

Nature Aquarium information magazine

# AQUAJOURNAL

ADA  
aqua design amano  
AUG.  
2012

## *Special Feature* The Jungle of Hermit

South East Asia, The Sanctuary of Cryptocoryne





# AQUA DESIGN AMANO The 20th ANNIVERSARY PRODUCTS

<http://www.adana.co.jp/en/20th>

ADA 20th Anniversary Products Catalog is now available in stores worldwide.

Please check your local ADA registered stores and distributors to get your copy! Limited quantities available, so please act quickly.

Find more issues at  
[magazinesdownload.com](http://magazinesdownload.com)







Travelling across Japan

Vol.46 Yuzawa Town, Niigata, Japan



The World's Largest Planted Aquarium Layout Festival

IAPLC 2012 Grand Prize winner will be decided at the Nature Aquarium Party

# NATURE AQUARIUM PARTY 2012

Nature Aquarium Party is ADA's annual event, capping the International Aquatic Plants Layout Contest 2012. We organize this event on Saturday, October 27th at Tokyo International Forum. For the first time in our contest history, we decide the top prize winners with the sum of world's contest juries' grading points, and popular votes of Nature Aquarium Party participants. Your vote may determine the grand prize winner. We are looking forward to meeting with all the people who love the planted aquarium hobby.

October 27, 2012 (sat) TOKYO INTERNATIONAL FORUM

1st part: Hall D7 2nd part: Royal Cafeteria

Open: 12:00 PM Start: 13:30 PM

Address: 3-5-1 Marunouchi, Chiyoda-ku, Tokyo 100-0005

**How to join** Participants will get original amenities! for details, please see the IAPLC homepage

<http://www.iaplc.com>

**Participation fee** JPY8,000 (including buffet dinner fee)

**closing date** September 30, (SUN) \*Entry will be closed as the entries reach the capacity.

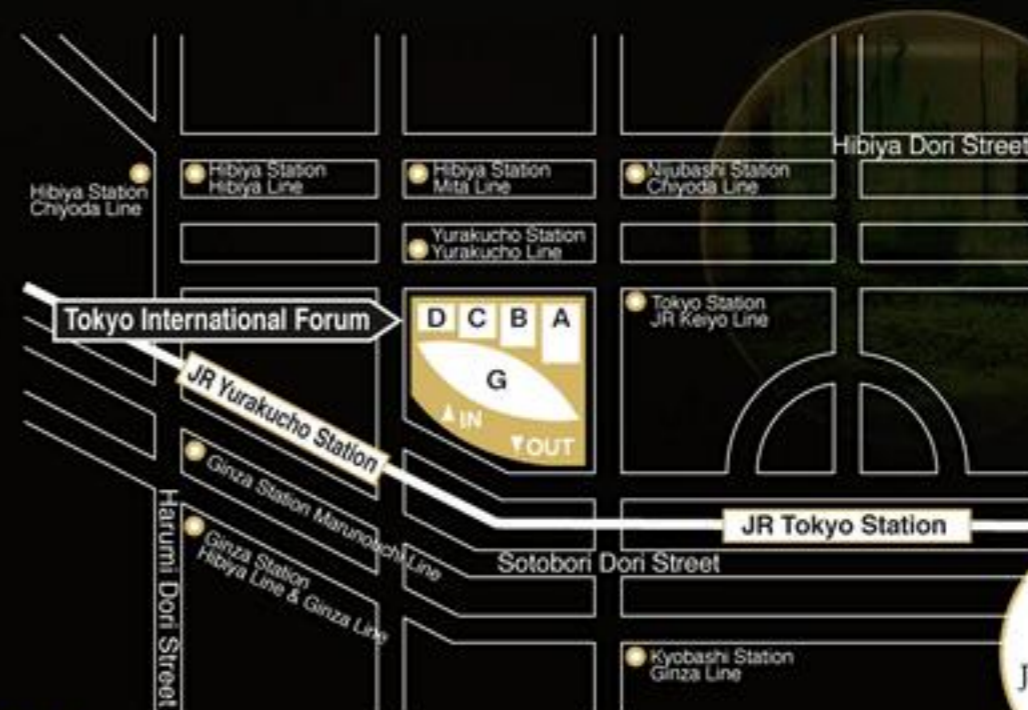
#### Event program

**The 1st Part** The IAPLC 2012 top prizes will be finally decided by the votes of NA Party participants, and grading points of the world's contest juries. Please pay close attention to the much-anticipated final world ranking result announcement.

The party participants are entitled to have a voting right to choose the top prize winners. We announce the top 100 layouts which passed the 2nd round grading at the reception of the Nature Aquarium Party, and the grand prize winners will be decided from those top 100 layouts.

**The 2nd Part** Enjoy and share the greatest moment with IAPLC top prize winners, and all the people who love the planted aquarium!

Have a nice time with the planted aquarium hobbyists gathered from all over the world! We prepare many events and fancy presents for the NA Party participants.



#### Access:

5-minute walk from JR Tokyo Station  
(Connected by B1 concourse with Keiyo Line at Tokyo Station)  
For details of access from Narita Airport or parking lot, please visit Tokyo International Forum website.  
<http://www.t-i-forum.co.jp/english>



### Spawning of Eastern-Japanese Common Toad (Yuzawa Town, Niigata, Japan)

In late May, I was headed for Kiyotsugawa River in Yuzawa Town to take pictures of a stream in the season of new green leaves. While I was walking on a mountain road towards the shooting point under a gray, threatening sky, I saw many Eastern-Japanese Common Toads at my feet. An even more amazing sight appeared before my eyes when I reached the stream - There was an astonishing number of Eastern-Japanese Common Toads laying eggs in a pool of water on a rock! This must be a truly eco-landscape photograph.

Shooting data / Ebony 8x20, Super-Symmar 210mm XL, 1/30 sec at f16 (+2 EV), center filter used, Velvia 100F 8x20 inch format film  
Text and photographs by Takashi Amano

# AQUA JOURNAL

AUG. 2012

## Contents

---

### Special Feature

## 8 The Jungle of Hermit

### 4 Travelling across Japan

Vol.46 Yuzawa Town, Niigata, Japan

### 44 Cryptocoryne a Lazy Man's Way

### 46 nature aquarium **notes**

Vol.49 Preparation of Substrate and Filtration System

### 48 Nature Aquarium Q&A





*Special Feature*

# The Jungle of Hermit

Being called a treasure trove of genes, the Southeast Asian jungles are a home to *Cryptocoryne*, an aquatic plant that has been attracting aquatic plant hobbyists for a long time. *Cryptocoryne* are generally found in streams flowing through trees in a dense green jungle world, quietly growing in shady conditions where the light is filtered through the foliage. Just like a wise and prudent hermit, they are looking at the jungle from the river bed. "*Cryptocoryne*", the name derived from how the plant's flower blooms, means "hidden inflorescence". "*Crypto*" and "*Coryne*" have the meaning of "hidden or secret" and "inflorescence", respectively. The inflorescence of *Cryptocorynes* enclosed by a beautiful spathe looks even more mysterious. In Japan, *Cryptocoryne* only attracts the interest of aquarists but it is the subject of academic research in Europe. *Cryptocoryne* has a profound charm that is indispensable for the Nature Aquarium and other types of planted aquarium as the plant that adds tranquility to an aquascape over time. The Special Feature of this issue explores the profound world of *Cryptocoryne* and introduces its effective use in the layout.

Southeast Asia, The Sanctuary of *Cryptocoryne*

*Photographs by Takashi Amano*

*Text by Masatoshi Abe / Tsuyoshi Oiwa*

*Translation support by Laura Findley*

A photograph of a Cryptocoryne plant in a stream. The plant has long, thin, arching leaves that are a silvery-green color. It is growing on a bed of dark, mossy rocks. The water is clear and flows over the rocks, creating a small waterfall effect. The background is a dense, green forest.

# Southeast Asian Jungle - A Home to Cryptocoryne

In this clear water stream, a cluster of *Cryptocoryne siamensis* was seen. pH: 6.5; Water temperature: 24°C; TH: 70mg/ℓ



When looking into a jungle stream under the sunshine filtered through foliage, *Cryptocoryne* grows in clumps as if they huddle against each other to try to catch a ray of light that is usually reflected off the surface of running water and barely reachable. The popular image of naturally-grown *Cryptocoryne* is in a form of clumps dotting the bottom of the river. When using a plant which is indigenous to a specific area or region, such as *Cryptocoryne*, for a layout, it is fun to visualize how the plant grows in its natural habitat. Being one of the major plant groups with a large species count, *Cryptocoryne* grow in various different environments including mountain streams, lowland rivers and swamps covered by thick dried leaves of jungle trees. Some *Cryptocoryne* grow in a place endowed with abundant sunlight while some survive in a very low light environment. This is why the information as to the plants' natural habitats are very important as this information helps us to build an image of the layout and also provide us with some tips for growing *Cryptocoryne* in an aquarium relating to the factors such as soil, water temperature, pH, water hardness and lighting. Now let us look at the *Cryptocoryne*'s natural habitat again. In Southern Thailand, *Cryptocoryne albida* is found on the river bank with the fertile tropical rainforest soil in an ochre color. We can see wildness in these *Cryptocoryne albida* which are developing emerged leaves from mud and vigorously surviving in stern natural environments. Meanwhile in the clear water area where tropical water lily and bladderworts are found, several clusters of *Cryptocoryne cordata* are observed at the foot of a tree grown from the water. With the leaves glowing in sunlight, the truly dense cluster of *Cryptocoryne cordata* that can never be seen in aquarium made us realize the greatness and splendor of natural environment. In this natural habitat of *Cryptocoryne*, the sound of birds and animals can be heard and various species of insects including dragon flies can be seen on the grass beside the water. *Cryptocoryne* are nurtured by this wonderful natural environment filled with vitality. The Southeast Asian jungles are a sanctuary for *Cryptocoryne* that must be protected forever.



## Fun Time with *Cryptocoryne*

Having features of a wild appearance and slow growth by way of spreading the runners or rhizomes, *Cryptocoryne* is surely one of the most suitable aquatic plants for the Nature Aquarium and is an excellent plant for long-term maintenance of the aquascape. From the smallest *Cryptocoryne parva* to the large *Cryptocoryne crispatula* var. *balansae*, the wide variety of this plant makes it an excellent choice to be planted in the foreground, mid-ground and background, even making it possible for hobbyists to create a layout just with the genus *Cryptocoryne*. This is an exclusive feature of the plant that can be found in no other aquatic plants. Another factor which makes *Cryptocoryne* an essential plant the layout is its outstanding tolerance of shades. With this characteristic, *Cryptocoryne* can grow big even if it is planted in a location with poor sunlight such as in the shade of stem plants and driftwood. People might think it is hard to grow *Cryptocoryne* because it tends to melt easily, but as long as the minimum adequate level of care is provided, the popular *Cryptocoryne* species are usually so easy to handle that even beginners can enjoy their attractiveness. Why don't you take your time and interact with *Cryptocoryne* and aquascape?

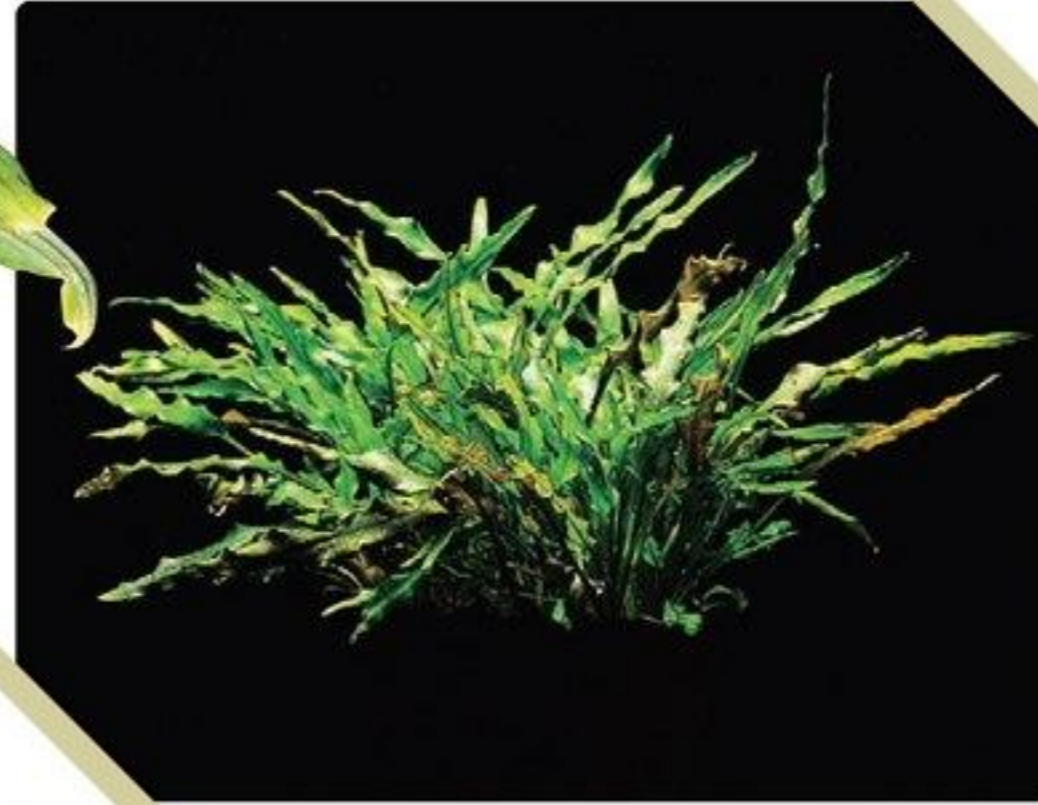


# List of Popular Cryptocoryne Species Useful for Layout

Among numerous species currently introduced, the species that can be used as a layout material are limited to the popular Cryptocoryne species which grow healthily under water. This section introduces 19+ 1 popular Cryptocoryne species ideal for layout making.



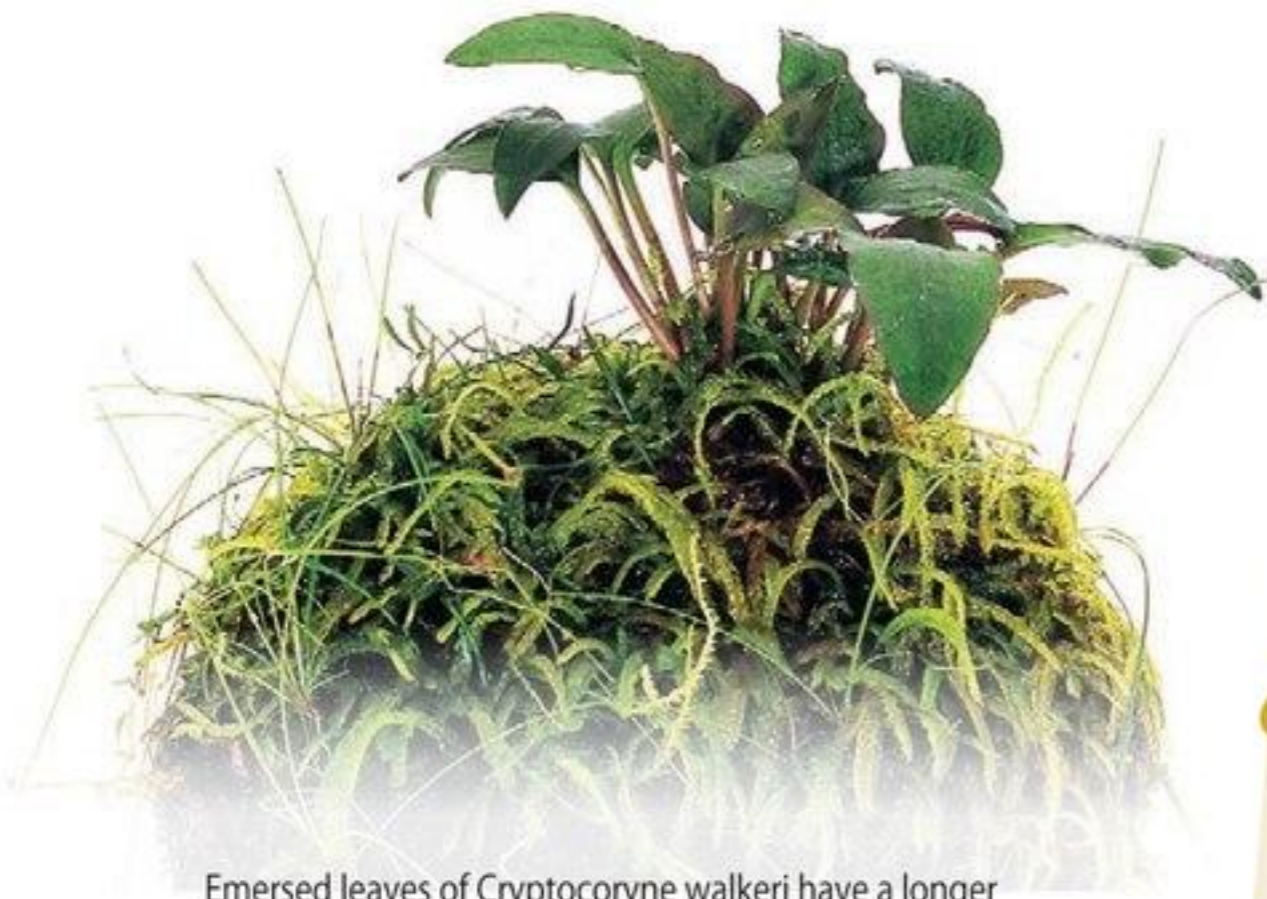
The brownish line from the leaf stem to the main vein is beautiful. The emerged leaves have an elongated and pointed shape compared to Cryptocoryne walkerii.



01  
*Cryptocoryne walkerii var. lutea*

## Cryptocoryne walkerii var. lutea

Distribution: Sri Lanka  
Water Quality: Mildly acidic to neutral  
Cryptocoryne walkerii var. lutea is one of the closely resembling Cryptocoryne species (var. walkerii, var. lutea and var. legroi) grown in Sri Lanka. Its green emerged leaves are gradually tinged with red and form wavy edges as it adapts to aquatic environment. This plant seems faster-growing and stronger compared to Cryptocoryne walkerii. Most of this species sold in a pot in shops are in good condition with adequate volume.

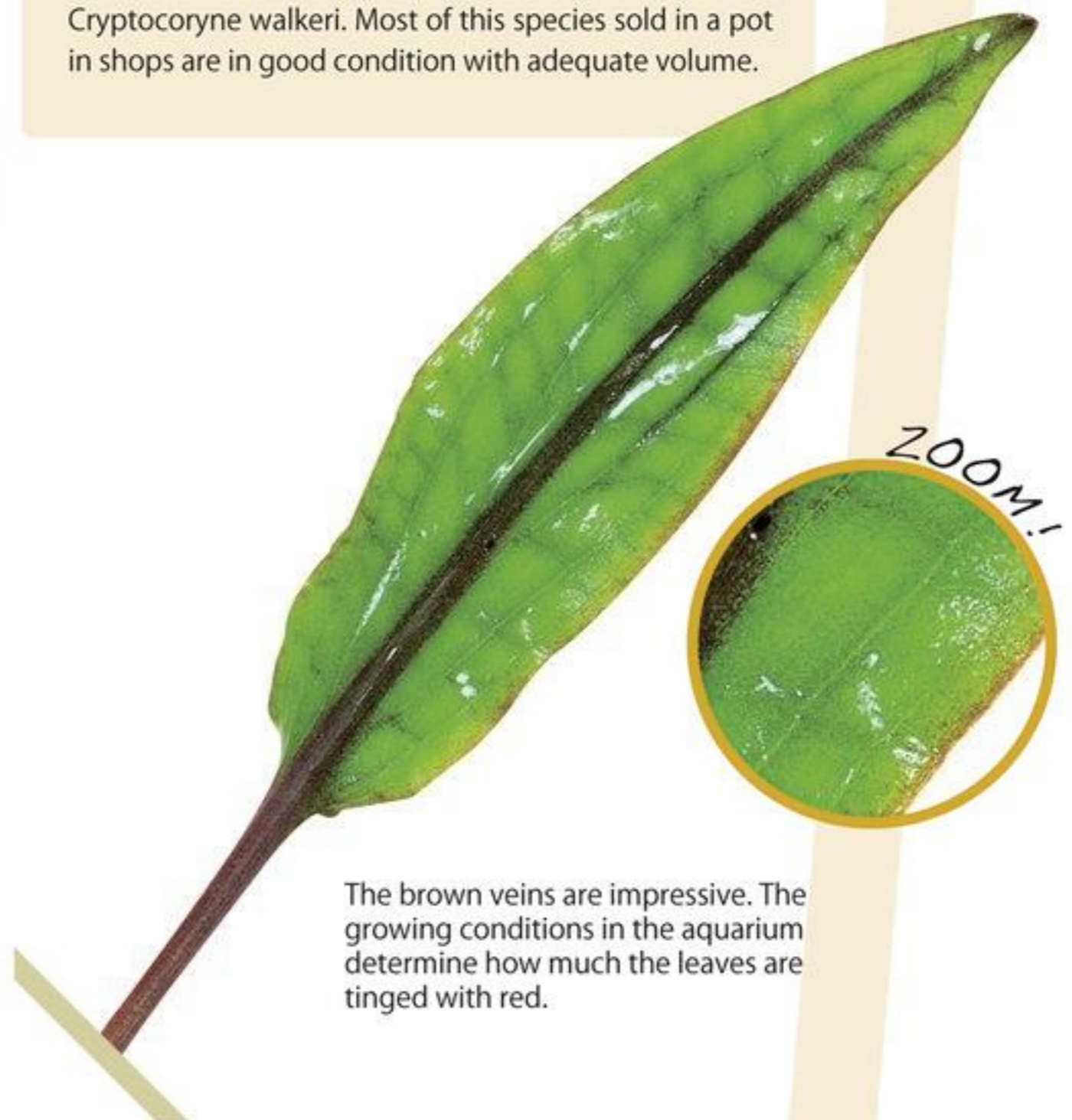


Emerged leaves of Cryptocoryne walkerii have a longer stem than var. lutea. They are smaller in size and slightly tinged with purple.

