

Nature Aquarium information magazine

AQUA JOURNAL

ADA
aqua design amano

JAN.
2013

[Special Feature]

Layout Master Training Seminar



ADA's Lighting Systems Higher brightness and a more simple design

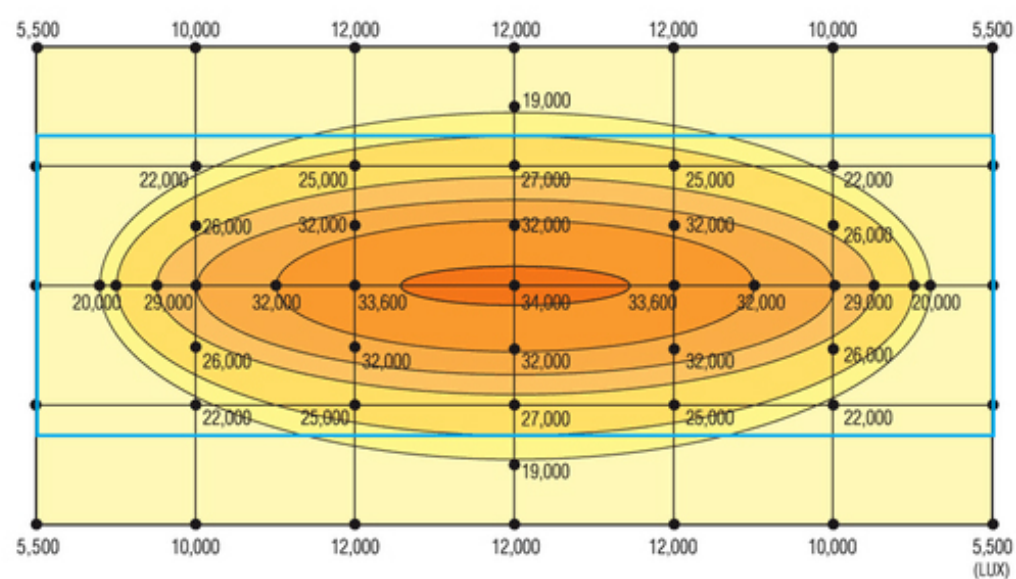
NEW! LED lighting system, AQUASKY,
designed for planted aquariums.

AQUASKY602

ADA's AQUASKY is the world's first LED lighting system developed specifically for planted aquariums. A new lineup, compatible with aquarium tanks 45cm wide and 60cm wide, is to hit the market, this fall. For 60cm wide aquariums, the single light model - AQUASKY 601 and the twin light model - AQUASKY 602 are available. Choose a model according to the type of main aquatic plants planted in your 60cm-wide aquarium. You can also install maximum of 3 LED lighting units (AQUASKY 601 x 1, AQUASKY 602 x 1) to a 60cm aquarium tank. AQUASKY 602 is capable of providing the same illuminance level as Solar I. AQUASKY series makes possible to fully appreciate aquatic plant layouts, which was hardly achieved by other LED lighting systems before.

*We measured the center spot illuminance level with following condition: Direct illuminance level measured at 12cm from the lighting source for AQUASKY 602, and 30cm for Solar I.

AQUASKY 602 featuring high light
distribution performance



W60xD30cm
AQUASKY 602

(Measurement distance: 12cm,
assumed distance between the light source and water surface)

High luminosity LED lighting unit developed
with ADA's lighting technology

front



It employs the material and
structure of outstanding heat
radiation performance.

back



It provides excellent light
intensity, which is created by
efficient LED layout.

A key to AQUASKY's brightness is its high luminosity LEDs and their layout. Numbers of high luminosity LEDs are regularly distributed in a shifted manner, and it makes possible to illuminate a whole aquarium layout. Heat generation is a common problem of high luminosity LED lamps. ADA solved the problem by employing the high radiation performance aluminum material and its unique fin structures.

NATURE AQUARIUM DATA 2 months after installation (trimmed 4 times)

Aquarium: Cube Garden W60xD30xH36cm

Lighting: AQUASKY 602 (LED 0.4W/each x 63/ 2 units)

Filter: Super Jet Filter ES-300 (prototype), Bio Rio, NA Carbon,
Lily Pipe P-1, Lily Pipe V-3

Substrate: Aqua Soil - Amazonia, Power Sand S

CO₂: Pollen Glass, 3 bubbles per second via
CO₂ Beetle Counter (using YA/Ver.2)

Additives: Brighty K, Green Brighty STEP2

Water Change: 1/3 once a week

Water Quality: Temperature 25°C (77°F) pH: 6.8 TH: 20mg/ℓ

Aquatic Plants: Wabi-kusa Eleocharis parvula x 3,
Wabi-kusa Glossostigma x 5, Wabi-kusa Stemmed Plants Mix x 4,
Wabi-kusa Stemmed Plants Mix Red x 1

Fish / Invertebrates: Trigonostigma espei, Otocinclus sp., Caridina japonica



The image shown is a Wabi-kusa layout aquarium about 2 months after installing AQUASKY 602. AQUASKY 602 is capable of providing plenty of light for light-loving *Glossostigma*, *Eleocharis parvula*, stem plants and other heliophytic plants.



