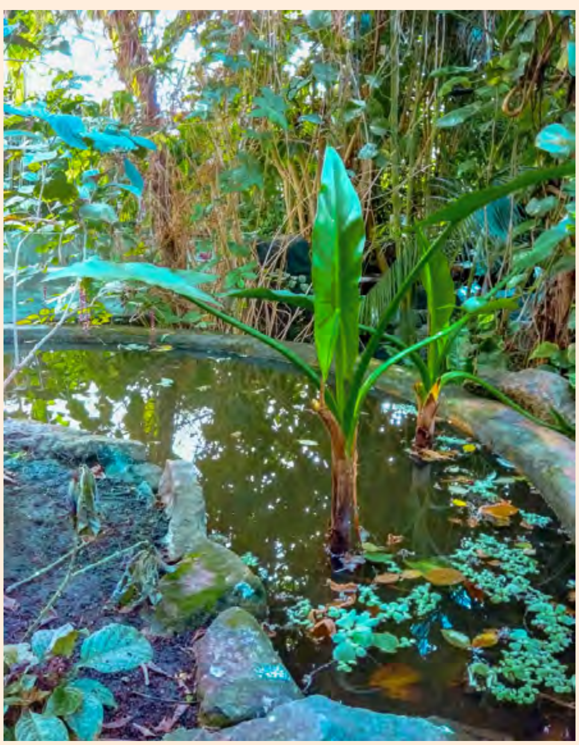

Figure 4: *Typhonodorym lindleyanum*. P Clark, 2018.

Figure 5: *Typhonodorym lindleyanum.* C McGiveron, September 2024.

Figure 6: *Typhonodorym lindleyanum* seeds and seed pod, which was harvested before splitting as the weight of the pod caused it to snap the stem holding it to the plant. The seed pod usually contained several rotten, unviable seeds (see below seed bunch in center of photo).

Figure 7: *Typhonodorym lindleyanum* flower. C McGiveron, April 2024.

Figure 8: *Typhonodorym lindleyanum* germination test, planted 20.08.24. The left basket housing 'skin off' seeds. The left half of the basket with 23 seeds covered with a 2cm layer of aquatic compost and single layer of gravel- in the right and side 23 left to float above the substrate. In the basket to the right, the same planted or floating seed test but with 12 seeds in each side, with the skin left on. C McGiveron, 30.09.24.

Figure 9: Germinated *Typhonodorym lindleyanum* seedling (10cm) against parent plant (3m). C McGiveron, February 2024.

Challenges in Propagation

Free-roaming animals in the glasshouses presented unique challenges. For instance, Luigi, a yellow-knobbed curassow, occasionally damaged the delicate seedlings. Strategic placement near mature plants minimized these disruptions.

Conclusion

This propagation project successfully established multiple generations of *Typhonodorum lindleyanum* Schott at The Living Rainforest. Insights gained from this work will guide future propagation and display design.

In researching *T. lindleyanum*, I discovered *Peltandra virginica*, a North American counterpart that reaches only 1 meter in height. This species was added to the collection in October 2024, and I plan to create a bog garden for educational comparisons of their evolutionary adaptations.

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Notes on the seed germination of underdeveloped berries of *Anthurium cachabianum* Hook

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Abstract: *Anthurium,* a genus within the family Araceae, is prized for its ornamental importance, as it produces attractive inflorescences. *Anthurium* growers get excited about them for another reason, as they allow us the opportunity to pollinate and hybridize these inflorescences, which, when successful, produce berries on the spadices. In cultivation, however, the development of berries can be challenging, often resulting in nonviable seeds. This article provides notable observations on the seed germination of underdeveloped berries from *Anthurium cachabianum* Hook.f, a species of ornamental importance. Seeds were removed from berries and germinated in an enclosed, high-humidity plastic box without drainage holes. Remarkably, almost all seeds germinated successfully within 62 days. This finding highlights the potential of seeds from underdeveloped berries to germinate under suitable conditions, encouraging further exploration and reporting by Aroid enthusiasts.

Key words: *Anthurium cachabianum*, cultivation, ornamental, seed germination, underdeveloped berries

Introduction

Seed germination is a complex process involving physiological changes triggered by environmental cues such as water availability, temperature, and **sometimes** light, which are essential for initiating germination or breaking seed dormancy. (Bewley et al., 2013). In **A**roids (Araceae family) seeds are contained within **infructescences (colloquially referred to as** berries**) which form on the** spadix after **successful** pollination (Croat, 1984). In some cases, underdeveloped fruits in plants are caused by several factors, such as nutrition, hormone production, pollination, water **availability**, and crop load, as well as physiological factors, such as seed weight, flower quality, and carbohydrate supply (Lawes et al., 1990). Furthermore, carbon partitioning is a fundamental issue in plant biology and development (Nicolas et al., 2022). It has been found that flower/fruit abortion is mainly caused by a deficiency in or competition for carbohydrates and nutrients among growing organs (Richardson et al., 2021).