## Cryptocoryne walkerii

Distribution: Sri Lanka  
Water Quality: Mildly acidic to neutral  
Cryptocoryne walkerii is a strong and easy-to-handle species which is relatively easy to grow. The submersed leaves resembles Cryptocoryne wendtii (green) but it does not have a specific form as to color (some changes green to brownish color) and patterns (brownish stripes) of the leaves. This plant is distinguishable from var. lutea in emerged form but once it has been transited into submersed form, it is hard to identify this plant due to its variable color.

02  
*Cryptocoryne walkerii*



The brown veins are impressive. The growing conditions in the aquarium determine how much the leaves are tinged with red.



The leaves of *Cryptocoryne albida* tend to turn green in a low light environment such as a deep tank or in the shade of other aquatic plants.



### **Cryptocoryne albida**

Distribution: Thailand

Water Quality: Mildly acidic to neutral

This narrow-leaf *Cryptocoryne* is suitable to be planted in the mid-ground of the layout. The appearance of the leaves differ depending on the amount of light; they turn green under low light while brown spots appear on the leaves in relatively high light conditions. Some leaves have slightly wavy edges. This is one of the toughest species and recommended even for hobbyists who are new to *Cryptocoryne*. Growing this species emersed is also easy and you can enjoy beautiful flower (spathe) which is white and red.



The leaves turn brown when grown in a 60-cm tank with abundant light and liquid fertilizers. The spotted pattern on the leaves enhances the charm of the plant.



Among varied *Cryptocoryne* species, *Cryptocoryne albida* is certainly one of the easy-to-use species for layout in terms of size, shape and toughness.

04

*Cryptocoryne beckettii*



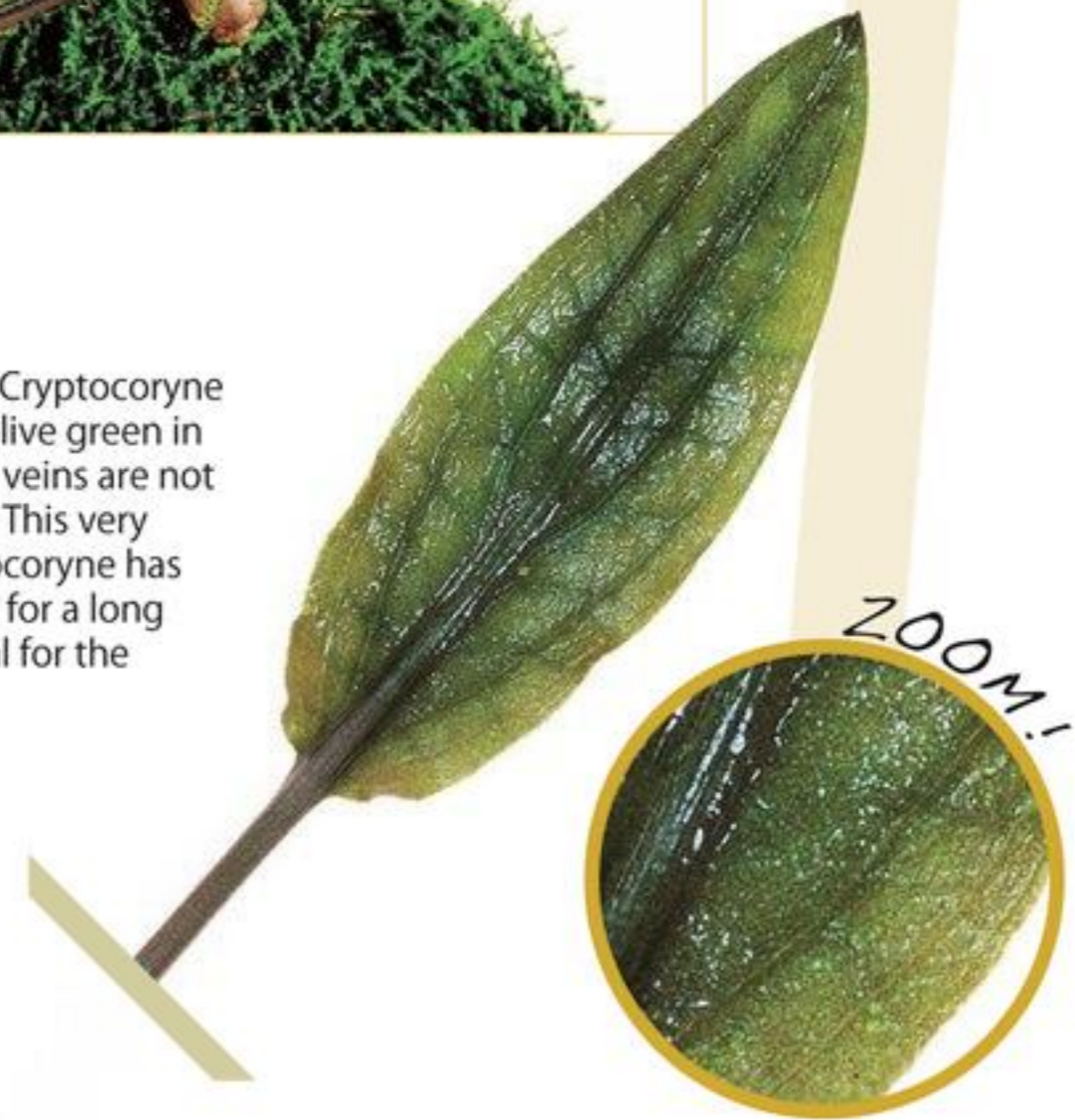
A spathe, which is a unique feature of Araceae, can be seen in an emersed environment. This alluring appearance with spathe is another appeal of Cryptocoryne.



### Cryptocoryne beckettii

Distribution: Sri Lanka  
 Water Quality: Mildly acidic to neutral  
 In contrast to non-glossy emersed leaves, Cryptocoryne beckettii develops glossy and spotless submersed leaves that are olive green in color, which is an attractive feature of this aquatic plant. The submersed leaves with slightly wavy edges grow up to about 10-20cm long. Cryptocoryne species originating from Sri Lanka, including this plant grow well even in relatively hard water. It is recommended to take your time to grow this plant without replanting so that the Cryptocoryne's signature glowing, glossy leaves can be enjoyed.

The leaves of Cryptocoryne beckettii are olive green in color and the veins are not very obvious. This very strong Cryptocoryne has been popular for a long time and ideal for the beginners.



ZOOM!

05

*Cryptocoryne undulata*



### Cryptocoryne undulata

Distribution: Sri Lanka  
 Water Quality: Mildly acidic to neutral  
 Among popular Cryptocoryne species, Cryptocoryne undulata grows relatively big and has high tolerance to environmental changes. This species has two types, red and green. Both of them have red-tinged submersed leaves with undulating edges regardless of environment in which they are grown. Fascinating look of the undulating-edged leaves can be enjoyed if this species is planted in groups in the layout.

Cryptocoryne undulata (red) sometimes even develops red-tinged emersed leaves.

Reddish brown veins on green leaves are beautiful. The entire leaves may turn reddish brown in some environments.



ZOOM!





Cryptocoryne petchii should be arranged effectively to use its brown leaves as a good accent in the layout. It is not colorful but has a great presence that only Cryptocoryne petchii can bring.

06

*Cryptocoryne petchii*

## Cryptocoryne petchii

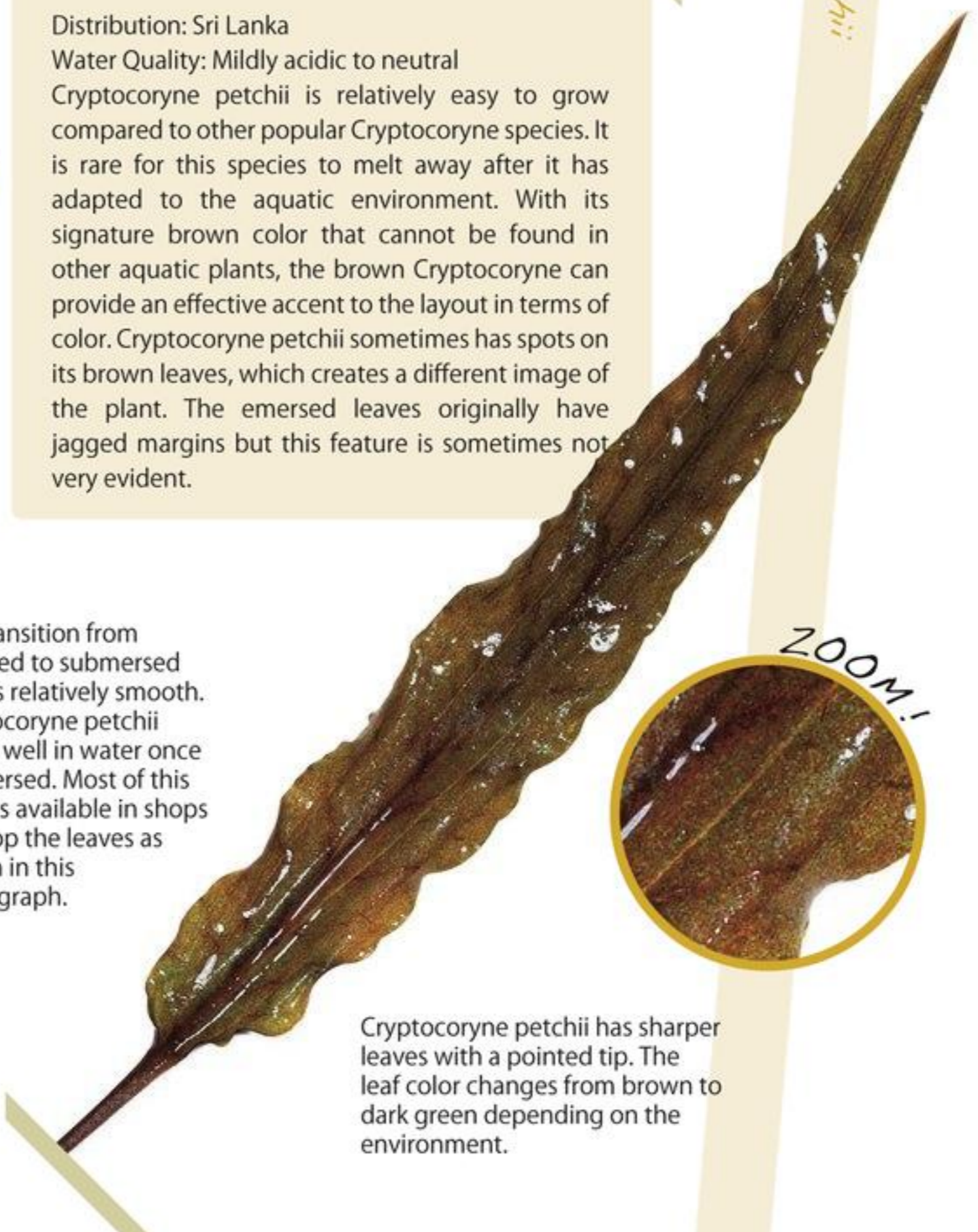
Distribution: Sri Lanka

Water Quality: Mildly acidic to neutral

Cryptocoryne petchii is relatively easy to grow compared to other popular Cryptocoryne species. It is rare for this species to melt away after it has adapted to the aquatic environment. With its signature brown color that cannot be found in other aquatic plants, the brown Cryptocoryne can provide an effective accent to the layout in terms of color. Cryptocoryne petchii sometimes has spots on its brown leaves, which creates a different image of the plant. The emerged leaves originally have jagged margins but this feature is sometimes not very evident.



The transition from emerged to submersed form is relatively smooth. Cryptocoryne petchii grows well in water once submersed. Most of this species available in shops develop the leaves as shown in this photograph.



Cryptocoryne petchii has sharper leaves with a pointed tip. The leaf color changes from brown to dark green depending on the environment.

ZOOM!



## Combining Cryptocoryne with Driftwood

Driftwood layout has a story: a fallen tree or a broken branch was carried away by water and finally became driftwood through the natural decaying process. Around the driftwood that has sunk under the gentle flow of water, aquatic plants grow over time. Cryptocoryne is a perfect match for recreating the impression of this type of scene, which represents a story. It might be because of Cryptocoryne's subdued leaf color and very slow growth which is a feature of shade-loving aquatic plants. The colors of Cryptocoryne are a subtle mix of earth colors including green and olive as well as brown and ocher, which blends naturally with the brown or black color of driftwood. On top of

that, the rosette leaves of Cryptocoryne create a link between the driftwood and substrate, providing a seamless flow within the layout. Besides the classic style of using Cryptocoryne in the mid-ground of the layout, it is an excellent idea to plant Cryptocoryne at the side or between the driftwood pieces that have been arranged in the mid-ground as a framework of the layout. This arrangement not only displays the inherent natural atmosphere of Cryptocoryne but at the same time adds a natural touch that can only be gained with the lapse of time to the layout, giving the appearance of great age and the passage of time.





W120×D45×H45 (cm)



W120×D45×H45 (cm)



To achieve this density, Aqua Soil-Amazonia should be used as a substrate material and damaged leaves need to be trimmed off frequently.

### Cryptocoryne parva

Distribution: Sri Lanka Water Quality: Mildly acidic to neutral  
 Cryptocoryne parva is the smallest known Cryptocoryne and is excellent for using as a foreground plant. The growth rate of this plant is very slow. Dense planting during the initial planting process and careful, patient maintenance are required to achieve a dense look. A dense and beautiful carpet of Cryptocoryne parva looks splendid and demonstrates great aquascaping skill.



It takes a long time to grow dense since each plant does not develop many leaves.

The leaves are small in size (3-5cm) and rigid. Growing and maintaining Cryptocoryne parva in good leaf condition is unexpectedly hard.

ZOOM!

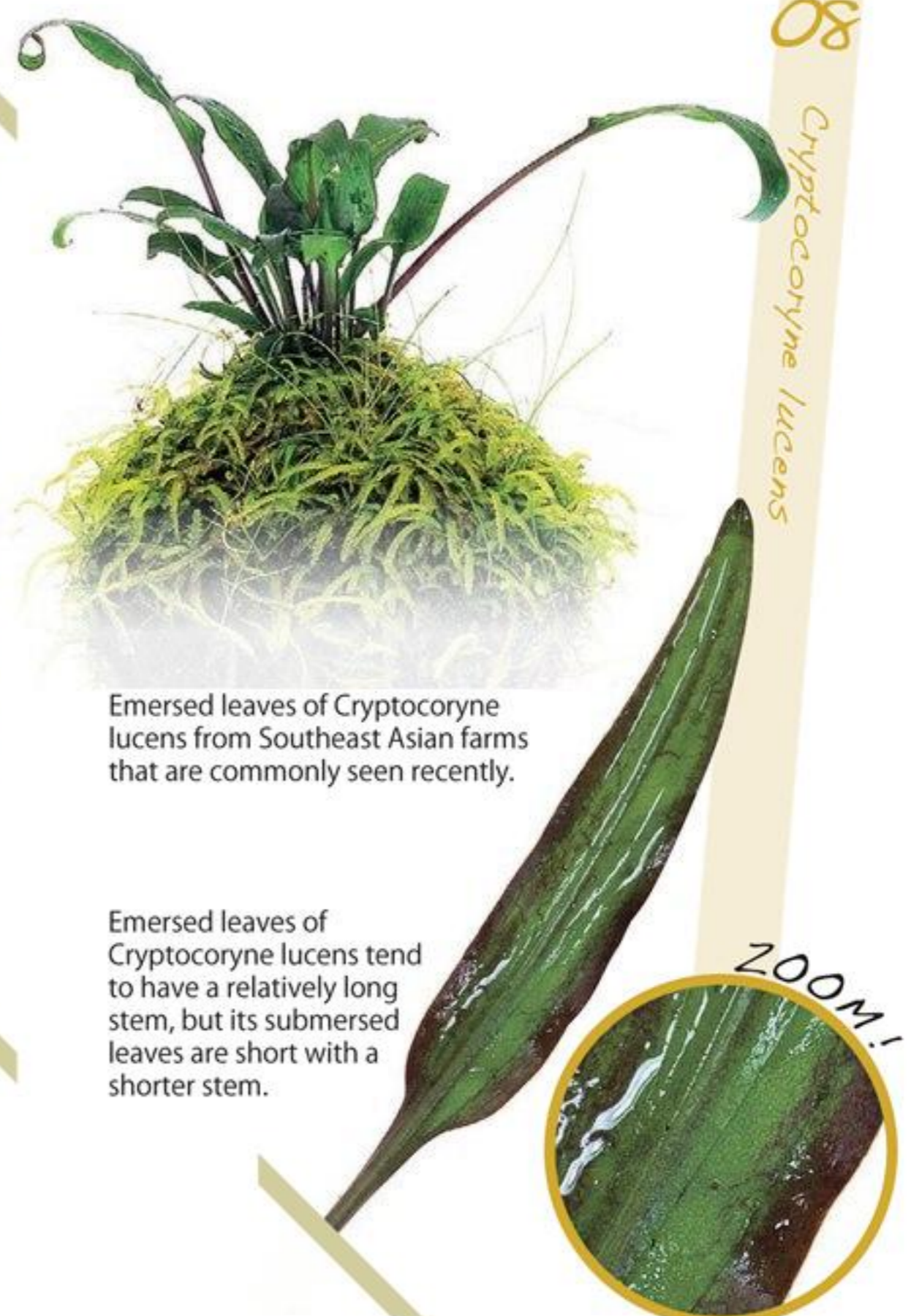
80



The beautiful leaves of Cryptocoryne lucens attract everyone who sees it. This is a good example where a single attractive plant is effectively arranged in a layout.

### Cryptocoryne lucens

Distribution: Sri Lanka Water Quality: Mildly acidic to neutral  
 Cryptocoryne lucens originally grows with narrow, upright leaves as shown in the above sample photograph. However, this species shipped from the farms in Southeast Asian countries does not show this style of growth. Cryptocoryne parva, Cryptocoryne lucens and Cryptocoryne willisii are closely related and they often naturally hybridize with each other.



Emerised leaves of Cryptocoryne lucens from Southeast Asian farms that are commonly seen recently.

Emerised leaves of Cryptocoryne lucens tend to have a relatively long stem, but its submersed leaves are short with a shorter stem.

ZOOM!



It takes a long time to grow dense clumps of *Cryptocoryne willisii* as shown in the photo. The long leaves bring a distinctive atmosphere to the layout.