The single light model for 45cm wide aquariums

AQUASKY 451

■ Light housing unit size : W430×D68×H10mm
 ■ Clear stand size : W450×D100×H95mm
 Product specification
 Input voltage : AC100~240V 50/60Hz
 Power consumption : 22W
 Current consumption : 650mA ±5%
 Luminous flux : 1,800~2,160lm
 Color temperature : Around 7,000K
 LED : 0.4/each×45 / LED lifetime : Over 30,000hrs
 Operating temperature range : 0~35°C

AQUASKY 451 is compatible with ADA Cube Garden / Cube Glass in the following sizes:
 W45 x D24 x H16 (cm) glass thickness 5mm
 W45 x D24 x H30 (cm) glass thickness 5mm
 W45 x D27 x H30 (cm) glass thickness 5mm



The practical single light model for 60cm wide aquariums

AQUASKY 601

■ Light housing unit size : W570×D68×H10mm
 ■ Clear stand size : W600×D94×H120mm
 Product specification
 Input voltage : AC100~240V 50/60Hz
 Power consumption : 30W
 Current consumption : 900mA ±5%
 Luminous flux : 2,520~2,850lm
 Color temperature : Around 7,000K
 LED : 0.4W/each × 63 / LED lifetime : Over 30,000hrs
 Operating temperature range : 0~35°C

AQUASKY 601 is compatible with ADA Cube Garden / Cube Glass in the following sizes:
 W60 x D30 x H18 (cm) glass thickness 5mm
 W60 x D30 x H36 (cm) glass thickness 6mm
 W60 x D30 x H45 (cm) glass thickness 6mm



The twin light model for 60cm wide planted aquariums

AQUASKY 602

■ Light housing unit size : W570×D68×H10mm
 ■ Clear stand size : W600×D188×H120mm
 Product specification
 Input voltage : AC100~240V 50/60Hz
 Power consumption : 60W (30W per lighting unit)
 Current consumption : 900mA ±5% (per lighting unit)
 Luminous flux : 2,520~2,850lm (per lighting unit)
 Color temperature : Around 7,000K
 LED : 0.4W/each × 63 (per lighting unit) / LED lifetime : Over 30,000hrs
 Operating temperature range : 0~35°C
 ※AQUASKY 602 comes with 2 adapters. Each adapter takes one lighting unit.

AQUASKY 602 is compatible with ADA Cube Garden / Cube Glass in the following sizes:
 W60 x D30 x H18 (cm) glass thickness 5mm
 W60 x D30 x H36 (cm) glass thickness 6mm
 W60 x D30 x H45 (cm) glass thickness 6mm

*Due to the characteristics of LED, there is a variance in range of color temperature. *Install AQUASKY 601 and AQUASKY 602 to a 60cm wide aquarium (W60xD30xH36cm) for higher light intensity.
 *Photo is for image only. The product has a power supply cord on the side. *Other displayed products are sold separately.





Traveling across Japan

Vol.48 Itoigawa City, Niigata, Japan



ADA's compact-size Jet Filter

SUPER JET FILTER ES-300

SUPER JET FILTER ES-300 is a great external canister style filter to enjoy Nature Aquarium with small aquarium sizes up to 60 liters. Despite its compact form, this product assures excellent filtration capability and has a fine, robust body.

Equipped with a small, but powerful filter pump

ADA's original filtration structure

Professionally handcrafted body with excellent durability

- Standard Filtration Media
Anthracite (activated carbon in net) 2L, Bio Cube 20 1L
- Pump Specification
Flow Rate: 6.0L/min (50Hz), 7.2L/min (60Hz)
Maximum Pump Head: 3.0m (50Hz), 3.6m (60Hz)
- Standard Accessories
Outflow Glass Pipe (Ø10), Inflow Glass Pipe (Ø13),
Clear Hose (Ø10) 1m, Clear Hose (Ø13) 2m, Hose Clip
- External Size: Ø144 x H360mm
- Capacity: 3L

- *For freshwater aquarium use only.
- *Flow rate and maximum pump head shown in data are under a no-load condition.
- *Set-package for 60 liter aquarium,
SUPER JET FILTER ES-300 (LILY TYPE),
comes with an outflow glass pipe (Ø10) and inflow glass pipe (Ø13).
- *Set-package for 36 liter and smaller aquarium,
SUPER JET FILTER ES-300 (SPIN TYPE),
comes with newly-developed LILY PIPE SPIN (outflow) and
LILY PIPE Mini (inflow).

SUPER
JET FILTER
ES-300



Lily Pipe Spin

Lily Pipe Mini



Slows the flow of water by
creating a circling flow inside

LILY PIPE Mini V-2 LILY PIPE SPIN

Lily Pipe Mini V-2 (Inflow)

■ Size: W55mm x H210mm(Ø13)

Lily Pipe Spin P-1 (Outflow)

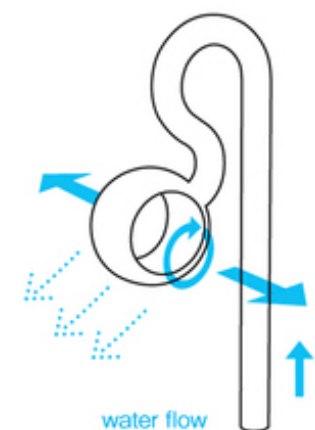
■ Size: W68mm x H150mm(Ø10)

Lily Pipe Spin P-2 (Outflow)

■ Size: W68mm x H150mm(Ø13)

ADA's LILY PIPE SPIN is designed for small size aquarium up to 36 liters. This product works well to slow the water flow from SUPER JET FILTER ES-300.

