

Nature Aquarium information magazine

AQUAJOURNAL

ADA
aqua design amano

SEP.
2012



MAINTENANCE

Daily Maintenance is the Key to Nature Aquarium Success

Creating Ideal Aquarium Conditions

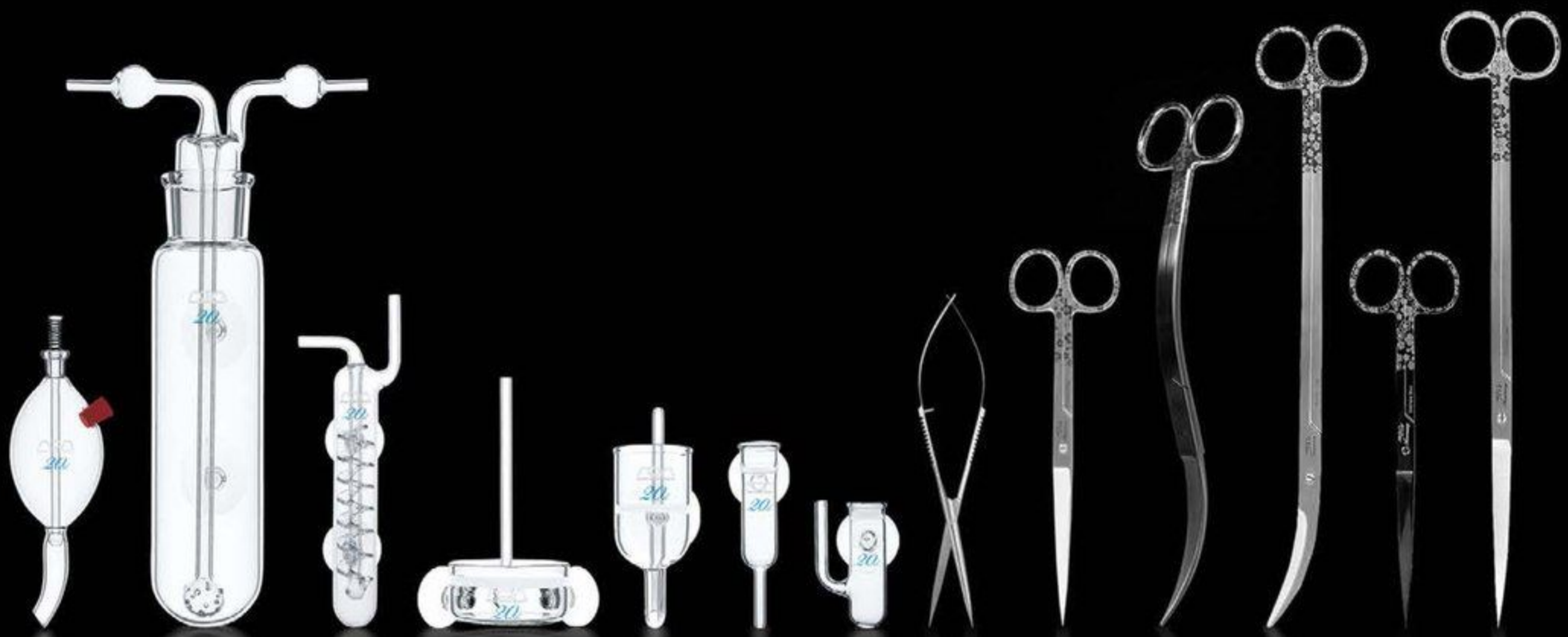
Addition of Iron and Absorption by Aquatic Plants

Maintenance methods for various types of Aquatic Plants

Aquascape Management MEMO

Planting of aquatic plants considering the maintenance of aquascape

Passion Ignites Enjoyment of the Hobby
ADA PREMIUM



AQUA DESIGN AMANO
The 20th ANNIVERSARY

All Products are

To know Mother Nature is to
We recreate the natural eco-system
a better understanding of



PRODUCTS

Available now

Love her smallest creations.
In our aquarium, which leads to
the global environment.

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.







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

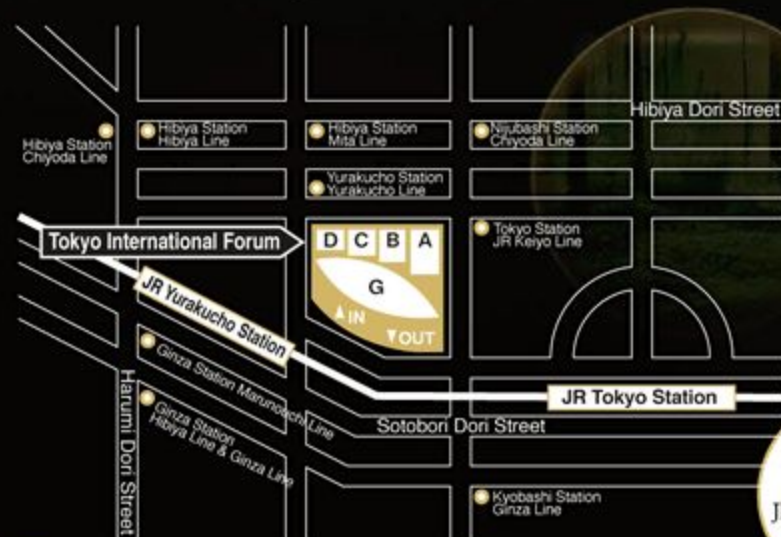
Address: 3-5-1 Marunouchi, Chiyoda-ku, Tokyo 100-0005

- 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>

1 minute walk from JR Yurakucho Station



Gigantic Cedar Trees Standing Deep in the Forest (Aga-Machi, Niigata, Japan)

There are four major places in Japan where cedar trees grow naturally: Yaku Island, Sado Island, in the Tateyama Foothills to Katakai River basin in Toyama and the Mogami River basin in Yamagata. Aside from the popular Sado Island, natural cedar's are also found in the Ura-Gozu area located in the former Mikawa Village side of the Gozu Mountain Range in Niigata. While I was climbing a route with no footpath during intense summer heat carrying heavy photography equipment on my back, I found dozens of huge cedar's standing on the hill. It was a pleasant surprise to stumble upon such a hidden scenic spot in Niigata.

Shooting data / Ebony SW57, Super-Symmar 110mm XL, 1/2 sec at f22, Velvia 100F 5×7 inch format film
Text and photographs by Takashi Amano

AQUA JOURNAL

SEP. 2012

Contents

Special Feature

8 MAINTENANCE

4 Travelling across Japan

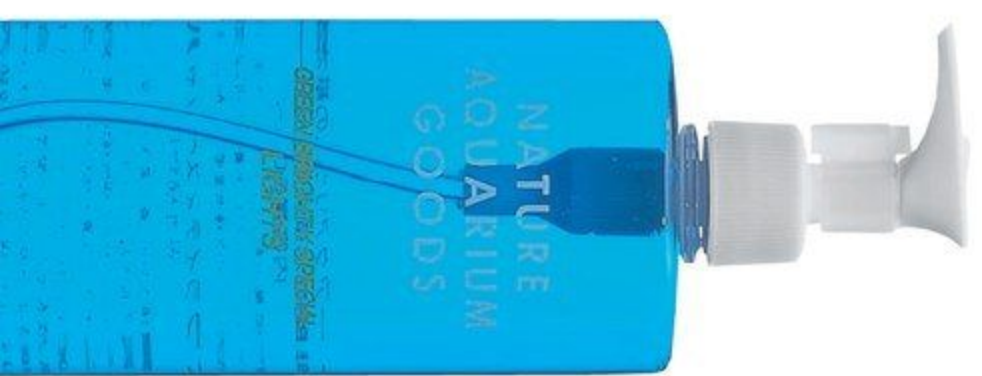
Vol.47 Aga-Machi, Niigata, Japan

44 An "Extensive Research" on AQUASKY

46 nature aquarium **notes**

Vol.41 Combining Substrate Materials according to Purposes

48 Nature Aquarium Q&A



Special Feature

MAINTENANCE



ANCE



Daily Maintenance is the Key to Nature Aquarium Success

A completed Nature Aquarium is only achieved through proper maintenance - not just by arranging materials in a composition and planting aquatic plants. This issue's Special Feature discusses the proper techniques and know-how for daily maintenance and long-term success for your layout.

Photographs by Takashi Amano

Text by Masatoshi Abe/Tsuyoshi Oiwa

Translation support by Frank Wazeter



Daily Maintenance Creates Ideal Aquarium Conditions

Proper maintenance techniques are vital to enjoying an aquarium with vibrant aquatic plants long-term. Once aquatic plants are planted into a new aquarium, maintenance begins. The enjoyment of a planted aquarium is not merely in appreciating the end result, but also in enjoying the daily maintenance routine. It is important to closely observe the aquarium everyday to see if the overall condition is stable, improving or deteriorating. Once you learn the proper techniques, you will be able to know the aquarium's condition just by looking at the tank's water.

■ Adding Liquid Fertilizer

The basics of supplying nutrients to the planted aquarium is to add potassium (Brighty K) and trace elements (Green Brighty STEP series). These nutrients are commonly prone to shortages in the aquarium, so they must be added daily to preserve the health of the aquatic plants. Over time, you will adjust the amount of fertilizers to add into the aquarium and evaluating the color and condition of aquatic plant leaves is the key to the effective dosing of liquid fertilizers. When algae is present, fertilizers should not be added.



Aquarium layouts with lush stem plants are not only prone to shortages of potassium and trace elements but are also prone to shortages of nitrogen and phosphorus. This causes leaf colors to deteriorate in plants. To solve this problem, add Green Brighty Special LIGHTS to the aquarium.

■ Adding Water Conditioner

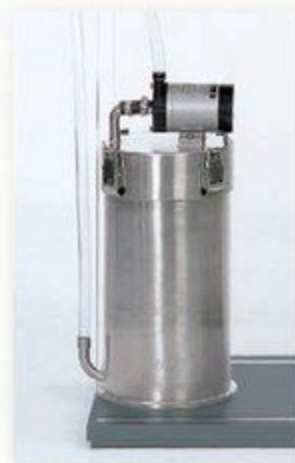
Although tap water is safe for the human body, adding tap water is harmful to small tropical fish. Water conditioner's make tap water similar to the tropical river water where these fish live. It helps create idealistic water with various effects including the removal of chlorine, protection of a fish's mucous membrane, supplementation of humic acid and the addition of various healthy vitamins.

The mucous membrane on a fish's body may get damaged easily when new fish are added to the aquarium or when water is changed. It is advisable to add Rio Base to the water in order to protect the fish.



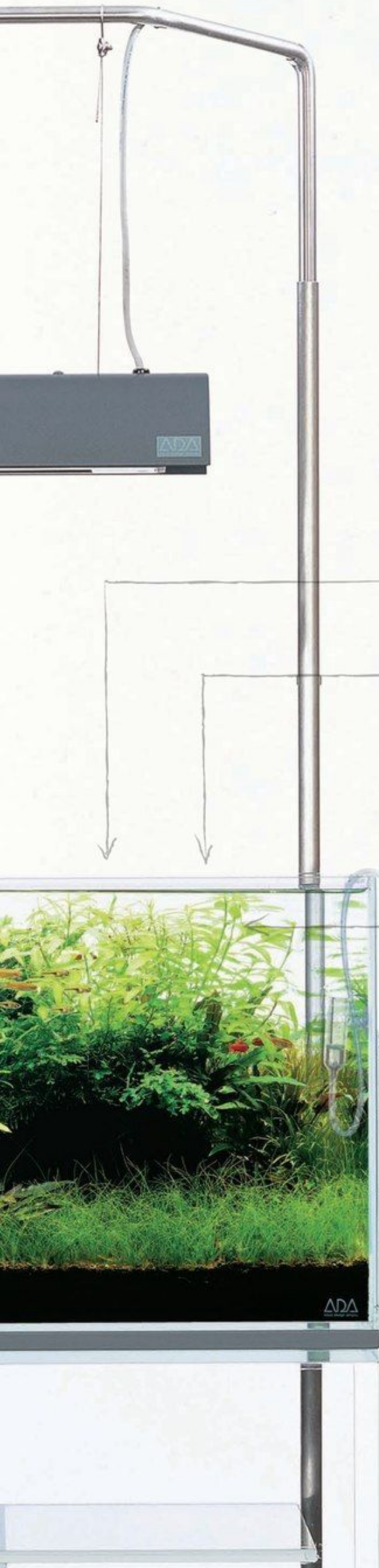
■ Bringing Out the Power of Microorganisms

The environment within an aquarium is supported by microorganisms, therefore it is important to grow them as fast as possible. During an aquarium's initial stages the growth of microorganisms is promoted by adding Green Bacter, which serves as a food source for them. Maintaining proper filtration capacity is key to the health of these beneficial microorganisms and it is advised to rinse filter media on a periodic basis to prevent clogging from built up detritus and decaying matter.



Control the conditions of microorganisms effectively!

A Nature Aquarium created with longevity in mind can only be maintained through regular daily maintenance. Wisely select tools and supplies from the wide range of specialized professional grade items in Nature Aquarium Goods for the maintenance of your aquarium.



■ **Trimming to Enhance a Layout's Appearance**

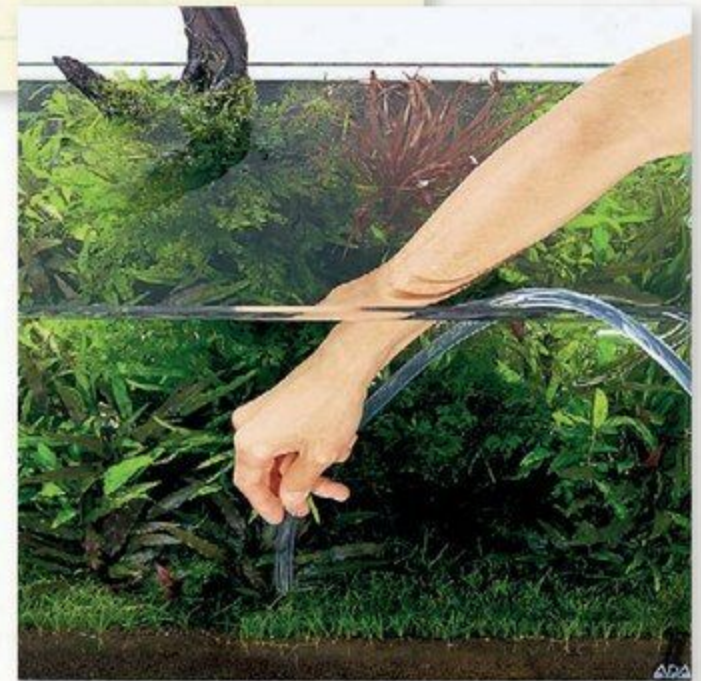
Trimming is a crucial technique to achieve a long-term layout. Through repeated trimming stem plants become denser and form attractive thickets. Because trimming influences the overall composition of the aquascape, it is necessary for you to carefully determine the line and height which you will trim aquatic plants.

The use of Trimming Scissors with long handles and curved blade tips makes the pruning of dense aquatic plants easier.

■ **Water Change is the Most Basic Maintenance Activity**

Once the aquarium condition is stable, approximately 1/3 to 1/2 of the entire aquarium's water should be changed once a week. With the positive stimulation brought about by the addition of fresh water, the aquatic plants look more vigorous after an aquarium's water is partially changed. During the water change, it is advised to siphon off sludge and withered leaves.

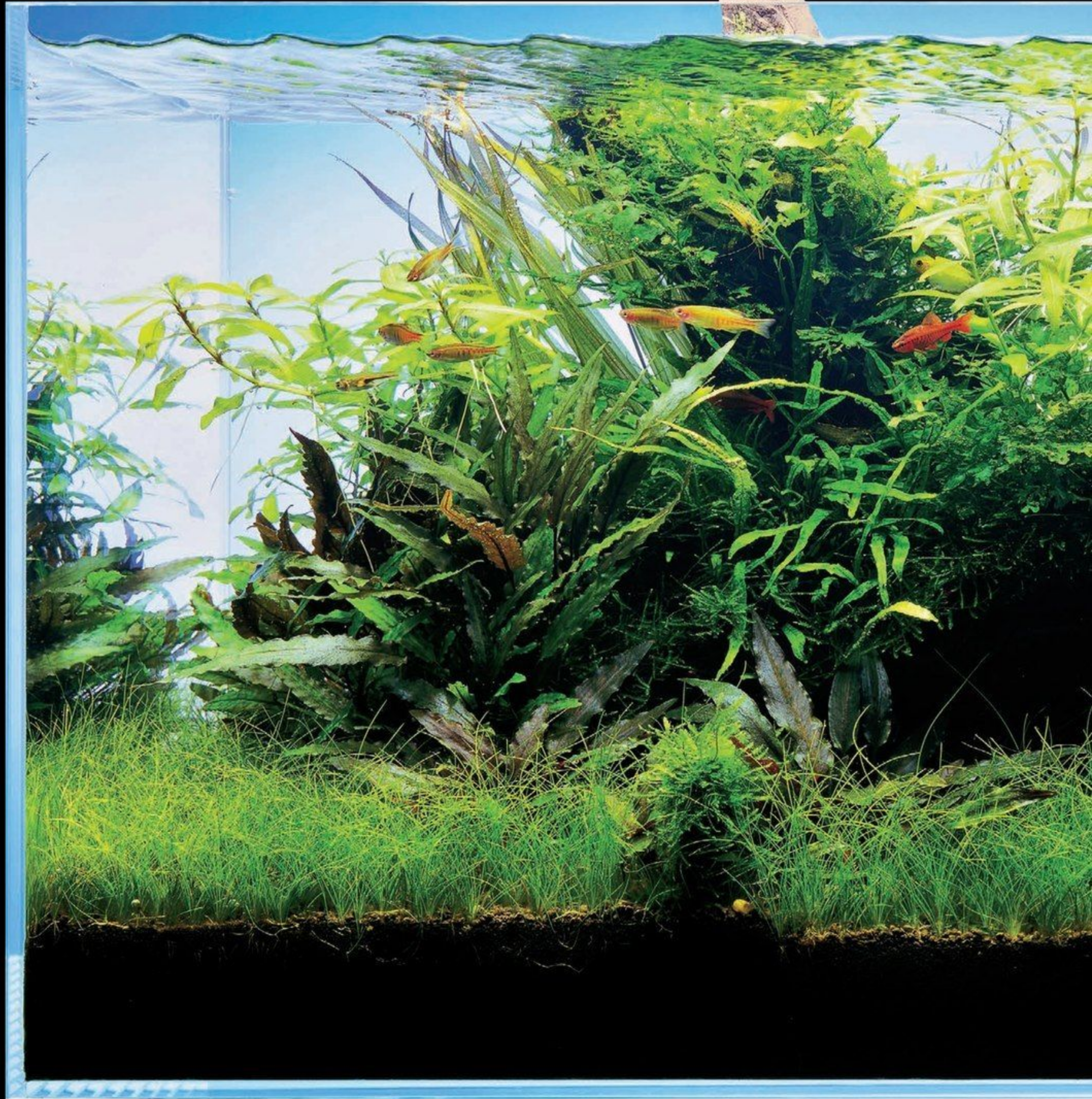
Drain the tank water while suctioning out sludge and algae using a fine hose (such as airline tubing). It is convenient to have both large and small hoses suitable for your aquarium size.

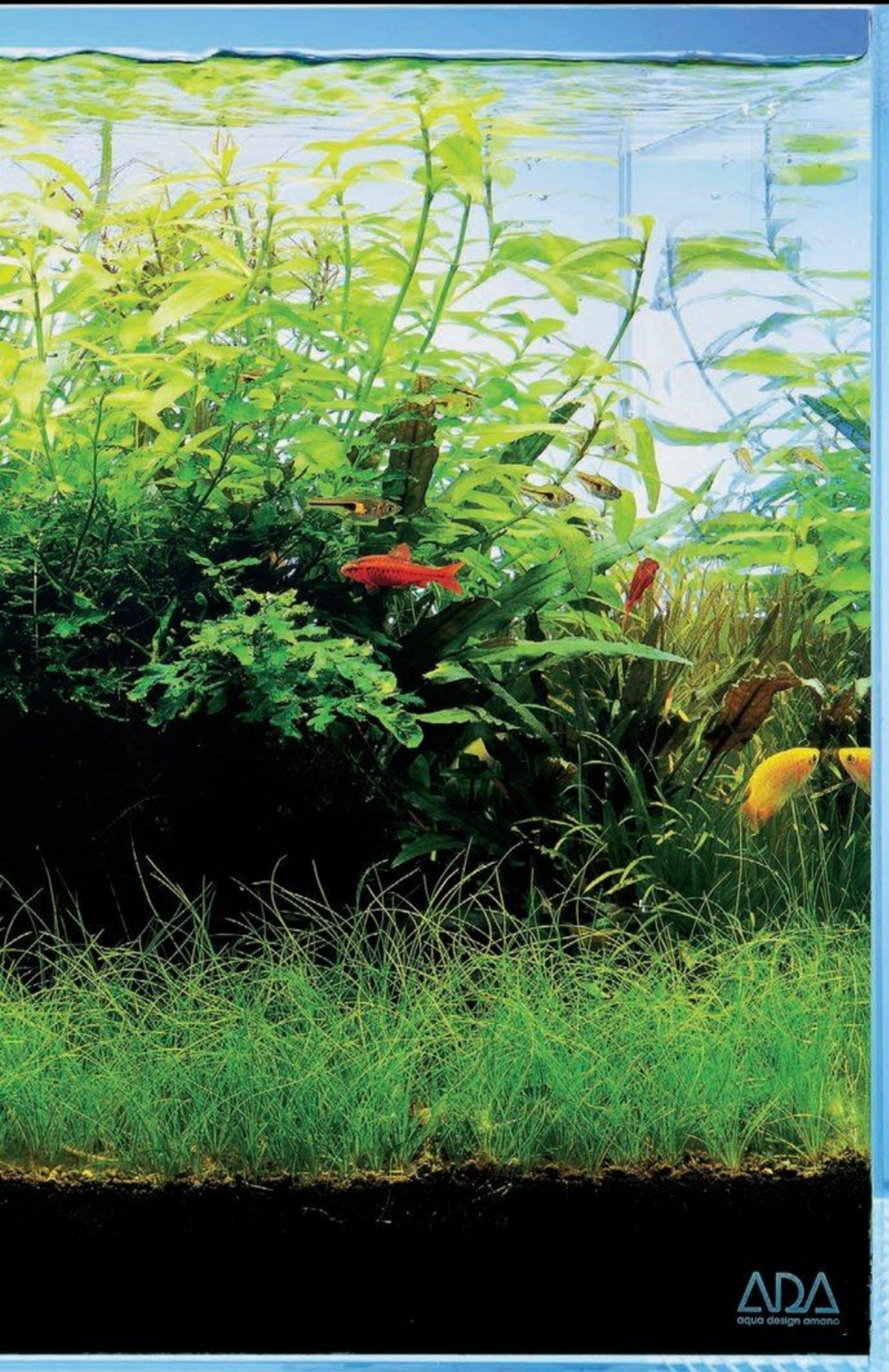


Green algae on the surface of the glass can be easily removed with Pro Razor. The surface of the glass should always be kept clean.