### **Cryptocoryne willisii**

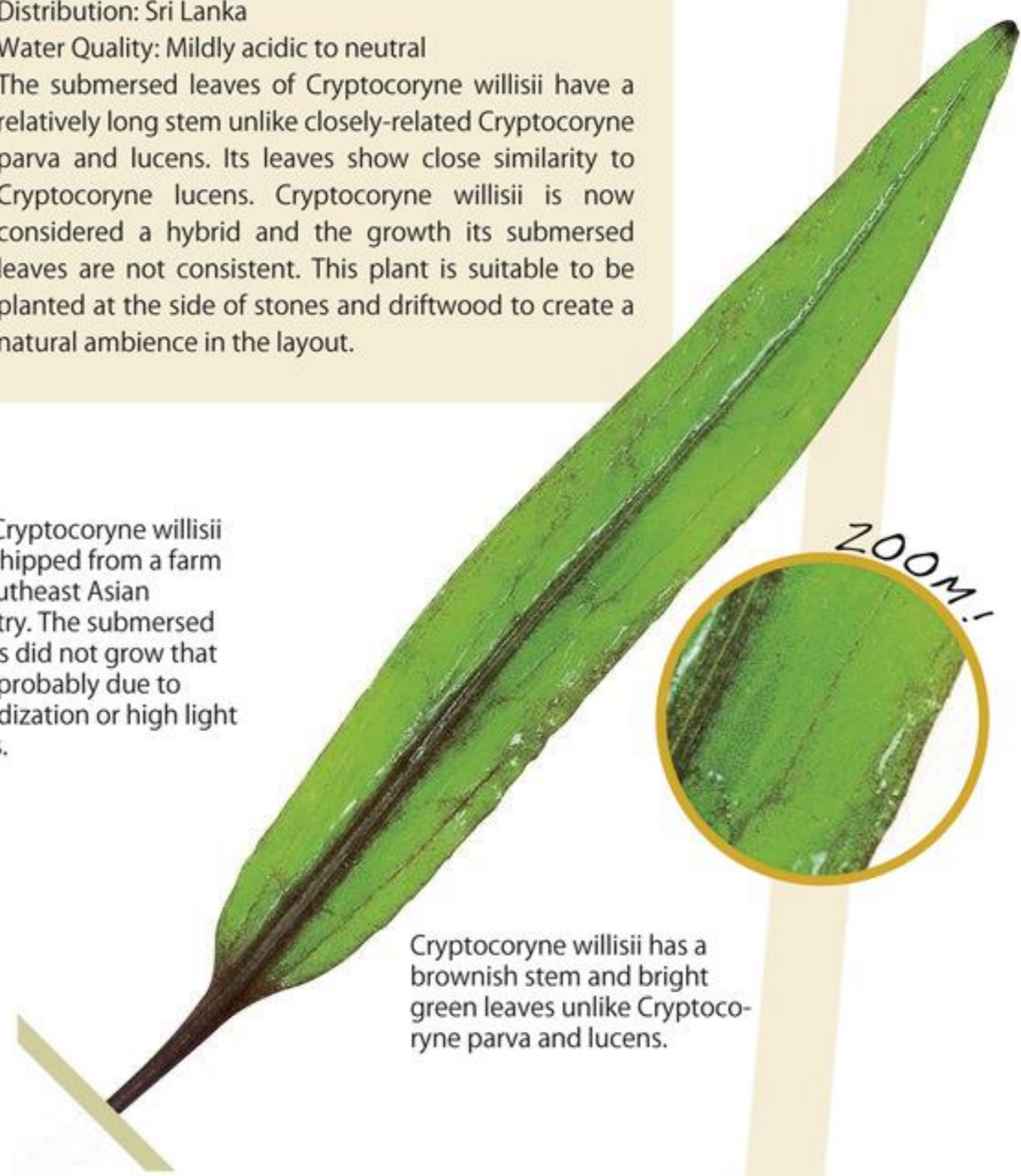
Distribution: Sri Lanka

Water Quality: Mildly acidic to neutral

The submersed leaves of *Cryptocoryne willisii* have a relatively long stem unlike closely-related *Cryptocoryne parva* and *lucens*. Its leaves show close similarity to *Cryptocoryne lucens*. *Cryptocoryne willisii* is now considered a hybrid and the growth its submersed leaves are not consistent. This plant is suitable to be planted at the side of stones and driftwood to create a natural ambience in the layout.



This *Cryptocoryne willisii* was shipped from a farm in Southeast Asian country. The submersed leaves did not grow that long probably due to hybridization or high light levels.



*Cryptocoryne willisii* has a brownish stem and bright green leaves unlike *Cryptocoryne parva* and *lucens*.

09

*Cryptocoryne willisii*

ZOOM!



Cryptocoryne crispatula var. balansae is a large plant having the longest leaves among Cryptocoryne species. Its leaves easily overhang if the tank is shallower than about 60cm.

### Cryptocoryne crispatula var. balansae

Distribution: Southeast Asia (Thailand)

Water Quality: Mildly acidic to neutral

Its tape-like wavy leaves are appealing and best suited for the background location of large tanks. The main leaf veins turn wine red color depending on the environment and further enhance the plant's beautiful appearance. Cut off excessively long leaves from its base because the leaves overhanging along the water surface may block the light into the aquarium.



The grown leaves easily become more than 50cm long. This plant prefers a bright place with good water circulation.

The biggest charm of this species is waves on its green leaves. Together with var. tonkinensis, this is a member of the Cryptocoryne crispatula group.

01

Cryptocoryne crispatula var. balansae



ZOOM!



Tape-like Cryptocoryne species are mainly used in the background. A soft impression can be achieved by planting them together with Hair grass or Glossostigma.

### Cryptocoryne retrospiralis

Distribution: Thailand & India

Water Quality: Mildly acidic to neutral

This plant closely resembles Cryptocoryne crispatula var. balansae, but its leaves are not as wavy as var. balansae. The leaves are in olive-green color, and unlike the light green leaves of var. balansae, give an austere elegant impression. Because this species does not soon grow as large as var. balansae, it is more suited for the use in regular 60-90cm tanks.



Careful attention is required as its old leaves and the leaves overhanging at the stagnant water surface can result in the melt and decay of the leaf tips.

This species is distinguishable from Cryptocoryne crispatula var. balansae by the leaf color and waves on the leaves. The leaf stem of this species does not turn red.

02

Cryptocoryne retrospiralis



ZOOM!



This plant is convenient for use in 60-90cm tanks because of its narrow and short (up to 40cm long) leaves. It is interesting to make a layout as in the photo using a great feature of *Cryptocoryne crispatula* var. *tonkinensis*.

### **Cryptocoryne crispatula** var. **tonkinensis**

Distribution: Vietnam & Myanmar

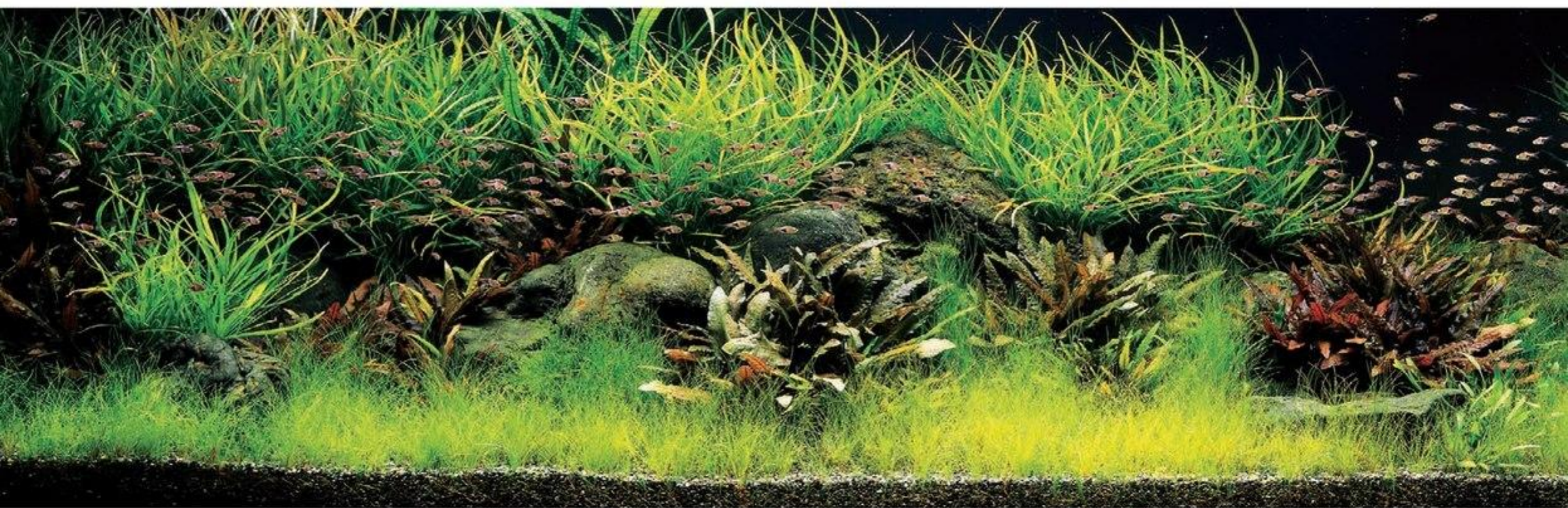
Water Quality: Mildly acidic to neutral

Among *Cryptocoryne* having unique and fascinating characters, this species is easily identifiable with its signature narrow tape-like leaves. Its leaf color varies ranging from green to brown, sometimes with spots depending on the growing conditions. The volume of each plant is relatively small, so dense initial planting is recommended. It is slow growing and requires adequate light and CO<sub>2</sub> supplementation to thrive.

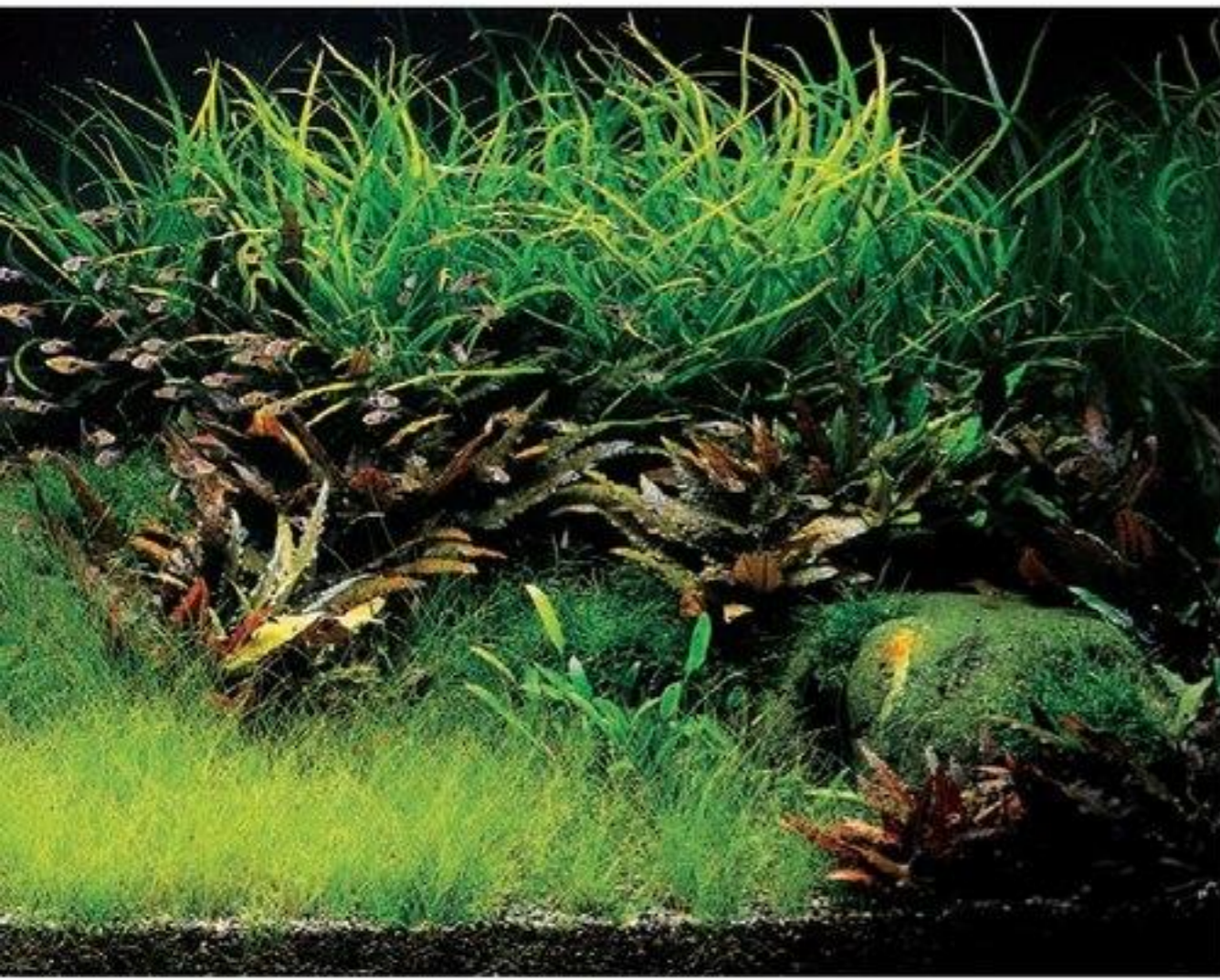
It is possible to grow this plant emersed in an environment having humidity close to 100%. Be careful of a drop in humidity in the initial stage. It is much easier to grow this plant under water.



The leaf width of approximately 2mm is the narrowest among *Cryptocoryne* species. The leaf color changes depending on the environment.



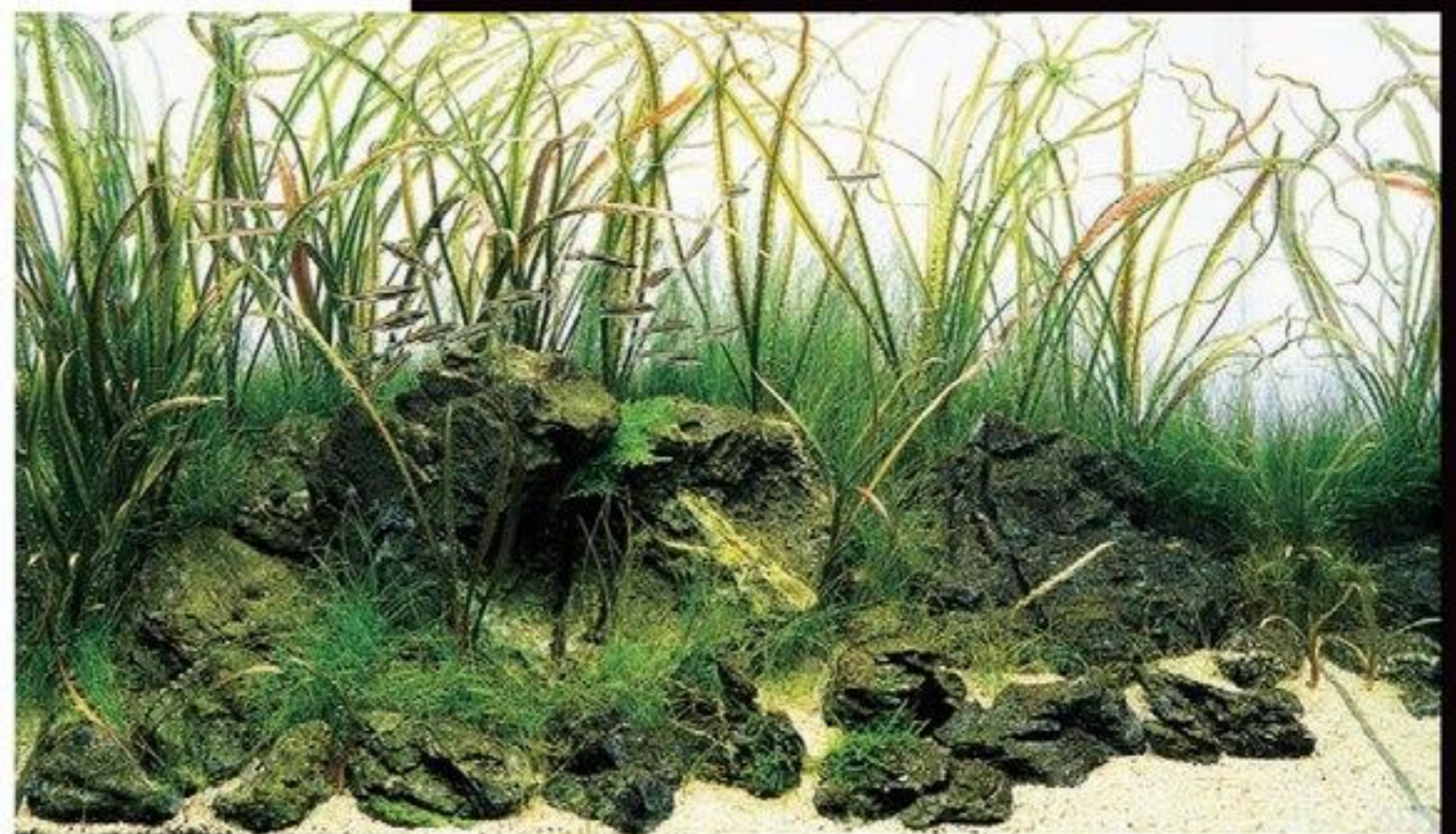




W240×D60×H60 (cm)



W90×D45×H45 (cm)



W60×D30×H36 (cm)

## Combining Cryptocoryne with Stones

An Iwagumi layout expresses the flow of water by the arrangement of the stones. With the arrangement of stones and aquatic plants, the layout depicts the river bed that can be found in nature. A combination of stones and Cryptocoryne originating from natural rivers flowing in tropical rainforests can bring an ambience of the plant's natural habitat in Southeast Asia to the layout. Having a wonderful feature of forming a dense and rich bush with its rosette leaves, Cryptocoryne offers many ways of utilization in different types of layout, such as rhythmically placing its bushes in spots between stones and planting it around the stones in the pursuit of a perfect match. The presence of Cryptocoryne adds a unique touch and helps create an impressive layout. Over time, the natural feel brought about by Cryptocoryne will be enhanced as the young shoots and leaves of the plant are formed around and between the stones along with the spread of the runners of its rhizomes. Cryptocoryne is slow-growing but its leaves will eventually become large. It is important to trim off the oversized leaves to ensure a good balance of the entire layout.

# Cryptocoryne Notes [Layout Section]

Cryptocoryne is a frequently used aquatic plant in the Nature Aquarium. Not only for the layout using Cryptocoryne as the main plant as shown in this special feature, there are many Cryptocoryne species that have sizes and shapes suitable for the mid-ground location of the layout which uses stem plants as well as many other different types of aquatic plants. This section discusses the use of Cryptocoryne in the layout.

## ● Planting Cryptocoryne

Before starting the planting of Cryptocoryne for layout making, you have to do some preparation if you purchased the plant in a pot. The first thing to do is to remove the rock wool around the roots. At this stage, it is important not to damage the roots. Damage to the roots of Cryptocoryne will affect the growth rate of the plant and it may take a longer time for the mature, submersed leaves of the plant to develop. If the roots are seen protruding out of the pot, it is advised not to forcibly separate the plant from the pot but to cut open the pot and take the plant out with the rock wool still around it so as to avoid causing damage to the roots. Next, remove the rock wool. Cryptocoryne spreads fine roots across the rock wool. If the rock wool is removed in a rough manner, the fine roots of Cryptocoryne can break off. To avoid this, roughly remove the outer side of the rock wool first, and then remove the residual rock wool around the roots carefully in a pail or a plastic container of water using fine-tipped tweezers. The rock wool should be removed completely without damaging the roots because it may contain chemicals harmful to living organisms such as *Cardina japonica* (Yamato Numa Ebi). After the rock wool has been removed, put the roots together so they can easily be held with tweezers and then plant the Cryptocoryne. Be careful not to plant too deeply in the soil. It is advisable to insert the plant in the soil with tweezers and then pull it back slightly until the roots are totally covered by the soil while the stem stays above the substrate.

Unlike Cryptocoryne sold by the stalk, a pot of Cryptocoryne usually has several stalks densely packed together. If the roots are found tangled after the rock wool is removed and it is difficult to separate into stalks, you may plant the Cryptocoryne without untangling them. When the bundle of the plant is too large to be picked

with tweezers for planting, you may make a shallow hole on the substrate and place the plants in it, and then pour some Aqua Soil or another type of soil on top of them so they will be held in place. This easy way of planting prevents damage to the roots and helps the healthy growth of Cryptocoryne. The density of planting influences the size of the submersed leaves that will develop. Planting several stalks of Cryptocoryne in high density prevents the development of overgrown submersed leaves. This is why Cryptocorynes used for the mid-ground location are planted in a bunch. If you wish to have large submersed leaves, it is advised to plant the Cryptocoryne stalk by stalk.

## ● Substrate for Cryptocoryne

As mentioned above, the condition of the roots is of particular significance for healthy growth of Cryptocoryne. New submersed leaves will grow well if the roots start growing healthily after planting. In the event the roots are damaged or melt in the substrate, it may take a longer time before the Cryptocoryne develops submersed leaves while existing emerged and submersed leaves may melt away before new submersed leaves grow. To prevent this problem, it is important to avoid the damage to the roots during pre-planting preparation and planting processes and in addition to it, to build the substrate conducive to healthy growth of Cryptocoryne roots. In the Nature Aquarium, peat moss is used to put around the roots of Cryptocoryne to be planted to encourage the root growth. In the early days of the Nature Aquarium, the substrate was mainly built with sea sand and Cryptocoryne grew very slowly in this type of substrate. Therefore, the roots of Cryptocoryne were covered by peat moss rich in natural organic acid that has the effect of promoting the root growth. Now Aqua Soil takes over the role that used to be played by



**Top** Large plant is placed in a hole made on the substrate and covered with Aqua Soil.

**Left** A few of small plants are held together at their roots and then planted with tweezers.

peat moss. Just like peat moss, Aqua Soil contains abundant natural organic acid which promotes the roots of Cryptocoryne and also helps develop new submersed leaves. Another advantage of Aqua Soil is its soft grains that do not hinder the growth of the roots. It also has an effect of making the water soft and acidic just like the water in the natural habitat of Cryptocoryne.