* For glass thickness 5 - 6 mm.





A Stunning Vista from Kamoshika Tenboudai (Itoigawa, Niigata, Japan)

People who visit Japan often state that the most beautiful autumn colored leaves are located here. However, they're not quite as beautiful as they once were, probably due to recent global warming and abnormal weather patterns. Still, there are a few places left where we can enjoy really fantastic colored leaves. One of these places is Kamoshika Tenboudai (the Antelope Observation Deck) off the Renge no Mori Nature Trail within Itoigawa City. During the autumn season, breathtaking panoramic views surround you for 360 degrees. It is one of a very few scenic places where we can enjoy the magnificent autumn leaves in their full brilliance.

Shooting data /Ebony 8x20, APO Symmar 480mm, 1/2 sec at f45, PL filter used,
Velvia 100F 8×20 inch format film
Text and photographs by Takashi Amano

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Special Feature

Layout Master Training Seminar



CO₂
Nishikienso CO₂ Supply

A wide range of skills and techniques are required to create and maintain a Nature Aquarium properly. Aqua Journal offers the “Layout Master Training Seminar” for everyone who is willing to start enthusiastically learning the know-how behind Nature Aquarium. Please refer to the information conveyed in this seminar to cover a broad range of knowledge for you to perfectly acquire the proper techniques. There is only one qualification for participating in this seminar - a “Passion” for aquatic plants. Now, let’s try!

Photographs by Takashi Amano
Text by Masatoshi Abe / Tsuyoshi Oiwa
Translation support by Frank Wazeter

Kanri_Maintenance

Maintenance

Eiyouso_Nutrients

Nutrients

Rokka_Filtration

Filtration

Tesyo_Substrate

Substrate

Hikari_Lighting

Lighting





PHOTO GALLERY

Fully Utilizing Various Aquatic Plants

In nature, a beautiful landscape is produced when the presence of both sun-loving trees and shade loving trees are integrated with layers of shrubs and herbs. The flora in nature serves as a very useful reference for creating an attractive Nature Aquarium. Planting aquatic plants in appropriate locations for their respective characteristics is important for making a layout which utilizes various species of aquatic plants. The aquatic plants which adapt to the environment will show a very healthy growth rate and appear to "sparkle" in the aquascape.