■ **Early Action is the Key to Algae Removal**

Algae can grow in the aquarium at any time. Algae will start growing vigorously when the filtration system is in a deteriorated condition or when the growth of aquatic plants slows down after trimming. It is advised to solve this problem by removing the grown algae as soon as possible (hand removal with airline tubing is an excellent technique) while monitoring the filtration system.





A Layout Featuring the Distinctive Shape of Driftwood

This layout features a single piece of driftwood attached with ferns and willow moss as the main compositional material. To highlight its unique shape, the driftwood is placed in such manner that its tip breaches the water's surface. Cryptocoryne and Blyxa are planted around the driftwood while hair grass is planted as the foreground plant. Frequent trimming of the fast-growing Hygrophila Polysperma is a necessary maintenance task in this layout to prevent the plant from overgrowing. Hygrophila polysperma is a strong plant which has a good tolerance to trimming, making it a suitable plant choice for the long-term maintenance of the layout.

DATA	
Tank	/ Cube Garden W60×D30×H36 (cm)
Lighting system	/ Grand Solar II (NA Lamp 36W Twin ×2) Lighting for 10 hours a day
Filtration system	/ Super Jet Filter ES-600 (Bio Rio)
Substrate system	/ Aqua Soil - Amazonia, Power Sand Special S, Bacter 100, Clear Super, Tourmaline BC, PENAC W for Aquarium, PENAC P for Plants
CO ₂ system	/ Pollen Glass - 3 bubbles per second with CO ₂ Bubble Counter
Air	/ Aeration with Lily Pipe for when lighting is OFF at night
Additives	/ Brighty K & Green Brighty STEP 2
Water change	/ 1/3 water change once a week
Water quality	/ Water temperature: 25°C; pH: 6.8; TH: 20mg/ℓ
Aquatic plants	/ <i>Hygrophila polysperma</i> <i>Blyxa auberti</i> <i>Blyxa novoguineensis</i> <i>Bolbitis heudelotii</i> <i>Microsorium</i> sp. (Narrow Leaf) <i>Fontinalis antipyretica</i> <i>Cryptocoryne petchii</i> <i>Eleocharis acicularis</i>
Fish species	/ <i>Puntius titteya</i> <i>Danio choprai</i> <i>Trigonostigma hengeli</i> <i>Colisa sota</i> var. <i>Caridina japonica</i> <i>Otocinclus</i> sp.

Maintenance Tips Considering the Temporal Changes of a Layout

First cut off the larger leaves of shade plants in the mid-ground

Driftwood forms the mid-ground by attaching ferns to it with the planting of Cryptocoryne around it. Maintenance of the layout can be made easier by using slow-growing shade plants for the mid-ground. When trimming these shade plants, cut off the excessively large leaves first.

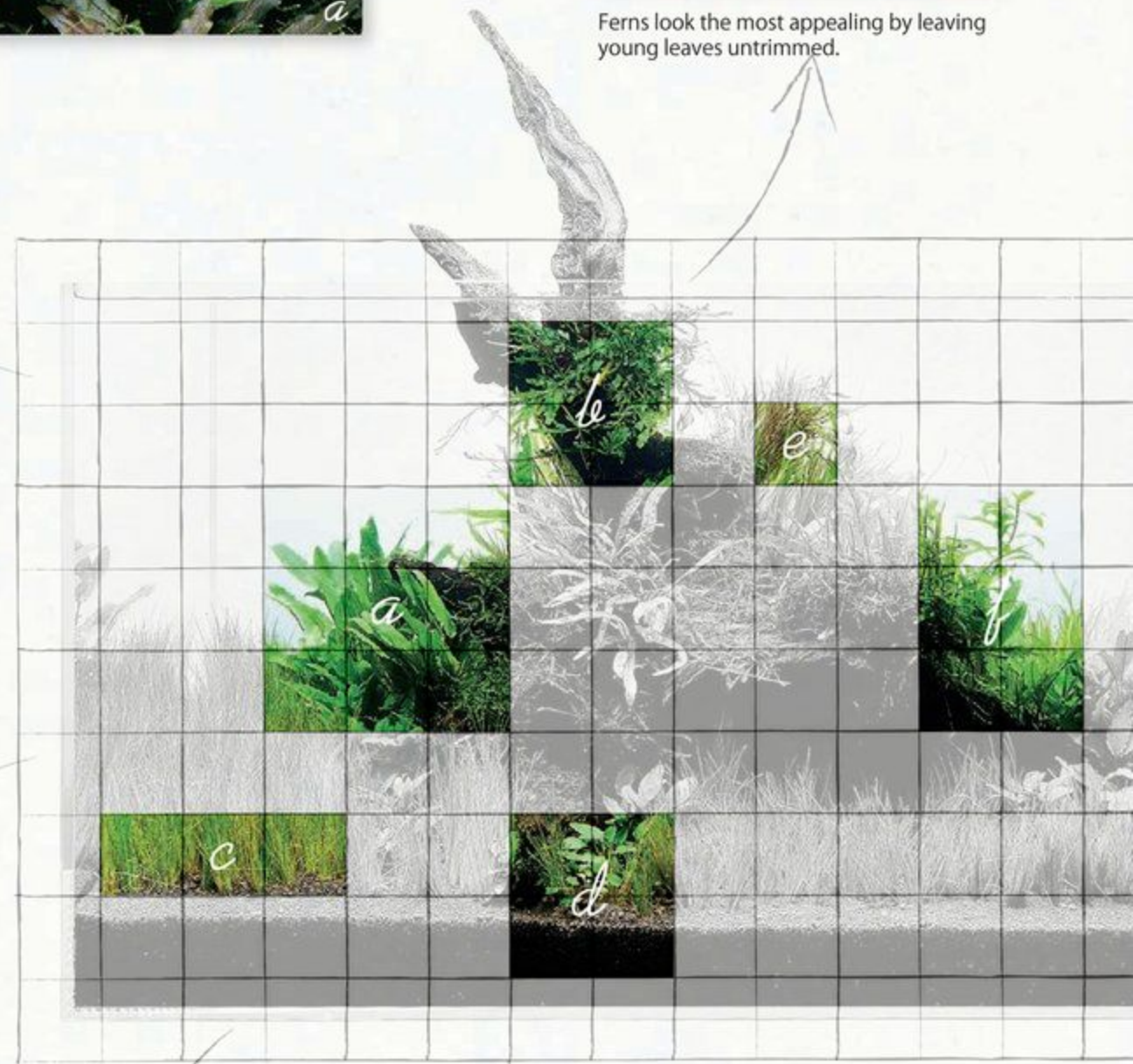


First, trim off the largest leaves on the outer side of Cryptocoryne as they get old and easily damaged.



Ferns look the most appealing by leaving young leaves untrimmed.

It is exciting to see the aquatic plants grow during the initial stage of a planted aquarium. However, the aquarium will eventually be unattractive if the aquatic plants are left growing without proper maintenance. Daily maintenance is not only limited to changing the water, but it also involves proper trimming to be performed for each type of plant. Particularly in a 60cm (24in) wide or smaller aquarium, the open space within the tank becomes rapidly occupied with aquatic plants if they are not properly trimmed, which results in an unwanted layout composition. In this section, the points of trimming are introduced for each type of aquatic plant using a 60cm (24in) tank as an example.



Trim the dwarf hair grass drastically short.



Carefully trim the willow moss using a tool such as Pro-Scissors Spring.

Trim the small aquatic plants in the foreground to a more compact size

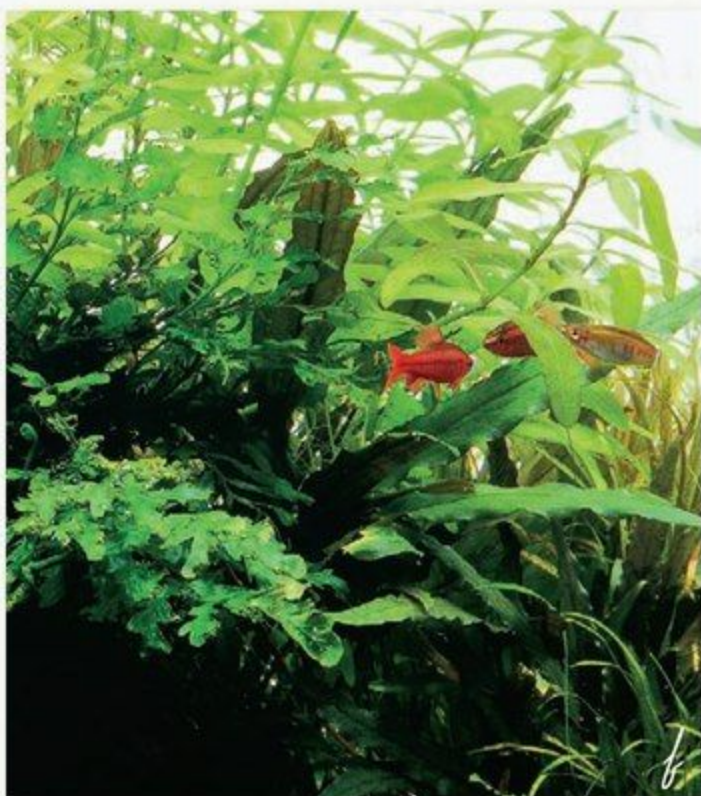
Short and small aquatic plants are mainly planted in the foreground. Even these plants will eventually have long leaves and stems as well as many runners and leaves if left unmaintained, leading to their overwhelming presence in the layout. The point of the maintenance of the foreground plants is to trim them as short as possible.

Trim the stem plants in the background once they reach the water's surface

The main plants to be planted in the background are stem plants and other tall plants. When overgrown, these plants may overhang along the water line and block the light into the aquarium. They will also occupy the open space in the layout. Stem plants need to be trimmed once their terminal buds reach the water's surface.



Through trimming, stem plants grow denser.



Aquatic plants that are planted in emerged form will develop submerged leaves adaptable to aquatic environment.

Cut off the emerged leaf once its color changes

Aquatic plants which are planted in emerged form, such as Cryptocoryne, will develop submerged leaves adaptable to the aquatic environment over time. However, the original emerged leaves will turn yellow and eventually melt away. Cut off and remove the leaves which have lost their color as soon as possible. Melted leaves may get sucked into the filter and affect the filtration capacity, which can cause algae.

Nature Aquarium is not complete with only the planting of aquatic plants. It is necessary to grow the plants to make them look attractive in a few months time. To achieve this, proper daily maintenance is crucial. The following are some important maintenance tips.

The secret of a beautiful Nature Aquarium is the composition. Therefore, it is essential to do the maintenance while taking the composition into consideration. It is necessary to trim the thickets of aquatic plants neatly. However, if the entire composition is not considered during the trimming process, the indispensable open space within the aquarium may be occupied by aquatic plants or the right-left balance created during the planting process may be ruined. Some key points to prevent these concerns include looking at the entire layout a little distance away from the tank and determining the trimming line while considering the growth speed of each plant.

Immediately after the aquatic plants were planted



The driftwood stands out when aquatic plants are still in the growing stage. A small gap is created between the front glass and aquatic plants as the plants will eventually spread by growing their runners.

About four months after the planting



The grown plants along with the driftwood makes the convex composition look much more prominent. The gap created in the foreground has been filled by hair grass.

Daily Maintenance

The Addition of Iron and its Absorption by Aquatic Plants

In Nature Aquarium, liquid fertilizers are added to the water for healthy growth and the enhanced appearance of aquatic plants. Iron in particular is an important element which improves the leaf color and promotes the formation of buds. This section discusses how aquatic plants uptake iron.

Liquid Fertilizers and Additives for Iron Supplementation

The fundamental liquid fertilizers that are added daily to Nature Aquarium are Brighty K and the Green Brighty STEP series. Brighty K supplies potassium, one of the three major nutrients, while the Green Brighty STEP series mainly supplies trace elements. There are three types in the STEP series, namely STEP1, STEP2 and STEP3, each of which features a different mix of trace elements. Iron is contained in all of them at different amounts; STEP2 contains the highest amount of iron. For the STEP series, the step is shifted according to the time elapsed since the initial setup of the aquarium which almost corresponds precisely with the growth stages of aquatic plants. STEP2 is added to the aquarium for the period from the 3rd month to 1 year after the setup when aquatic plants grow vigorously and stem plants are luxuriant. Of the trace elements, iron which has the effect of promoting pigment synthesis and bud growth is required in large amounts during this period. If it is observed that aquatic plants have grown thick in the aquarium, an increase the amount of STEP2 added to the water. When a lot of red stem plants that require a large amount of iron are used in the layout or when bleached buds are observed, an extra amount



of iron needs to be supplied by adding ECA together with STEP2. ECA, an additive, contains readily-absorbable bivalent iron at high concentrations. It is quickly absorbed by aquatic plants and brings about a rapid effect in improvement of leaf color and the promotion of bud development. In the Nature Aquarium Gallery, the liquid fertilizer Green Brighty STEP2 is mainly added to ordinary aquariums for iron supplement. When an extra amount of iron is required for a layout which has abundant red stem plants, the additive ECA is used together with STEP2.

How Will the Iron Added to the Aquarium be Used?

A simple experiment was performed to investigate how iron is absorbed by aquatic plants. The form of iron absorbed by aquatic plant is bivalent iron (Fe^{2+}). Green Brighty STEP2 and ECA contain iron in this form. First, ECA was added to a 90cm (36in) aquarium tank with lush aquatic plants to increase the concentration of bivalent iron in the water up to $2.5mg/\ell$. Then, the subsequent reduction in the amount of bivalent iron was measured. As a result, the blue line in the graph below shows the sudden decrease in iron. However, the decline in the iron amount is not solely due to iron absorption by aquatic plants, but also partially attributed to natural iron oxidation taking place in the water and iron-oxidizing bacteria within the filtration system. In light of this, the water from the

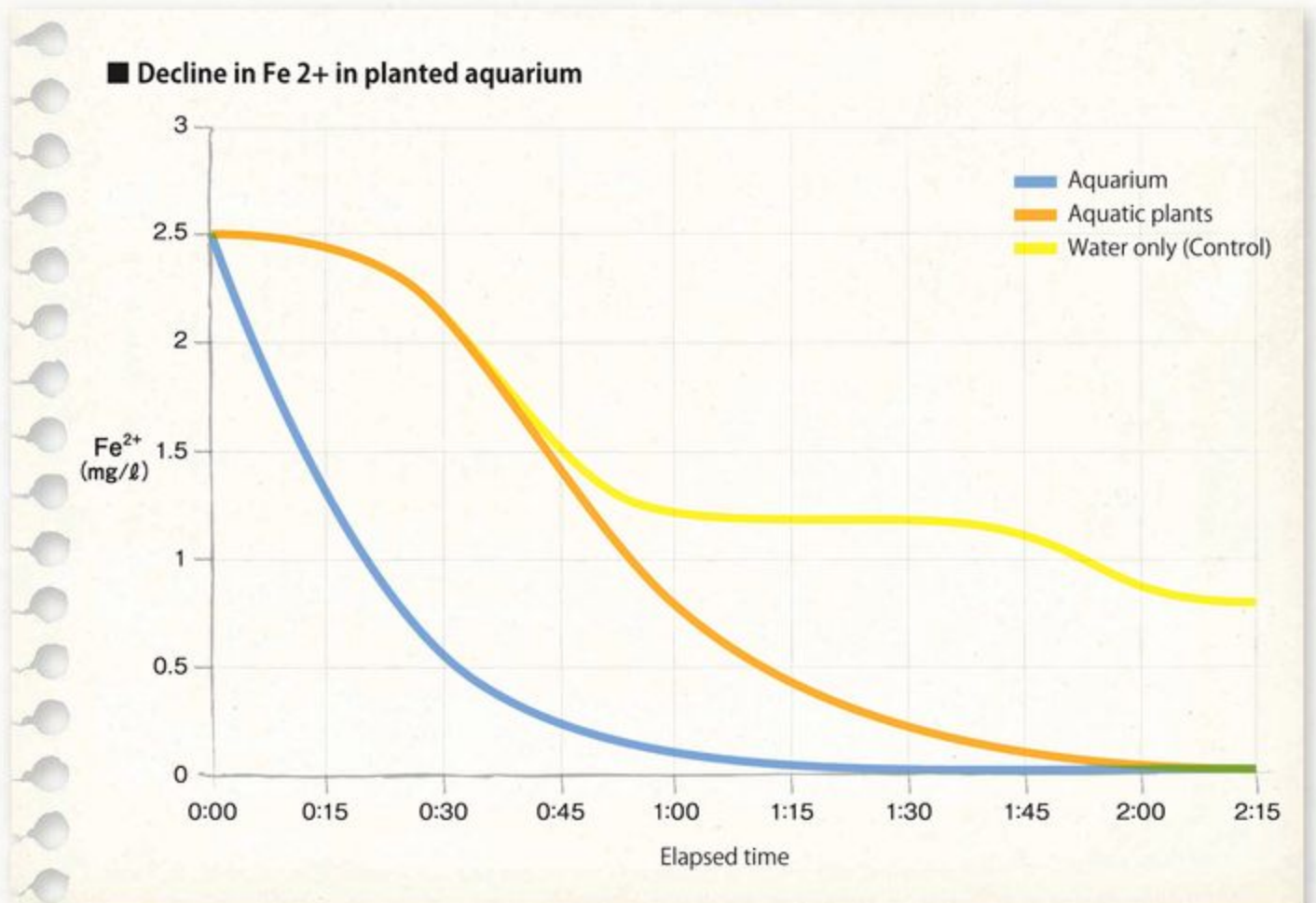
same aquarium tank was isolated to observe the iron absorption by aquatic plants and natural iron oxidation. The orange line in the graph shows the amount of iron absorbed by aquatic plants. Although the decline rate is slower due to the environment free from the effect of filtration system, the iron concentration reached an undetectable level in approximately two hours. Meanwhile the yellow line indicates the decline in iron amount in an aquarium that is filled with water only. The decline rate is even slower than the orange line, but it shows that the amount of iron decreased steadily over time. From these results, it can be concluded that trace elements, particularly iron which is prone to oxidation, drastically decreases immediately after they are added to the aquarium tank; and it is therefore recommended to add them in small amounts at higher frequency rather than adding them in large amounts at one time in order to reduce waste. The idealistic way of adding liquid fertilizers is to add them a few times daily while the aquarium lighting is on. If it is hard to implement this due to work or schedule, it is recommended to add liquid fertilizers at least once a day when the lighting is on in the morning. Adding liquid fertilizers for a few days' dosage in one shot is not recommended because this method produces a large amount of waste.

Liquid fertilizer containing rich readily-absorbed bivalent iron

Both Green Brighty STEP2 and ECA contain bivalent iron. In view of the fact that bivalent iron loses its effects once oxidized, the bivalent iron contained in these fertilizers have been converted into chelated iron (the iron bonded to a chelating agent) for prevention of oxidation during storage. In the aquarium, bivalent iron is easily oxidized by dissolved oxygen and iron-oxidizing bacteria in the water. Effective iron absorption by aquatic plants can be expected if the iron is added at shorter intervals.



Green Brighty STEP2





The Addition of Iron and its Absorption by Aquatic Plants

Vivid color of red stem plants and other aquatic plants can be achieved by adequate iron supplementation.

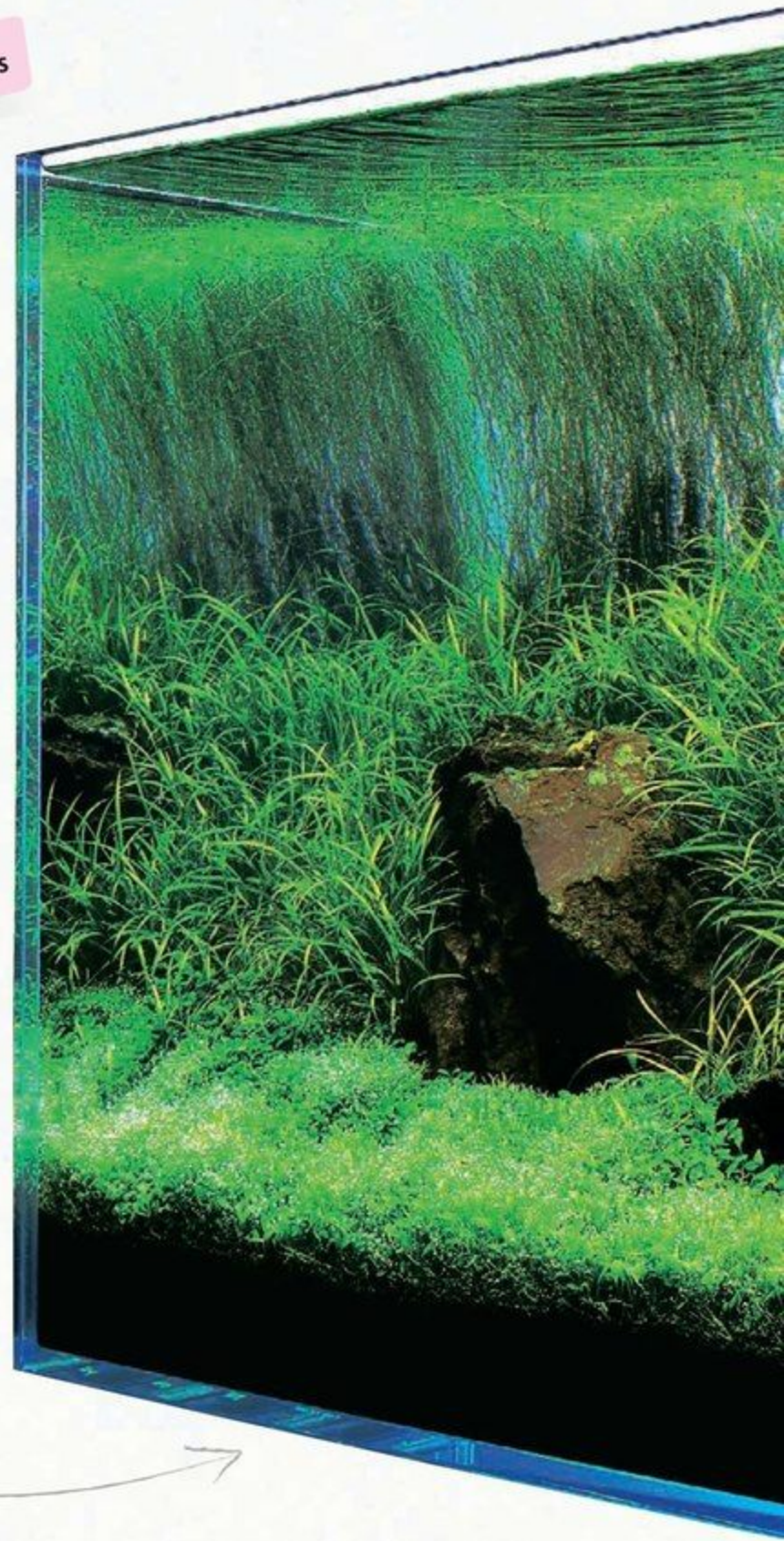
Planting an Iwagumi Layout for Easy Maintenance



Plant *Glossostigma* elaborately between Riccia stones



This layout was produced during a seminar organized for ADA authorized dealers. Amano modified the Iwagumi arranged by a participant and planted the aquatic plants. The point of this layout is a plant arrangement with easy maintenance into consideration.