Once it has started growing, Cryptocoryne spreads its roots in the substrate and grows further by taking in nutrients vigorously from the roots. There are two nutritional conditions for the substrate conducive to the healthy growth of Cryptocoryne. One is to be able to supply nutrients on a long-term basis, and the other is to have rich soil bacteria that help the absorption of nutrients via the roots. To satisfy these two conditions, it is recommended to spread Power Sand under the Aqua Soil. Bacteria in the substrate grow by feeding on organic nutrients contained in the Power Sand and supply nutrients to the roots of the Cryptocoryne. Power Sand Special, a substrate material blended with Bacter 100 and Clear Super for the enhanced growth of soil bacteria, contains



1. Cryptocoryne sold in a pot. 2. Cut open the pot with scissors. 3. Separate the plant from the pot without damaging the roots. 4. Remove the rock wool with hand. 5. Place the plant in water and loosen the rock wool. Carefully remove the rock wool with the tips of tweezers. 6. Now plant the Cryptocoryne.

more organic nutrients compared to normal Power Sand and is suitable particularly for the layout using Cryptocorynes as the main plant species. Even though this type of layout is suited for long-term maintenance, the nutrients which were provided during the initial set up will exhaust in about one year's time. Necessary nutrients can be supplied easily just by inserting solid nutrients such as Iron Bottom and Multi Bottom into the substrate.

● **Growth Control of Cryptocoryne**

Shade-loving Cryptocoryne is a relatively slow-growing and less-demanding plant. On the other hand, it is vulnerable to environmental change in terms of water quality and light levels. If this plant is subjected to sudden changes of environment, it can show symptoms such as tiny holes on the leaves, discoloration and melting. Another thing to note is that even slow-growing Cryptocoryne will eventually have larger volume of leaves and new plants will grow around them. The following are some brief notes on growing and management of Cryptocoryne.

<Lighting>

Cryptocoryne is a shade-loving plant and does not require strong light for growth. Some Cryptocoryne species may have problems such as small leaves and loss of original color and its proper growth may be affected under strong light. For this reason, Cryptocoryne is suited for planting in the shade of driftwood and other aquatic plants in the layout. It also develops beautiful submersed leaves in a deep tank where the light is adequately softened. Each popular Cryptocoryne species have different levels of adaptability to changes in light intensity, but they are usually weak to significant changes in the amount and quality of light. It is therefore advisable to replace the lamp, one by one if more than

one lamp is installed on a lighting system, before it becomes too dim to avoid significant changes in lighting conditions. If the lamp suddenly becomes very bright after replacement, Cryptocoryne may develop tiny holes on its leaves, eventually leading to melting of entire leaves. In the event of melting of submersed leaves of Cryptocoryne, suction off the melted leaves with a hose and wait until new submersed leaves that are adapted to aquatic environment begin to grow.

<Water quality>

The water in the natural habitats of Cryptocoryne in the Southeast Asian region is mostly soft, acidic water. In view of this, it can be said that substrate made up of Aqua Soil is suitable for growing Cryptocoryne in terms of water quality. Each Cryptocoryne species has a different adaptable range of water and some species seem to have less chance to melt in very hard, alkaline water just like the water in Europe. But still, every Cryptocoryne is vulnerable to a rapid changes in water quality and their submersed leaves start melting from the tips after a significant amount of tank water is changed with tap water. For this reason, the tank water should be changed little by little on a periodical basis to avoid sudden change of tank water quality.

<Temperature of substrate>

Temperature of substrate is significant for Cryptocoryne because the plant's growth rate is influenced by the condition of the roots. In a layout using Cryptocoryne which is maintained throughout the year, Cryptocoryne stops

growing in winter when the temperature of the substrate goes down even if a heater is installed in the water, and it starts growing again on the arrival of spring when the substrate becomes warmer. To improve this situation, it is effective to maintain the temperature of the aquarium by controlling the room temperature or maintain the temperature of the substrate by installing a Growth Plate within the substrate.



During trimming, cut off the old leaves which have holes or turned yellow at the base of leaf stem.

<Growth management>

Oversized submersed leaves of Cryptocoryne need to be trimmed to ensure the balance of the layout, though the trimming does not have to be as frequent as for stem plants.

Moreover, a clump of Cryptocoryne can be maintained in good condition by trimming off old submersed leaves at the right time. Submersed leaves of Cryptocoryne should be cut off at the lowest end of the leaf stem. ADA's Trimming Scissors are very useful for this kind of delicate work in water. Old submersed leaves of Cryptocoryne usually lose their gloss and curl up or turn yellowish. If any leaf showing such symptoms is observed, cut it off first in the trimming process. Cryptocoryne species spread the rhizomes from where new plant develops. If the new plant is away from the main plant and affects the balance of the layout, put the blade tips of the Trimming Scissors into the substrate to cut the rhizome and pull out the new plant.



If the nutrient level of the substrate goes down after a half to one year has passed since the initial set up of the aquarium, the nutrients should be replenished with solid nutrients such as Multi Bottom using Bottom Release.



Shade-loving Cryptocoryne develops submersed leaves in locations under soft light such as deep inside the tank and in the shade of driftwood.



This species casually placed in the shade of driftwood shows the attraction of Cryptocoryne hiding in the shadow.

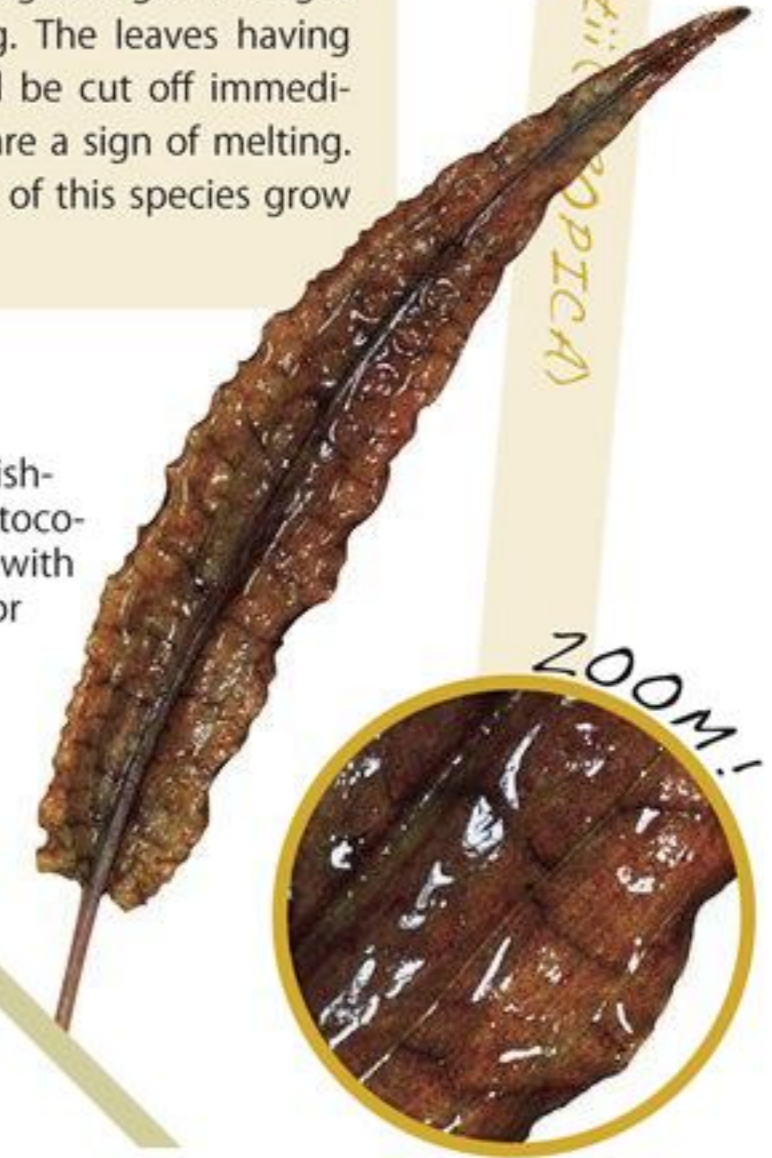


Brown Cryptocoryne shows its reddish underside of the leaves under the light. The beautiful leaf underside is one of the attractive features of Cryptocoryne.

### Cryptocoryne wendtii (TROPICA)

Distribution: Sri Lanka  
 Water Quality: Mildly acidic to neutral  
 This is a Cryptocoryne wendtii that has been released by Tropica Aquarium Plants, a Danish aquatic plant farm well-known for its excellent conditions of the plants. The plant's beautiful hammered leaves glowing in the light is truly appealing. The leaves having tiny holes should be cut off immediately since they are a sign of melting. The broad leaves of this species grow relatively large.

This plant is distinguishable from other Cryptocoryne wendtii species with its broad, brown-color hammered leaves.



13  
 Cryptocoryne wendtii (TROPICA)

ZOOM!



This representative Cryptocoryne species looks really elegant when it grows big. The Cryptocoryne wendtii (green) group is suited to the mid-ground location in the layout.

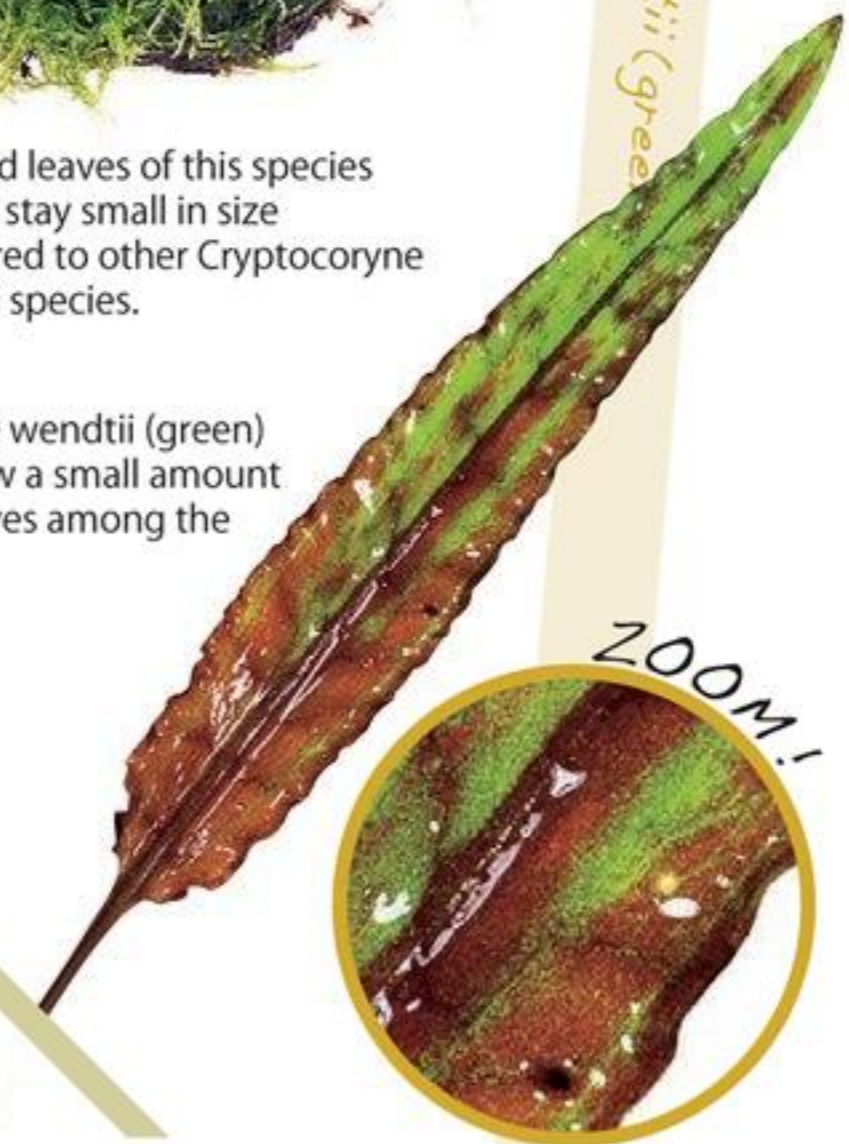
### Cryptocoryne wendtii (green)

Distribution: Sri Lanka    Water Quality: Mildly acidic to neutral  
 Among popular Cryptocoryne species, only this plant and its hybrid species Cryptocoryne wendtii x hybrid have submersed leaves that stay green at all times. It might be surprising, but if you wish to use a green Cryptocoryne for the layout, this species is the only option. This plant recently shipped from the farms in Southeast Asian countries seems weak with smaller emersed leaves and thin leaf stems.



Emersed leaves of this species tend to stay small in size compared to other Cryptocoryne wendtii species.

Cryptocoryne wendtii (green) may also grow a small amount of brown leaves among the green leaves.



14  
 Cryptocoryne wendtii (green)

ZOOM!



This large plant can be used as a background plant in an Iwagumi layout as shown in the above photo. A cluster of *Cryptocoryne wendtii* "Mi Oya" snuggling against the stones looks attractive.

## Cryptocoryne wendtii (Mi Oya)

Distribution: Sri Lanka Water Quality: Mildly acidic to neutral  
 This is a member of the *Cryptocoryne wendtii* group that naturally grows in the Mi Oya River basin in Sri Lanka. Transition into the submersed state is very smooth if the plant is sold in good condition. Once it has adapted to aquatic environment, *Cryptocoryne wendtii* "Mi Oya" grows fast and its broad leaves become large, making this plant suited to tanks as large as 90cm. It has a relatively good tolerance to high water temperature.



Brown *Cryptocoryne* adds warmth to the aquascape. *Cryptocoryne wendtii* (brown) slightly tinged with red matches the body color of Rasbora from the same land.

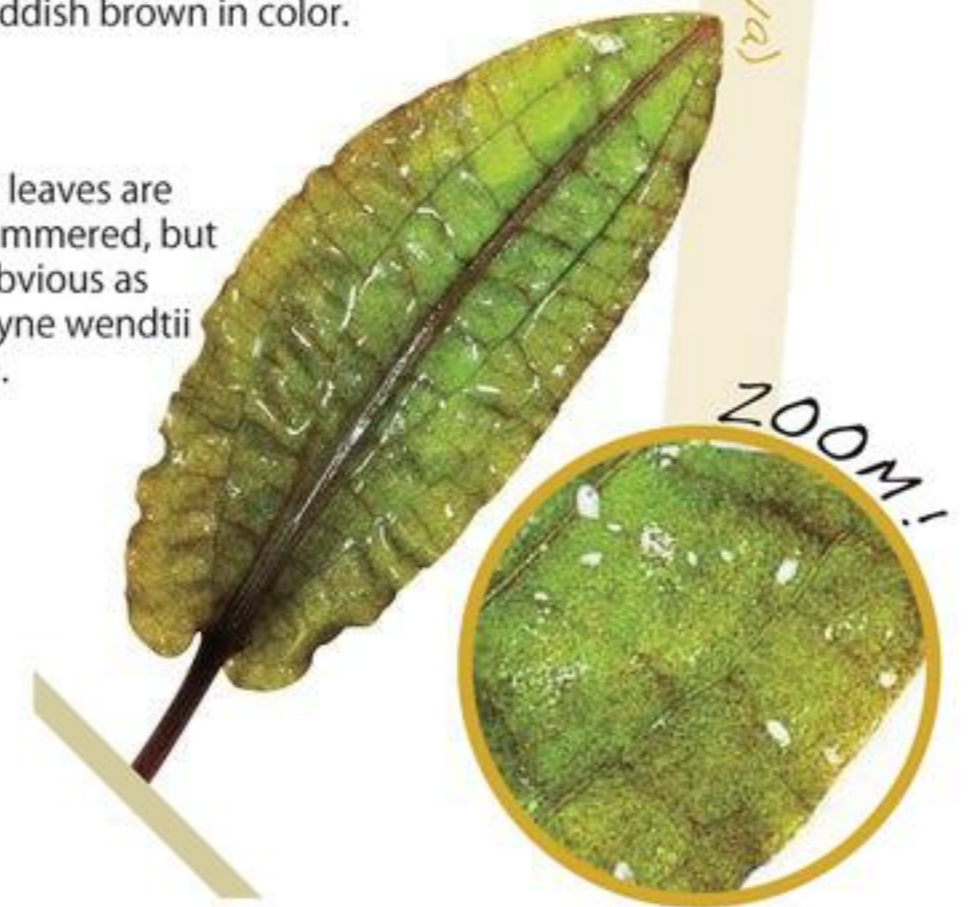
## Cryptocoryne wendtii (brown)

Distribution: Sri Lanka Water Quality: Mildly acidic to neutral  
 In contrast to *Cryptocoryne wendtii* (green) which is a representative green *Cryptocoryne* species, this *Cryptocoryne wendtii* (brown) is a representative species of brown *Cryptocoryne* that has been popular from long ago. Although it bears only small emerged leaves when sold in shops, its submersed leaves will eventually grow large. In view of this, this plant should not be planted in the front position of the layout, or the plant's presence may become too overpowering.



The emerged leaves are green while the submersed leaves are reddish brown in color.

The broad leaves are slightly hammered, but not that obvious as *Cryptocoryne wendtii* (TROPICA).



15 *Cryptocoryne wendtii* (Mi Oya)

ZOOM!



The dark green submersed leaves are beautiful with a reddish brown underside. The submersed leaves of this plant become large in contrast to the small emerged leaves.

Both topside and underside are brown and the veins turn olive green in certain environments.



16 *Cryptocoryne wendtii* (brown)

ZOOM!



This plant does not grow very fast but develops new leaves vigorously from the inner part when it is in good condition. The pink underside of the leaf can be seen when the leaves are growing.

### Cryptocoryne pontederifolia

Distribution: Sumatra Water Quality: Mildly acidic to neutral  
Cryptocoryne pontederifolia featuring heart-shaped leaves in a light green color will look attractive if used in the layout as an accent. This species is most likely to melt during transition from emersed to submersed form. When it starts melting, the melted portion should immediately be suctioned off with a hose so that the plant will not melt away up to above the roots. As long as this measure is taken properly, the new leaves will develop albeit taking some time. New leaves slowly developing from the inner part of the plant, which is a great feature of Cryptocoryne pontederifolia, is really impressive. This round-leaf Cryptocoryne is ideal for beginners.



The thick leaves of this plant are tough and easy to manage even above water. A single plant does not develop many leaves.

The leaf resembles Cryptocoryne ciliata but it is brighter green in color and has an auricle. The topside of the leaf is sometimes tinged with red when in good condition.



17

*Cryptocoryne pontederifolia*

### Cryptocoryne ciliata

Distribution: Borneo, Thailand & Malaysia  
Water Quality: Mildly alkaline  
This plant has two variants, namely var. ciliata and var. latifolia. Both of them grow partially emersed in brackish waters in their native habitats. This plant prefers mildly alkaline water and this characteristic is unchanged even when cultivated in a farm. For this reason, it can hardly be used in a planted aquarium together with other aquatic plants. In addition, this Cryptocoryne has the tendency of becoming smaller in water. In view of these facts, this plant is best grown partially or totally emersed. This species is included in the list as it is popular in the market, but it must be said that it is not suitable for the use in a planted aquarium.



This plant is easy to grow in an emersed environment. It may be a good idea to use this plant in a terrarium.

Cryptocoryne ciliata with thick, pointed leaves prefers an environment with bright light. The photograph shows a leaf of var. ciliata.



18

*Cryptocoryne ciliata*

## Cryptocoryne wendtii x hybrid

Distribution: Sri Lanka  
 Water Quality: Mildly acidic to neutral  
 Unlike *Cryptocoryne wendtii* (green) having submersed leaves which are not constantly green in color, this hybrid species always develops green leaves both in emersed and submersed environments. This feature makes this plant a good choice when hobbyists wish to place nothing but green plants in the layout or as an alternative to *Cryptocoryne wendtii* (green). The length of its leaves with wavy edges is almost same as the stem length. This is a beginner-friendly plant which is stronger and easier to handle than *Cryptocoryne wendtii* (green). *Cryptocoryne wendtii* green x tall form is another hybrid of *Cryptocoryne wendtii*.



This plant is released by Oriental Aquarium in Singapore. It develops broader and more dynamic leaves compared to *Cryptocoryne wendtii* (green).