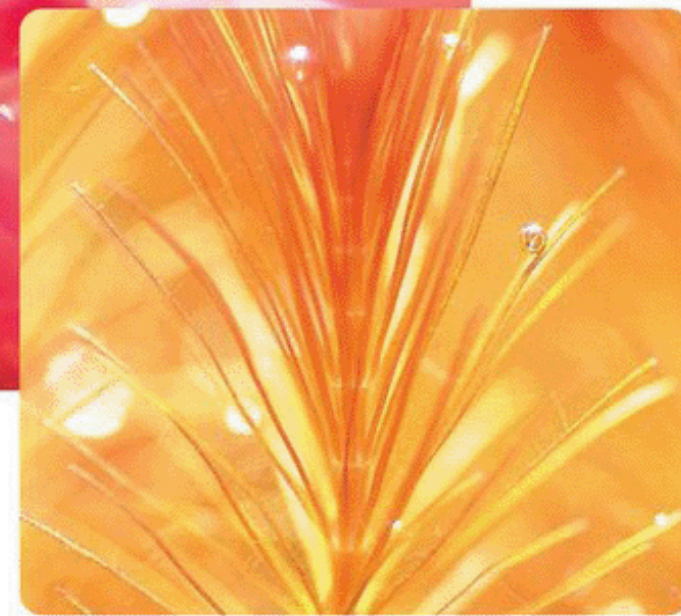
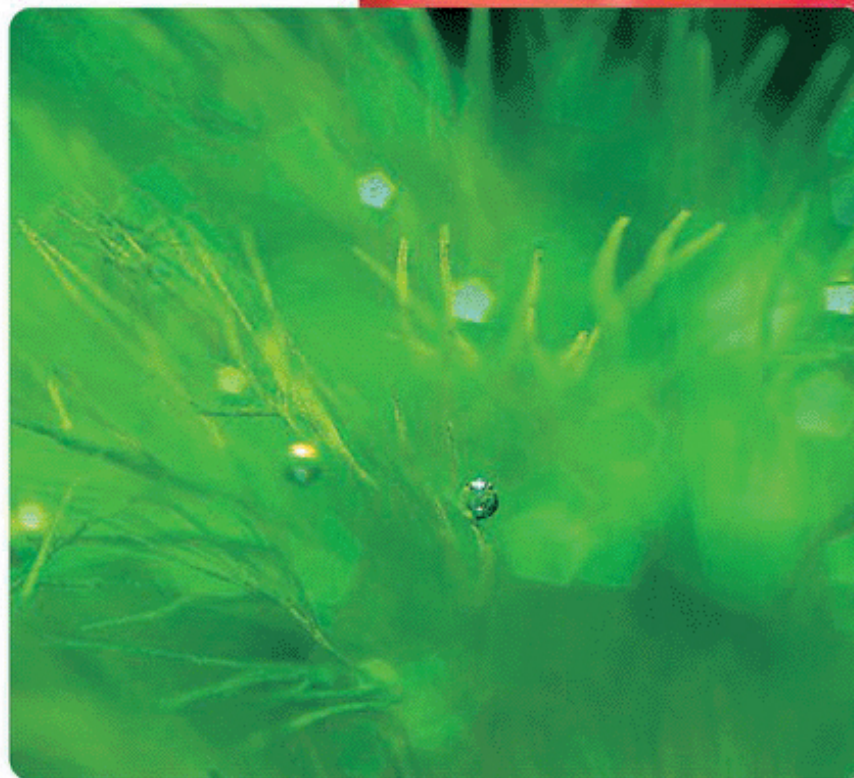
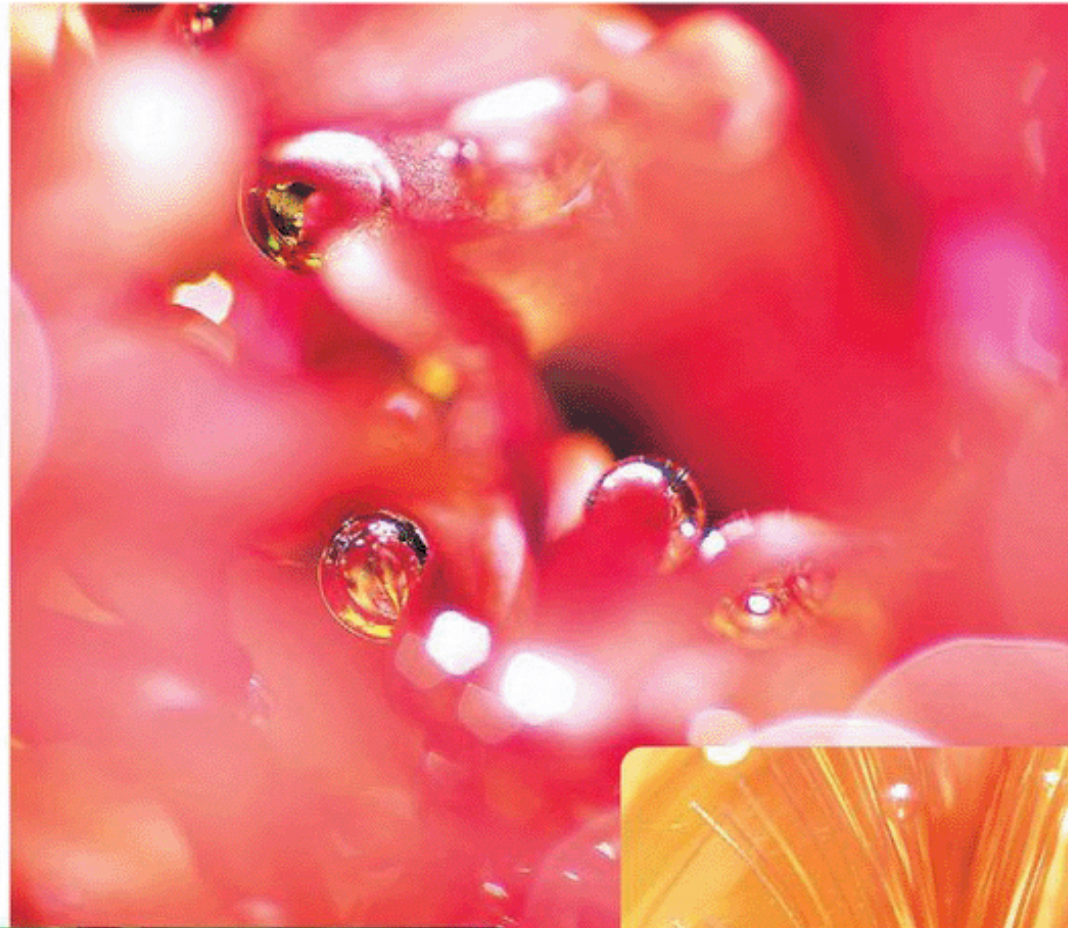
Tank size / W60 x D30 x H36 (cm)

CO₂ Supply Essential for Photosynthesis of Aquatic Plants

It is now a common practice to supply CO₂ to the planted aquarium. However, the same degree of effectiveness in CO₂ supply can not be expected from different CO₂ supply methods. This section introduces effective methods for CO₂ supply to grow healthy aquatic plants.