The Combination of Riccia and Glossostigma

Riccia is used by tying it on a flat stone such as Riccia Stone. The stone as well as the thread used to tie Riccia onto the stone will eventually be covered by grown Riccia and become invisible. Riccia is a floating plant and may float out of the substrate if no action is taken. A solution to prevent this concern is to plant *Glossostigma* together with Riccia. The runners of *Glossostigma* spread out in all directions and hold the Riccia onto the substrate. This technique also contributes to easy maintenance. To trim these plants, the surface of the plants should be trimmed thinly.

DATA

- Tank / Cube Garden W90×D45×H45 (cm)
- Lighting system / Grand Solar I (NAG-150W-Green / NA Lamp 36W Twin ×2)
Lighting for 10 hours a day
- Filtration system / Super Jet Filter ES-600 (Bio Rio, NA Carbon)
- Substrate system / Aqua Soil - Amazonia, Power Sand Special M, Bacter 100, Clear Super, PENAC W for Aquarium, PENAC P for Plants, Tourmaline BC
- CO₂ system / Pollen Glass Large 30Ø - 3 bubbles per second with CO₂ Beetle Counter (Using Tower)
- Air / Aeration with Lily Pipe P-4 for 14 hours when lighting is OFF at night

Featuring crystal-like air bubbles produced during photosynthesis, Riccia is a primary plant for an Iwagumi layout. However, this fast-growing plant is difficult to maintain. The maintenance of Riccia can be made easier by combining it with Glossostigma.



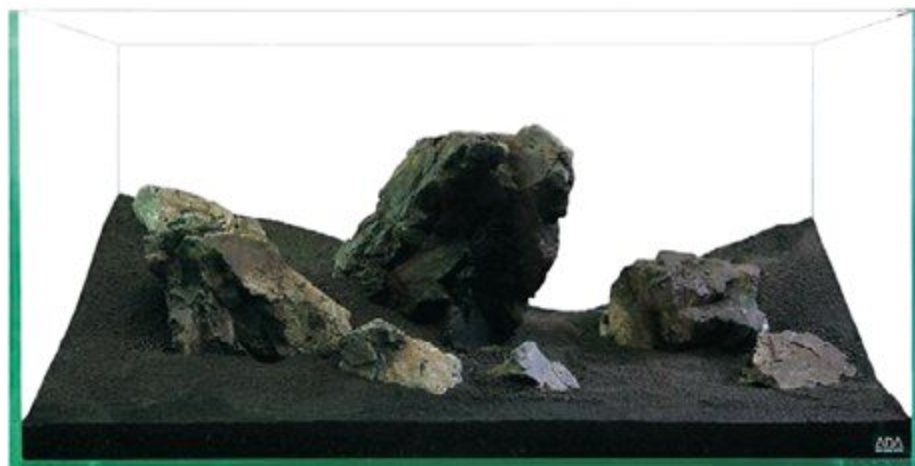
Completion of Iwagumi Layout

- Additives / Brighty K & Green Brighty STEP 1
- Water change / 1/3 water change once a week
- Water quality / Water temperature: 25°C; pH: 6.8; TH: 50mg/ℓ
- Aquatic plants / *Riccia fluitans*
Glossostigma elatinoides
Echinodorus tenellus
Eleocharis vivipara
- Fish species / *Hemigrammus armstrongi*
Otocinclus sp.
Caridina japonica

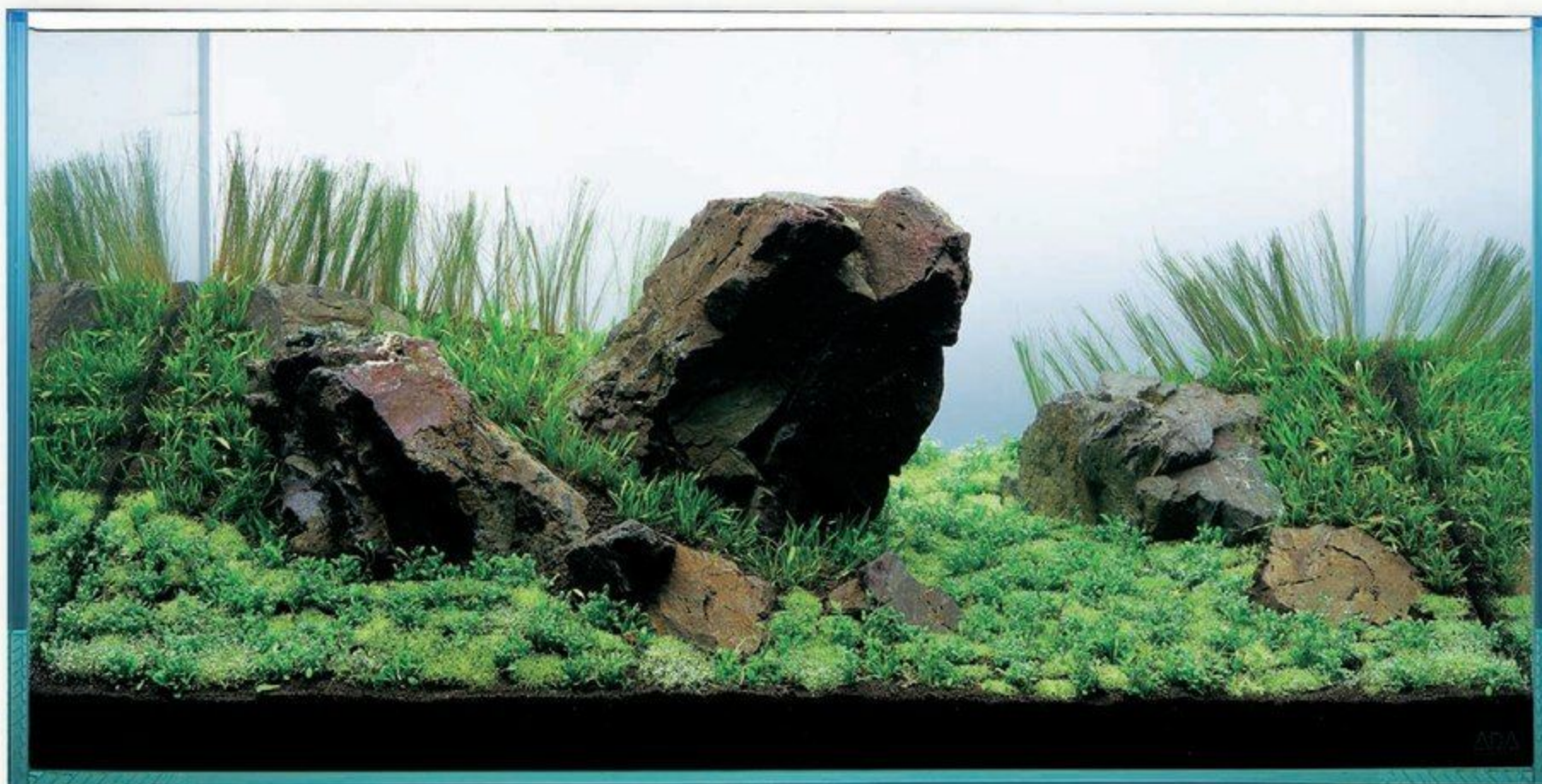
Planting and Maintenance of Iwagumi Layout Considering Temporal Changes

Immediately after the aquatic plants were planted

Riccia, a floating plant, needs to be tied onto a stone or other object to keep it in water. In Nature Aquarium, the technique using Riccia Stone and Riccia Line has been developed to prevent Riccia from floating out of the substrate. Although Riccia stone is suitable to cover the entire area of the substrate, they are intentionally placed with some gap between them in this layout so that *Glossostigma* can be planted in the gaps. *Glossostigma*, which grows by spreading runners, will have the effect of holding down the floating Riccia. *Echinodorus tenellus* is planted around the stones while tall-growing *Eleocharis vivipara* is planted behind the stones.



Manten stones are arranged and Aqua Soil Powder type is mounded around them. Slopes are made with the highest point on the right and left ends of the layout.



Four types of aquatic plants were planted in combination. Aquatic plants should be selected taking easy maintenance into consideration.

1.



The combination of *Glossostigma* and Riccia adds variation to the layout, creating a layout filled with natural ambience that cannot be obtained just by planting either one of them.

2.



Echinodorus tenellus planted in the background stretches its runners across the stones towards the front side.

■ Expressing natural ambience with foreground plant

The main aquatic plants used in Iwagumi layout are short foreground plants. The representative species used as foreground plant include *Glossostigma*, cobra grass (microsword) and hair grass. Except for the layout type where only a single species of plant is planted, there is a technique where several species of foreground plants are mixed to have rich variations and produce an enhanced natural feel and texture.

Iwagumi layout uses two styles of planting; one is planting involving only one species of aquatic plant and the other is mixed planting where more than one species of aquatic plants are planted in combination. In the latter case, a layout which enables easy maintenance and easy growing of plants can be achieved by highlighting the features of each aquatic plant.



Eleocharis vivipara will have a refreshing touch when they are planted at such density that the background can be seen through them.

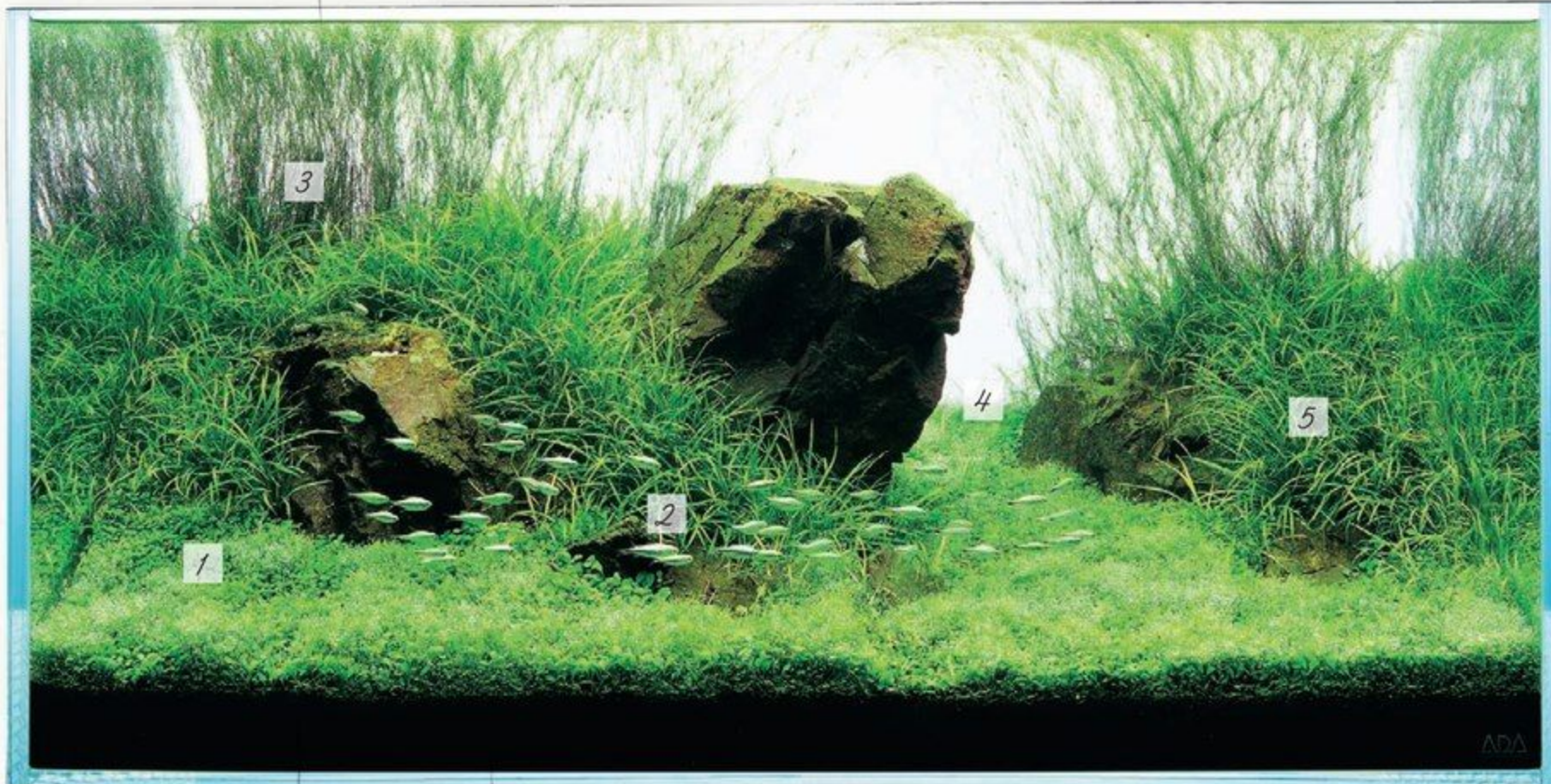
3.



The substrate is covered by Riccia and Glossostigma until the deepest part of the layout to secure an open space in the center. Narrow leaves of Echinodorus tenellus provide an accent to the aquascape.



4.



The point of early maintenance on this Iwagumi layout is to thin the foreground plants for the health of the undergrowth.



Echinodorus tenellus planted around the stones add a uniquely natural touch to the layout. It vigorously spreads runners and grows dense narrow leaves like a bushy summer grass.

5.

About two months after initial planting

The aquatic plants used for this layout are relatively fast-growing and will be flourishing in about two months time. Riccia together with Glossostigma performs photosynthesis vigorously and will produce a lot of oxygen bubbles. Echinodorus tenellus has grown very dense submersed leaves and now looks quite different from its emerged form that was seen during the planting process. Eleocharis vivipara can have a refreshing impression that fits the atmosphere of Iwagumi layout by adequately trimming off its plantlets on the top of the plant.

Layout Production for a Public Aquarium Tank with Easy Maintenance in Mind.



Large glass tank is very heavy and must be carried by a lot of people. The final positioning is carried out very carefully.



Once the position of driftwood has been determined, the border line for cosmetic sand is drawn. The idea is to balance space and natural curve.



After placing the stones serving as soil dividers with no gap between them, an additional amount of Aqua Soil is poured to make the substrate thicker for easy planting.



An extra amount of *Anubias barteri* var. *nana* should initially be placed in the mid-ground. Subsequently, the plant is reduced to achieve a good balance. The key is the subtraction of excess.

From the Layout Production Site

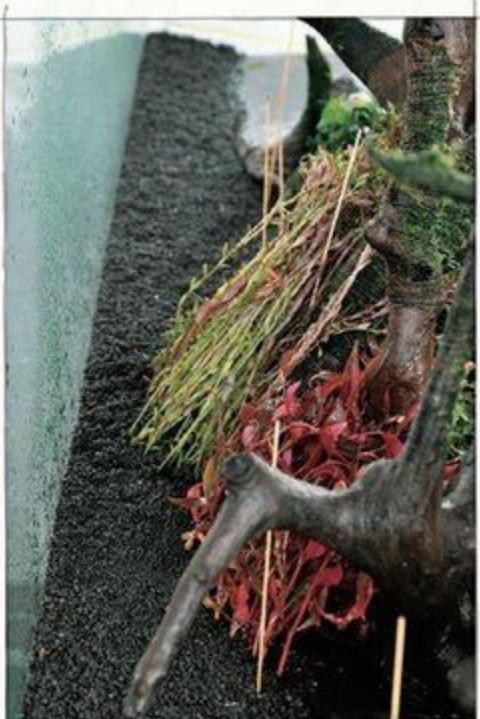
Other than Nature Aquariums for private use, some are installed in facilities of a highly public nature such as hospitals and shops. These aquaria are called "public aquariums" and maintained by aquarium specialists on a periodical basis. Recently, a large Nature Aquarium was newly installed in Toki Messe, a convention center representing Niigata City. The tank installed in Toki Messe is as large as W240×D60×H60cm and made of glass. A special wood cabinet was produced to support this huge, heavy tank and carried into Toki Messe together with the tank. The first thing the

ADA staff did at the layout production site was to install the wood cabinet on a designated level surface and place the tank on it. Installation work prior to the layout production must be perfect as safety is of the utmost importance for public aquariums. Around the time when the installation of the tank is completed, Amano had arrived at the layout production site. First, Amano placed the pre-selected driftwood into the empty tank. The arrangement of driftwood was designed in advance. Next, a line was drawn on the bottom of the tank as the border line between cosmetic sand and

Aqua Soil. Then, the driftwood was removed from the tank and a divider made of cardboard was installed to spread cosmetic sand and Aqua Soil in respective areas. Once the substrate is built, the next thing to do is to arrange the driftwood again within the tank and place the stones serving as the soil divider along the border line. A sturdy soil divider prevents Aqua Soil from flowing onto the cosmetic sand and helps make the maintenance easier. In this layout, the driftwood is arranged based on the convex composition. This composition is made more prominent by



Stem plants were planted from the back side of the tank. First, *Alternanthera reineckii* was planted in the center.



The stem plants in the background are planted in their respective areas which were determined while looking at the balance of the layout. Bamboo sticks are used as a marking.



Two to three stalks are planted together with pincettes. The stems were tilted in the same direction to ensure easy dense planting of the stems. This is a great tip to remember about planting stem plants densely.

Public aquariums that are to be installed in public facilities need to be maintained properly to have an attractive appearance at all times. In light of this, it is ideal to create an easy-to-maintain layout which can be enjoyed even immediately after trimming for this type of aquarium. This section introduces how a layout is created for a public aquarium.



Vocational school students came to see the layout production on that day. Amano was working non-stop on the planting while answering the questions from the students.



After the background plants have been planted, Amano started attaching ferns to the driftwood while checking the overall balance. The layout production is completed now. Water is poured into the tank.



This is how the layout looks after the tank is filled with water and the equipment is all set. Powerful lighting systems and filters are used for this layout. A large chiller and exhaust circulator were also installed to control the rise in water temperature in summer.

planting several types of stem plants with red-color species in the center of the background and also by planting short Australian dwarf Hydrocotyle at the sides of the stem plants. Layout production for a huge aquarium seems to be time consuming, but it did not actually take much time to complete the layout work because of the elaborate preparation, such as tying willow moss onto the driftwood and trimming the stem plants to an even height being done in advance. Preparation is very important for the layout production for a public aquarium which can not take a long time due to access.

d a t a

Toki Messe is one of Japan's major integrated convention facilities housing a large exhibition hall, hotel, museum and other facilities. Located at the mouth of Shinano River, which flows into the Japan Sea, this facility is a wonderful tourist attraction featuring an observation room that provides a panoramic view of the Niigata Plain. The public aquarium introduced in this section was installed on Level 2 of the Atrium, the main entrance of the facility. Please come by and see the aquarium if you visit Toki Messe.