One of the widely cultivated species of ornamental importance, *Anthurium cachabianum,* features an erect infructescence (Figure 1) that has a reflexed spathe, a spadix 7.5-8.5 cm long and 1.2-1.4 cm in diameter, and red, pointed berries about 6 mm long. The mesocarp is juicy and pulpy with numerous oblong raphide cells. It produces two cream-colored ovoid seeds, about 3.2 mm long, 2 mm wide, and 1.2 mm thick, enveloped in a gelatinous substance (Croat, 1984).

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The author acquired an intriguing specimen of *A. cachabianum* that featured underdeveloped fruits which differed in appearance from typical fruit. The plant has an erect stem with very short internodes, short cataphylls that degrade into brown fibers, erect petioles, adaxially flat with acute margins, leaf blades adaxially green, abaxially paler, elliptical with an acute base and acuminate apex, slightly raised midrib, thin lateral veins, patent, spaced 9-10 mm apart, with ~ 2 finer intermediate veins. The plant showed signs of water stress, such as leaf curling, possibly due to prioritizing water storage for fruit development (Foschi et al., 2021). Since Anthurium berries are inedible due to their raphide content (Barabé et al., 2004), the focus shifts to their propagation potential. This study aimed to evaluate the germination viability of underdeveloped *A. cachabianum* seeds using a simple propagation method outside a laboratory setting.

MATERIALS AND METHODS

Plant material

A self-pollinated A. cachabianum, imported from Indonesia, was acquired in April 2024 through a local nursery in the Philippines. The plant, in its early fruiting stage, displayed pale peach or apricot-colored berries (Figures 2 and 3). It was maintained indoors under optimal conditions (21°C–29°C, 60%–80% humidity, bright indirect light) in a well-draining potting mix consisting of coconut cubes, pumice, charcoal, and cocopeat. Watering was done weekly with tap water, and good air circulation was ensured. The berries took approximately two months to ripen, though they remained pale and underdeveloped compared to the typical red, glossy berries of A. cachabianum. On May 19, 2024, the berries were harvested. Seeds were manually extracted, washed with distilled water to remove flesh, and air-dried briefly on a paper towel before planting.

Seed germination set-up

The seed germination setup (Figure 4) consisted of an "aroid mix" made of equal parts aged bark chips, dried coconut chunks, vermicast, neem powder, carbonized rice hull, aged coconut peat, lightweight expanded clay aggregates, and pumice. This mix was placed in a transparent, reused plastic container without drainage holes.

The potting mix was moistened, and seeds were sown on the surface. The container was sealed with a transparent plastic lid to maintain high humidity while allowing light to pass through. The container was placed in a shaded area on a balcony, receiving indirect sunlight from morning to afternoon. Temperature and humidity were maintained at 26°C–32°C and 70%–90%, respectively.

Observations

Germination was monitored from May 19 to July 20, 2024 (62 days). Observations were conducted on days 16, 24, 43, and 62, during which the container was briefly opened to photograph the seedlings. After each session, seedlings were misted with tap water to maintain moisture and replenish lost humidity.

Results

The first signs of germination appeared 16 days after sowing (Figure 5), with green radicles transitioning to a photosynthetic state. By day 24 (Figure 6), coleoptiles emerged, and the hypocotyl began to elongate. At day 43 (Figure 7), the epicotyl developed, producing the first small leaves (plumules). By day 62 (Figure 8), the plantlets displayed cordate-shaped leaves typical of Anthurium in early development (López-Páez et al., 2022). Different seedlings exhibited varying growth rates, likely due to genetic and environmental factors (Figure 9).

Discussion

During the early germination stage, the observation revealed that *A. cachabianum* follows epigeal germination, where cotyledons emerge above the soil surface. Germination occurred rapidly, with radicles appearing in as little as 16 days. The 62-day germination period observed here is relatively quick compared to other non-aroid ornamental plants.

However, differences in seedling development suggest that genetics, environmental conditions, and physiological factors influence growth rates (Tan et al., 2013). While overall germination was successful, technical parameters such as germination onset time, rate, and viability percentages were not quantified due to monitoring limitations.