Nisankatanso_CO₂ Supply

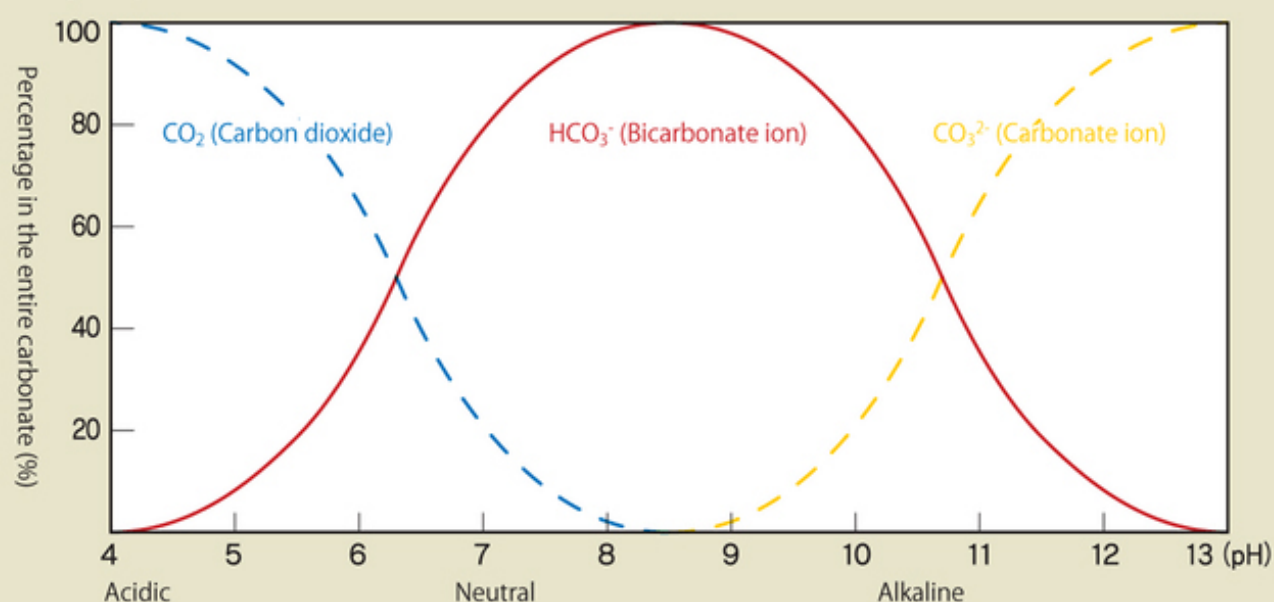
CO₂



Why do I need to supply CO₂?

Plants grow healthily through photosynthesis. In order to properly grow and perform photosynthesis, plants require light, CO₂, and water. However, when aquatic plants photosynthesize, they require significantly different CO₂ conditions from their terrestrial counterparts which carry out photosynthesis in the open air. When in water, the state of CO₂ is converted based on pH. Besides, CO₂ diffusion rates are significantly lower in an aquarium which does not have adequate water flow. For these reasons, a local lack of CO₂ may be caused around aquatic plants. This is a particularly pronounced problem in aquariums with limited water surface area and water volume. To grow lush and healthy aquatic plants in such an environment, CO₂ supply is absolutely critical. However, not just any CO₂ system will do. There are a few ways of supplying CO₂ that is effective for promoting photosynthesis while other ways do not deliver much effect. The method of CO₂ supply that can lead to a sudden rise in CO₂ levels is not suitable due to safety reasons. The CO₂ system adopted by ADA is an extremely safe and effective natural CO₂ supply utilizing a cartridge of liquified carbon dioxide, which becomes diffused through a Pollen Glass diffuser. The fine mist of CO₂ bubbles released from Pollen Glass is very easily dissolvable in water and

■ Change in pH and forms of carbonate



Free carbon dioxide increases as the water becomes more acidic. Free carbon dioxide is a form usable for photosynthesis in most aquatic plants.

the supply is sufficient to meet all of the CO₂ demands of the plants. The pH level in the water lowers when CO₂ is supplied. In mildly acidic water, free carbon dioxide molecules in the water increases, creating a conducive environment that promotes photosynthesis for many aquatic plants. Alternatively, if the CO₂ supply is insufficient, the pH level rises and the water becomes neutral or mildly alkaline as a result of the photosynthesis process. When

this happens, the free carbon dioxide molecules in the water decrease and bicarbonate (HCO₃⁻) increases, causing a negative impact on photosynthesis. There are a few rare exceptions - such as *Hemianthus micranthemoides*, which will not be negatively affected by this event. Natural CO₂ using a Pollen Glass will directly increase the level of CO₂ in the water. This method is very effective for promoting photosynthesis.

Adjustment of CO₂ supply amount

The Adequate amount of CO₂ to be supplied varies depending on the tank size. This is because a larger amount of CO₂ is required for a large amount of water to maintain the same CO₂ level. Even for the same size of aquarium, the appropriate amount of CO₂ varies with the type and thickness of aquatic plants growing in it. Therefore, it is necessary to finely control the amount of CO₂ to be supplied for each tank. The ideal tools for the adjustment of the CO₂ levels are the CO₂ Bubble Counter and CO₂ Beetle Counter. In the DATA for aquascape photographs featured in photo books and Aqua Journal magazines, the phrase such as "3 bubbles per second with

CO₂ Bubble Counter" is used to indicate how much CO₂ is to be supplied to the tank. You may refer to this data as a reference for the standard CO₂ amount to be supplied to the respective tank size with lush aquatic plants. During the initial setup period of aquarium, the amount of CO₂ should basically be about one third to one half of the volume indicated in the aquascape data. For example, the standard amount of CO₂ to be supplied to a 60cm tank is "one bubble per second with CO₂ Bubble Counter" in its initial stage. As the aquarium ages, the CO₂ amount is to be gradually increased to cope with a higher rate of photosynthesis of growing aquatic plants.