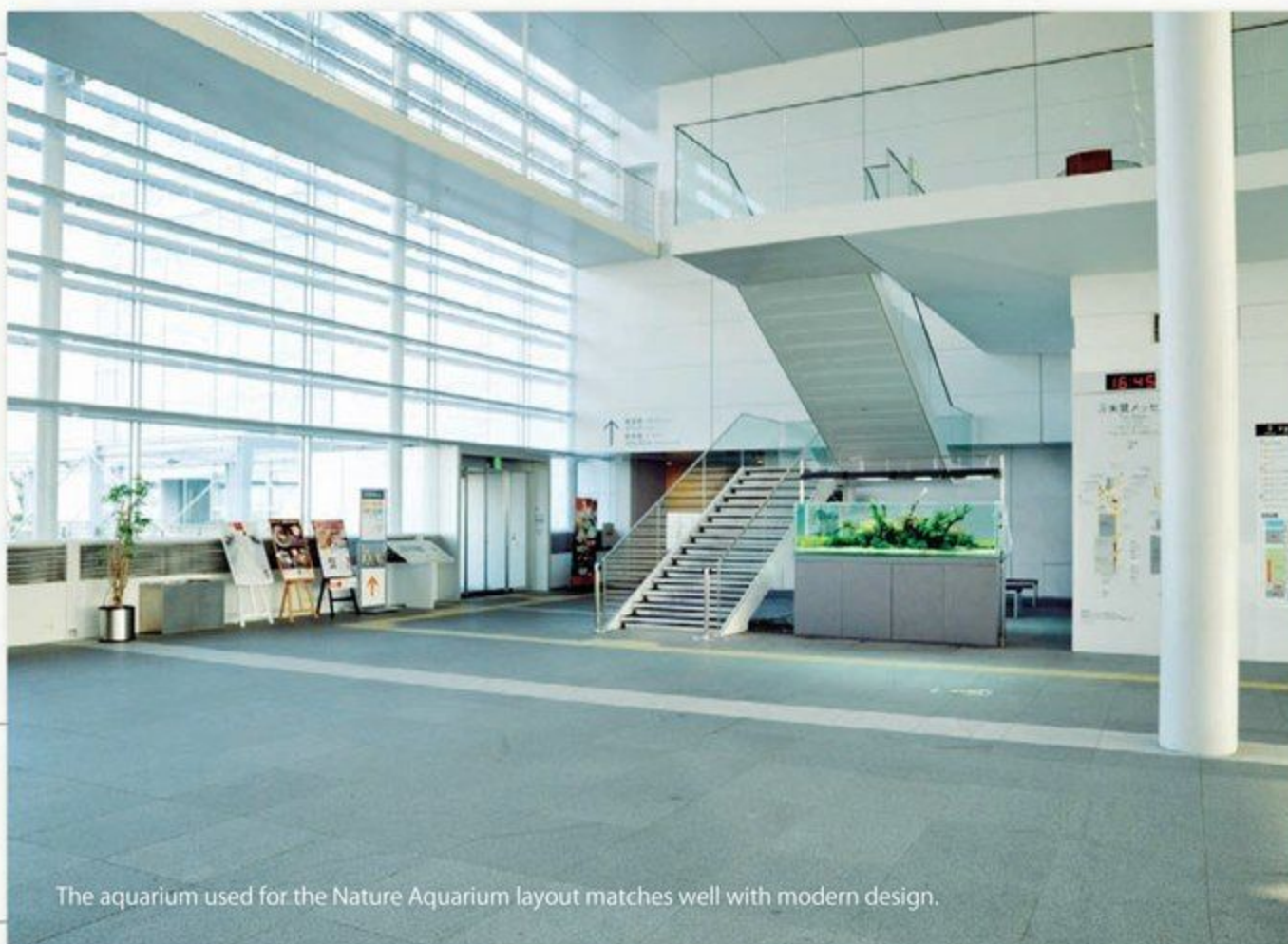


■ TOKI MESSE NIIGATA CONVENTION CENTER
6-1 Bandajjima, Chuo-ku, Niigata City, Niigata 950-0078
Japan
TEL: 025-246-8400
URL: <http://www.tokimesse.com>

Layout Production for a Public Aquarium.



The layout immediately after the completion of planting. We can see that many species of stem plants were planted in good balance in the center.



The aquarium used for the Nature Aquarium layout matches well with modern design.

The Daily Routine of Maintenance from the Aquarium & Plants Maintenance Department, ADA

"June XX, 2010"



Satellite Niigata

A 200(W) X 60(D) X 70(H) (cm) (78 X 24 X 27.5in) tank is installed in such a way that it can be enjoyed from the front, back and left sides. This arrangement requires careful attention to detail including paying attention to the lower stems of the stem plants in the background. Mr. Sasage checked, as usual, the aging of the undergrowth of the stems on this day.



- A: "Feeding the fish is fun," the lady at the counter says.
 B: Inspecting the water quality before commencing maintenance.
 C: The water inlet/outlet is located under the cabinet.
 D: Brightly K also has the effect of enhancing the buffering capacity of water.
 E: Cutting off the old Cryptocoryne leaves.



Departed from ADA



Returned to ADA



- A: Stem plants which were cut off had aged lower stems.
 B: Aligning the height of each species of stem plant.
 C: Planting the aquatic plants quickly while making sure they are planted in the correct position.
 D: Siphoning off the sludge accumulated between the foreground plants.
 E: Among the patients and guests, Nature Aquarium is very popular.



The time allowed for maintenance of a public aquarium in a hospital or other public facility is limited for the convenience of the facility. Even with such restrictions, public aquariums are required to be kept in tip-top condition at all times. This section introduces a typical daily routine of the ADA maintenance staff from the Living Organisms Department.



Shunpei Sasage
ADA Maintenance staff

Mr. Sasage feels pride in helping to spread the fascination of Nature Aquarium and always makes sure to provide careful service.



15:30~17:30

Midori Hospital

A 240(W) X 60(D) X 60(H) (cm) (94 X 24 X 24in) tank is installed in the reception lobby. The beautiful clusters of stem plants relax the people who see them. Today it was necessary to replant the stem plants after trimming. The stems had been repeatedly trimmed many times, and finally reached the end of their lives.





10:30~12:00

Friends

Two aquariums in the sizes of 120(W) X 45(D) X 60(H) (48 X 18 X 24in) and 60(W) X 30(D) X 36(H) (24 X 12 X 14 in) (both in cm) were installed in this garden store. Today, only the trimming of background plants in the 120cm aquarium and the removal of algae on stones in the 60cm was necessary.



A: A warm atmosphere fills the shop.
B: The plants are cut at the shortest height possible.
C: Many stem plants were trimmed.
D: The aquarium is equipped with pre-filters filled with activated carbon.
E: All the glass equipment was replaced for cleaning.
F: After trimming, Green Gain was added to help the plants grow back.



Moving to the next destination



A: Upon evaluating the condition of the plants, it was decided to trim and replant the stem plants.
B: Trimming of the stem plants started immediately.
C: The trimmings of the stem plants were replanted quickly afterwards.
D: Lightly rinsing the filter media became necessary to maintain performance.
E: Slits under the aquarium help to release heat.



13:30~15:00

Johoku Clinic

A 180(W) X 60(D) X 60(H) (cm) (70 X 24 X 24in) aquarium was installed in the waiting room. Cosmetic sand and stem plants are used for this aquascape in order to produce a warm layout which helps to ease the anxiety of the patients. Today the only maintenance required was to rinse the filter media and the trimming of the stem plants. The extra trimmings were carried back to ADA.

Foreground plants should be trimmed before they become too thick and overgrown. There are two ways of trimming foreground plants. Select the most appropriate method according to the species and condition of the plant.

■ Foreground plant trimming method 1: Hair grass Pruning with curved-type scissors

Trim the hair grass at about 2cm (3/4 in) above its base. The untrimmed portion should be very short because longer untrimmed portions are prone to algal growth. Over time, tall hair grass will become shorter through repeated trimming.

Trim the hair grass in so that the height of the untrimmed part of the plant is perfectly even. Trimming scissors with curved blades are ideal for this method of trimming.



■ Foreground plant trimming method 2 Removing strips of carpet plant from the front

Another method is to cut away runners with scissors along a line about 5cm (2in) from the front pane of glass and remove the strip of foreground plants. Using this method, you can get rid of the oppressive overgrown feeling caused by an excessively thick foreground plant. This method works well for slower-growing aquatic plants such as cobra grass (microsword) which takes time to grow new leaves after a trimming.

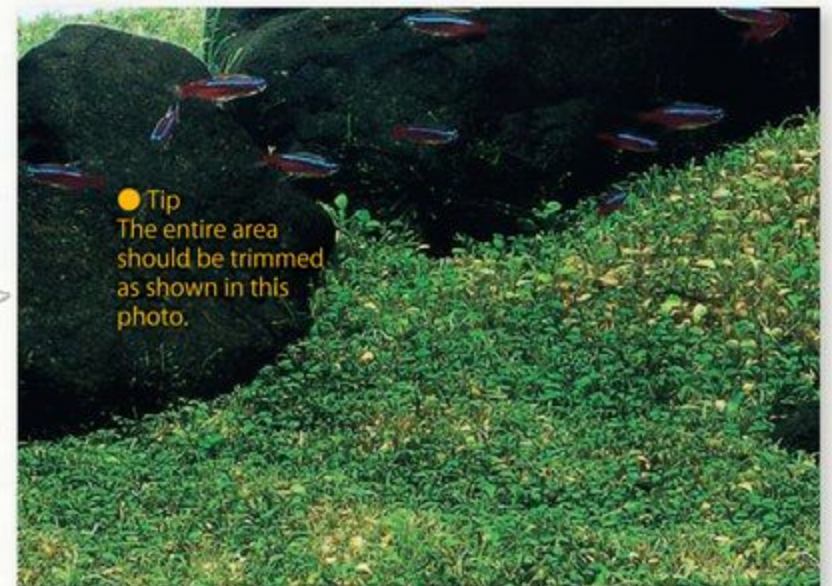
After a strip of plants is removed, it is highly recommended to siphon off Aqua Soil with a fine hose and replace it with some new soil.



■ Foreground plant trimming method 1: Glossostigma Pruning with curved-type scissors

Glossostigma can be trimmed using the same method as hair grass. Glossostigma is a fast-growing plant and its lower stem ages fast if it becomes excessively thick, which causes a slowdown in new leaf development after trimming. Early trimming is required for this plant. Along the sides of a stone, Glossostigma usually becomes tall. Carefully trim the plant along the line of the stone.

Trim the entire Glossostigma section short and even. Avoid uneven trimming.



■ Siphoning off sludge buildup at the plant's base. Siphon off with a hose that has a small diameter.

Feces of *Cardina japonica* (Yamato Numa Ebi) and sludge accumulates at the base of foreground plants over time. Excessive build up of these objects can slow down the growth of foreground plants and cause blue-green algae to grow. To prevent these problems, the sludge build up at the base of the plant should be suctioned off with a fine hose while changing the aquarium water.

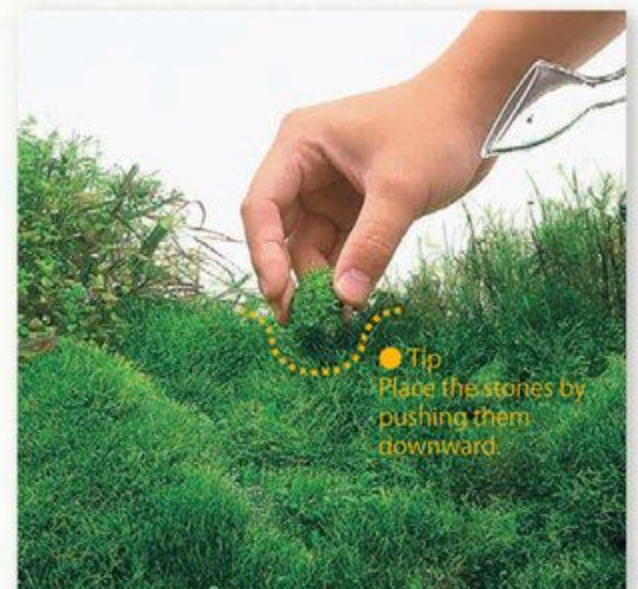
Place the hose with slight force on top of the plant to suction off the sludge. The force of the siphon can be adjusted by bending the hose.



■ Suppress the buoyancy of Riccia Placing small stones attached with Riccia

Riccia produces a lot of oxygen bubbles during photosynthesis, which causes increased buoyancy that helps Riccia float out of the substrate. Once Riccia has grown thick, this becomes a problem. If Riccia is found to be very fluffy when pressed down, we advise you to place a few small stones attached with Riccia as a weight. This helps to suppress the increased buoyancy of Riccia and helps to maintain the aquascape for a long period of time.

Placing small stones attached with Riccia as a weight adds a wave like appearance to the surface of a Riccia carpet, giving the aquascape a fresh look.



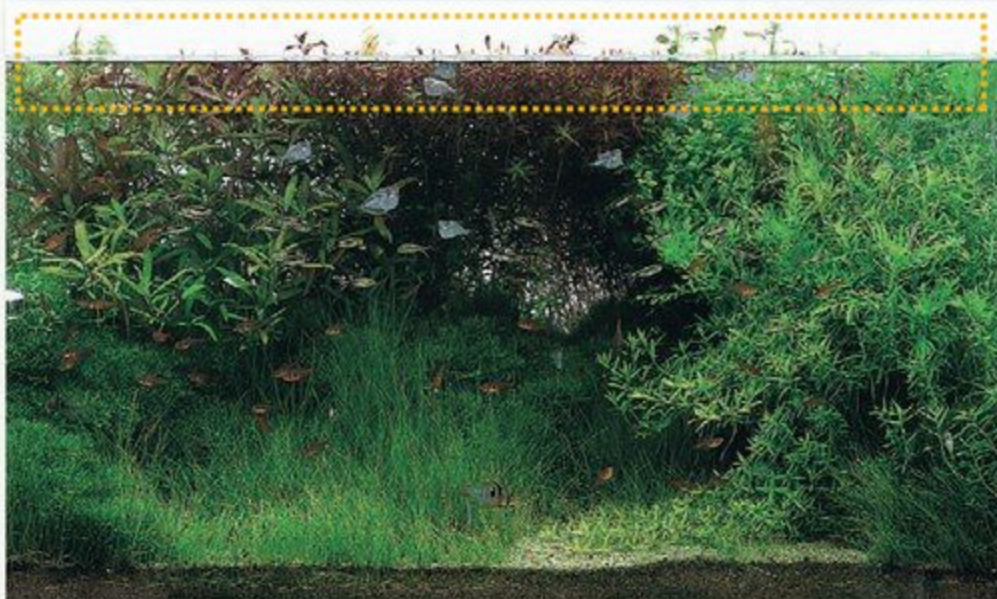
For a layout using stem plants, the composition and long-term maintenance of an aquascape depends on the trimming of stem plants. For this reason, trimming is the most important process among the various daily maintenance tasks.

MAINTENANCE
METHODS

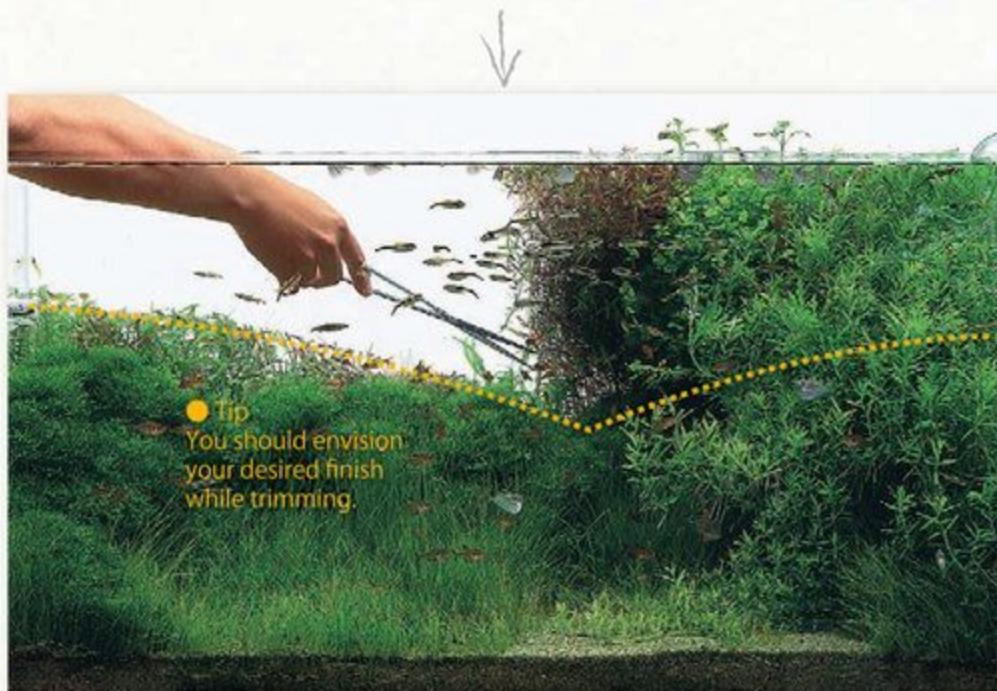
■ Stem plant trimming method

Determine the line of trimming

The stem plants planted in the background must be trimmed when they reach the water's surface. It is a natural desire to cut the stem plants at a higher position, as we do not want to make drastic changes to the aquascape. However, this way of trimming leads to a much shorter lifespan of an aquascape.



Stem plants should be trimmed if they reach the water's surface as shown in the above photo.



When trimming stem plants for the first time, cutting them at the lowest point possible helps to maintain healthy stems for a long period of time.

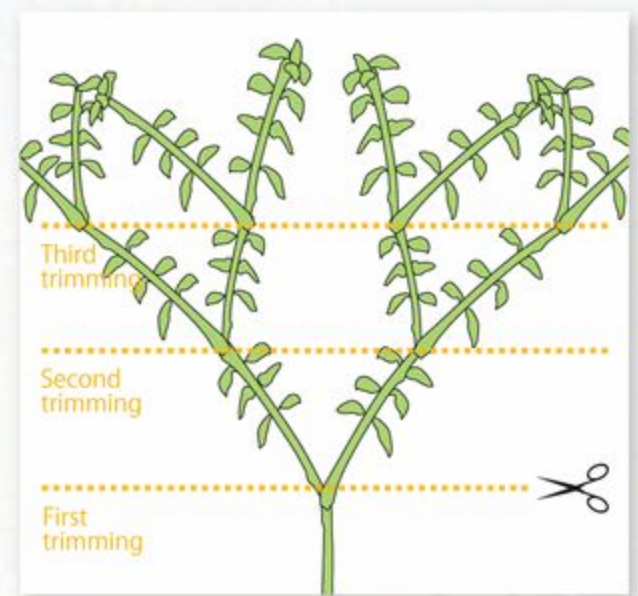


In this layout, the trimming was performed along the mid-ground line produced by the stones attached with Riccia.

■ Creating more dense stem plant thickets

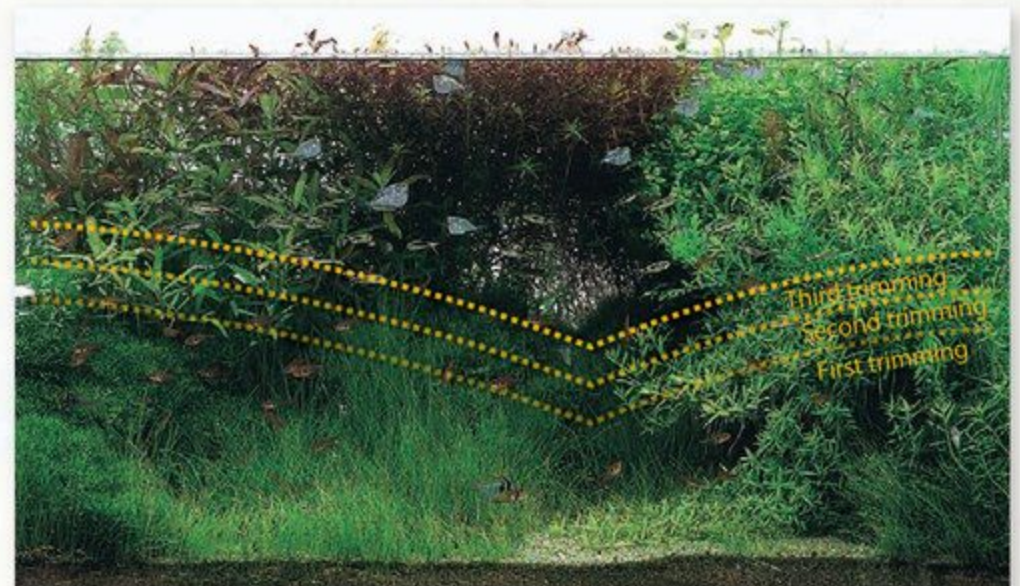
Shifting the line of trimming higher each time

Trimming has the effect of aligning the terminal buds and increasing the density of plant. Shifting the trimming position gradually higher up the plant, as shown in the illustration, promotes the branching out of the stem. Stem plants will have denser leaves and form a beautiful cluster by promoting the branching of their stems like a broom.



Stem plants, such as species of Rotala, which have a good tolerance to repeated trimming are useful in the planted aquarium.

The appearance of stem plants is maintained by trimming. However, over time the lower portion of the plant will become aged and the development of new leaves will slow down if the plant is repeatedly trimmed at this point. When these problems are observed, we recommend that you replant the trimmings of the vigorously-growing upper portion. Make sure to cut each stem to the same height when you replant for a uniform appearance.



Stem plants can be maintained for a long time by making the first trimming line as short as possible.

■ Post-trimming care

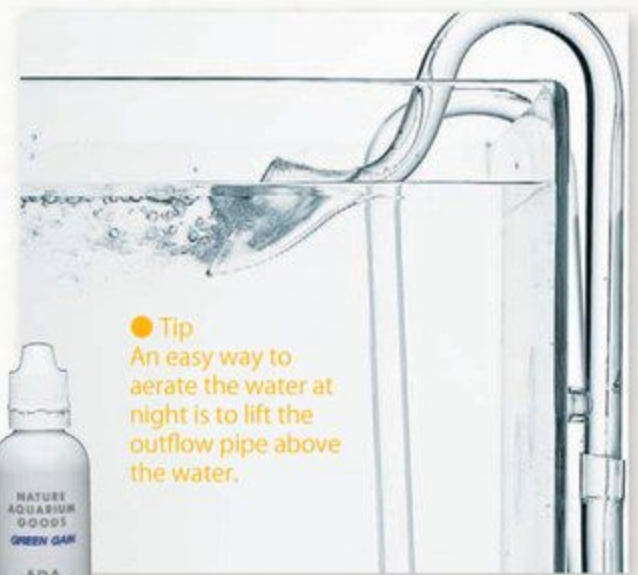
Repair the damage caused by trimming

If the terminal bud is cut off the aquatic plant suffers serious damage because the terminal bud is the part of the plant that grows vigorously and produces plant hormones. This also affects the water purification capacity of the plant and can lead to algal growth in the aquarium. Therefore, after the aquatic plants are trimmed, we advise for you to perform night time aeration to stimulate the activity of microorganisms. At the same time, you should change the water in the aquarium frequently until new leaves develop.

Green Gain
This additive contains plant hormone and promotes the development of new leaves. It should be added daily to the aquarium after trimming until new leaves develop on the plants.



● Tip
An easy way to aerate the water at night is to lift the outflow pipe above the water.



Rosette-type aquatic plants such as Echinodorus and Cryptocoryne develop large leaves while spreading runners or rhizomes. In order to maintain the appearance of this plant type, cut the runners and old leaves.

Trimming method for leaves

Cut leaves off at their base

The leaf of a rosette-type aquatic plant should be cut from the base of the leaf. The attractive appearance of the plant can be maintained by cutting off the old or damaged leaves (refer to the photos below) which promotes the development of new leaves. When the leaves become too dense, some of the leaves should be cut off to an adequate level.