Figure 1: The acquired *A. cachabianum* during its fruiting stage. — Photo: Sam Brillo

Figure 2: Infructescence of *A. cachabianum*. The underdeveloped berries are characterized by discoloration (brown instead of red), and the spadix where the berries are attached is drier and more wilted than usual. — Photo: Sam Brillo

Figure 3: The seed germination set-up. May 19, 2024. The containers remained to maintain humidity. — Photos: Sam Brillo

Figure 4: Seedlings after 16 days (June 3, 2024) — Photo: Sam Brillo

Figure 5:. Seedlings after 24 days (June 11, 2024) — Photo: Sam Brillo

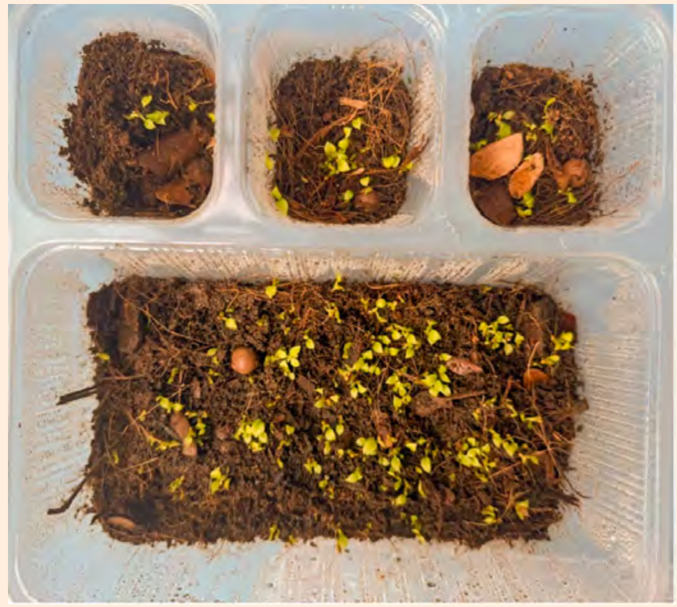

Figure 6: Seedlings after 43 days (June 30, 2024) — Photo: Sam Brillo

Figure 7: Seedlings after 62 days (July 20, 2024) — Photo: Sam Brillo

Figure 8: Seedlings with young leaves. Some seedlings appear to grow faster than others. (A) It appears to have longer internodes than the others but can also indicate faster growth. (B) It appears to have delayed growth. (C) Ungerminated seed appears to be nonviable. — Photo: Sam Brillo

Conclusion

This study demonstrates that seeds from underdeveloped berries of *A. cachabianum* are viable and capable of germination under favorable conditions, despite potential dehydration stress. Future studies could focus on quantifying germination rates, seed viability, and other technical parameters to expand knowledge on the propagation of *Anthurium cachabianum* and related species.

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Unveiling Hidden Treasures: Newly Discovered Endangered Aroids in the Philippines and the Power of Citizen Science

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Introduction

Each year, the world observes Endangered Species Day on the third Friday of May. In 2024, this day fell on May 17. This occasion serves as a reminder of the urgency to safeguard our planet's most vulnerable wildlife through educational initiatives, habitat restoration projects, and advocacy efforts. Among the treasures of biodiversity in the Philippines are the aroids, or plants of the family Araceae. With their diversity and ecological importance, the preservation of endangered aroids is critical to maintaining the country's ecosystems and biodiversity.

Over the past three years, researchers have identified seven new aroid species that are endemic to the Philippines, spanning three distinct genera.

Amorphophallus (corpse flowers): Known for their extraordinary and occasionally malodorous inflorescences, these plants thrive in well-drained, fertile soils of tropical forests. Two new species were discovered, increasing the Philippines' records to 20 species (excluding the cultivated *A. konjac*)

Cryptocoryne (water trumpets): These aquatic plants, found partially or fully submerged in freshwater habitats, are critical indicators of ecosystem health. Four new species were documented, bringing the total to 11 native species (excluding the mistakenly documented *C. auriculata*)

Schismatoglottis: These mesophytic plants thrive under low-light forest conditions, supporting ecological balance by providing shelter and nutrients. A single new species was discovered, increasing the Philippine records to 13 species

These discoveries, often in areas subject to human pressures like poaching, deforestation, and urbanization, underscore the need for conservation. This article commemorates World Endangered Species Day 2024, driven by a passion for Philippine aroids and their preservation. Below is a summary of these newly discovered species:

***Amorphophallus calcicola* M.N.Tamayo, Magtoto & Sumalinog (2021)**

The species is currently limited to the forested karst limestone areas of the Loboc Watershed Forest Reserve at an elevation of 250–260 meters. The plant seems to be confined exclusively within the limits of the protected area where it was first discovered. The epithet 'calcicolus' is derived from the Latin words 'calci', which refers to the calcium content of the limestone substrate, and 'colus', derived from Latin 'incola' meaning dweller, in reference to the unique karstic substrate of the Bohol island where this new species was discovered. The plant exhibits a flowering period that spans from June to July.