Keep in mind that excessive CO₂ amount can contribute to slower leg movement of Yamato Numa Ebi (Caridina Japonica or Amano shrimp) due to a minor lack of oxygen. In this event, the amount of CO₂ supply should be slightly reduced to adjust to the appropriate amount. This adjustment method is effective to find the optimal amount of CO₂ to be supplied; but it requires a certain amount of experience. If you are a beginner, it is recommended to use Drop Checker for convenience. The pH level of water changes by how much CO₂ is supplied to the aquarium. Based on this fact, Drop Checker, which changes its reagent color according to the pH level of water helps you determine if the CO₂ supply amount is appropriate. When the reagent of Drop Checker is blue or bluish green in the morning before the start of CO₂ supply, it can be determined that an appropriate amount of CO₂ is supplied if the reagent has turned green in 4-5 hours after the CO₂ supply is started (and the lighting is turned on). In the event the reagent remains blue, the CO₂ amount is too little while it is too much if the reagent turned yellow.



A bubble formed within the CO₂ Bubble Counter. It serves as a reference for the CO₂ supply amount.



Reagent colors of Drop Checker that can be used as a reference of CO₂ level in water.

Product Features

Upgrading the CO₂ Advanced System

The CO₂ Advanced System is an ideal CO₂ supply system for a 60cm tank that contains all the instruments and parts necessary for CO₂ supply. By adding ADA's CO₂ Adapter and Tower to the CO₂ Advanced System, the running cost can be reduced with the use of a large refillable tank instead of a small cartridge. If CO₂ Beetle Counter and Pollen Glass Beetle are further added, the system can be used for 90cm or larger tanks.



[Nature Aquarium Terminology]

•Photosynthesis

A reaction by which chloroplasts of plants produce organic compounds from CO₂ and water using light. Organic compounds produced by photosynthesis are mainly used by plants for their growth. Oxygen is a by-product of photosynthesis.

•Natural CO₂ supply

A method to supply CO₂ where Pollen Glass is used to produce fine CO₂ bubbles to allow CO₂ to be naturally dissolved in water. This is a safe CO₂ supply system because more CO₂ bubbles are dissolved in low- CO₂ water and on the other hand, the dissolution of CO₂ bubbles slows down when CO₂ level of water is high. In contrast, the forced CO₂ supply in which CO₂ is forcedly dissolved into water flow has the risk of oxygen deficiency caused by sudden rise in CO₂ level.

• Liquefied carbon dioxide

High concentration of pure CO₂ filled in a cartridge or tank under high pressure (at approximately 6.0MPa). ADA has product ranges consisting of small cartridges (Tropical Forest, etc.) and large tanks (Tower, etc.).

• Free carbon dioxide, bicarbonate and carbonate

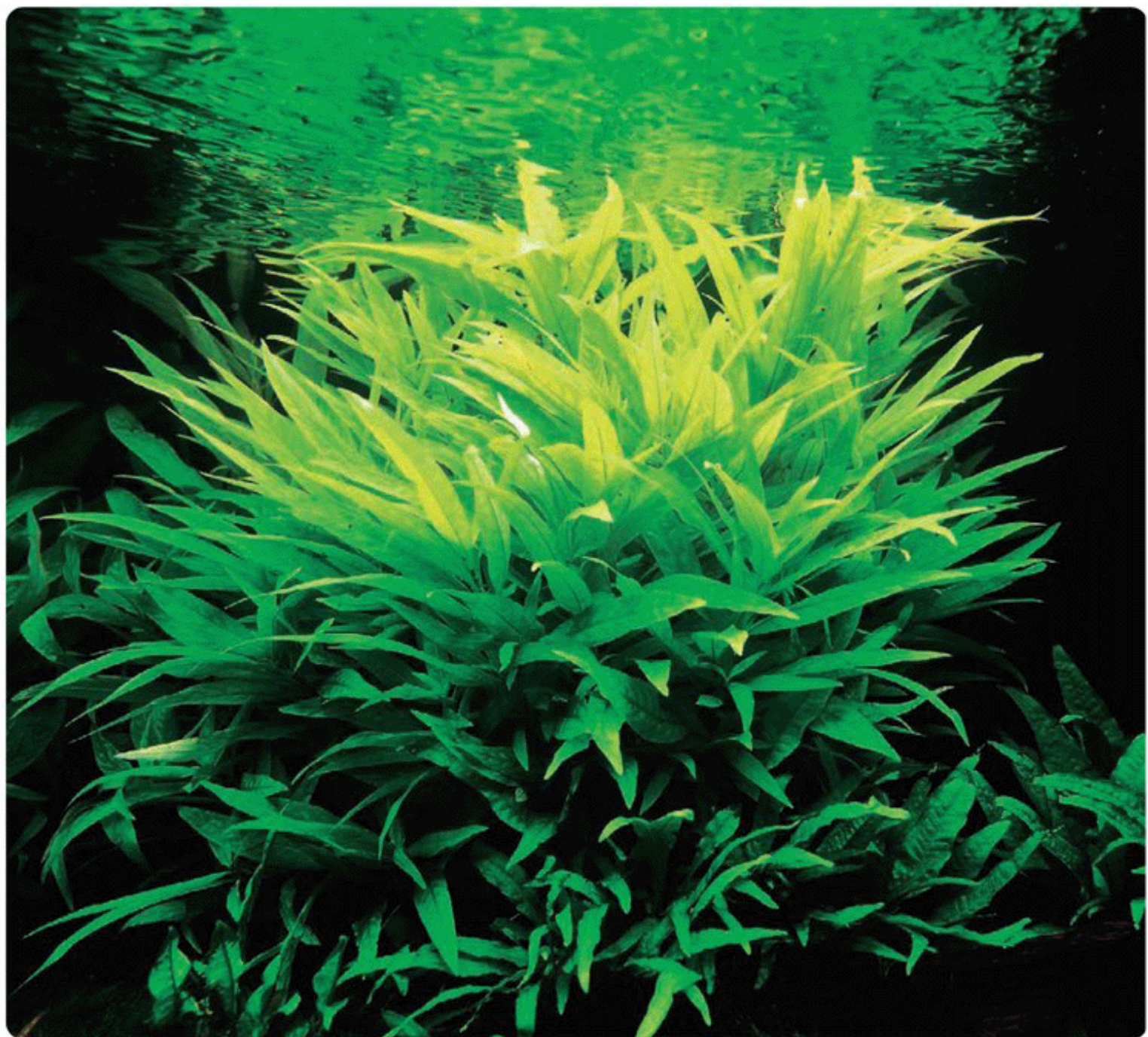
Carbon dioxide that is dissolvable in water is converted into free carbon dioxide in water. It is also converted into bicarbonate (HCO₃⁻) and carbonate (CO₃²⁻) when reacting with water. The ratio of these three forms of carbon dioxide varies depending on the pH level of water (hydrogen ion concentration).