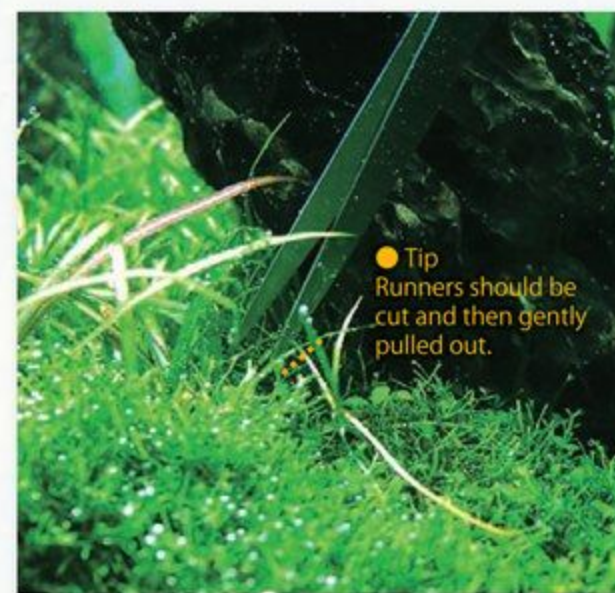
● Tip: Slightly open the scissor blades and move them along the leaf stem. Then, cut off the leaf at the base of the leaf stem.

Trimming Scissors with long handles is the most useful for accurately cutting off the dense leaves of rosette-type aquatic plants at the base of their leaf stems.

Trimming runners

Trim off runners that have grown beyond the intended area

Echinodorus and Cryptocoryne grow and develop new leaves by runners and rhizomes, respectively. These plants will look more natural if they are left to grow to a certain extent. Nevertheless, the runners should be cut if they have grown beyond the intended area before the roots of the new runners grow too deep.



● Tip: Runners should be cut and then gently pulled out.

The plant growing by sending out its runners adds an enhanced natural touch to the layout. The runners can be cut off if they are not wanted.

Additional fertilizer for roots

Inserting root fertilizers accurately with Bottom Release

Echinodorus and Cryptocoryne grow thick roots within the substrate and absorb nutrients vigorously via their roots. For this type of plant, additional nutrient supplement by means of solid fertilizer is very effective. Echinodorus in particular requires careful attention because new leaves that develop from within the inner side of the plant will lose their color when nutrients are lacking.



● Tip: Depending on the leaf condition, fertilizers should be inserted slightly away from the base of the plant.

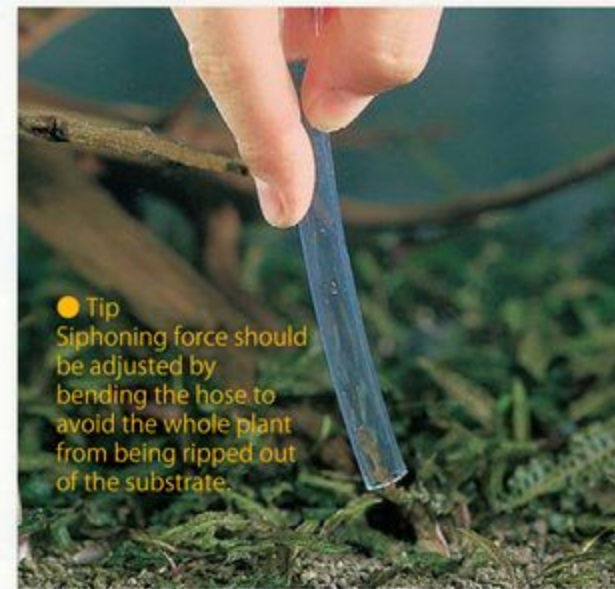
With the help of Bottom Release, solid root fertilizers can be inserted deeply and accurately in the substrate.

Multi Bottom Iron Bottom

Treating melted leaves

Melted Cryptocoryne leaves should be siphoned off

It is common that the leaves of Cryptocoryne planted in an aquarium will melt away. Tiny holes on the entire leaf surface are a sign of melting. These holes gradually become bigger and subsequently the entire leaf starts melting. Melted leaves should be siphoned off carefully with a fine hose. While siphoning, be careful not to pull out the main plant.



● Tip: Siphoning force should be adjusted by bending the hose to avoid the whole plant from being ripped out of the substrate.

Once tiny holes are observed on the surface of the leaf, melting can no longer be prevented. The leaf should be siphoned off as soon as possible.

These leaves should be trimmed

The damaged leaves of Cryptocoryne and Echinodorus as shown in the photos below should be trimmed.

Cryptocoryne

Echinodorus



The hole is enlarging

The hole on the leaf will only become bigger if left untreated.



The leaf almost entirely melted

The above leaf of Cryptocoryne beckettii var. petchii is torn and lost its color. Some of the leaves of this plant turn yellow.



Discoloration is observed on the leaf edge

Discoloration of leaf edge can be seen when closely looking at the leaf. The leaf is also partially torn.



A large part of the leaf is lost

If there are a lot of snails in the aquarium, some of the plant leaves may have round holes caused by snails which feed on them.



The leaf appears to have been eaten by animal

The above leaf was partially eaten by Cardina japonica (Yamato Numa Ebi). The shrimp in the aquarium are too abundant if many leaves with this damage are observed.



The leaf was eaten by an animal and lost its color

This Echinodorus leaf was partially eaten by Cardina japonica (Yamato Numa Ebi) and slightly lost its color due to lack of nutrients.

04.

Maintenance
Method
**Epiphytic
Aquatic
Plants**

If not properly maintained, the relatively slow-growing epiphytic aquatic plants will look unattractive with spots on the leaf caused by algae. Damaged leaves should be cut off as soon as possible to promote the development of new leaves.

■ **Trimming for development of new leaves**
Old leaves should be cut off early

It is natural to not want to cut off the leaves of slow-growing plants. However, the key to maintaining an attractive appearance of epiphytic plants is to trim off the old or damaged leaves frequently. Epiphytic plants will develop fine new leaves as long as their rhizomes are healthy. The trimming of epiphytic plant leaves should be performed while checking the leaf conditions.



Powerful Pro-Scissors Force is ideal for cutting off the thick and hard stems of epiphytic plants.

Be careful of fern diseases during the summer when water temperature rises

Fern diseases cause darkening and melting of leaves. These diseases take place when an aquatic plant is purchased in emerged form and when deteriorated water circulation is caused during the hot summer due to excessively dense leaves. It is important to remove fern leaves to reduce the density for prevention of diseases.



Phyton Git
Phyton Git is effective for prevention of fern diseases. In the event fern disease is observed, all the affected leaves must be cut off.

Leaves suffering from fern diseases

These leaves should be cut off

The epiphytic plant leaves shown in the photos below should be cut off whenever they are found.

Epiphytic Aquatic Plant

The leaf color does not appear healthy nor translucent



This Bolbitis leaf, which was originally green and translucent, turned brownish and lost its translucent look.

The leaf has spots and does not have a healthy color



The leaf color does not appear healthy and some spots are observed on the leaf surface. Although the entire shape is still maintained, the recovery of the leaf health is not expected.

There are sporangia on the back side of the leaf



Sporangia on the leaf backside are a feature of fern plants. However, it is advisable to cut off the leaves with sporangia due to its unattractive appearance.

Plantlets have been formed



If the plantlet becomes noticeable, weakened parent plant or deteriorated water quality is suspected.

Substantial loss of leaf color



This Anubias leaf has black spots caused by algae. Its leaf tip has turned yellow.

The symptom of faded leaf color except for leaf veins is caused by a lack of nutrients and is often observed in a relatively old aquarium.

Choose the right tool from the wide range of layout tools available for each maintenance task.

Trimming stem plants along a line

A layout which has relatively tall stem plants can easily be maintained while keeping the same impression by trimming the stem plants along a line just above the driftwood.

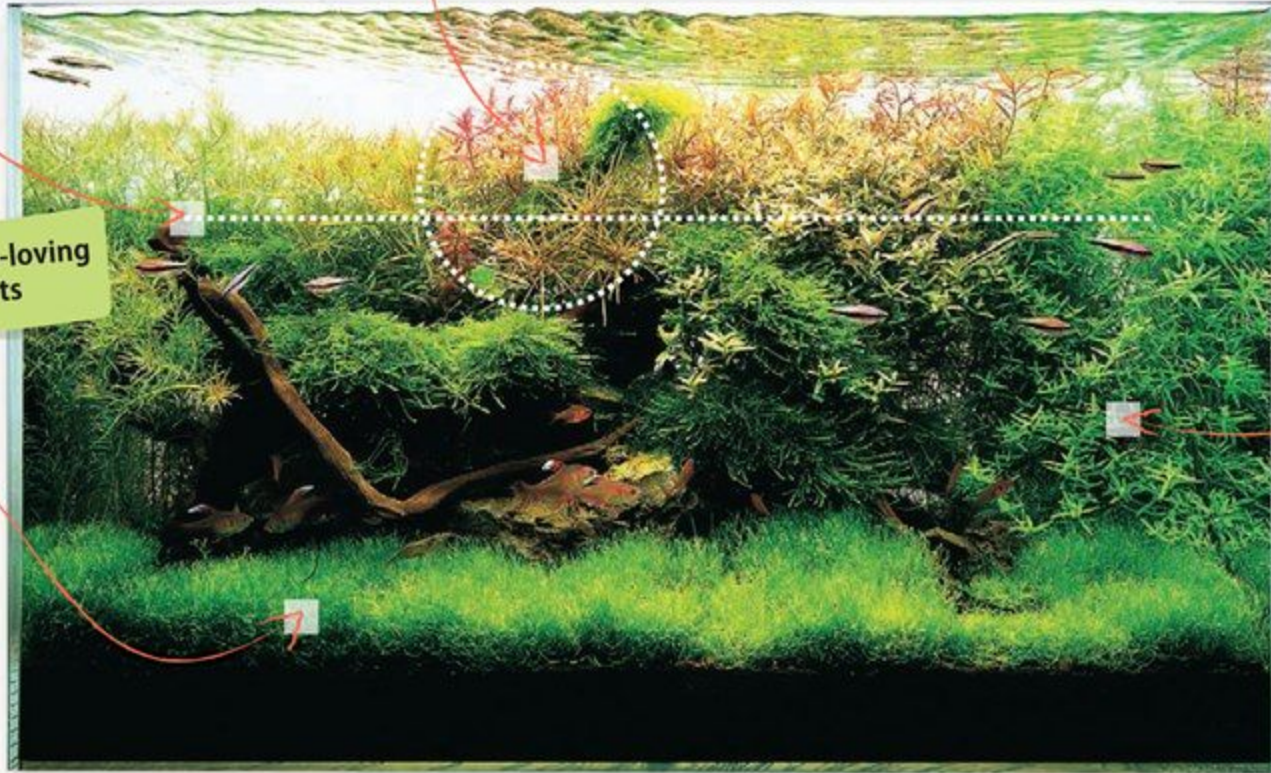
Cut off the protruding terminal buds

The terminal buds sticking out of the driftwood should be cut off during the overall trimming process. The stem plant leaves will become narrower with repeated trimming.

Cut stems in a slope

If you wish to have an attractive bush of stem plant such as *Rotala rotundifolia* (Green), trim the plant diagonally to form a slope from front to back using Trimming Scissors Curve type.

Layout mainly using sun-loving (high light) aquatic plants



Trim the carpet into a thin layer

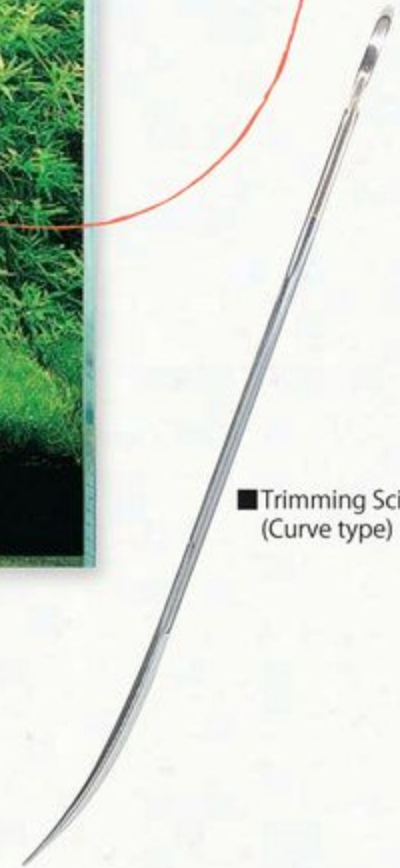
Riccia planted in the foreground can be maintained longer by trimming the surface into a thin layer. Pro-Scissors Spring (Curve type) is convenient for this type of trimming task.

■ Pro-Scissors Spring (Curve type)



A layout mainly using sun-loving (high light) plants such as stem plants and Riccia requires frequent trimming.

■ Trimming Scissors (Curve type)



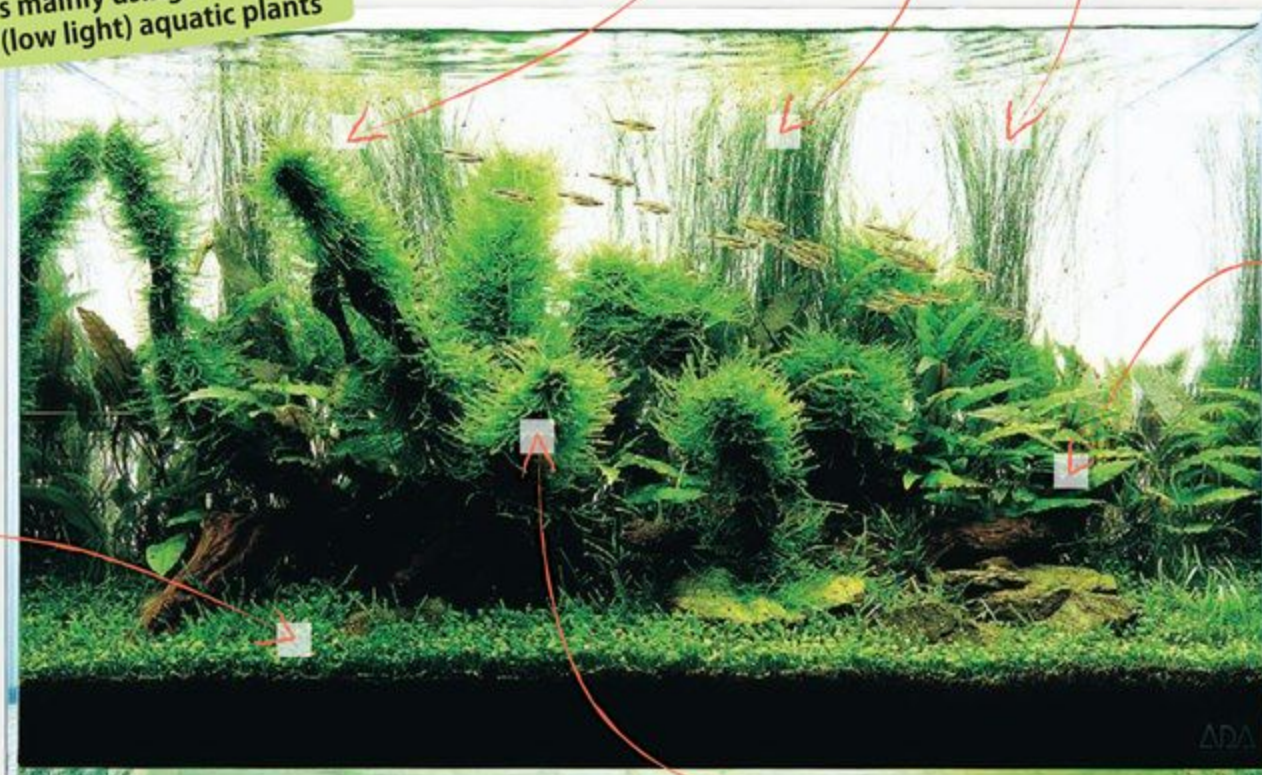
■ Trimming Scissors (Straight type)



Snip off plantlets early

Plantlets of *Eleocharis vivipara* should be cut off to prevent an unsightly appearance. The use of Trimming Scissors (Straight type) is recommended.

Layouts mainly using shade-loving (low light) aquatic plants



Cut off the old leaf

Cut off any old *Cryptocoryne* leaves which have holes or lost color immediately. Excessively large leaves should also be cut off.

■ Pro-Scissors Spring (Straight type)



Cut off old leaves carefully

Marsilea angustifolia used as a foreground plant is a slow-growing fern. Cut off its old leaves carefully during the trimming process.

Willow moss is an unexpectedly fast-growing plant for a shade (low light) plant. Be careful not to leave it too thick.

Keep moss relatively thin

Moss attached to the driftwood dries from the underside if it is left excessively thick. Keep the moss thin by trimming it with Pro-Scissors Spring (Straight type).

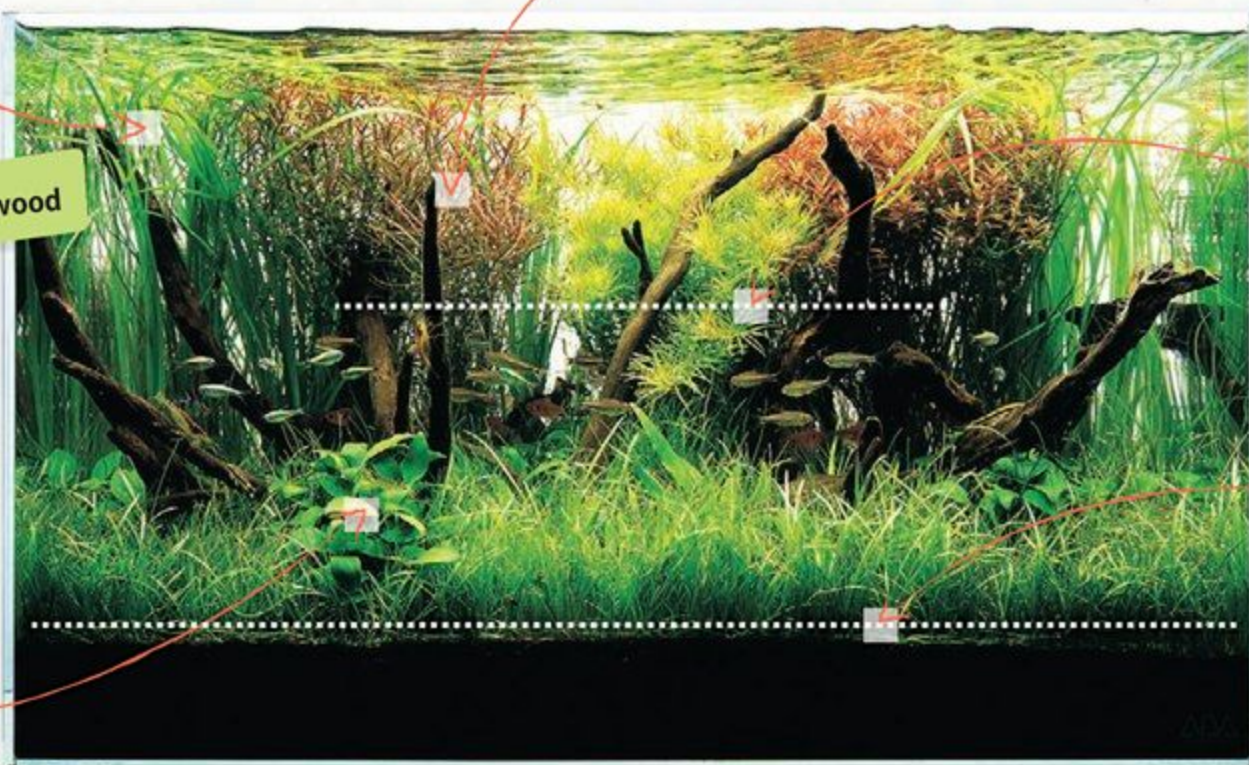
Various types of layout are created in the Nature Aquarium style, and the maintenance differs depending on the tank size and the species of aquatic plants used. In this section, important tips for managing your aquascape are introduced using a 60cm (24in) tank as an example.

Cut the tape-like leaf near its base
The long tape-like leaves of Cyperus should be cut one by one near the base. It is advised to cut off the leaves with damaged tips or algae problems first.

Pay attention to the cut section of stem plants
The stem plant bush should be trimmed to form a slope with the front side lower in height. This will lead to an attractive appearance of the stem plant thicket when their new buds grow again.

Initial trimming position
Stem plants should initially be trimmed at a lower position. Doing this helps stem plants develop denser stems and leaves and eventually form an appealing thicket.

A Layout using petite driftwood



Cut Anubias leaves in moderation
Slow-growing Anubias will be even slower in developing new leaves if it is trimmed too much. It is advisable to trim this plant only moderately with Pro-Scissors Force.

■ Pro-Scissors Force

Perform driftwood delicately in an elaborate layout created with petite driftwood and narrow-leaf stem plants.