This is a rare species because the submersed leaves of most *Cryptocoryne* species are not always green.

19

*Cryptocoryne wendtii* x hybrid



Planting this *Cryptocoryne* in a location raised by stones or driftwood is a good way to enjoy its red underside of the leaves.

## Cryptocoryne cordata "blassii"

Distribution: Southeast Asia      Water Quality: Mildly acidic to neutral

This is the most easily-available *Cryptocoryne* having round leaves with red backside. Keeping in mind that round-leaf *Cryptocoryne* including this species are generally slow growing, the hobbyists should take their time and enjoy the plant's growth. This species develops its leaves one by one as it grows larger. In view of this characteristic, it is advisable to plant this *Cryptocoryne* a little extra during the initial planting process. The attractive feature of this plant is its red underside of the glossy olive-green leaves. This is a *Cryptocoryne* loved by professionals.



*Cryptocoryne cordata* "blassii" develops yellow spathe around the flower. The color and shape of spathe which differ among species always fascinate hobbyists.

Among round-leaf *Cryptocoryne* which are generally hard to grow, this species is relatively easy to handle. Its leaf underside tinged with red is really beautiful. This is considered as a variant of *Cryptocoryne cordata*.



20

*Cryptocoryne cordata* "blassii"

ZOOM!



## Arranging Cryptocoryne as the Only Plant in the Layout

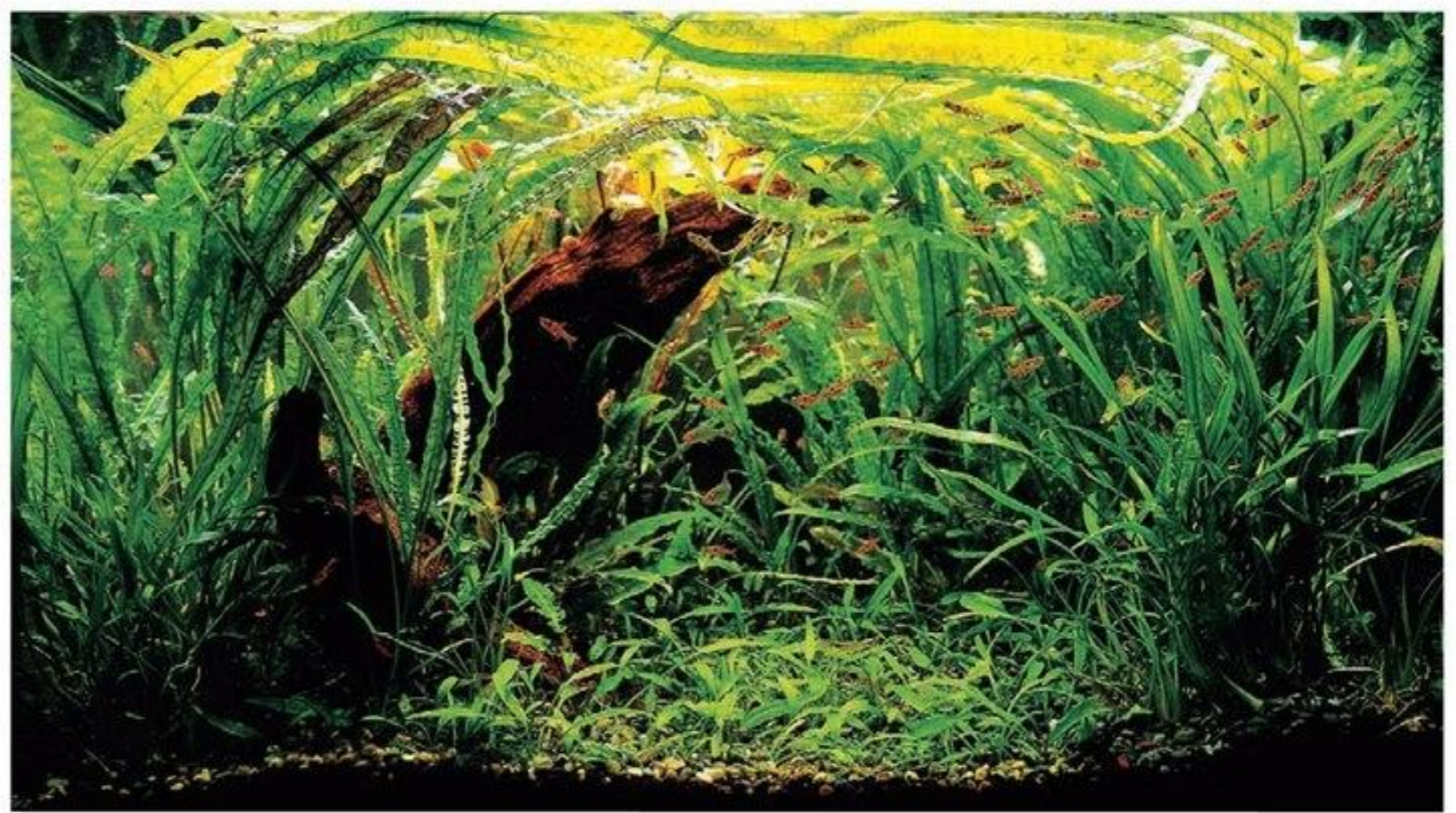
Widely distributed in Southeast Asia, *Cryptocoryne* has a broad range of leaf types from small to large size and from round to long leaves. With such a rich variety of leaf variations, *Cryptocoryne* is suited for all the foreground, mid-ground and background locations in the layout, making it possible to create a layout just by planting *Cryptocoryne* species only. When making this type of layout, short *Cryptocoryne parva* should be planted in the foreground while *Cryptocoryne retrospiralis* and *Cryptocoryne crispata* var. *balansae* which develop long leaves are to be planted in the background in the layout provided with composition materials such as driftwood and

stones. Subsequently, the species that have been selected from the most popular medium-sized *Cryptocoryne* are planted in the mid-ground to achieve a layout using *Cryptocoryne* only. Although different in leaf size, leaf shape and color, *Cryptocoryne* plants commonly have a calm image; and accordingly, the layout with *Cryptocoryne* also has a cool, austere elegant atmosphere. The layout using *Cryptocoryne* as the main plant is suited for long-term maintenance. It would be great to enjoy a *Cryptocoryne* layout with matching fishes such as *Rasbora* over long periods of time.





W60×D30×H36 (cm)



W60×D30×H36 (cm)



W90×D45×H45 (cm)

# Cryptocoryne Notes [Cultivation Section]

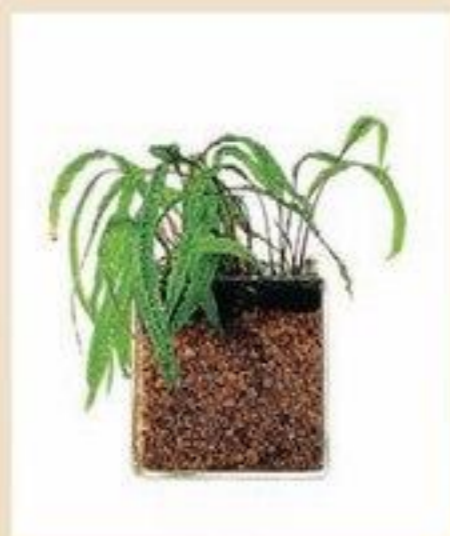
Besides nurturing in the planted aquariums, Cryptocoryne can be cultivated in a pot or bowl in both emerged and submersed forms. Cultivation of Cryptocoryne in an emerged state, in particular, gives us more profound pleasure by presenting us flowers and leaves having a different image from the submersed leaves. Simple cultivation methods of Cryptocoryne are introduced in subsequent pages. Check it out!

## ● Enjoying Emerged Leaves of Cryptocoryne

Distributed in waterside environments in the Southeast Asian tropical rainforest, Cryptocoryne develops different types of emerged and submersed leaves to survive even in different levels of water between dry and rainy seasons. Some Cryptocoryne species are hard to grow in water, but even they can be grown relatively easily in an emerged form because there are no worries about water quality problems. The basic environments for growing Cryptocoryne in an emerged form are discussed below.

### <Temperature and humidity>

Cryptocoryne distributed in tropical regions thrives at about 25°C. In winter, Cryptocoryne will not wilt even if the temperature goes down to about 10°C, however it almost stops its growth. It is advisable to maintain the aquarium temperature at more than 20°C even in winter to ensure healthy growth of



Cryptocoryne crispatula var. balansae grown in an environment with humidity as high as nearly 100%. It developed the leaves which are an intermediate between the emerged and submersed leaves.

Cryptocoryne. Humidity is equally as important as temperature. Most Cryptocoryne species develop nice emerged leaves but they do not have resistance to dry weather since they are originally adapted to a hot and humid tropical climate. Cryptocoryne shows better growth if a heater is installed in an aquarium tank with a shallow level of water (the level at which a half of the pot/bowl is submerged) or steam from a humidifier is continuously supplied to the cage to maintain the humidity level at 70-80%. If Cryptocoryne is grown in an environment where the humidity is as high as nearly 100%, it develops different kind of emerged leaves, which can be said as semi-submersed leaf or an intermediate between the emerged and submersed leaves. This semi-submersed leaf is an

interesting form of Cryptocoryne, but adequate care should be taken when taking it out from the aquarium or cage, keeping in mind that it is highly vulnerable to dry air compared to ordinary submersed leaves.

### <Lighting and CO<sub>2</sub> injection>

Despite being a shade plant, Cryptocoryne will not grow healthily without a certain level of light. Shade plants have a higher tolerance to shade compared to sun-loving plants and do not require very strong light. Yet, they still perform photosynthesis to survive like any other plant. When growing Cryptocoryne in an emerged form, a lighting system using fluorescent lamps should be installed above the tank or cage. Sufficiently bright light for Cryptocoryne can be obtained from one to two units of 20W NA Lamp when a 60cm tank is used. CO<sub>2</sub> is also essential for photosynthesis of plants. In nature, air flow is always caused by wind and thus lack of CO<sub>2</sub> seldom takes place. However in an environment with the absence of air flow, lack of CO<sub>2</sub> may locally occur. Emerged leaves of Cryptocoryne use the absorbed CO<sub>2</sub> for photosynthesis, but they may not get sufficient CO<sub>2</sub> in a closed aquarium or cage where ventilation is very limited. For this problem, injection of CO<sub>2</sub> just like the one performed for planted aquarium is an effective solution. No diffuser such as Pollen Glass is required when Cryptocoryne is grown emerged. In this case, install the tip of a silicon tube in a suitable location within the tank to add a small amount of CO<sub>2</sub> for enhanced growth of emerged leaves of Cryptocoryne.

## ● Difference in Growth Rate between Substrate Types

In the natural environment, Cryptocoryne grows in rivers and ponds. Among various substrate types including mud, clay and sand, Cryptocoryne is most observed in muddy and clayey locations. In view of this, it can be assumed that the growth rate of Cryptocoryne would vary among the different substrate types. To test this assumption, a comparison of the growth rate of Cryptocoryne australis was made among peat moss, Bio Soil and Aqua Soil-Amazonia. Firstly

on peat moss which features good water retention and ventilation ability and is often used for cultivation of epiphytic plants such as orchids, Cryptocoryne that spreads the roots in the soil did not grow well. Peat moss is soft and does not hinder the root growth, but it does not contain the bacteria and nutrients which are found in the soil in Cryptocoryne's natural habitats. Secondly on the Bio Soil which offers the conditions closer to the environment of Cryptocoryne's natural habitats, the plant grew better than on the peat moss since the Bio Soil contains soil bacteria and nutrients. However, the water permeability of Bio Soil can easily be lost if the Bio Soil is pressed hard. A key to the effective use of Bio Soil is to refrain from squashing it to keep it fluffy. Lastly on Aqua Soil-Amazonia, the Cryptocoryne showed the best growth among the three types of substrate materials used for this comparison. This must be due to the advantageous factors of Aqua Soil-Amazonia, such as soft grains and high water permeability as well as rich organic acid and nitrogen. These factors promote the growth of soil bacteria and the healthy growth of plant roots, which helps Cryptocoryne absorb nutrients vigorously and thrive. Each Cryptocoryne species shows different growth rates depending on the substrate material used. It is important to select the substrate material suitable for the plant species you wish to grow.



1.



2.



3.

1. Cryptocoryne grown on peat moss. Its leaves are a little small. 2. Cryptocoryne grown on Bio Soil. Emerged leaves developed ordinarily. 3. Cryptocoryne grown on Aqua Soil-Amazonia. The plant developed the largest emerged leaves.



A flower of *Cryptocoryne albida*. The spathe has reddish brown edges and a twisted tip. The inner side is in beige color with unique patterns.

#### ● Enjoying *Cryptocoryne* Flower

*Cryptocoryne* sometimes bears a flower when it is grown in an emersed state. The above photograph shows a flower of *Cryptocoryne albida*. The petal-like portion is called a spathe, which is a modified leaf and encloses an inflorescence (a cluster of many small flowers). The inflorescence is hidden inside the spathe and is not visible from the outside. The shape of the spathe differs among species; some have a screw-like tip with almost no opening in the center. You need to grow *Cryptocoryne* for as long a time as possible to enjoy its unique flower. This is because the time when *Cryptocoryne* should flower varies depending on temperature, humidity and day length; hence it is very hard to estimate the timing. *Cryptocoryne* flowers usually wilt in a few days time. If you are fortunate enough to catch sight of a *Cryptocoryne* flower, you should enjoy and appreciate it to its fullest. Flower formation requires a lot of phosphorus and potassium as well as nitrogen. In view of

this, the use of Aqua Soil-Amazonia and nutrient supplementation by way of Multi Bottom Iron Bottom are beneficial for *Cryptocorynes* to flower.

#### ● Enjoying the Leaf Underside of *Cryptocoryne*

The submersed leaves of *Cryptocoryne* are in a unique, austere elegant color such as green tinged with brown and olive green. When the submersed leaves are in good condition, they look calm and beautiful with a glossy surface. The underside of the leaf is another attractive feature of submersed leaves of *Cryptocoryne*. Some *Cryptocoryne* species, including *Cryptocoryne affinis*, have different types of leaf topside and underside and show us the fascinating combination of green topside and red underside. *Cryptocoryne* develops rosette leaves unlike stem plants and many of them have a leaves efficiently. The appealing look of *Cryptocoryne* relatively long leaf stem so they can

spread the coryne can be enhanced if the plant is arranged, whether in a planted aquarium or in a pot, in such way that its leaf stems and underside of the leaves are visible. When attempting this way of arrangement, it is advisable to plant *Cryptocoryne* in front of stones and driftwood in a planted aquarium or plant it on a mound of soil which was made higher than the edge of the pot/bowl so that the leaf stems and underside of the leaves can be seen clearly without being blocked by other objects.



Submersed leaves of *Cryptocoryne affinis* have a green topside and red underside. It's beautiful leaf underside can serve as a good accent in the layout.

#### ■ *Cryptocoryne* and Fishes

*Cryptocoryne* originated in Southeast Asia matches well with cyprinid fish such as Rasbora from the same homeland. The calm body color and patterns of Rasbora go particularly well with the unique color and shape of the submersed leaves of *Cryptocoryne*. More specifically, the origin of the fish and plant may not exactly be the same. Yet, they may share some common environmental factors that make them matching partners. When growing *Cryptocoryne* and Rasbora in the same aquarium, you must be careful of deterioration in water quality. Most of the cyprinid fish are big eaters and accordingly, the amount of their feces is large. Feces of fish easily dirty the aquarium water and eventually raise the nitrate level of the water. Stem plants and other ordinary aquatic plants vigorously absorb nitrate in the water via their leaves, but this cannot be expected with *Cryptocoryne*. Another thing you should be careful of is changing the tank water. The change of a large amount of tank water containing a high concentration of nitrate can lead to sudden change of the tank water quality, which could result in melted submersed leaves of *Cryptocoryne*. If it is anticipated that the water within the aquarium can get dirty easily, it is advised to change the water little by little at shorter cycle lengths.



A mix of Rasbora that matches *Cryptocoryne* well. Rasbora species which are active and eat well tend to dirty the aquarium water quite quickly. Attention should be paid to maintain good water quality.



## The World of Cryptocoryne: Exclusive Interview with Dr. Niels Jacobsen

In conjunction with the release of the Cryptocoryne-themed special feature articles, the Aqua Journal held an interview with Dr. Niels Jacobsen (Department of Agriculture and Ecology, University of Copenhagen) who is the author of the Cryptocoryne encyclopedia titled "Cryptocorynen", a highly coveted book among aquatic plant enthusiasts. Dr. Jacobsen's valuable talk is introduced together with his green house where many precious Cryptocoryne species are nurtured.

**AJ** Firstly, could you please share with us why you have started researching Cryptocoryne?

**Dr. Jacobsen** When I majored in biology at the University of Copenhagen, I was interested in several Cryptocoryne species which were grown in a green house of a botanical garden. I knew about Cryptocoryne because I had been growing this aquatic plant in my aquarium tank since a few years before that. Around that time, an article about the chromosome number of several Cryptocoryne species was contained in a book about aquatic plants written by Dr. H.C D. de Wit (1970 Edition). At the time, I was studying mainly about the importance of chromosome number in plant evolution. To me, it was a real crossover of three factors (interest in chromosome, the book written by Mr. de Wit and Cryptocoryne in botanical garden).

**AJ** How many Cryptocoryne species do you have now? How do you manage them?

**Dr. Jacobsen** Well, I'm currently growing about 50 species of Cryptocoryne, including natural hybrids such as *Cryptocoryne willisii* and *Cryptocoryne x purpurea*. Each of them is grown using different types of soil and in different

water quality. I have found that all the Cryptocoryne species originated in acidic environments in tropical rainforest can be nurtured using leaf peat. These Cryptocoryne can grow healthily on the leaves of *Fagus sylvatica* (one of the popular forest trees in Denmark) that has been decomposed for two to three years and then mixed with water. Although I have never tried, but I believe that most of the tree leaves can be used as a quality substrate material. The Cryptocoryne species which grow at the side of a major river or on the bank of a river flowing in a tropical rainforest can be easily grown on mineral soil mixed with leaf peat. In my green house, the Cryptocoryne species originated in tropical rainforest really thrive in an environment resembling a submerged location which is created in an aquarium or a container. The Cryptocoryne I am growing on mineral soil is placed in a pot while keeping the water level at 3cm high. Keeping in mind that strong sunlight in the summer season is a great enemy to the plants of tropical rainforest origin, I make sure to keep them in the shade in the green house. The Cryptocoryne species grown on mineral soil usually have a tolerance to intense light or a

characteristic of seeking light. Nevertheless, the plants which belong to the *Cryptocoryne crispatula* group hibernate in summer in Denmark when the daylight hours are long. When winter with shorter day length arrives, these Cryptocoryne start forming their leaves under the light from the lighting system.

**AJ** What do you think the most difficult thing in growing Cryptocoryne is?

**Dr. Jacobsen** Hmm, I'm afraid your question is not very appropriate. Since Cryptocoryne has wide varieties, you cannot ask for a single answer. If I had to mention one, it would be to properly identify the species or group of the Cryptocoryne I am growing; make sure their growing conditions are appropriate and grow them according to those conditions. For example, *Cryptocoryne griffithii* can grow on only leaf peat while *Cryptocoryne affinis* and *Cryptocoryne aponogetifolia* require high-pH soil and water. The latter two species are somehow difficult to grow in an emersed environment; and on the other hand, *Cryptocoryne wendtii* grows under any soil and water quality. Nevertheless, this kind of standard differs depending on the



**A:** Flowering *Cryptocoryne purpurea* (from Malaysia). **B:** Rare *Cryptocoryne* are under great care. *Cryptocoryne annamica* spreading large leaves. **C:** Spathe is taxonomically important for identification of species. *Cryptocoryne edithiae* (from Kalimantan). **D:** *Cryptocoryne elliptica* (from Malaysia) and other *Cryptocoryne* are grown using leaf peat.



**E:** *Cryptocoryne ferruginea* (from Sarawak) which flowers at the time of full moon. **F:** *Cryptocoryne cordata* Griffith (from Kalimantan) bears a very beautiful flower. **G:** Good condition of the plant can be seen by its glossy leaf surface. *Cryptocoryne minima* (from Malaysia). **H:** The section for *Cryptocoryne* originated in tropical rainforests

individual because the growing environment is more or less different between each person.

**AJ** I understand. Then, how did you collect the *Cryptocoryne* species you have now?

**Dr. Jacobsen** In these few years, I visited *Cryptocoryne*'s native land to explore their natural habitat with the cooperation of local botanists. International collaboration for *Cryptocoryne* is more active particularly in recent years. In addition, some friends of mine gave me some species and I also purchased some from farms and aquatic plant importers.