Ideal Lighting for the Underwater Photosynthesis of Aquatic Plants

Lights that are suitable for photosynthesis vary between aquatic plants and ordinary land plants. This is due to the fact that some spectrums of wavelengths are attenuated rapidly in water while other wavelengths can penetrate deep water.

Hikari_Lighting

Lighting



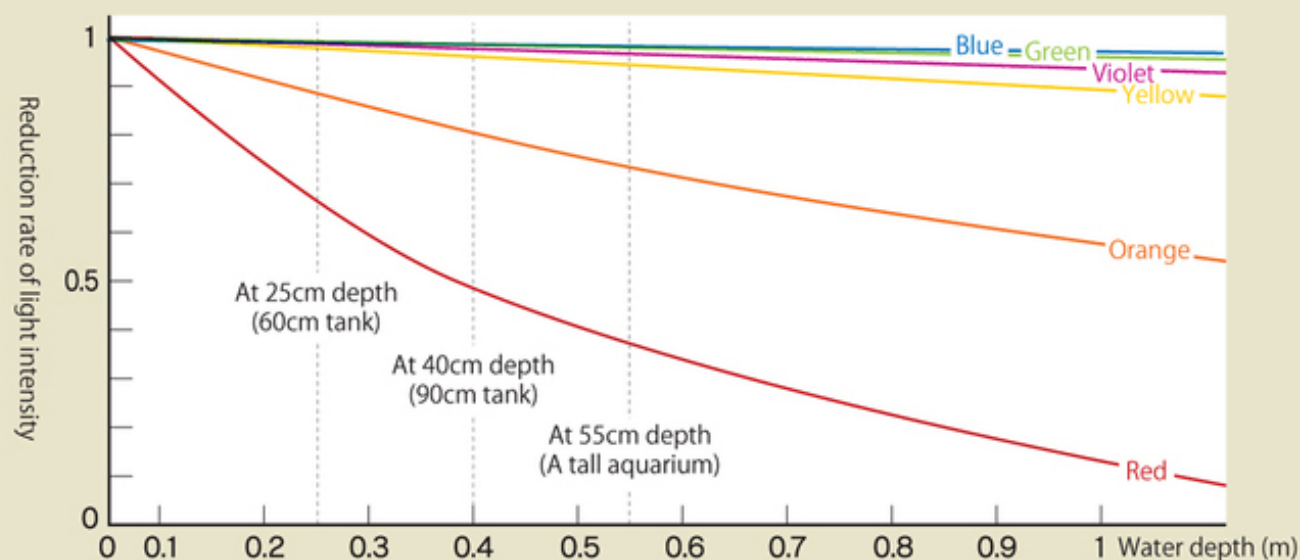
Light is the most important condition for plant growth

Among various growing conditions for aquatic plants in nature, such as substrate, nutrient salt concentration and presence of water flow to mention a few, the most important condition is light. This can be seen from the fact that no aquatic plants are distributed in deep waters where underwater light intensity is so low that plants are unable to perform photosynthesis. Light generally becomes weaker in water due to attenuation. To cope with this factor, aquatic plants have evolved

to use low levels of light effectively. For example, some *Cryptocoryne* species in South-east Asia develop a number of submersed leaves to cover as much surface area as possible to capture light that is only available for a few hours a day. *Cryptocoryne* plants grow uniquely-shaped and colored submersed leaves so that they can perform photosynthesis even with only a few hours in low light to thrive. In water, light is attenuated with increasing water depth and the attenuation

varies depending on the light wavelength. The red region of the light spectrum is very rapidly attenuated in water and therefore does not penetrate much in water. On the other hand, the blue part of the light spectrum penetrates deep water due to low attenuation. Considering these facts, it is believed that the submersed leaves of aquatic plants use blue light for the photosynthesis process. ADA's NA Lamp contains more blue wavelengths of the spectrum than ordinary fluorescent lamps based on this concept. With this Lamp, aquatic plants undergo photosynthesis more vigorously and grow healthier. Under ADA's lighting system, both the metal halide and LED lights contain more blue spectrum light and they are therefore beneficial for the healthy growth of aquatic plants even in deep water. Its effect can be observed particularly on foreground plants such as *Glossostigma* and *Eleocharis acicularis*. These plants grow in shallow, bright places in nature, but in the aquarium, they are usually planted in low-light sections. In light of this, aquariums with thick foreground plants show that an adequate amount of light is supplied even to the foreground location.