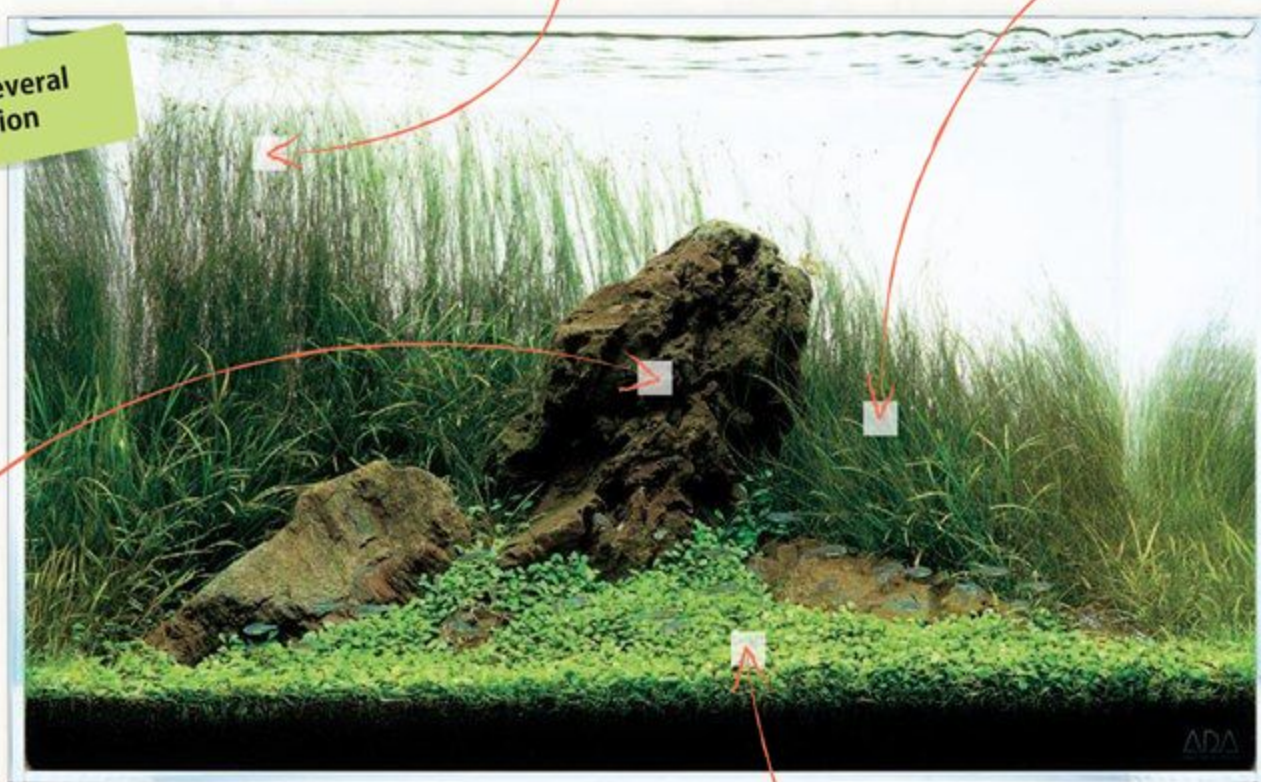
Leave only a thin layer of the foreground plant untrimmed
It is recommended to use Pro-Scissors Wave for trimming foreground plants in a layout involving complicated driftwood arrangements. In this case, the foreground plant should be evenly trimmed, leaving just a thin layer of its bottom part behind.

■ Pro-Scissors Wave

Maintain the open space by trimming plants to different heights
Eleocharis vivipara was trimmed to different heights to maintain the open space on its right side. The diagonal line used for trimming is made to be parallel with the slope of the soil mound.

Cut off the protruding runners
Echinodorus tenellus propagates by plantlets that grow on the tip of runners. Cut off the runners and plantlets which are obviously sticking out of the bush early.

An Iwagumi layout using several aquatic plants in combination



■ Pro Picker

In an Iwagumi layout using several species of aquatic plants in combination, trimming should be performed according to the growth of each plant.

Removing algae on stones
Stubborn black beard algae that has grown on the stones should be scraped off with Pro Picker. The green algae covering the entire stone surface can be removed by brushing the surface of the stone.

■ Pro-Scissors Short (Curve type)

Keep the foreground plants thinner
It is recommended to use flexible Pro-Scissors Short (Curve type) for the trimming of foreground plants in a 60cm (24in) aquarium to properly maintain the open space.

Maintenance and Enjoying the Changes in an Aquascape

Most Nature Aquariums contain a variety of aquatic plants, including fast-growing Riccia and stem plants as well as slow-growing ferns and mosses. Initially, the fast-growing plants grow vigorously and as time passes, the ferns such as *Microsorium* attached to the driftwood will start spreading their leaves. With this growth of aquatic plants, the overall impression of the aquascape will change a lot. Maintaining the aquarium in such a manner that the evolution of the aquascape can be enjoyed is the essence of maintenance. Comprehensive skills in water quality control, fertilization, control of CO2 amounts to be injected, trimming, observation of the aquarium and other aspects are required for the long-term care of an aquascape.

Trimming and replanting stem plants

1. The lower portion of stem plants will become aged after repeated trimming. If you anticipate that the aged lower portions can no longer develop new leaves, trim the stem and replant it in the substrate.

Lushly growing *Microsorium*

2. *Microsorium* has grown lush over time. Its leaves should be trimmed before they become excessively large to maintain the good appearance of the plant. Be careful of excessive leaf density.

An aquascape with an impressive line of moss covered driftwood branches

For a layout using stem plants in the background, it is necessary to consider how the aquascape appears after the stem plants are trimmed. To ensure an appealing appearance in this situation, moss and ferns are attached to the driftwood located on the front side to create an attractive mid-ground. This is an important tip for the easy long-term maintenance of this type of aquascape.

Long-term maintenance



Microsorium is a supporting plant in this layout due to the strong presence of willow moss attached to the driftwood.

Aquascapes created in an aquarium change over time. In light of this, it is required to maintain the overall appearance of the aquascape while monitoring the growth of each aquatic plant. As time goes on the layout will take on different atmospheres.



Enjoying the changes of an aquascape

Management of cosmetic sand

3. A foreground constructed with cosmetic sand is free from plant maintenance. However, this type of foreground still requires maintenance work including removal of feces from *Cardina japonica* (Yamato Numa Ebi).

Maintaining Riccia

4. If Riccia is found fluffy due to its increased buoyancy, it is advisable to place small stones with Riccia tied to them to prevent the plant mass from floating out of the substrate. Some Riccia will lose its buoyancy over time while being maintained in the water.

Complete Story of the Creation of an Elaborate Layout



Several pieces of horn wood that are properly sized for a 180cm (72in) aquarium were carried to the production site. They were divided into groups organized by textures.



Mr. Amano quickly checks out the size and branch shape of the driftwood and then begins making the composition. He even used a wild method of breaking branches that were too long.



Mr. Amano places flat Yamaya stones at the side of the driftwood as support.



This concave composition made with Horn wood and Yamaya stone displays stable beauty.



There are more Yamaya stones in this photo compared with the photo showing the complete composition. It is because Mr. Amano took out the unnecessary stones while fine-tuning the composition.



Mr. Amano planting aquatic plants with the help of a staff member who passes the plants to Mr. Amano with perfect timing. The process of crafting each layout is taken very seriously.



Planting begins with the foreground and the sides of the driftwood. Cobra grass (Micro sword) and Cryptocoryne are planted first.

Framework for a stable composition

The framework was made to form a concave composition from the left/right at a ratio of 2:3. The driftwood is laid out to be very stable and elegantly highlights the shape of the Horn wood. When arranging driftwood which serves as the framework of a composition, it is necessary to consider the subsequent maintenance tasks. No matter how attractive it looks, a wobbly driftwood composition is not suitable in a layout as it can negatively affect maintenance. Another feature of this layout is flat-shaped Yamaya stone which is usually difficult to use. Placing this type of flat stone unevenly and while planting foreground plants between them adds a profound touch to the foreground which is an essential aspect of the lower part of the aquascape.

The aquascape is able to be maintained for a long period of time with proper maintenance. However, it is difficult to maintain it in an attractive condition unless a solid layout composition is made first. This section shows how a finely crafted layout is created.



The planting of small foreground plants is made easier by pouring water until the substrate surface is barely submerged.

1.



It is convenient to use bamboo sticks to determine a good balance of stem plants to be planted in the background. In this layout, tape-like *Vallisneria nana* is planted between the stem plants.

2.



A seamless link is created from foreground to mid-ground and background by this planting arrangement (Epiphytic plants were attached to the driftwood after this).



Cryptocoryne which grows well even in the shade is planted at the border between the foreground plants and stem plants.

3.

The combination of driftwood and flat Yamaya stone contributes to the fine, detailed expressions of the layout. This helps create a natural atmosphere across the entire aquascape.

Planting to create a seamless link in the layout

Cryptocoryne is planted at the border between the *Cobra grass* (*Micro sword*) at along the sides of the driftwood and stem plants in the background. This *Cryptocoryne* creates a seamless link between the short foreground plants and tall stem plants. *Cryptocoryne* also has the benefit of being easy to maintain and it grows well even in the shady locations such as when it becomes shadowed by wood and stem plants.

Planting of aquatic plants considering the maintenance of an aquascape

Hemianthus callitrichoides "Cuba" is planted between the Yamaya stones while *Cobra grass* (*micro sword*) is planted at the sides of the driftwood. The flat Yamaya stones were left unburied into the substrate because their presence would become much less prominent when the foreground plants grow taller. The presence of Yamaya stone which are barely seen between two species of foreground plants will add a natural, profound touch to the aquascape. The stem plants in the background are hidden behind the driftwood at this point in time. These plants are arranged in this way so that when they grow taller, the unsightly bottom part of the stems plants will not be visible even after these plants are trimmed along the line of the driftwood. Aquatic plants are planted taking the subsequent maintenance tasks into consideration.



Layout Emphasizing Perspective with Driftwood

Due to the limited depth of the tank, expressing the perspective of a layout within an aquarium requires some creative ideas in arranging the composition materials and the placement of aquatic plants. For this layout, the perspective is emphasized by the sizes of driftwood used; it looks like the bush on the right side comes to the front by using larger driftwood while the bush on the left side looks like it is located on the back side by utilizing smaller driftwood. In addition, attaching slow-growing ferns to the driftwood has the added benefit of easy layout maintenance.



DATA

Tank	/ Cube Garden W180×D60×H60 (cm)	Water change	/ 1/3 water change once a week	
Lighting system	/ Grand Solar I (NAG-150W-Green / NA Lamp 36W Twin ×2) ×3 units Lighting for 10 hours a day	Water quality	/ Water temperature: 25°C; pH: 6.8; TH: 20mg/ℓ	
Filtration system	/ Super Jet Filter ES-2400 (Bio Rio L)	Aquatic plants	/ <i>Ludwigia arcuata</i> <i>Ludwigia brevipes</i> <i>Rotala rotundifolia</i> <i>Nesaea pedicellata</i> <i>Vallisneria nana</i> <i>Cryptocoryne wendtii</i> "Mi Oya" <i>Cryptocoryne petchii</i> <i>Bolbitis heudelotii</i> <i>Microsorium</i> sp. <i>Hemianthus callitrichoides</i> "Cuba" <i>Lilaeopsis novae-zelandiae</i>	Fish species
Substrate system	/ Aqua Soil - Amazonia, Power Sand Special L, Bacter 100, Clear Super, PENAC W for Aquarium, PENAC P for Plants, Tourmaline BC			/ <i>Eleocharis acicularis</i> <i>Anubias barteri</i> var. <i>nana</i> "Yellow Heart" <i>Echinodorus tenellus</i> <i>Fontinalis antipyretica</i> <i>Rasbora vaterifloris</i> <i>Puntius rhomboocellatus</i> <i>Trigonostigma heteromorpha</i> <i>Rasbora borapetensis</i> <i>Puntius titteya</i> <i>Crossocheilus siamensis</i> <i>Otocinclus</i> sp. <i>Caridina japonica</i>
CO ₂ system	/ Pollen Glass Large 50Ø - 6 bubbles per second with CO ₂ Beetle Counter (Using Tower)			
Air	/ Aeration with Lily Pipe P-6 for 14 hours when lighting is OFF at night			
Additives	/ Brighty K, Green Brighty STEP 2 & ECA			

Enhancing the Perfection of Aquascape with Maintenance

Three months after the initial planting.



The stem plants were planted at a left/right ratio of 2:3. They are to be trimmed to form a concave composition to maintain the attractive look of the aquascape.

1.

Check the condition of the substrate

At least the top layer of the substrate should be replaced with new soil after a part of the foreground plants is removed or when stem plants in the background are replanted. In other circumstances, it is not usually required to replace Aqua Soil with new soil.



The substrate that is maintained in a healthy condition has a nice-looking cross-section with white roots.

Hemianthus callitrichoides "Cuba" planted between the flat Yamaya stones has covered the empty surface of the substrate. On the other hand, Cobra grass (Micro sword) planted at the side of the driftwood is spreading its runners towards the open space. As a result, these two species of plants grow in combination in certain spots and add a natural look to the bottom side of the foreground. The stem plants in the background become denser after a few rounds of trimming. They display charming clusters with evenly aligned terminal buds. For this type of concave composition using stem plants, the trimming line in the open space in the center is the most important.

2.

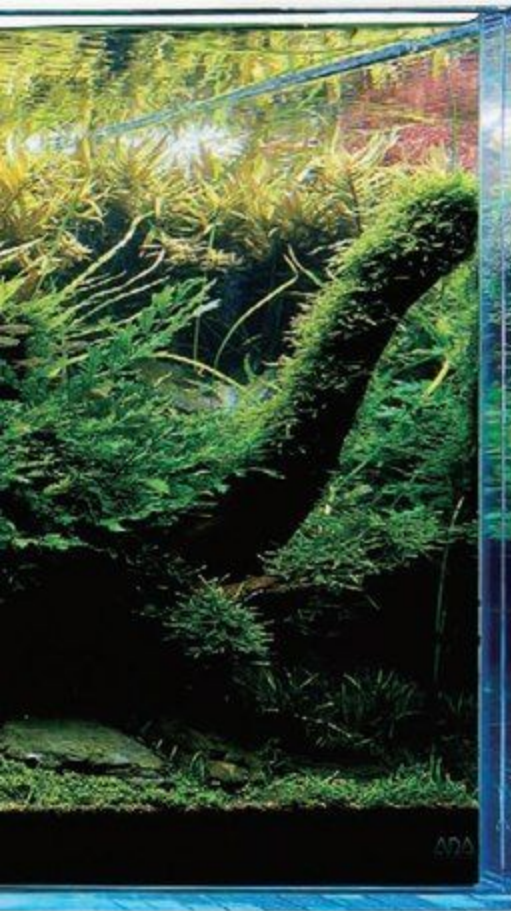
Keep the glass surface clean

Green algae which often grows on the glass can be easily removed by scraping it off with Pro Razor. It is advisable to monitor the condition of the aquarium. The growth cycle of green algae gets longer as the aquarium condition becomes stable.



Removal of algae is made easy with Pro Razor. After the removal work is completed, detach the blade and thoroughly wipe off the water.

The environment within the aquarium gradually changes as time passes. Some aquatic plants flourish while some wither away. The overall balance of an aquascape should be kept by adjusting the volume of each plant through trimming and other maintenance tasks.



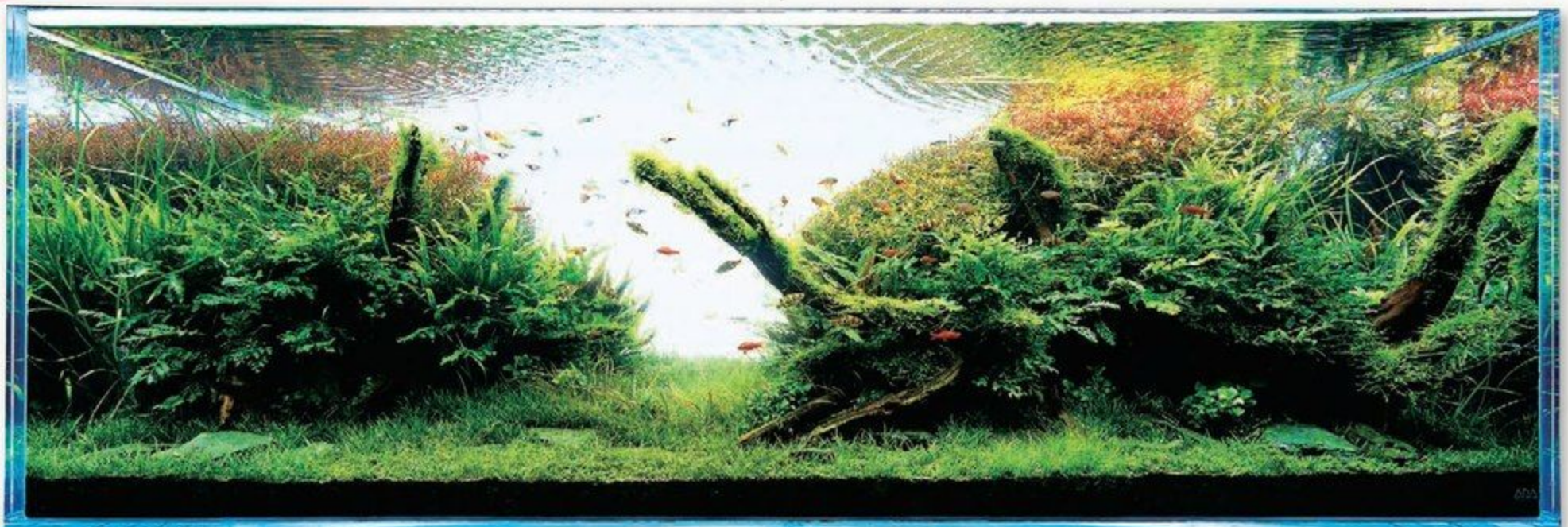
A short type of scissors is convenient for trimming willow moss. Use Pro-Scissors Spring to carefully trim this plant.

3.
Trim the willow moss before it becomes too thick

Although it is easy to grow, willow moss requires trimming to look attractive on the driftwood. The entire surface of willow moss should be trimmed into a thin layer before it becomes excessively thick. Frequent trimming of willow moss will lead to its appealing look.



Approximately one month later



The perfection level of the aquascape has been enhanced by the neater line of the stem plants in the background.

The most different aspect of the layout compared to one month ago is the line of stem plants in the background. It can be seen that the line between *Ludwigia brevipes* and *Rotala rotundifolia* on the right side is now much neater. This was achieved by adjusting the trimming position of each of these plants with a careful eye aimed at how they look like after one month when their terminal buds grow again after trimming. The impression of the foreground plants has also changed after Cobra grass (*Micro sword*) grew vigorously and spread its leaves to the areas covered by *Hemianthus callitrichoides* "Cuba".



Cobra grass (*Micro sword*) flourished in the area around Yamaya stones which had originally been occupied by *Hemianthus callitrichoides* "Cuba". This made the presence of Yamaya stones less prominent.



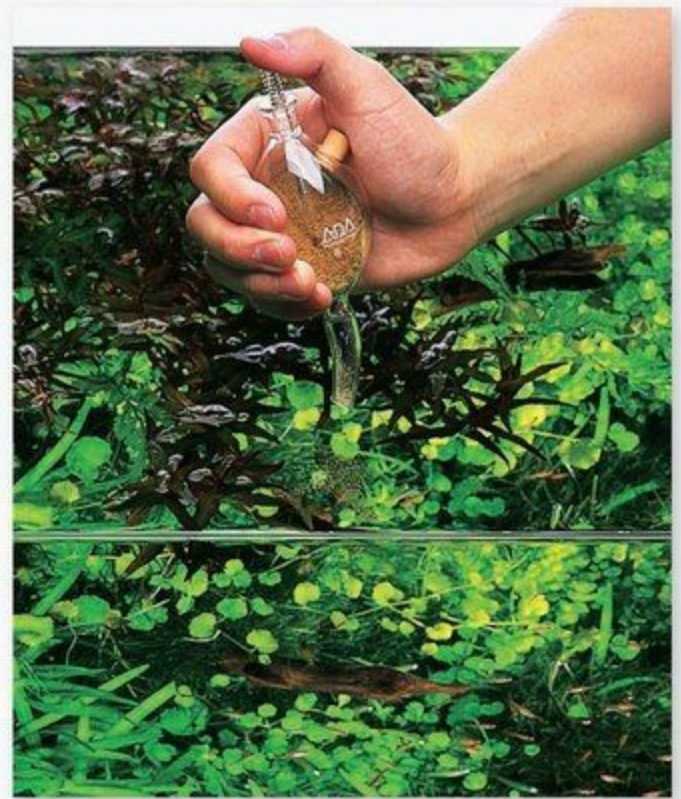
The line of the stem plants in the background is crucial to this concave composition. The perfection level of the aquascape is enhanced by trimming the plants to make this line neater.





It is a very enjoyable time when you feed the fish using AP Glass and watching them eat the food from above the water.

MAINTENANCE
TIPS



Fish Food AP series slowly reaches the water surface thanks to the slightly curved outlet of AP Glass. It is advised to feed fish a few times a day instead of once a day.

Creative Ways of Fish Feeding

Creative ways of Fish Feeding

The important points in fish feeding is to watch and see if all the fish become full or not. Most of the fish aggressively snatch their food when they are hungry but they slow down as they get full. If this change in how the fish eat is observed, the feeding should be stopped. In addition, you can feed the fish more efficiently with this creative little idea. If you use AP Glass to drop AP Fish Food slowly into the water, the floating characteristics of AP Fish Food can be retained and it stays on the surface of the water for a longer time. You can feed the fish with the food going with the water flow if you put some AP Fish Food at the outflow pipe of Lily Pipe. If you drop AP Fish Food as if you are throwing it onto the water's surface, the food can reach the fish swimming near the middle and bottom levels faster. Feeding fish in a creative way while monitoring the fish brings a certain joy to the person who feeds them.

Daily Maintenance Checklist

1

Recommended amount of liquid fertilizer by tank size

Size	Interior capacity (ℓ)	Green Brighty series	Green Bacter	Green Gain	ECA	Phyton Git	Chlor-Off	Rio Base	Vitamix
60cm tank (24in)	60	3m ℓ	6 drops	6 drops	24 drops (1m ℓ)	12 drops	12m ℓ	3 caps (36m ℓ)	3 caps (36m ℓ)
90cm tank (36in)	166	9m ℓ	18 drops	18 drops	3m ℓ	36 drops (1.5m ℓ)	36m ℓ	108m ℓ	108m ℓ
120cm tank (48in)	219	12m ℓ	24 drops (1m ℓ)	24 drops (1m ℓ)	4m ℓ	2m ℓ	48m ℓ	144m ℓ	144m ℓ
180cm tank (72in)	590	30m ℓ	2.5m ℓ	2.5m ℓ	10m ℓ	5m ℓ	120m ℓ	360m ℓ	360m ℓ

※ Add 2m ℓ of Chlor-Off to 10 ℓ of water during water change.