**AJ** Do you have any memorable episodes about your visit to natural habitats of *Cryptocoryne*?

**Dr. Jacobsen** Yes, each of my trips has interesting episodes. The first place I visited for observation of *Cryptocoryne*'s wild habitat was the southwest part of Sri Lanka. I crossed many undulating hills with small streams and finally saw flowering *Cryptocoryne thwaitesii* with my own eyes. It was a wonderful and beautiful moment. And after coming out of the forest, soaked in mud and sweat, I realized that even leeches had enjoyed a wonderful moment on me in that morning! In 1978, I, together with Mr. Josef Bogner (who found *Cryptocoryne bogneri*), visited Mr. Henry Ong Kee Chuan (who found *Cryptocoryne keei*) in Sarawak, Borneo. Mr. Henry Ong was a kind gentleman who had a vast knowledge on the fishes and plants of Sarawak.

We took a night boat from Kucing to Sibul to observe the habitats of a few *Cryptocoryne* species (*Cryptocoryne auriculata*, *Cryptocoryne striolata*, *Cryptocoryne longicauda* and *Cryptocoryne cordata* "blassii"). Inside of the boat cabin was unbearably hot. I still remember how happy I was when I saw a stream in a cool shade of the forest, having the bottom and sides all covered by *Cryptocoryne longicauda*. I went in the water just with a diving mask and underwear on and saw *Cryptocoryne longicauda* and pipefish. It was another really splendid

moment. Even Mr. Ong was surprised to see an extraordinary scenery created by a bridge railing (broken, of course) and he joined our underwater observation. During this trip, we saw *Cryptocoryne ciliate*, *Cryptocoryne lingua* and *Cryptocoryne pontederiifolia* subsp. *Sarawacensis* in Batu Kintang, west of Kucing. We tried to find *Cryptocoryne ferruginea* that had been observed near Kucing several years ago, but it didn't seem to go well. *Cryptocoryne ferruginea* has a feature of white hair on its leaf underside. While we were talking under the shade of a tree, we realized that we haven't checked if there was white hair on the *Cryptocoryne pontederiifolia* subsp. *Sarawacensis* we had found. We quickly looked at the underside of the leaf and found white hair there. Yes, we found *Cryptocoryne ferruginea*! During the trip, we talked about pollination of this tiny aquatic plant grown in a location affected by the ebb and flow of tides; and it was compiled into an article titled "Does *Cryptocoryne Ferruginea* Flower at the Time of Full Moon?" The answer is – Yes, *Cryptocoryne ferruginea* flowers at the time of full moon! In 2004, I visited Batu Kintang again with Mr. Josef Bogner for observation of the natural habitats of *Cryptocoryne ciliate*, *Cryptocoryne lingua* and *Cryptocoryne ferruginea*. On the way to the bridge over a river, we came to know that a crocodile was spotted near the bridge right after we had walked in the waist-deep muddy water towards the upper stream. When I have an opportunity to visit there again, I will avoid walking in deep muddy water.

**AJ** Have you experienced any failures in your *Cryptocoryne* research career?

**Dr. Jacobsen** Of course, I've gone through failures. One of them is that I spoiled many *Cryptocoryne* due to inappropriate growing conditions. I had an experience where I didn't pay much attention to the thriving plant and in the end I found it dead. And quite some time ago, I brought back *Cryptocoryne* cognate showing extremely good growth from India. Many of its seeds had also germinated and the plants were

growing really well. I placed that *Cryptocoryne* cognate with other *Cryptocoryne* from Sri Lanka, but one day it was gone. If I had paid more attention to this *Cryptocoryne* cognate and if I had not been so overconfident, the plant would have been with me now. I lost many *Cryptocoryne* until I established the nurturing method using leaf peat. These *Cryptocoryne* are now considered to be easy-to-grow plants. They grow like weeds in proper environments.

**AJ** By the way, do you enjoy planted aquarium using *Cryptocoryne*?

**Dr. Jacobsen** I have never been in the situation where I conduct experiments of *Cryptocoryne* in an aquarium environment. Just recently, I made an experimental aquarium for *Cryptocoryne* in my house, but it's not yet in the stage of disclosing it so far.



**Dr. Niels Jacobsen**

Professor at the University of Copenhagen, Denmark. Known as a world authority on the research of *Cryptocoryne*. He has written the *Cryptocoryne* encyclopedia "Cryptocorynen". Currently working on the discovery of *Cryptocoryne* population variation.



▲ Longitudinal section of the kettle of *C. crispatula*. Note the conspicuous constriction at the middle of the kettle.

# Cryptocoryne of the Nam Lik Watershed in Northwestern Laos

Text and photographs provided by: Troels Andersen, Ole Pedersen, Claus Christensen and Niels Jacobsen  
 Article provided by: The Aquatic Gardeners Association, Inc. (The original article in The Aquatic Gardener 19-1)  
 URL: <http://www.aquatic-gardeners.org/>

## ■ Natural Habitats of Cryptocorynes

The Lao People's Democratic Republic in Southeast Asia. This landlocked country is surrounded by China to the north, Vietnam to the east, Cambodia to the south, and Thailand and Myanmar to the west. Laos is a largely mountainous country and has a monsoon climate with two main seasons: the rainy season and the dry season. Due to the relatively small human population of Laos and the low industrial production, the pressure on the environment has been much less than in surrounding countries and this is clearly seen when it comes to the water quality of rivers and lakes. The Mekong River is known as "the Sea of Laos" and more than 1,000 indigenous species of fishes live in the Mekong and its tributaries. One of the more spectacular fishes is the Mekong giant catfish (*Pangasianodon gigas*), which is said to be the world's largest freshwater fish with a reported weight of more than 330 kg (728 lb.). Nam Lik is a large river with a discharge of several hundred cubic meters per second. Although it receives sewage water from the settlements in its catchment area, the water is crystal clear. Its banks are lined with numerous populations of *Cryptocorynes* and other water plants; it is a sight that can hardly be seen elsewhere in the world. In

our survey, we encountered thousands of specimens but they all belonged to only one species, *Cryptocoryne crispatula*.

## ■ Diversity of *Cryptocoryne crispatula* adapting to environments

*C. crispatula* is an amphibious plant distributed in several countries of Southeast Asia (Kasselmann 2003). Taxonomic delimitation to other varieties is to some extent based on the structure and color of the limb of the spathe, and on leaf differences. In this survey in the Nam Lik watershed, three *Cryptocoryne* varieties were observed. Jacobsen (1980, 1991) observed that some forms occurred in rivers with a relatively constant water table, while rivers with large seasonal fluctuations in water level hosted the more amphibious forms, characterized by shorter and more or less smooth leaves. The most abundant variety in the Nam Lik watershed was *C. crispatula* Engler var. *crispatula*. The limb of the spathe has line-like markings, and the limb may be recurved and both short and long. At least the upper part of the kettle is deep purple. The leaves of *C. crispatula* var. *crispatula* are rather stiff and will stand upright when grown emersed. The leaves of this variety may be very tiny when flowering. After flowering

they will grow much longer, for example with strong undulated leaves. *C. crispatula* var. *crispatula* was observed in the broadest range of pH, conductivity and substrate types for the three observed *Cryptocoryne* varieties (Refer to Table) and this was perhaps the reason why this particular variety was most abundant. Whilst *C. crispatula* Engler var. *sinensis* (Merrill) Jacobsen did not occur as frequently as other varieties. *C. crispatula* var. *sinensis* has been recorded from the Yunnan province in China and it seems that this particular variety has a somewhat different climatic distribution compared with other species of *Cryptocoryne* (Bastmeijer 2005). The leaves are stiff and easily stand upright when emersed and in the dry season, the leaves are more grass-like. The spathe of *C. crispatula* var. *sinensis* has a rather short tube and also a short, somewhat fleshy limb of the spathe. The limb of the spathe has regular red dots on a yellow background. The kettle has a constriction in the wall half-way and red dots on the inside of the wall. In Laos, we found *C. sinensis* in clay with relatively high pH and conductivity values in the water (Refer to Table). Like Bogner (1998), who reported the variety from banks of larger rivers, we also found *C. crispatula* var. *sinensis* on the banks of the Mekong River and larger



▲ *Cryptocoryne crispatula* var. *crispatula* in the emersed form as it occurred in the Nam Lik River. It is a typical biotope for many *Cryptocoryne* in Southeast Asia. They often occur intermingled with the root of this willow-like bush, creating substrate stability in the middle of the stream.



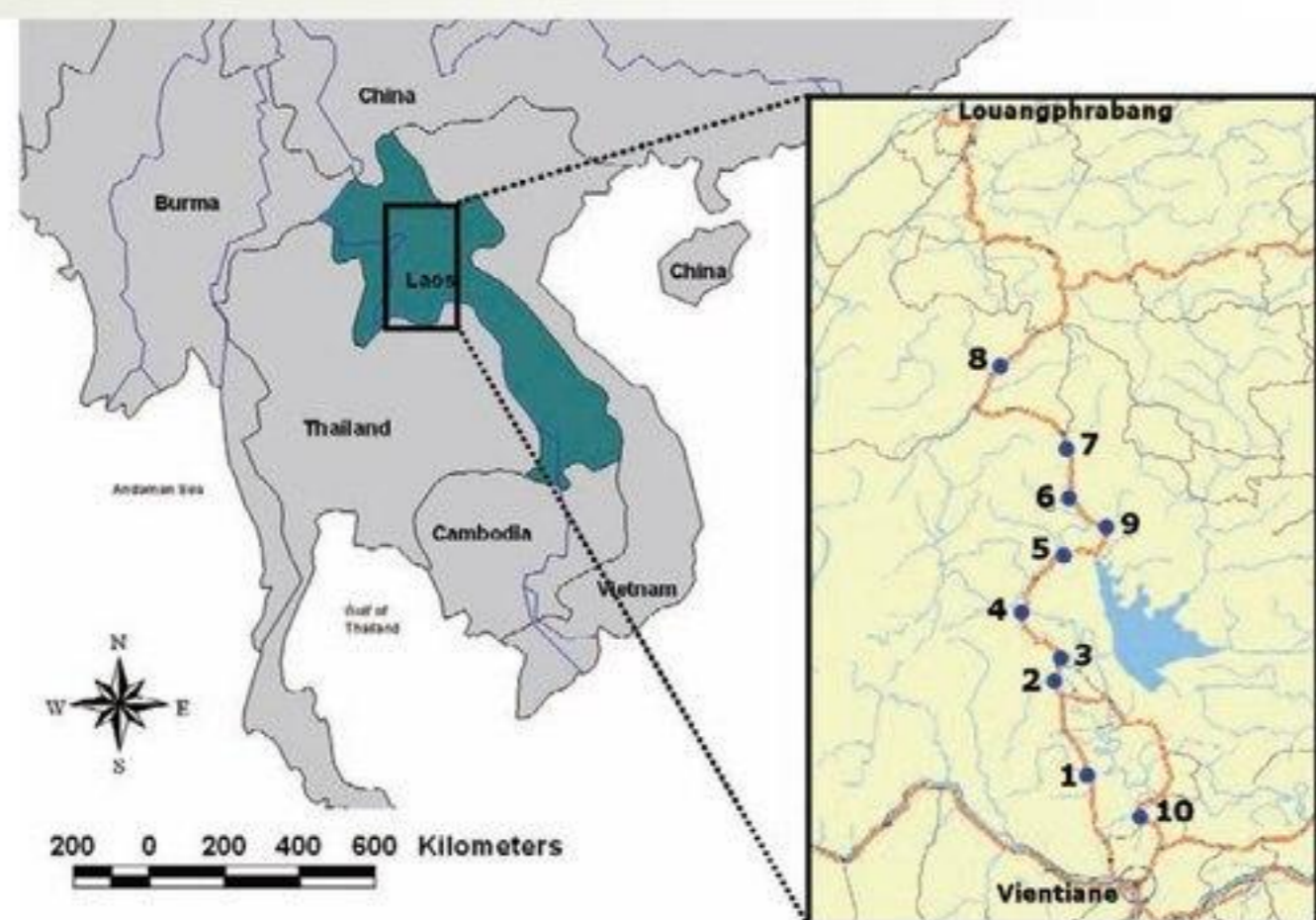
▶ *Cryptocoryne crispatula* var. *crispatula* in the submerged form collected from Nam Chim a tributary of the Nam Lik River. The leaves were rather stiff and stood upright even when lifted above the water.



▲ Inflorescence of *Pogostemon stellatus* as it appeared in Houay Pat, a tributary to the Nam Lik River. We also found the submerged form, which is among the most beautiful and decorative aquarium plants.



▲ *Cryptocoryne crispatula* var. *sinensis* on banks of the Nam Lik River in Vang Vien, Laos. Many individuals were flowering when we visited the site in March 2004. The inflorescence was typical for *C. crispatula* var. *sinensis* with a very short tube and also a short limb of the spathe.



<Literature Cited>

Bastmeijer JD (2005) "The Crypts pages." <http://132.229.93.11/Cryptocoryne/index.html> Accessed September 2005

Bogner J (1998) "Cryptocoryne crispatula Engler var. sinensis (Merrill) Jacobsen." *Aqua-Planta* 23: 120-122

Jakobsen N (1980) "The Cryptocoryne albida group of mainland Asia (araceae)." *Meded. Landouwhogeschool Wageningen* 19: 183-204

Jakobsen N (1991) "Die schmal blattrigen Cryptocorynen des asiatischen Festlandes." *Aqua-Planta* 16: 1-33

Kasselmann C (2003) *Aquarium Plants*. Krieger publishing company, Malabar, Florida, USA

Linke H (1997) "Cryptocoryne albida R.N. Parker am Tad Leuk." *Aqua-Planta* 22:81,83-90

◀ Route description for plant collections along the main road from the capital Vientiane in south to the central part of northern Laos. In the background, Southeast Asia with Laos in dark. In front, the central area for our field collections, where coordinates on numbers are given in Table 1.

tributaries of Nam Lik. Here, it grew emerged in December and the scattered populations all had numerous flowers. This biotope becomes completely submerged with up to 8 meters (26 ft.) of water in the wet season and during this time, the plant most likely survives on stored carbohydrates in the well-developed rhizome. The third *C. crispatula* encountered in the Nam Lik watershed was *C. crispatula* Engler var. *balansae* (Gagnepain) Jacobsen. This variety has broad, crispy and bullate leaves and is thereby easy to distinguish from other *C. crispatula* varieties. The emerged *C. crispatula* var. *balansae* can hold its leaves more or less upright. When submerged, the leaves can grow up to a length of 60 cm, or 24 in., (including the petiole) with a typical width of approximately 2 cm. The color may vary from red-brown to light green depending on the light and the substrate but the actual color probably depends on the ecological form, too. The inflorescence is characterized by line-shaped purple markings on the limb. The natural habitat of *C. crispatula* var. *balansae* is often calcareous (Jacobsen 1980), which concurs with the neutral pH values of the waters in which we found it (Refer to Table).

■ Conclusion

In the Nam Lik watershed, water chemistry and substrate changed quite a lot within a short distance but it did not seem to affect the distribution of the *Cryptocoryne* to any great extent. In particular, *C. crispatula* var. *crispatula* seemed to thrive in almost any water body from vivid flowing rivers to bow lakes of drying riverbeds. The less common *C. crispatula* var. *sinensis*, which according to our information is not cultured for aquarium purposes, inhabited quite different biotopes compared to the marshes where it had previously been found in China. This plant may be much more common than thought hitherto, in particular in the northern part of the Mekong River. Undoubtedly, many other interesting aquatic plants are still to be discovered in Laos. The relatively low pressure on environmental resources by the human population is probably the key to the flourishing nature and aquatic environment of the Nam Lik watershed. In the past, the Laotian government allowed unrestricted logging to reduce the country's forests. Recently, however, the government has developed a plan for environmental conservation and forest renewal, implying that we can expect to find these plants also in the future.



◀ *Cryptocoryne crispatula* var. *balansae* with its typical and conspicuous bullate leaves.

▲ The biotope where the *Cryptocoryne crispatula* var. *balansae* were collected. This is a typical example of a minor stream in the Nam Lik watershed. Close to the road, the banks are cultivated with vegetables, and further from the road, more and more forest is found in the catchment area.

No.	River	Temp	Cond.	pH	Substrate	Cryptocoryne species	Other plant species
1	Ban Nagna	31	40	5.12	Gravel, sand and clay		<i>Eriocaulun sp., Limnophila sp., Ludwigia sp., Maesilea sp., Nymphoides sp., Hygrophila polysperma., Hydrocotyle verticillata, Salvinia cucullata, Utricularia sp.</i>
2	Nam Cheng	33	85	6.14	Gravel and mud	<i>C. crispatula</i> var. <i>crisoatula</i>	<i>Hydrilla verticillata, Hygrophila sp., Nymphoides sp., Potamogeton crispus</i>
3	Nam Chim	31	233	7.24	Clay	<i>C. crispatula</i> var. <i>crisoatula</i>	<i>Ceratopteris sp., Nymphoides sp.</i>
4	Nam Lik	30	275	8.00	Sand and soil	<i>C. crispatula</i> var. <i>crisoatula</i>	<i>Hydrilla verticillata, Potamogeton crispus</i>
5	Houay Pat	27	180	6.82	Gravel and mud	<i>C. crispatula</i> var. <i>balansae</i>	<i>Hydrilla verticillata, Potamogeton stellatus</i>
6	Nam Song	26	270	7.62	Rubble, gravel and clay	<i>C. crispatula</i> var. <i>sinensis</i>	<i>Egeria sp., Hydrilla verticillata, Hydrocotyle sibthorpioides, Potamogeton crispus</i>
7	Nam Pad	26	295	6.72	Clay		<i>Rotala rotundifolia</i>
8	Nam Ken	27	428	8.00	Rubble and clay	<i>C. crispatula</i> var. <i>sinensis</i>	
9	Nam Ngad	27	147	7.17	Gravel		<i>Bacopa sp., Hydrilla verticillata, Marsilea sp., Potamogeton stellatus, Potamogeton crispus</i>
10	Nam Ngum	27	119	7.12	Mud	<i>C. crispatula</i> var. <i>balansae</i>	<i>Hydrilla verticillata, Potamogeton crispus</i>

▲ Table: Environmental parameters (temperature, conductivity, pH and dominating substrate) and plant occurrence of visited sites in the Nam Lik watershed, Laos. Varieties of *Cryptocoryne crispatula* were recovered on 7 out of the 10 visited sites.



Nine months after planting

9 months after...



#### ■ TANK DATA

W350×D75×H75(cm)  
Cryptocorynes planted in this layout  
/ *Cry.crispatula* var. *balansae*,  
*Cry.retrospiralis*, *Cry.costata*,  
*Cry.lucens*, *Cry.parva*

## Change in Cryptocoryne Layout

The layout introduced here was made using Cryptocoryne as the main plant in a large aquarium tank having a width of 3.5m. In line with the relatively slow growth of Cryptocoryne, the layout also changes slowly over time. When nine months have passed since the planting, a photograph of this layout was taken to see the changes. At this point of time, the layout had become bolder and more dynamic with the foreground where *Cryptocoryne parva* and *Marsilea* sp. are delicately combined; the

mid-ground with largely-grown *Cryptocoryne costata* and *Cryptocoryne lucens*; and the background with more mature *Cryptocoryne crispatula* var. *balansae* and *Cryptocoryne retrospiralis*. This type of layout mainly using Cryptocoryne is usually created with the intention of maintaining it for a long period of time. This layout is no exception, and it will be maintained further for a longer period of time. Shade-loving Cryptocoryne grows slowly but steadily. Its rhizome, in particular, spread widely

across the substrate and the leaves also become gradually denser. Due to metabolism, the leaves get older and change its color from outer side and these old leaves must be trimmed off. However, the leaf density becomes higher as the roots grow denser. When about one and a half year has passed since the layout was created, the Cryptocoryne planted in the mid-ground and background will have denser leaves, adding a natural feel to the layout. Long-term maintenance of this type



# The Jungle of Hermit and the Passage of Time



One and a half years after planting

of *Cryptocoryne* layout requires proper management. Shade plants such as *Cryptocoryne* grow slower than stem plants and other sun-loving plants. Therefore, once the aquarium is in a stable condition, hobbyists can take their time and enjoy the layout with less hassle in terms of trimming. When keeping fishes together with plants in a Nature Aquarium, the sludge caused by feces and leftover of fish food surely builds up and this can lead to deteriorated aquarium environ-

ment and algae problem. Particularly the substrate surface and the locations with lush aquatic plants are prone to sludge buildup. As a measure against it, the accumulated sludge should be suctioned off during the change of aquarium water which is to be performed on a periodic basis. Sludge in a large aquarium tank can be removed efficiently by attaching a gravel cleaner available in the market to the tip of a hose and bringing it close to the surface of substrate or willow moss to suction out the

water together with sludge. The sludge is mainly made up of organic matters which can cause an increase in disease-causing germs harmful to fishes. It also causes an anaerobic environment within the substrate as a result of lack of dissolved oxygen, eventually resulting in deteriorated aquarium environment. Periodic cleaning of the aquarium as mentioned above is beneficial for more stable water quality and long-term maintenance of *Cryptocoryne* layout.