***Cryptocoryne esquerionii* Naive & N.Jacobsen (2022)**

C. esquerionii was discovered in Tampilisan, Zamboanga del Norte. This species stands out distinctly from all other *Cryptocoryne* species due to its yellow, bumpy spathe with a long, pointed tip. While the data on its natural populations is deficient, it is important to note that further assessment must be conducted to determine its actual conservation status.

***Cryptocoryne paglaterasiana* Naive & N.Jacobsen (2022)**

This species is exclusively found in the streams of Tampilisan and Liloy Municipalities, with a population of less than 100 mature individuals. The highly endemic species was discovered growing in close proximity to human settlements, where there is a high prevalence of anthropogenic activities such as quarrying, poaching, slash and burn, and agriculture. These activities pose a significant threat to the survival of this aroid. The specific epithet '*paglaterasiana*' was created by combining the names of two citizen scientists, Mr. Ariel Paglalulan and Mr. Edilberto Ponteras. The term 'pagla' was derived from Mr. Ariel Paglalulan, and 'teras' from Mr. Edilberto Ponteras. These individuals discovered the species and informed the first author about it. In cultivation, this plant thrives in sandy soil with leaf litter.

Cryptocoryne vinzelii **Naive (2023)**

The species was named after Vinzel D. Duhaylungsod, the son of the citizen scientist who discovered it and served as the second author. The specimen was found in a stream within the rubber plantation. The newly discovered species exhibited its flowering period from February to May. The preliminary cultivation findings indicate that this plant displays exceptional resilience to clay, sandy soil, showcasing its effortless ability to thrive in such circumstances. Moreover, it has been effectively established as an advantageous addition to aquariums. Currently, the species is exclusively found in the streams of Lamitan City, Basilan, with a population of less than 50 mature individuals.

Cryptocoryne zamboangaensis **Naive (2023)**

In March 2023, an unidentified population of *Cryptocoryne* was discovered in a stream located in the Zamboanga del Norte province of the Philippines, with the assistance of three citizen scientists. The newly discovered species is exclusively found on the Zamboanga Peninsula. Currently, the species has exclusively been discovered in the designated area, with a population of less than 250.

Schismatoglottis minuta **Tandang & M.D.Angeles (2023)**

It has been documented exclusively on Samar Island in the Philippines. The species is presently documented in three specific areas in Samar: the Paranas (Samar Island Natural Park), Canavid, and Matuguinao. The locations are tropical lowland evergreen rainforests with tall dipterocarp trees predominating and consisting of rocky habitats with a moist substrate. The species thrives as a terrestrial herbaceous lithophyte in habitats characterized by low vertical cliffs adjacent to creeks with shallow running water. It also grows in rock crevices under full shade within limestone forests.

The specific epithet "*minuta*" describes the relatively small size of this new species in comparison to other *Schismatoglottis.*

The Power of Citizen Science in Discovering New Aroids

Notably, the species mentioned above were found mostly by citizen science, which showcases how important it is in the discovery of new aroids, greatly increasing the extent and reach of botanical study. Early identification of new species and real-time reporting benefit from the varied data provided by citizen scientists from many geographic locations. This method enhances conservation efforts by offering direction for methods to protect unusual or recently identified aroids. Including the public in citizen science projects also improves their awareness of and respect of botany, which fuels more participation and support of conservation initiatives. Including citizen scientists also increases resource efficiency, reduces research costs, and makes use of local knowledge, enabling a more complete and accurate knowledge of the variety and distribution of aroid species. Working together, professionals and volunteers help to accelerate the process of discovery and support general scientific and environmental projects.

Aroids are among the species that the World Endangered Species Day stresses the need of protecting and conserving. This day reminds us of the urgent need to preserve biodiversity and the value of citizen science in identifying and safeguarding newly discovered aroid species before they run the danger of extinct. Engaging the public in the study and preservation of aroids will help us to better understand their ecological significance and ensure their long-term survival, so contributing to the total well-being of our planet and global biodiversity.

Figure 1: Habit and inflorescence of *C. esquerionii*. © 2023 by Mark Arcebal Kling Naive

Figure 2: Flowering *C. paglaterasiana*. © 2022 by Mark Arcebal Kling Naive

Figure 3: Inflorescence of *C. vinzelii*. © 2023 by Mark Arcebal Kling Naive

Figure 4: Habit of *C. vinzelii*. © 2023 by Alvin B. Duhaylungsod

Figure 5: *C. zamboangaensis* Tube, Spathe, and Spadix. © 2023 by Mark Arcebal Kling Naive

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