Recommended CO₂ system and CO₂ amount by tank size

Tank size	CO ₂ diffuser	CO ₂ counter	Ordinary amount of CO ₂ to be injected (upper limit)
45cm (18in) tank	Pollen Glass	CO ₂ Glass Counter	1 bubble per 2 seconds (up to 2 bubbles per second) with Glass Counter
60cm (24in) tank	Pollen Glass	CO ₂ Glass Counter	1 bubble (up to 3 bubbles) per second with Glass Counter
	Pollen Glass Large 20Ø		
75cm (30in) tank	Pollen Glass Large 20Ø	CO ₂ Beetle Counter	2 bubbles (up to 5 bubbles) per second with Glass Counter
	Pollen Glass Beetle 30Ø		
90cm (36in) tank	Pollen Glass Beetle 40Ø	CO ₂ Beetle Counter	1 bubble per 2 seconds (up to 4 bubbles per second) with Glass Counter
120cm (48in) tank	Pollen Glass Beetle 50Ø	CO ₂ Beetle Counter	1 bubble (up to 3 bubbles) per second with Glass Counter
180cm (72in) tank	Pollen Glass Beetle 50Ø x 2	CO ₂ Beetle Counter	1 bubble (up to 4 bubbles) per second with Glass Counter
			2 bubbles (up to 5 bubbles) per second with Glass Counter X 2

Solar series to be installed

Tank size	Recommended number of units to be installed					
	Solar Mini	Solar I	Solar II	Grand Solar I	Grand Solar II	Grand Solar 250
Mini S/M	1	—	—	—	—	—
60cm (24in) tank	—	1	1	—	—	—
90cm (36in) tank	—	1~2	—	1	—	1
120cm (48in) tank	—	2	—	2	—	2
180cm (72in) tank	—	3~4	—	3	—	2~3

※ Distance from the water surface Solar II & Grand Solar II: 10 - 15cm (4 - 6in) / Solar I, Grand Solar I & Grand Solar 250: 30 - 40cm (12 - 16in)

Water quality check item by purpose

	PH	TH	NH ₄	NO ₂	NO ₃	CIO	COD	PO ₄
To find out the quality of tap water	○	○				○		
To find out if the water quality is suitable for growing aquatic plants	○	○	○	○				
To find out how established the filtration system is								
To find out the water quality after water change					○		○	
To find out the if the water quality is suitable for fish	○		○	○				
To identify the sign of algal growth				○	○		○	○

There are many types of maintenance tasks, including daily maintenance tasks such as the addition of liquid fertilizer and feeding the fish, weekly maintenance tasks such as water changes, and the maintenance tasks to be performed as and when necessary such as trimming. For any of these maintenance tasks, it is important to monitor the condition of aquatic plants as well as tropical fish and adjust the amount of CO₂, food, water to be changed and others factors accordingly. Particularly for liquid fertilizer and CO₂ injection, the amounts mentioned in the above tables are for reference only. Your maintenance skills will be enhanced by controlling the

dosage on your own judgment taking into consideration the species and growth status of your aquatic plants as well as the overall aquarium condition. Adequacy of your dosage should basically be determined by the condition of living organisms in the aquarium; for example, color and luster of the leaves for liquid fertilizer; oxygen bubbles generated during photosynthesis for CO₂ injection; and stomach bloating for fish feeding. This section provides some information useful for maintenance in the form of a data sheet. Monitor the aquarium condition daily for optimal maintenance!

Tank size and interior capacity

Tank size (cm)	Interior capacity (ℓ)
30×30×30	25
31×18×24 (Mini S)	12
36×22×26 (Mini M)	19
45×24×30 (Mini L)	30
45×24×16	16
45×27×30	34
45×30×45	56
45×45×45	85
55×55×55	152
60×30×18	30
60×30×36	60
60×30×45	75
60×45×45	112
75×30×20	41
75×45×45	141
75×45×60	185
90×30×20	50
90×45×45	166
90×45×60	223
120×30×20	66
120×45×45	219
120×45×60	295
180×60×60	590

Daily Maintenance Checklist

2

- Water temperature

 - 22°C (71.6°F) or below ————— Make sure that the heater and thermostat are working properly. Make sure that the appropriate wattage is selected for the heater used.
 - 23-27°C (73.4-80.6°F) ————— Optimal temperature range
 - 28°C (82.4°F) and above ————— Replace a fan or chiller. Do a partial water change with cool water.
- Water clarity

 - Cloudy water ————— The filtration system is not working properly → Add Clear Dash; Install a UV sterilization lamp.
 - Yellowish water ————— Tannin leached out of the driftwood → Perform water change more frequently; Use activated carbon.
 - Film on the surface of water ————— Decline in filtration capacity → Rinse the filter media with aquarium water; Perform aeration during night time
- Amount of CO2 injected

 - Drop Checker (blue) ————— Lack of CO2 → Increase the amount of CO2 to be injected
 - Drop Checker (green) ————— Optimal amount of CO2 injected
 - Drop Checker (yellow) ————— Excessive CO2 amount → Reduce the amount of CO2 to be injected
- Lighting system

 - Reduced illuminance ————— Replace the lamp (The lamp to be replaced almost every one to one and a half years when lighting for 8 hours a day)
 - Check if the lighting time is appropriate ————— Optimal lighting time is 8 to 10 hours
- Glass equipment

 - Algae on Lily Pipe ————— Wash dirty Lily Pipe with Superge or Spring Washer.
 - Dirt or aquatic plant on the inflow pipe of Lily Pipe ————— Remove dirt and aquatic plants.
 - Algae on Pollen Glass ————— Wash with Superge.
 - Adequate amount of water in Glass Counter ————— Add water with the dropper provided.
- Water flow

 - Water flow from the outflow port of Lily Pipe is too slow. ————— Make sure that the hose is not bent. In the event of clogged filter media, rinse with aquarium water.
 - Stagnant water surface ————— Adjust the installation position of Lily Pipe.
- Algal growth

 - Algae on the glass surface ————— Remove algae with Pro Razor.
 - Black beard algae on stones, driftwood or aquatic plants ————— Remove with Pro Picker; Apply diluted solution of Phyton Git (only for Anubias); Remove affected leaves.
 - Filamentous algae tangled in aquatic plants ————— Remove algae with a brush; Siphon off with a hose; Add Cardina japonica (Yamato Numa Ebi) to the aquarium
 - Blue green algae in aquarium ————— Suction off with a hose; Sprinkle Bacter 100 onto the affected area; Add Black Molly to the aquarium
- Aquatic Plants

 - Algae on aquatic plants ————— Cut off the affected leaf; Add Cardina japonica (Yamato Numa Ebi), Otocinclus or Crossocheilus siamensis to the aquarium; Use activated carbon
 - Color loss of leaf ————— Increase the amount of liquid fertilizer to be added; Add ECA to the aquarium; Supply additional fertilizer with Iron Bottom or Multi Bottom
 - Hole(s) on leaf ————— Caused by snails which feed on leaves; or melting of leaf (in case of Cryptocoryne)
 - Dwarfing of plant ————— Install a softener if excessively high water hardness is detected; Due to stress caused by an animal such as Cardina japonica (Yamato Numa Ebi),
 - Presence of oxygen bubbles ————— The plant is healthy if it produces oxygen bubbles during photosynthesis. If not, the amount of light and CO2 is insufficient.
 - Excessively tall height ————— Trim the plants.
 - Aged lower stem of stem plants ————— Snip off the stem and replant it.
 - Excessive density of leaves ————— Cut off some leaves to reduce the density.
 - Plant which appears to have been eaten by an animal ————— Siphon out snails; Reduce the number of Cardina japonica (Yamato Numa Ebi)
- Living organisms

 - Many Cardina japonica (Yamato Numa Ebi) stay just below the water surface ————— Lack of oxygen → Perform aeration during night.
 - Unusual behavior on Cardina japonica (Yamato Numa Ebi), ————— Excessive CO2 amount → Reduce the amount of CO2 to be injected / Effect of pesticide residue in aquatic plant → Change the tank water; Use activated carbon / Ammonia in the water → Change the tank water; Use activated carbon
 - Eating condition of fish ————— Fish are healthy if they are aggressively snatching the food. Make sure that all the fish get food.
 - Abnormal symptoms on the body surface of fish ————— Due to illness or the shock as a result of sudden change in water quality
 - Fish poking its snout above the water. ————— Lack of oxygen → Change the tank water and perform aeration.

AQUASKY

An "Extensive Research" on AQUASKY

AQUASKY, the LED lighting system for growing aquatic plants, has been attracting a lot of attention. Despite the long-held perception that no aquatic plant will grow with LED lighting systems, ADA has overcome the disadvantages of the conventional LED lamps by using our accumulated know-how on lighting systems for aquatic plant layouts. Here we introduce the background story of the development of the AQUASKY and how aquatic plants grow under this new LED lighting system.

Advantages of LED Lighting System and Misconception

In recent years, LED lights have become popular as a general lighting system for indoor use. The advantages of LED lights including a higher luminosity efficiency over incandescent and fluorescent lamps as well as increased brightness at lower power consumption rates. LED lights also have the benefit of a remarkably longer lifespan compared to incandescent and fluorescent lamps and their energy- and resource-saving feature attracts attention despite its relatively high initial cost. However, many people have felt that the LED lighting systems installed in their homes were unexpectedly dim. Although each LED bulb is very bright if we directly look at it, their light-emitting area is considerably small. In fact, we need to install many more LED bulbs or adjust the reflection angle using mirrors so the entire room is adequately lit up. These adjustments come with a higher product cost and this is why many of the LED lighting systems sold at a lower price are dimmer than what we expect. It is generally said that the heat emission of LED lights are low. However, it still emits heat when it converts the electric energy into light and higher-intensity LED lights emit a considerable amount of heat.



AQUASKY has a body made of aluminum with high thermal conductivity.



Its unique structure provides a larger surface area for better heat dissipation.



Staggered LED layout for enhanced light distribution

Poor heat dissipation leads to a shorter lifespan of LED bulbs and other electronic components. In light of these facts, the thinking that "LED lights simply mean high brightness and long life" is a big misconception. Achieving bright and long-lived LED lights involves substantial costs.

White LED's are Actually Suitable for Growing Aquatic Plants

In response to the popularization of LED light as a general lighting system, some lighting systems using LED lamps started to come on to the aquarium scene. There was a general recognition that no aquatic plant would grow under LED lights because their wavelength was not suitable for growing aquatic plants. However, this is a big misconception. As proven by AQUASKY, aquatic plants are able to perform photosynthesis and grow under white LED lights. Unlike in the air, selective absorption of specific wavelengths is significant in an underwater environment. Red wavelengths are rapidly attenuated in water while blue wavelengths can reach deep water without being subjected to high attenuation. Based on this fact, it is believed that aquatic plants use blue light effectively to perform photosynthesis in water. ADA's NA Lamp, the

world's first fluorescent growing light for aquatic plants, has been developed based on this theory. NA Lamp was an epoch-making lamp which enhanced the blue wavelengths of three-band fluorescent lamps with the aim of promoting the photosynthesis of aquatic plants. This know-how was also used for Metal Halide Lamp NA-MH150W. The white light emitted from ordinary LED lighting systems is achieved by using a filter in yellow color, which is complementary to blue, on top of a blue LED lamp. The blue light passes through the yellow filter and appears to be white to human eyes. The ordinary spectral distribution chart for white LED lights show that the most spectral energy is distributed to blue wavelengths while red wavelengths are not contained much. This fact indicates that white LED light is transmitted in water without being subjected to much attenuation and can be efficiently used for photosynthesis by aquatic plants. It can safely be said that white LED light is suitable for growing aquatic plants.

Why Aquatic Plants Did Not Grow under other LED Lights?

Then, why did aquatic plants not grow with the conventional type of LED lighting



Healthy aquatic plants grown under the light from AQUASKY

systems? It is because the absolute intensity reaching the plants was not sufficient for the same reason why we feel the indoor LED lighting is unexpectedly dim. Green plants, including those of an aquatic nature perform respiration as well as photosynthesis. If their photosynthesis process is undertaken in low-intensity lights, the energy produced from photosynthesis is exhausted by the plants' respiration activity and will not be used for their growth. The light intensity where the production rate during photosynthesis and the consumption rate during respiration are equal is called the light compensation point. Plants cannot grow if the intensity of available lighting is not higher than the light compensation point. The light intensity where the plant reaches its maximum rate of photosynthesis is called the light saturation point. Even if the light intensity exceeds this light saturation point, the rate of photosynthesis will no longer increase but rather, it may decrease due to photo-inhibition. When growing aquatic plants in an aquarium, the light intensity must exceed the light compensation point and preferably, it should be as close as the light saturation point for better growth of plants. The problem here is that a bright LED lighting system can only be achieved by increasing the number of LED bulbs or increasing the light intensity of each LED bulb. Accordingly, a measure against the heat generated by the lighting system is also required and this will entail an additional cost. For this reason, the light intensity of conventional LED lighting systems, which place the topmost priority on affordable cost, was absolutely too low for the healthy growth of aquatic plants. Meanwhile, the spotlight-like LED lights may emit light with adequate intensity immediately below it. Still, this type of LED light is not suitable for planted aquarium because it is unable to light up the entire tank.

Solutions Adopted for AQUASKY

In order to achieve the light intensity required for the healthy growth of aquatic plants in 30cm (12in) and 36cm (14in) aquariums, AQUASKY uses 30 units of 0.4W SMD LED lamp. They are arranged in a staggered pattern for better light distribution. AQUASKY's 12W luminous flux of 1,450 to 1,550 lm ("lm" means lumen which is a unit of light intensity) is the best in class and its brightness is equivalent to Solar Mini, a 27W twin fluorescent lamp. Its body is made of aluminum featuring high thermal conductivity and its surface is shaped into fins to give a larger surface area for higher heat dissipation to deal with the heat generated by high-intensity LED lamps. These innovations were created using the know-how accumulated through the development of other types of lighting systems such as Solar I and Grand Solar I. Furthermore,

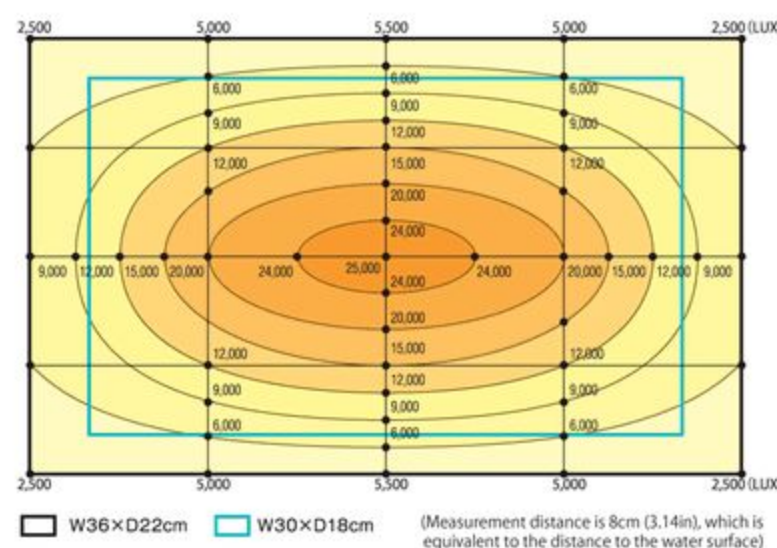


AQUASKY is equipped with a dedicated stand which allows the lighting system to be installed at the optimal position, helping aquatic plants grow healthily under adequate light. This stand is made with clear acrylic which makes AQUASKY look like it is floating in the air. This is one of the AQUASKY's greatest features which is not seen in any other conventional lighting system. With this stand, the aquarists can enjoy planted aquarium with an open feeling. AQUASKY for the tanks in other sizes will be available soon*.

Color and Color Temperature of White LED Lamp

Conventional white LED has had a disadvantage in that green and red colors do not look vivid under it. The cause of this problem is that the light emitted from white LED lamp does not have much green or red wavelengths. There are some high color-rendering LED bulbs which solve this problem, but even this type of bulb provides only low luminosity efficiency and tends to be dimmer than other

AQUASKY is equipped with a dedicated stand lamps due to its darker filter color containing mixed phosphors. Although AQUASKY focuses on brightness (illumination) it is not a high color-rendering LED lamp, which means green and red colors look very natural under it thanks to its improved filter. Meanwhile, white LED lights have the characteristic of significant variance in color temperature error between each product. The basic color temperature of the light from AQUASKY is approximately 7,000K (Kelvin, a unit of color temperature). Please note that the error in this color temperature has very minor variation between individual products as a characteristic of the white LED. The temporal change in an aquarium equipped with AQUASKY can be viewed on the ADA View videos (available on YouTube). These videos were filmed using AQUASKY as the only light source. You can see with your own eyes how natural the colors look under AQUASKY in these videos.



Temporal change in aquarium can be viewed on ADAView on YouTube.

Brightens up the entire aquarium

AQUASKY is positioned at the optimal height with its dedicated stand to light up the entire aquarium.

* AQUASKY for W45cm (18in) and W60cm (24in) tanks are scheduled to be released in the middle of September.

Combining Substrate Materials according to Purpose

In Nature Aquarium, various materials are used for the substrate where aquatic plants spread their roots. You can create your desired layout by appropriately combining the substrate materials such as Aqua Soil which promotes healthy growth of plants, Power Sand which prevents the hardening of soil and promotes the growth of substrate bacteria and cosmetic sand which provides a natural feel to the foreground of the layout.

● Using the Appropriate Type of Power Sand

In Nature Aquarium, the substrate suitable for growing aquatic plants or the substrate that has a natural atmosphere is created by combining more than one substrate material. This is why a wide lineup of substrate materials is available under the Nature Aquarium Goods brand. Substrate materials can be broadly divided into three groups. The first to mention is the group consisting of Power Sand and substrate additives (such as Bacter 100) for creating an environment conducive to the growth of substrate bacteria. This is the group that helps aquatic plants grow healthily and supports Nature Aquarium's concept of "Long-term maintenance of an attractive layout." The Power Sand series is comprised of two products containing different amount of organic matter, namely Power Sand and Power Sand Special, each of which is available in three different grain sizes (S, M and L). Power Sand Special contains more organic matter than Power Sand and it also contains Bacter 100 which is a source of substrate bacteria and Clear Super which serves as the initial food for the bacteria. These additives are contained in Power Sand Special to break down its rich organic matter effectively. With these additives, Power Sand Special displays an outstanding effectiveness for the growth of aquatic plants such as *Cryptocoryne* and *Echinodorus* which vigorously absorb nutrients via their roots. However, an excessive amount of organic matter may burden the filter during the initial stage of the aquarium. For this reason, Power Sand is a better choice in the case where a new filter is installed in the aquarium to be set up. On the other hand, Power Sand Special is more suitable for an aquarium which is reusing an existing filter that has already been well established. As for the long-term maintenance of the layout, Power Sand Special is more powerful than Power Sand because it promotes the growth of bacteria more effectively and the effective period of the organic matter contained in it is longer than Power Sand. In light of these features, it can be noted that the combination of Power Sand Special and shade-loving *Crypto-*

coryne is suitable for the long-term care is an ideal match. Meanwhile, the grain size of the Power Sand series should be selected according to the water depth. The larger and deeper the tank, the greater the hydraulic pressure applied to the substrate. The smallest grain size, S, seldom hardens in a small 60cm tank where hydraulic pressure is low. In a deeper tank, however, this size of Power Sand can get clogged due to greater hydraulic pressure and gradually causes the substrate on the bottom to harden while the layout is maintained over a long period of time. The chances of a hardened substrate is smaller with the larger grain size. Therefore, the Power Sand series with a larger grain size is selected for deep aquariums. As stated above, the type of Power Sand series product that is suitable for each respective aquarium is determined by the species of aquatic plants to be used in the layout, condition of the filter and the water depth.

● Characteristics of Aqua Soil

After the Power Sand series suitable for the aquarium is sprinkled onto the substrate, the selected type of Aqua Soil is spread on top of it following the standard substrate building method of Nature Aquarium. Among the soil products under the Aqua Soil series which features materials derived from natural soil, the most popular item is Aqua Soil-Amazonia. Aqua Soil-Amazonia is made of black earth containing rich organic materials and nitrogen which are essential for promoting the plant growth. Aqua Soil-Amazonia having this great benefit is appreciated as the best substrate material in terms of rapid growth of aquatic plants and the minimal chance of failure in nurturing the plants. There is an obvious difference in growth rate of aquatic plants between the preceding substrate system made with natural sand on top of Power Sand and the current mainstream using Power Sand and Aqua Soil-Amazonia in combination. Aqua Soil-Amazonia contains abundant humus, which is the end-product of decomposed plants, and this soil's signature black color is brought out by it. This humus, one of the ben-

eficial features of Aqua Soil-Amazonia, has the effect of promoting bacterial activity and stimulating the growth of plant roots. It also helps keep the physiological functions of fish in good condition while enhancing their body color. These outstanding effects make Aqua Soil-Amazonia the most standard item amongst the wide range of substrate materials used for Nature Aquarium. When the soil humus leaches out of the substrate, the water in the aquarium turns yellow or brownish. This unique phenomenon will be less prominent when the entire substrate is covered by aquatic plants. The yellow water can also be eased by changing the aquarium water and with the use of NA Carbon. On the other hand, this problem is difficult to solve if the substrate system created with Aqua Soil-Amazonia is left exposed or the filter is running without any aquatic plants in the layout. In such circumstances, not only humus but organic matter and nitrogen also leaches out of the substrate into the water and cause some other problems such as cloudy water due to waterborne bacteria feeding on organic matter and green water caused by waterborne algae feeding on nitrogen. A solution to avoid these problems is to plant an adequate volume of aquatic plants during the initial stage and to set up the aquarium following the procedures to be mentioned later in this section. Meanwhile, the Aqua Soil series has the tendency of making the water more neutral to acidic due to the characteristics of the natural soil used as the source material. However Aqua Soil-Amazonia is an exception. The water quality of the aquarium using Aqua Soil-Amazonia is largely influenced by the tap water used for the water change. If the tap water or other type of water to be poured into the aquarium has a high pH level or when any object which can raise the pH level, such as commercially-available activated carbon, is used as filter media, the water of the aquarium using Aqua Soil-Amazonia may demonstrate an increase in pH level. If you wish to maintain a low pH level by way of substrate material, Aqua Soil Africana and Malaya using highly acidic soil as the material are the best

choices. Although not as good as Aqua Soil-Amazonia in terms of the growth rate of aquatic plants, these types of Aqua Soil are optimal for the aquatic plants requiring lower pH and KH levels and for the case where a low pH level should be maintained for the fish kept in aquariums with no aquatic plants. It is advised to select the most appropriate Aqua Soil according to your purpose and intended water quality.