# Fascination of Cryptocoryne

Cryptocoryne features calm, elegant appearance as well as unique and rich varieties. The Aqua Journal asked Takashi Amano about the natural habitat of Cryptocoryne when he visited Thailand for a shooting. From the Cryptocoryne's home environment to the stories behind the underwater photography, we bring you a variety of episodes and attraction of Cryptocoryne.

**AJ** What made you decide to visit the home to Cryptocoryne at that time (1996)?

**Amano** Each of the worlds' three major tropical rainforests has its representative aquatic species; Echinodorus for Amazon, Anubias for West Africa; and Cryptocoryne for Southeast Asia. I have taken underwater photographs of Anubias and Echinodorus before, so I really wanted to take pictures of Cryptocoryne in the water.

**AJ** I heard you went to Southeast Asian countries such as Thailand and Malaysia. Did you find Cryptocoryne easily there?

**Amano** Among the many natural habitats of Cryptocoryne reported, the ones I saw were the locations with clear water such as spring-fed ponds and clear streams.

**AJ** You mean those places that are deep in a remote jungle?

**Amano** Not really. I visited a certain which was a very popular location for Cryptocorynes and many aquatic plants and it flows just beside a temple.

**AJ** Besides Cryptocoryne, what species of aquatic plants can be observed around the Cryptocoryne's natural habitats?

**Amano** There were clusters of huge *Hygrophila corymbosa* along the aforementioned River. I heard about the place from Mr. Holger Windeløv, the Adviser to Tropica Aquarium Plants. The stream there was crystal clear and a variety of aquatic plant species, including *Crinum thaianum* flower, were observed. There was a fairly good mix of aquatic plants, such as *Hygrophila*, ferns and *Microsorium*, to name a

few. I even saw a gigantic water sprite!

**AJ** How do Cryptocoryne grow in their natural habitats?

**Amano** *Cryptocoryne albida* grew on the shallow bank of streams in both emerged and submersed forms. I think I saw emerged leaves more. The sides of clear streams were covered by rubbles and soil. Cryptocoryne does not grow on rubble, so the locations with and without Cryptocoryne were clearly seen. It was like fishes were swimming between the clusters of Cryptocoryne. Taking this into account, I think it would be good if the layout has both the portions with clusters of Cryptocoryne and the portions with no Cryptocoryne, just like Cryptocoryne is here and stem plants are there, instead of planting Cryptocoryne all over.

**AJ** I remember that you used to make substrate with Aqua Soil-Malaya for the layout using Cryptocoryne as the main plant. Is the soil of the Cryptocoryne's natural habitats also in yellow ocher color just like Aqua Soil-Malaya?

**Amano** Yes, it was slightly yellowish. Aqua Soil-Malaya has an image of soil found in Southeast Asia. On the other hand, the soil in Africa is slightly reddish due to iron contained in it while the soil of Amazon is blackish. Each Aqua Soil was named after the soil of each of these regions.

**AJ** Cryptocoryne has a wide variety of species with different shapes of leaves. This means that the environment



River bed covered by *Cryptocoryne siamensis*. They get soft sunlight as if the sunshine filtered through foliage for a few hours a day only.

of their habitats is also different from each other?

**Amano** When compared, round-leaf Cryptocoryne can be found more in the streams flowing in a jungle in low light conditions while narrow-leaf Cryptocoryne are seen along the rivers flowing quite fast in the sun. For example, shade-loving Cryptocoryne having round leaves with red undersides grow at a water depth of 2-3 meters in a secluded place with only a little sunlight. In contrast, sun-loving and narrow-leaf Cryptocoryne such as *Cryptocoryne retrospiralis* and *Cryptocoryne crispata* var. *balansae* are observed in locations with abundant sunlight. The environment of Cryptocorynes' natural habitats is really different from one another. Come to think of it, the poor growth of round-leaf Cryptocoryne might be attributed to an exposure to strong light, not due to the water depth. In general, aquatic plants do



Clusters of *Cryptocoryne albida* on the riverbank. Ocher-color soil as shown in the photo can be often seen in Thailand.



The aforementioned River flowing beside a temple. White flowers of *Crinum thaianum* are really beautiful.

not need to be exposed to light all day long. Particularly shade-loving *Cryptocoryne* require light just for 30 minutes to one hour a day to perform photosynthesis. The required light condition differs between the plants and we can roughly know how much light is needed by the plant depending on its leaf shape.

**AJ** During your underwater photography, did you encounter any danger like being bitten by a poisonous snake or fighting with crocodile you had experienced in Amazon?

**Amano** Yes. During the trip, I saw a very mystic pond. Whenever I see a beautiful river and pond, I have an urge to dive in to see how they are under the water, because how they look is really different from above and under the water. And at the moment I jumped into the water, a fisherman hastily shouted and told me to return onto the boat. Then, the fisherman showed me something – it was a gigantic leech, as large as 15cm, stuck on our boat. I was about to bleed to death!

**AJ** Oh, no. Nobody wants their blood to be

sucked to death by a leech.

**Amano** Another thing is that while I was really excited with taking underwater pictures, I was carried away by the swiftly flowing river without realizing and about to be sucked into a pipe.

**AJ** Oh, you almost died so many times! We're really glad you returned alive. Lastly, could you please tell us how we can enjoy attractive *Cryptocoryne* in the planted aquarium?

**Amano** It's a good idea to have lush clusters of *Cryptocoryne* in the planted aquarium, but I think it's not easy to create a layout just with *Cryptocoryne*. The same also applies to other popular aquatic plants such as *Echinodorus* and *Anubias*. I think *Cryptocoryne* stands out by mixing with other plants because it can give a good contrast to the surrounding plants. Another good feature of *Cryptocoryne* is that it can easily root in the substrate and therefore it is suitable for a layout to be maintained for a long period of time. *Cryptocoryne* is in fact unexpectedly strong. For example, stem plants

growing fast and vigorously require frequent trimming. However, the lower part of the stem easily withers away while trimming is performed repeatedly and in the end, replanting will be needed. Unlike stem plants, *Cryptocoryne* can be maintained steadily unless the environment is changed drastically.

**AJ** But I had the image that *Cryptocoryne* can melt easily and is hard to grow...

**Amano** *Cryptocoryne* does not simply melt away. In fact, *Cryptocoryne* melt is a sign of the subsequent development of healthier leaves. It is trying to shed old leaves and grow new leaves so as to adapt itself to the new environment. You know, new leaves cannot come out if old leaves are still there. *Echinodorus* and *Anubias* also become mossy or brown and eventually wither in the initial stage. Ultimately, this is similar to *Cryptocoryne* melt. I guess *Cryptocoryne* has better adaptability than *Echinodorus* and *Anubias*. I take it for granted that *Cryptocoryne* will melt. So, I think nothing of it.

**AJ** I think I can get along with *Cryptocoryne* better if I relax and take my time to face them. Thank you very much.



# Cryptocoryne a Lazy Man's Way

**Text and photographs provided by:**

Ronald B. Finlayson Sr.

**Article provided by:**

The Aquatic Gardeners Association, Inc.

(The original article in The Aquatic Gardener 19-1)

**URL:**

<http://www.aquatic-gardeners.org/>

## ■ The Days of Pursuing the Leading-Edge Technologies

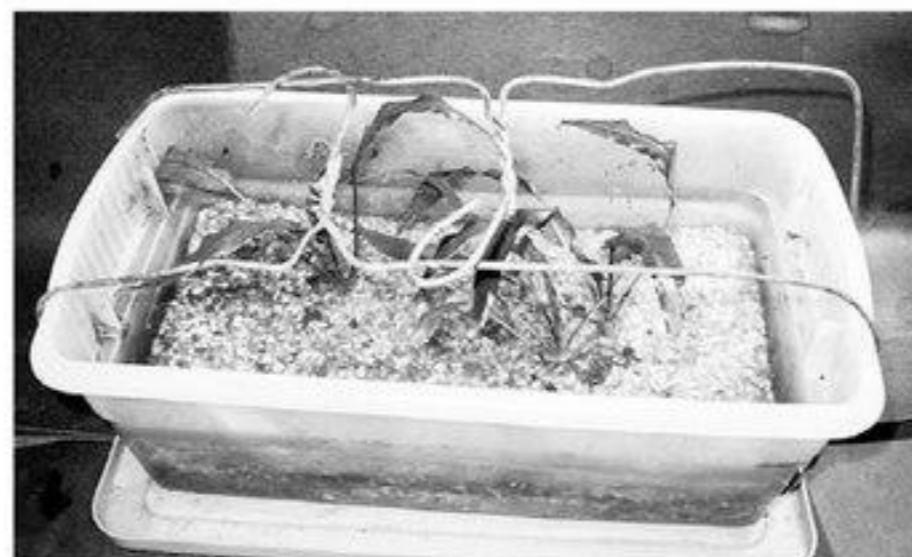
When I returned to the aquarium hobby in the early 90s, after a 20-year absence, I decided that I wanted to concentrate on aquatic plants. The early years were marked by one generation of lighting after another (tubes were dated for appropriate removal), multiple designs/types of filtration, numerous substrates, and several CO<sub>2</sub> delivery systems. Also there was the testing for CO<sub>2</sub>, nitrates, nitrites, PH, GH, ammonia, and KH almost daily and I still have the logs (I am still a log addict in many areas). After a while I realized several things: 1. I was running out of time; 2. My wife was starting to question my sanity

regarding both time and money; and 3. I was having less enjoyment from the hobby. So I decided to go: 1. Low tech; 2. Low cost; and 3. Simple. From reading everything I could get my hands on (that has not changed either) I became familiar with using soils and fertilizers. I learned that most aquarium plants are bog plants that will grow emersed in wet soil or in low water levels. I became interested in trying this method.

## ■ Growing Cryptocoryne Emersed

One of my areas of interest is the genus Cryptocoryne, and for many years I had mixed results when introducing new Crypts to my aquariums.

Readers with more knowledge will be analyzing what I did incorrectly or might have done better. This article is about what works for me based on how I approach the hobby. I enjoy equally a plastic shoe box with one species of Cryptocoryne, and the same plant in an aquarium with or without fish. For the most part, the plants in my aquaria are in pots with soil. My two planted aquaria are traditional set-ups with no soil. To achieve my goal of growing Crypts emersed, I built a small enclosed greenhouse in my cellar. It has three shelves and measures 4'L x 2'W x 7'H. The shelves are a little over 2' apart and the greenhouse has a bottom and a top. The materials include a sheet of plywood or particle board and approximately 16 2x3x8' studs. The two sides and the back are enclosed; I used an inexpensive 8'x8' blue plastic tarp. The front is covered with clear UV resistant plastic with a 2" round dowel on the bottom so it can be rolled up for access. For lighting I installed a 4'



Clear plastic

Raised with coat hangers



Simple greenhouses installed in basement. The containers placed on the top shelf are slid into a large bag. The large containers under the top shelf are covered with clear plastic. Coat hangers are used to prevent the contact between the bag and the plant.



Flowering Cryptocoryne  
This is truly the sign of healthy  
Cryptocoryne.

T8 florescent fixture with two bulbs on each shelf. I have recently seen 4' shop lights that take T8 bulbs for under \$10. The lights are controlled by a timer and stay on for 11 hours a day. It is a simple, inexpensive, low-tech setup.

#### ■ Simple Way to Grow Cryptocoryne

I use various-sized plastic containers from shoebox-size up to 56 quarts. The size you choose will depend on your needs and what you want to accomplish. For instance I keep killifish in the larger containers with the Crypts. The larger containers are covered with same clear plastic that I used on the front of the greenhouse. The plastic is attached to the container using binder clips. The smaller shoe box containers are slid into large fish bags. I create a tent effect by using two coat hangers. This holds the bag off the top of the shoebox by several inches and allows space for plant growth while keeping the humidity level high. Use a rubber band or clip to

close the end of the bag. Do not throw the plastic cover for your tented containers away, you will need them as a tray underneath. This protects the bag from damage and also catches any condensation that leaks out. The growth medium I use is garden soil or a commercial mix that you would buy at the store. For the commercial mixes check the label for content. Some of the mixes have been PH adjusted so they have lime. Others may contain additives that would not be desirable. If using soil from the yard make sure it is from an area that has not had a pesticide applied. I add approximately 1 to 1.5" of soil to the container and mix in laterite and fertilizer. I use pond tabs crushed up, you only need a fraction of one tab, a couple of sprinkles is plenty. I may add a little peat moss. This is all mixed together and then topped off with 1 to 1.5" of fine natural gravel. You are now ready to plant the Crypt or any plant you desire. After planting just add dechlorinated tap water

to the container. On average my water levels are from at least .5" to 2" above the gravel. This safeguards against evaporation and the container going dry. My larger quart containers have more water because of the fish. To maintain the plants, I periodically pour or siphon off the water down to gravel, clean out any mulm and add new water with a drop or two of liquid fertilizer. I have never had a Crypt meltdown in the containers.

#### ■ Conclusion

I have used this method for a number of years with success. The plants that I take out are strong, durable specimens that do well in my aquariums. The biggest problem is that I tend to forget about the containers for a month or two, only to find that they have dried out or algae have taken over! This is my way of growing Cryptocoryne. There is nothing new in there, but it is good enough.



Approximately 1 to 1.5" of soil is added to the container and mixed with laterite and fertilizer. On top of it, 1 to 1.5" of fine natural gravel is sprinkled.



Lush clusters of healthy Cryptocoryne!

## Preparation of Substrate and Filtration System

The first thing to do when setting up a Nature Aquarium is to build the substrate layer within the aquarium tank. There are many substrate setup methods, and the technique for setting up a new aquarium is quite different from the technique used when performing a Nature Aquarium make over. The substrate setup is closely linked to the establishment of a good, effective filtration system. Therefore, it is very important to prepare both the substrate and filtration systems properly.

### ● Functions of Substrate and Filtration System

In the Nature Aquarium, the substrate serves as a place where aquatic plants take root to absorb the nutrients. Keeping this in mind, the substrate system has been evolved to provide the aquatic plants with a place for easy root growth and become a supplying source of adequate nutrients. Sea sand was used as a substrate material in the very early days of aquarium development; however it was not suitable due to its excessively hard grain and absence of nutrients. In fact, aquatic plants hardly grew on the sea sand. To solve this problem, Power Sand containing rich nutrients and Aqua Soil having soft grains which do not hinder root growth have been developed. Along with the increase in the nutrient levels contained in and released from the substrate, the filtration system installed in the aquarium is required to have a higher filtration capacity. The filter used for the Nature Aquarium changed the nitrogen and organic acids dissolved in the water into an easily-absorbable state in addition to the function of removing the impurities and contaminants in the water. What is closely connected with the functions of the substrate and the filtration system is the various microorganisms including bacteria. Power Sand, which should be spread at the very bottom of the substrate, contains rich organic nutrients. Nevertheless, aquatic plants cannot absorb them directly from the soil. The plants can absorb these nutrients via their roots only after the organic nutrients are broken down into inorganic forms by microorganisms. Similarly, Aqua Soil-Amazonia (currently Aqua Soil-NEW Amazonia) contains abundant organic matter and nitrogen derived from natural soil, which are to be broken down within the substrate. These substances which have been dissolved in water are also broken down by the microorganisms within the filter

and then absorbed by aquatic plants through their leaves. As can be seen from this, there is a close connection between the substrate and filtration system. They need to be well prepared during the initial setup of an aquarium so that they can start functioning as soon as possible.

### ● Setup of Aquarium Can Easily Fail

During the initial setup of an aquarium, the microorganisms within the filter will not grow even if the filter is run in the tank just filled with water only. This is because plain water does not contain organic matter and nitrogen which serve as a food for the microorganisms. Even if only fishes are added to this aquarium, the amount of organic matter and nitrogen supplied by the fishes is too scarce to establish the microorganisms suitable for the Nature Aquarium's water quality level. For Nature Aquarium, a significant amount of microorganisms is required to break down the plentiful organic matter and nitrogen within the substrate. Then, what about if the substrate is built up using Power Sand and Aqua Soil-Amazonia and then the filter is used? Unfortunately, this is also not a very good way for establishment of the filtration system. If the filter runs without planting aquatic plants on the substrate, the water easily becomes cloudy and it affects the smooth establishment of the filter. The possible cause of cloudy water in case of bare substrate is the fine particles of Aqua Soil released into water and the increase of waterborne germs and algae which feed on organic matters and nitrogen dissolved in the water. On the other hand, if aquatic plants are planted from the very beginning, the release of fine particle of the soil caused by water flow and leaching of organic matter and nitrogen out of the substrate are reduced thanks to the aquatic plants. These plants also absorb nutrients present in the

water. For these reasons, the water does not become cloudy easily with aquatic plants. In the event the cloudy water occurs by the use of Aqua Soil-Amazonia, there is a high chance that the cloudy water problem due to increased germs and algae can occur successively. If cloudy water is observed while filling up the tank with water, it is advised to remove the tank water to get rid of the fine particles of the soil before commencing the operation of the filter. If a large amount of organic matter and nitrogen contained in the soil particle goes inside the filter, the growth of germs and algae in the water will quite possibly take place.

### ● In the Case of Setup of a New Aquarium

When a brand new filter is installed, it will take at least three to four weeks for biological filtration involving beneficial bacteria to function to an adequate level. Therefore during the initial setup period, the aquarium water should be changed frequently; and the biological filter media such as Bio Cube and Bio Rio should be used in combination with activated carbon such as anthracite and NA Carbon to absorb and get rid of contaminants. These contaminants are mainly organic matter and nitrogen which is excessively released from the substrate during the period. An important technique that is used to reduce these contaminants is planting of the aquatic plants to cover the substrate surface and early absorption of nutrients by the plants. To achieve this, the method of using various substrate additives was formulated with the aim of stimulating the early growth of beneficial bacteria within the substrate. Aquatic plants can be grown on the substrate consisting of Aqua Soil only or the combination of Aqua Soil and Power Sand. However, the substrate additives are still important to reduce the failed setup of a new aquarium and to maintain the

substrate in good condition for a long period of time. Bacter 100 is a substrate additive containing more than 100 kinds of substrate bacteria in a dormant state. By sprinkling over Power Sand during the substrate setup process, it can make a substrate environment conducive to the growth of beneficial bacteria. Clear Super is a substrate additive made from activated carbon powder and organic acid. The organic acid serves as an initial food for the microorganisms and helps their growth. The effect of Clear Super is further enhanced by using it in combination of Bacter 100. An increased amount of microorganisms within the substrate promotes the breaking down of organic matters and nitrogen contained in Power Sand and Aqua Soil and allows them to be absorbed by aquatic plants easily as nutrients. Hence, the use of substrate additives is beneficial to achieving stable water quality. It is recommended to use the substrate additives since they can be used only when building up the substrate during the initial setup.

#### ● In the Case of Aquarium Makeover

Unlike in the case of a new aquarium setup, with an existing set up, making use of the existing microorganisms within the filter and substrate is the most efficient method and poses the minimal risk of failure. Yet, there are some notes on transplanting of beneficial microorganisms that are worth knowing: firstly, it is ideal to remove the filter before demolishing the existing aquarium and if possible, let it run in the other aquarium in good condition until it is installed in the new tank. The aquarium water becomes cloudy when aquatic plants are removed or the composition materials such as driftwood and stones are taken out of the tank. The filter should be removed before proceeding with these removal works to prevent the cloudy water from going into the filter. In the event that there is no appropriate tank available for keeping the removed filter in, the water inside the filter must be completely drained after the filter is removed from the old aquarium. Aquarium makeovers usually take time. During this period, the filter should be kept empty to expose the filter media to the air so that the microorganisms within the filter can get oxygen. Secondly, the Aqua Soil and Power Sand used for the existing substrate should basically be replaced with new ones since the old substrate may be covered by a significant amount of sludge or it may be in an excessively anaerobic condition which can lead to deteriorated water quality or algal growth. An important point for the removal of the existing substrate is to avoid removing completely the brown muddy water

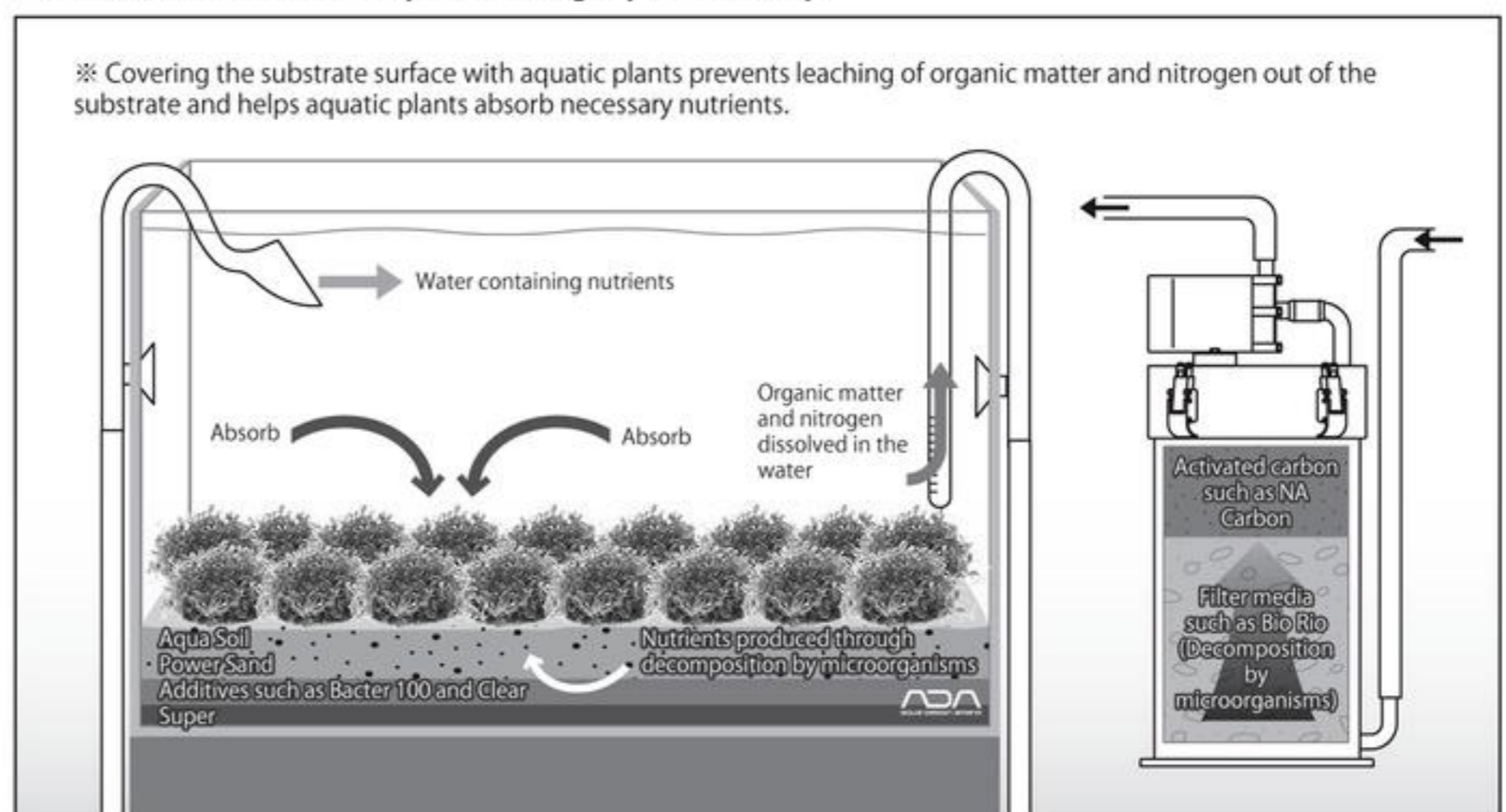
left on the bottom of the tank. Since this brown water contains abundant live microorganisms, it is advised to leave this water to the extent that the bottom of the tank is barely covered with it. Spreading Power Sand on top of this brown water allows the new substrate to have rich beneficial bacteria which have grown from the microorganisms contained in the brown water. Meanwhile, ensuring a good balance between aerobic and anaerobic bacteria is very important for the substrate. In view of this, it is recommended to apply Penac W and Penac P, substrate additives which help increase the amount of dissolved oxygen within the substrate, together with Bacter 100 and Clear Super.

#### ● Making Use of Pack Checker

The aquarium setup period can be shortened to a certain extent by proper preparation of the substrate and filtration systems. However, it is impossible to ascertain that the aquarium has been well established without water quality measurement. The standard items to be measured during setup of an aquarium are chemical oxygen demand (COD), ammonium ( $\text{NH}_4$ ) and nitrite ( $\text{NO}_2$ ). All of these can easily be measured with Pack Checkers. COD mainly indicates the contamination of water caused by organic matter. During the initial setup period, organic matter leaches out of the substrate. If abundant microorganisms are present within the filter and substrate, they break down the contaminants and the COD level declines accordingly. Ammonium is produced when organic matter is decomposed. Since ammonium is also contained in Power Sand and Aqua Soil-Amazonia, its level becomes very high in a few days to one week after the initial setup of the aquarium. Ammonium is converted to nitrite by microorganisms. Nitrite is harmful to living organisms

and the nitrite level sharply rises in one week to two weeks from the initial setup, and subsequently declines drastically after it has been converted to nitrate ( $\text{NO}_3$ ) by microorganisms in three to four weeks from the aquarium setup. The declined nitrite level indicates that an adequate amount of microorganisms has been established within the substrate as well as the filter and biological filtration has started functioning. The abovementioned process is a typical example in the case of setup of a totally new aquarium. The time required to achieve the established aquarium may be shorter in the case of an aquarium makeover. It also differs depending on the ambient temperature and dissolved oxygen level of the water. Growth of microorganisms is promoted at a relatively high temperature, and thus it takes a longer time to establish the aquarium in winter when the temperature of the substrate and filter is lower due to low ambient temperature. On the other hand in summer when water temperature rises, the dissolved oxygen level tends to become lower and this slows down the growth of aerobic microorganisms. Oxygen is required for decomposition of organic matter, ammonium and nitrite and the microorganisms which break down these substances are aerobic microorganisms. Even when the old filter is carried over to the new aquarium, the microorganisms may temporarily become less active due to the change in water quality. During the initial setup period, it is advisable to change the water frequently to get rid of the water contaminants and at the same time, be sure to perform aeration when the lighting is turned off during the night to maintain the adequate dissolved oxygen level. Once the Pack Checker does not detect any ammonium and nitrite, you may add fishes and shrimps to the aquarium with peace of mind.

#### ■ Substrate and Filtration System during Aquarium Setup



# Q&A

Many people visit the Nature Aquarium Gallery when it is open on Sundays and Japanese public holidays. We receive feedback from visitors saying that they have learned a lot by seeing the actual Nature Aquarium aquascapes and the equipment used. Together with the feedback, we also receive a number of questions. The Nature Aquarium Q&A in this issue introduces the questions asked by the visitors to the Nature Aquarium Gallery.

**Q** I have a question about the aeration system. On a publication released by ADA, there was a description "AIR: Aeration with Lily Pipe for 14 hours when lighting is OFF at night" among the aquarium data. I would like to ask how the aeration is performed. I guess a timer is used for this purpose. **Question ①:** How aeration can be performed only at night using the Lily Pip which is usually placed inside the water? **Question ②:** Are two units of external filters used and are they switched at the time of ON/OFF of the lighting?

**A** If aeration with Lily Pipe is mentioned in the aquarium data, the Lily Pipe is switched to the aeration mode manually without using a timer. When the lighting is turned off at night, the installing position of Lily Pipe is changed to a higher side and then with the suction cup, the Lily Pipe is fixed in a position where almost half of the outflow port comes above the water surface. You may reduce the tank water to the level at which almost half of the outflow port comes above the water line. When turning on the lighting in the next morning, the position of the Lily pipe is lowered (or the reduced water is replenished). If you do not have the manpower to do the manual aeration, you may use an air pump and Pollen Glass for AIR to perform a timer-controlled aeration. NA Control Timer which controls lighting, aeration and air



Be careful of the water level and angle of Lily Pipe. Agitated water may splash during aeration.

pump is very convenient. With the NA Control Timer, the air pump starts the operation once the lighting turns off. Aeration has the effect of releasing excessive CO<sub>2</sub> from the water and keeping the dissolved oxygen level constant. It is strongly advised to perform aeration in any way for Nature Aquarium when the light is off during night.

**Q** I have set up a new aquarium one week ago. The environment is as follows:

**Tank:** W60×D30×H45 (cm)

**Substrate:** Aqua Soil-Amazonia and Power Sand

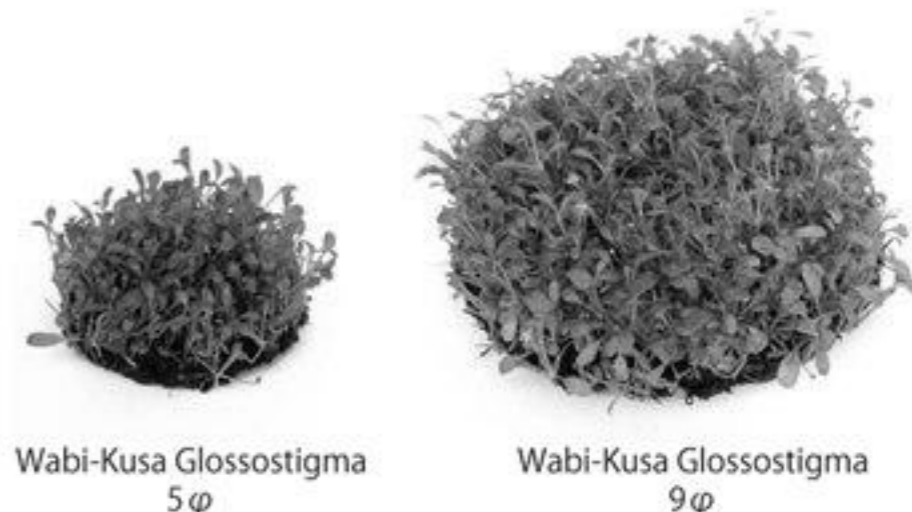
**CO<sub>2</sub>:** 1 bubble per second

**Lighting:** One unit of metal halide lamp 70W 9 hours /day

**Liquid nutrients:** Brighty STEP2 and Brighty K One push/day

**In the above environment, only Glossostigma leaves are melting. The Glossostigma grows slow and is not getting taller. During the initial setup period, is the Glossostigma usually like this until it takes root? Could you tell me what actions I can take to improve the situation?**

**A** Glossostigma melts depending on the conditions when it was sold in the shop. It tends to melt easily particularly in the case where it was sold in a pot and had a long, upright stem. Even after the leaves melt away, Glossostigma is likely to grow again if its runners and stem are left unwithered. In view of this, it is recommended to observe the plant as it is for a while. To minimize the failure rate in growing Glossostigma, it is advised to select and purchase a plant with lush leaves. ADA's "Wabi-Kusa Glossostigma" currently on sale has a lush healthy leaves and starts growing smoothly just by placing it on the Aqua Soil substrate. Glossostigma goes well particularly with the substrate made with Aqua Soil-Amazonia. On this type of substrate, you will see the plant spreading its runners usually in one week time.



**Q** I would like to learn about the capacity of Softener and also the regeneration of ion-exchange resin. The current water hardness (GH) is 3°dH. I'm not sure if it is due to this water quality, but some of my aquatic plants which seem to have a tolerance to rise in water hardness, such as Syn-gonanthus sp., Tonina fluviatilis and Rotala ramoisor, have melted away. Blyxa is also not growing well. Can the conditions of these plants be recovered if I install a Softener?

**A** Lowering of water hardness with Softener differs depending on the conditions of the aquarium. Be sure to measure the water quality using a reagent for total hardness (TH or GH) periodically before using the Softener. With ion-exchange resin having the characteristics of lowering the water hardness, the total hardness of aquarium water quickly lowers. If the total hardness does not go lower than a certain level, the effect of ion-exchange resin has been lost. In this case, you should replace the resin with a new one or regenerate it following the procedures outlined below. ① Pour water in a glass and make it saline to the extent that a part of the salt added to the water remains undissolved at the bottom of the glass (i.e., saturated saline). ② Put the used ion-exchange resin in the saline, stir occasionally with a tool such as a chopstick and leave it for about one hour. ③ Drain the saline while keeping the ion-exchange resin in the glass. Put new water into the glass to rinse the resin. ④ If the ion-exchange resin is not used immediately, seal the container in which the resin is placed in



### Send us your questions!

We welcome your questions and inquiries about the Nature Aquarium. Please feel free to send your questions to the ADA Editorial Department by email ([aj@adana.co.jp](mailto:aj@adana.co.jp)) or to our postal address listed at the end of this magazine.

water to prevent the resin from drying up. Ion-exchange resin loses its effect if its surface is worn out or dries up. In the event the total hardness of the water does not decline even after the ion-exchange resin was regenerated using the abovementioned method, you need to purchase a new ion-exchange resin. *Syngonanthus* sp. will not grow if the total hardness as well as KH (carbonate hardness) are high. The Softener lowers the total hardness but not KH. To lower the KH level in the water, it is recommended to use the additive "be Soft" under the Dolaqua series together with the Softener.

### Q Could you tell me how I can grow beautiful willow moss?

A Willow moss is a strong and easy-to-grow plant. However, proper care is required to make it look attractive in the layout. Firstly Moss Cotton should be used to attach willow moss to driftwood or stone. Moss Cotton has a similar color to willow moss and is not noticeable even right after putting it around the moss. It also has a great feature that it will biodegrade at around the time when willow moss has taken root to driftwood or stone. As an important note, you should be careful about the amount of the willow moss to be attached on driftwood or stone. It should be a thin layer and after the willow moss is attached, the surface of

the driftwood or stone needs to be partially seen. It is also important to tie the willow moss tightly on the driftwood or stone with Moss Cotton so that it will not come loose. The willow moss should be trimmed when it grows thicker. If the willow moss is completely attached to the driftwood or stone, you may pluck it with your hand and then even it out with Trimming Scissors for the final touch. If not, you should trim the willow moss carefully with Trimming Scissors. Just like other aquatic plants, willow moss will look attractive through periodical trimming. The water temperature will go up in the coming season. Sufficient attention should also be taken to the rise in water temperature as willow moss prefers a lower temperature.

### Q May I know how can I control and remove brown algae?

A The algae that are generally called "brown algae" are diatoms. This type of algae grows only during a limited period of time and for the Nature Aquarium, it is usually about two weeks after the aquarium was set up. After diatoms are observed in the aquarium, green algae will grow on the diatoms using them as a base. In view of this, it is advisable to add living organisms that are beneficial for algae control to the aquarium before diatoms start to grow. *Otocinclus*, an algae eater, is effective

to control diatoms which are highly viscous and stick on the surfaces of driftwood, stone and plant leaves. About three to five *Otocinclus* are sufficient for a 60cm tank. The best timing to add the living organisms for algae control to the aquarium should be a little while before algae starts growing, and not after. Therefore, it is important to closely monitor the changes within the aquarium. The initial stage of the aquarium is too early to add *Otocinclus* and *Cardina japonica* (Yamato Numa Ebi) to the aquarium because the water quality is not yet stable and ammonia or nitrite which is toxic to these living organisms may be present in the water at that time. Before adding them to the tank, be sure to check the water quality and observe the living organisms to see if they show unusual behavior due to the aquarium water. Diatoms grow during the initial stage of the aquarium because the beneficial bacteria within the filter which purify the water are not fully active yet. The growth of diatoms can be suppressed by letting the filter run for about two to three weeks before it is installed in the new aquarium. To promote the growth of the bacteria for biological filtration, it is crucial to prepare the filter not in a bare tank but in a tank with fishes in which an adequate amount of organic matters are present (in the event only a bare tank is available, it is advised to add liquid fertilizer as if feeding the bacteria in the filter).

#### How to Attach Willow Moss to Driftwood



Before planting, tear willow moss into thin layers.



Place the willow moss on driftwood while imagining moss in nature.



Tie the willow moss on the driftwood with Moss Cotton.



Lastly, trim off the protruding willow moss with scissors.



Moss Cotton will biodegrade at around the time when the willow moss has taken root to the driftwood.

# ADA LED lighting system makes it possible to grow healthy aquatic plants.

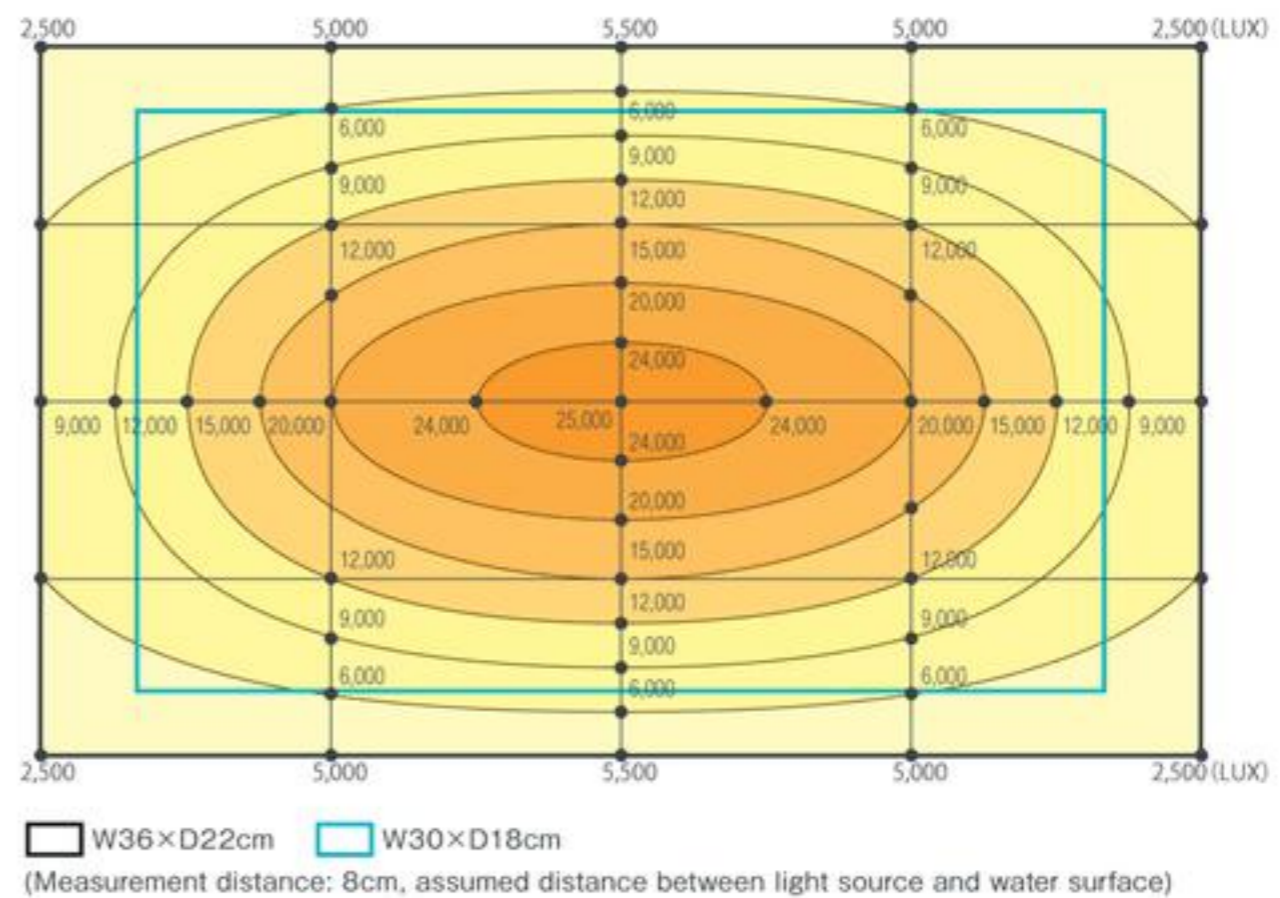


LED Lighting System for aquatic plants

## AQUASKY

Ensuring the enough light intensity for the entire aquarium is our highest priority in developing ADA's first LED lighting system.

The point light source of a single LED unit seems providing very high brightness. However, to be used in a lighting system, it's not enough for plant growth. AQUASKY, equipped with efficient layout of 30 SMD LED lamps of 0.4W per unit, makes it possible to give excellent light distribution and light up the entire aquarium. AQUASKY's 12W luminous flux : 1,450~1,550lm is the best-in-class light quality.



\*Photo is for image only. This product has a power supply cord on the side.  
\*Displayed Cube Garden, Cube Cabinet and glass products are sold separately.

■ Light housing unit size: W280mm x D68mm x H9mm  
■ Clear stand size: W300mm x D100mm x H95mm (for aquarium 30cm in width) W360mm x D100 x H95mm (for aquarium 36cm in width)  
■ Product specification Input voltage: AC100 - 240V 50/60Hz / Power consumption: 17W / Current consumption: 0.4A / Color temperature: 7,000K - 8,000K / LED: 0.4W/each x 30 AQUASKY is a CE certified product (CE Mark)