● **Producing a Natural Feel with Cosmetic Sand**

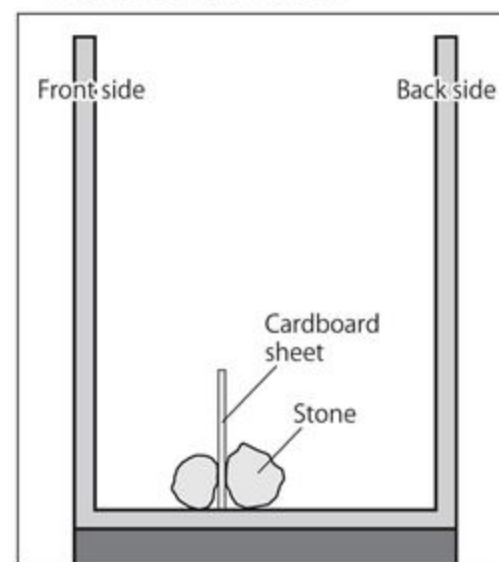
Substrate built with Power Sand and Aqua Soil is topped with a thin layer of Aqua Soil Powder type mainly in the foreground to add a final touch. This is done because the short aquatic plants to be planted in the foreground can easily spread their thin roots in the substrate using Aqua Soil Powder type which has a finer grain size than the normal type of Aqua Soil. Another purpose of using Aqua Soil Powder is to give a finer look to the foreground which remains conspicuous even after the aquatic plants grow larger. In the case where the substrate is to be left exposed with no aquatic plants grown on it, cosmetic sand (Layout Sand series) is used instead of Aqua Soil Amazonia Powder type which is a soil intended for the substrate with aquatic plants. The Layout Sand series is comprised of a conventional lineup of Colorado Sand and Sarawak Sand with additional items of Congo Sand and Mekong Sand. These are all natural sands and the effect of promoting the growth of aquatic plants cannot be expected. Rather, one of the purposes of using cosmetic sand is to create a foreground which can be easily maintained for a long period of time by making use of the cosmetic sand's character of not being conducive to good growth of aquatic plants. A balanced look for the layout that is free of an oppressing feeling can be achieved by maintaining the foreground as thin as possible. When Power Sand and Aqua Soil are used in combination to build the substrate, a foreground plant such as Glossostigma grows faster and the foreground may become excessively thick if these plants are not trimmed frequently. On the other hand, the substrate made by spreading a thin layer of cosmetic sand can be maintained easily with no hassles of frequent trimming and replanting. From these facts, it can be seen that cosmetic sand is suitable for long-term maintenance. When using cosmetic sand for the foreground, the substrate needs to be clearly divided from the mid-ground and background (using Power Sand and Aqua Soil) where aquatic plants are to be planted. A convenient tool for this purpose is a partition made of cardboard. First, stand a strip of cardboard sheet pre-cut to the appropriate length along the pre-determined border line. At this time, the partition stands stably if it is supported by appropriately sized stones placed on both sides. When spreading the substrate materials, be sure to spread Power Sand and sprinkle additives such as Bacter 100 and Clear Super first onto the area where Aqua Soil is to be spread. Subsequently, cosmetic sand and Aqua Soil is spread on the substrate. They should first be spread along the partition in good balance so

that the partition will be securely in place. Once the partition has become stable, remove the stones supporting the partition. The stones left buried in the substrate may become an obstacle to the subsequent planting process. The point of dividing cosmetic sand and Aqua Soil is to make the cosmetic sand area in the front as thin as possible and make the Aqua Soil at the back thicker for easy planting. If there is a difference in the level of substrate materials on both the sides of the partition, the substrate may partially collapse and the substrate cannot be clearly divided into different sections. Make sure from by looking from at the line from a side angle that the levels of the substrate materials on both the sides of the partition are aligned and a straight slope is formed. If the slope is excessively gentle, it is suspected that the cosmetic layer is too thick or the Aqua soil layer is too thin. Dividing the substrate into sections is completed once the slope is confirmed to be well formed and the partition is removed. Subsequently, some stones serving as a soil divider are placed along the border line to prevent the soil from flowing onto the cosmetic sand portion.

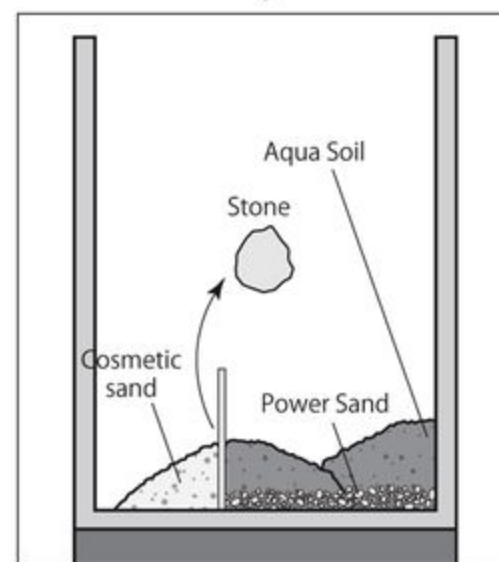
● **Notes on Aquarium Set-Up**

Once the substrate has been built following the procedures stated above, water is poured into the tank up to the level where the substrate is barely submerged for easy planting of aquatic plants. In the case of a large tank like the ones installed in the Nature Aquarium Gallery, water is poured while swinging around the tip of the hose connected to the water tap like a sprinkler. This method cannot be used for small tanks and in cases where the water cannot be poured using a hose. In this event, it is recommended to place a plastic bag on the substrate and pour the water from a plastic container slowly onto it. Whichever method you choose, the murky water accumulated in the tank should be drained and replaced with clear water after the planting is completed and before the tank is filled up with water. This work can be done effectively by draining the murky water with a hose while pouring in the same amount of clear water. The cause of this murky water is suspected to be the particles of fine soil from the substrate material such as Aqua soil and the dirt from unwashed cosmetic sand. The murky water left untreated can lead to prolonged cloudy or green water caused by organic matter and nitrogen contained in the soil particles and contaminants. It is important to ensure the water within the tank is clear before starting to run the filter. Some people run the filter before planting aquatic plants to have an established filter early. However, this can result in prolonged cloudy or colored water due to agitated fine soil particles and humus leaching out of the exposed substrate. When setting up a new aquarium, it is advised to plant an adequate amount of aquatic plants once the substrate is completed so that the entire substrate surface will be covered in a short period of time. It is beneficial to resolve the cloudy or colored water problem as well as for easy maintenance.

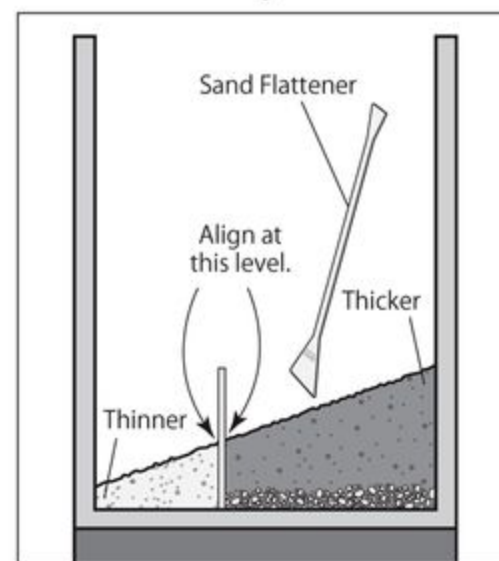
■ **Procedures for Dividing Cosmetic Sand and Soil Sections**



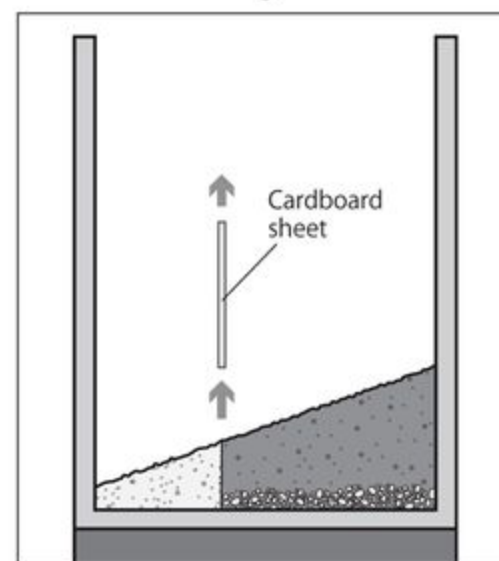
1 **Place a partition**
Put a strip of cardboard sheet along the pre-determined border line and support it with the stones placed on both its sides.



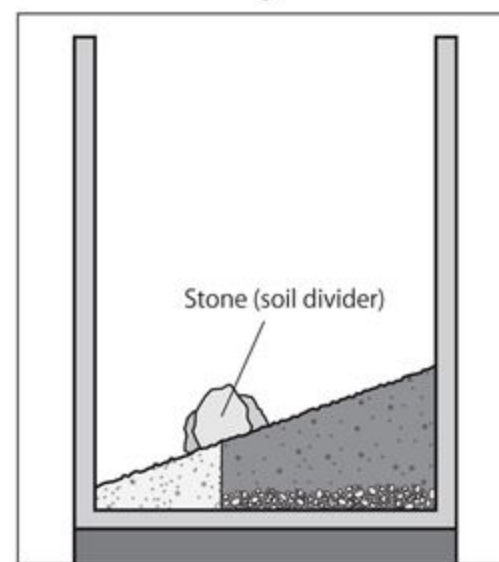
2 **Spread the substrate materials**
Spread the substrate materials on both the sides of the partition, maintaining a good balance so that the partition will be securely in place. Once the partition has become stable, remove the stones.



3 **Flattening the surface with slope**
Flatten the substrate surface to have a thinner (shorter) front side and thicker (higher) back side. Make sure to align the levels of the substrate materials on both the sides of the partition.



4 **Remove the partition**
Once the substrate surface has been flattened, remove the partition by pulling it up in one shot. Do any necessary touch ups if the border line is not clear.



5 **Place the soil divider stones**
Place some stones serving as a soil divider along the border line. Use different sizes of stones to make no gap between them.

Q&A

Although the process varies between each aquarium, there is a nearly fixed pattern for the establishment of the aquarium environment, beginning from the production of ammonia and nitrite all the way up to the establishment of the filtration system. The difference between the people who understand the key points of aquarium management and other people is reflected in the water quality control practice during this process. The saying: "A small difference makes a big difference," seems to apply to everything.

Q I heard that I need to change the aquarium water as frequently as possible if I build the substrate using Aqua Soil-Amazonia. How frequently should I change the water in that case?

A Aqua Soil-Amazonia has the great feature of promoting the growth of aquatic plants because it contains rich organic nutrients. These organic nutrients serve as a source of nutrition for aquatic plants but at the same time, it can contaminate the aquarium water if they are excessively present in the water. During the initial stage of an aquarium when the filtration system is still new and aquatic plants are just planted, the water easily gets dirty because the amount of organic matter released from Aqua Soil-Amazonia is more than the amount being broken down by microorganisms and absorbed by aquatic plants. Therefore, it is very important to change the aquarium water with the intent to get rid of excess organic matter. Particularly in the first week after the setup of the aquarium, it is advised to change 1/2 to 1/3 of the aquarium water daily. In the second week, it is preferable to change the aquarium water at the frequency of once every two days. If

this pattern of water change cannot be achieved, the aquarium water should be changed as close as possible to the frequency of the pattern mentioned. Water change during the first two to three weeks from the initial setup of the aquarium is a key to a successful planted aquarium. The efforts made during this period will be rewarded in the form of healthily grown aquatic plants.

Q Cryptocoryne are very dense and attractive in the aquascapes on Aqua Journal. Are there any tips for planting Cryptocoryne?

A In many cases, Cryptocoryne that is to be planted in the aquarium is purchased in the form of a potted plant. After removing the rock wool, Cryptocoryne should be planted as it is without dividing it into several portions. Doing this helps the plant grow dense from the



Cross-section of Cryptocoryne in a pot

beginning. Pro-Pinsettes Grip type helps hold the thick stem is the ideal tool for planting Cryptocoryne and other rosette-type plants.

Q Should I attach a single stalk of Microsorium and Bolbitis to driftwood in a layout, or should I attach a few stalks of them together?

A The Rhizome is an important part for Microsorium and Bolbitis. If the plant is with a thick rhizome, it can be attached to the driftwood just as a single stalk. If the rhizome is small, you may attach a few stalks together. When a few stalks of these plants are attached together to the driftwood, the plant

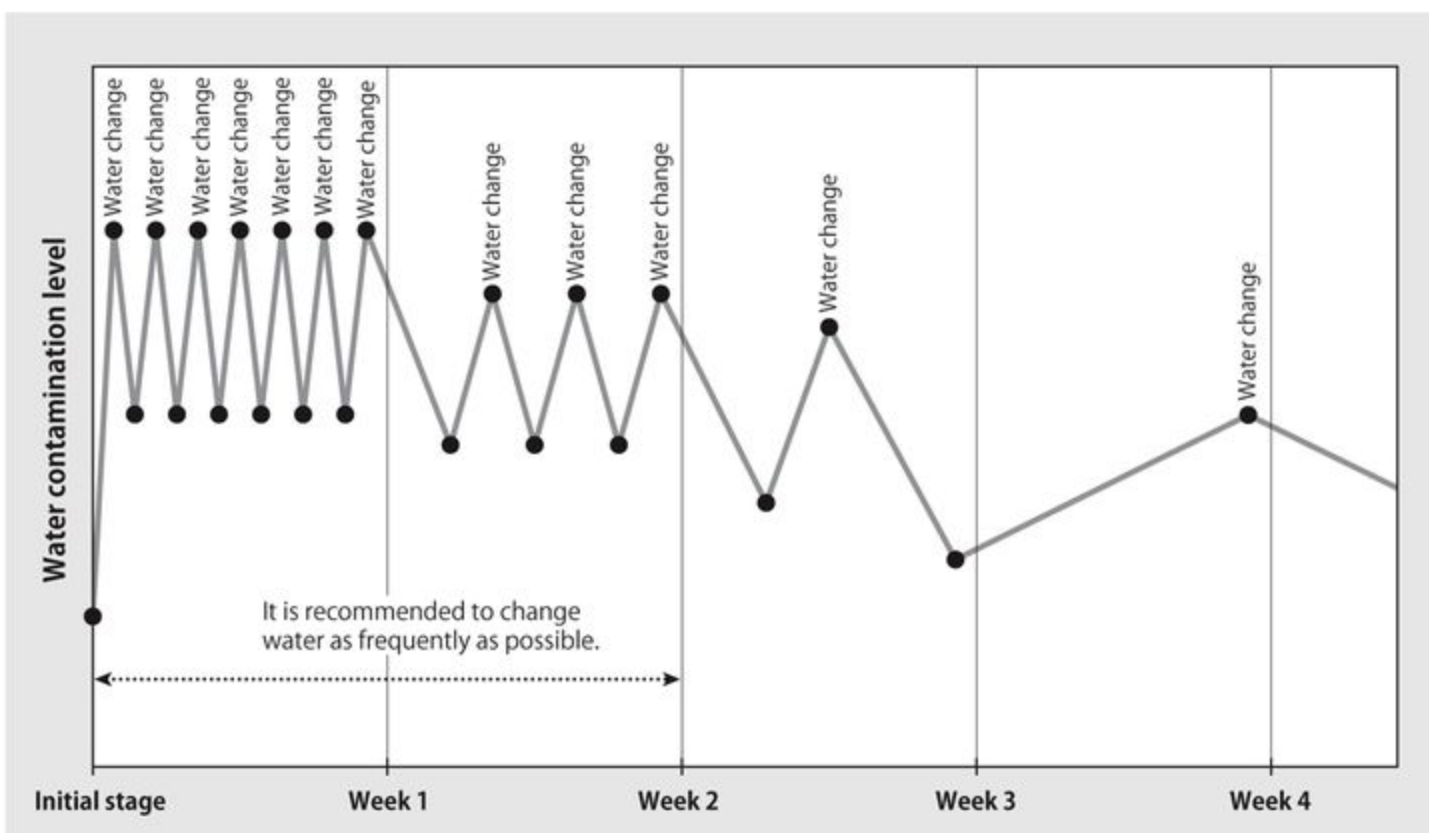


1. Choose Bolbitis with a firm and solid rhizome. Old or damaged leaves should be cut off at the base of the leaf stem.



2. After the leaves are cut off, attach the rhizome of Bolbitis to the driftwood using Wood Tight. Be careful to not let the Wood Tight loosen.

■ Image of frequency of water change and water contamination



Water can get contaminated very easily until the third week from the initial setup when the filtration system is established. Until this time, it is advised to change the tank water as frequently as possible.

Send us your questions!

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

growth will be restrained and the leaves will become smaller in size due to the cramped condition of their rhizomes. Whichever method you choose, Wood Tight is used to attach epiphytic plants to the driftwood. It is advised to secure the plants to the driftwood so the rhizome is holding around the wood tightly.

Q What can I know by checking the water quality with Pack Checker COD?

A COD or chemical oxygen demand is a water pollution indicator. Pack Checker COD contains oxidant to measure the amount of oxygen consumed for oxidation of organic matter present in the water. High COD means a large amount of organic matter which indicates a contaminated water condition. During the initial stage of an aquarium when the aquarium water can easily get dirty, the COD value is usually 8 - 10mg/ℓ while its value for a tank with active filter bacteria that vigorously break down the organic matters is 0 - 2mg/ℓ. When the aquarium has too many fish or very dirty water, the COD value can become above 6mg/ℓ in many cases. Regular checking of the COD value tells you how contaminated the water of your aquarium is. You can also use the results as a reference to determine the timing of water change.

Q Will *Cryptocoryne parva* develop new buds even after its leaves are cut from the leaf stem?

A The answer is given on the assumption that you are not going to trim off the excessively dense *Cryptocoryne parva* leaves but just cut off a part of the leaves affected by algae. As with other *Cryptocoryne* species, *Cryptocoryne parva* will also develop its new buds even when its leaves are cut at the base of the leaf stem. However, in the case where extremely slow-growing *Cryptocoryne parva* is planted together with *Echinodorus tenellus* or *Eleocharis acicularis*, its presence can be overwhelmed by other plants after its leaves are cut off. Meanwhile *Cryptocoryne parva* is prone to



A sample layout using *Cryptocoryne parva* as a foreground plant

black beard algae which usually grows on the leaf edge. It is advisable to add *Crossocheilus siamensis* to the aquarium as a measure against algae. Time and careful management are required for dense growth of *Cryptocoryne parva*.

Q When should I add Green Bacter? What effects does it have?

A Green Bacter contains organic acids which become food for microorganisms and has the effect of promoting the growth of beneficial bacteria. In light of this, the first week from the initial setup of the aquarium is a period when the addition of Green Bacter is very effective. In particular, bare tanks and an aquarium which uses gravels or ceramics instead of Aqua Soil does not contain much organic matter which can serve as food for microorganisms. It is a good practice to add Green Bacter to these types of aquarium with the aim of growing microorganisms. As mentioned, Green Bacter shows its effectiveness particularly during the initial stage of aquarium. This is why it is

included in with the CO₂ Advanced System set which is mostly purchased by a person who is going to set up a new aquarium. Other than the initial stage of the aquarium, Green Bacter is also effective when the filtration capacity deteriorates and after routine maintenance, such as rinsing of the filter media, is performed.



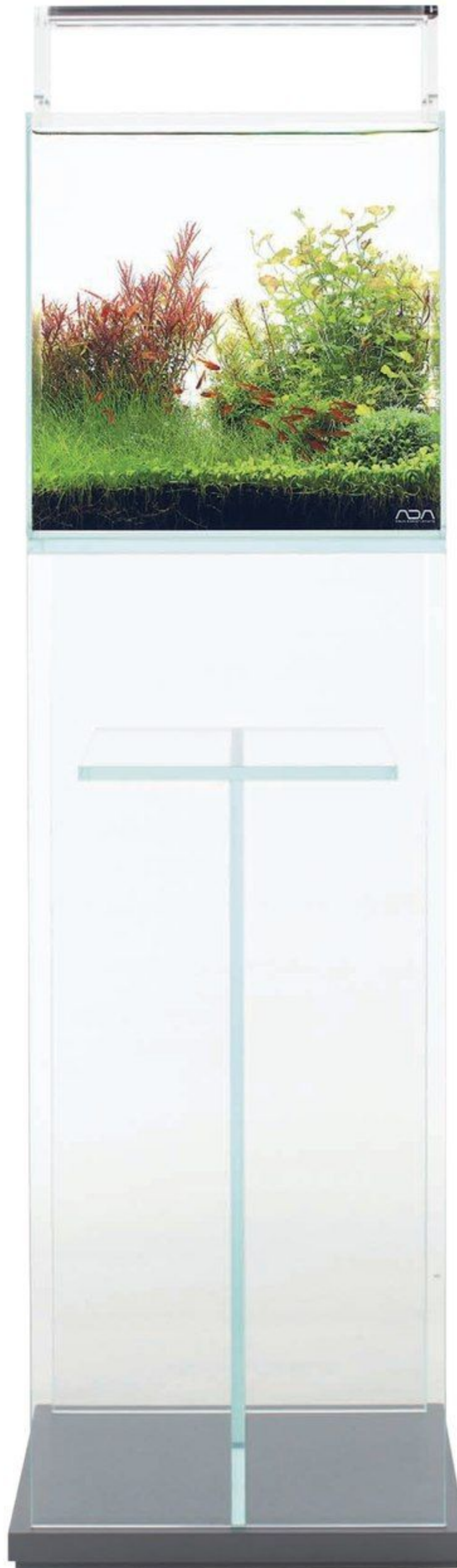
Add Green Bacter as if you are feeding the microorganisms.

AQUASKY+CUBE CABINET



Real Simple. Advanced Aquarium System

ADA's new Cube Cabinet becomes more simple. Its elegant crystal-clear body is made by the same glass material of Cube Garden, and perfectly matches Cube Garden and ADA's new LED lighting system, AQUASKY.



AQUASKY301 for W30cm tank
AQUASKY361 for W36cm tank

Cube Cabinet Clear for W30 x D30 (cm)
Cube Cabinet Clear for W36 x D22 (cm)

Optional wooden base board for W30 x D30 (cm)
Optional wooden base board for W36 x D22 (cm)
Color: Gun Metallic Silver

*Cube Garden and AQUASKY are not included in Cube Cabinet.

*An optional wooden base board, enhancing stability, is sold separately.