■ Reduction in underwater light intensity by spectrum



Light attenuation in underwater environments vary by wavelength. The red range of the spectrum is attenuated the quickest while the blue part of the spectrum is not attenuated nearly as much.

Characteristics of each light source

Lighting systems use various types of light sources such as fluorescent, metal halide and LED lamps. What features do these light sources have? First of all, each light source is different in light emission, brightness (total luminous flux and luminance) and color temperature. Therefore how aquatic plants and fish within an aquarium appear differs depending on what light source is used. NA Lamp (including NA Lamp Twin) is a fluorescent lamp featuring high light diffusion and an excellent color rendering property. The interior of the aquarium looks bright and vivid under this lamp. However, it also has the disadvantage that it cannot be installed away from the water surface in order to avoid the problem of lower light intensity caused by light diffusion. A metal halide lamp, such as NAMH-150W, emits strong light while presenting a superior color rendering property, which is also a great feature of the fluorescent-type NA Lamp. NAMH-150W can be installed away from the water's surface to a certain extent but it tends to cause problems where the center of the aquarium becomes much brighter than other parts and more shadows appear in the aquarium. These problems are caused due to the linear light emitted by a metal halide lamp. As a solution to these shortcomings, Grand Solar I, which is

equipped with a metal halide lamp and twin fluorescent lamps had been developed. With Grand Solar I, a vivid and bright aquarium can be achieved even with a good distance between the lighting system and water surface. Meanwhile, LED's, a new light source, has advantages including highly energy saving efficiency with very low power consumption for the brightness achieved. Another great feature of the LED is that the size of the lighting system can be made compact using an LED lamp. LED lighting systems for the aquarium that have been released in the past did not create satisfactory brightness, color tempera-

ture and color rendering properties and thus they were not suitable for aquatic plants. ADA's latest LED lighting system, the AQUASKY has resolved these issues. With its simple, slim design, AQUASKY has successfully made a fresh new style of aquarium lighting systems. The most optimal choice of lighting system varies depending on the tank size, users' preference in design and the style of layout (open aquarium or underwater layout only). It is advised to select the optimal light source most suitable for your aquarium taking these factors into consideration.



A pendant style lighting system that allows you to create an open aquarium.



LED lighting system AQUASKY features an enhanced simple and elegant design.

Product Features



Solar II

Solar II is a lighting system equipped with twin fluorescent lamps designed for 60cm tanks. It uses two units of NA Lamp 36W Twin as the light source. It features an excellent color rendering property despite the disadvantage of needing to be installed near the water's surface.



Solar I

Solar I is a lighting system that uses a metal halide lamp designed for a 90cm tank. Since the light source of Solar I emits strong light, this lighting system can be installed away from the water surface and is suitable for open aquarium. Its disadvantages of causing an extremely bright center part of the aquarium and making dark shadows have been improved with the Grand Solar I which is equipped with additional two units of NA Lamp 36W Twin.



AQUASKY

The world's first LED lighting system for aquatic plants. Through improving on the weakness of conventional LED aquarium lights, including light intensity, color temperature and color rendering properties, AQUASKY has been developed as a lighting system that promotes the healthy growth of aquatic plants and helps to create an appreciation for aquatic plants by making them appear more attractive. When used together with its dedicated clear stand, AQUASKY has a compact lighting unit featuring an excellent stylish design.

[Nature Aquarium Terminology]

• Illuminance

Illuminance is the measure of the intensity of light (the amount of light received) on a certain location (such as the water surface for an aquarium). Illuminance is indicated in Lux (lx). In water, illuminance varies depending on the type and number of light sources as well as the distance from the water line (because number of flux reaching the water surface from the light source differs by these conditions). Illuminance is higher where the lights from multiple lighting sources overlap.

• Total luminous flux

Total luminous flux is a measure of total intensity (amount) of light emitted from a lamp which is the light source. Luminous flux is indicated in Lumen (lm). Since fluorescent and metal halide lamps emit light in all directions, the level of total luminous flux may not be reflected in illuminance properly unless the light is guided appropriately with tools such as a reflector.

• Color temperature

Color temperature is a measurement in Degrees Kelvin (K) that indicates the hue of light. Color temperatures with warm colors are low while that of cold temperatures are high. The color temperature becomes higher as more blue light is added, which is beneficial for photosynthesis. The most appropriate color temperature for planted aquariums is about 7,000 – 8,000K taking into account the color rendering property. A color temperature higher than that (10,000 – 12,000K) may affect the color rendering property.

• Color rendering property

The Color rendering property is a measure of the ability of a light source to reproduce the colors of various objects authentically in comparison with a natural light source. It is indicated in Average Color Rendering Index (Ra) with a maximum of Ra 100. Fluorescent NA Lamp has the average color-rendering index Ra=90, which means that the light from an NA Lamp is extremely close to natural light (its color rendering property is very high).

Symbiotic Relationship between Aquatic Plant Roots and Microorganisms

Aquatic plants need to grow their roots across the substrate for their healthy growth. To achieve this, a symbiotic relationship with microorganisms within the substrate is vital. This section discusses the substrate system of Nature Aquarium that has evolved in unique ways.

Teisyo_Substrate

Substrate

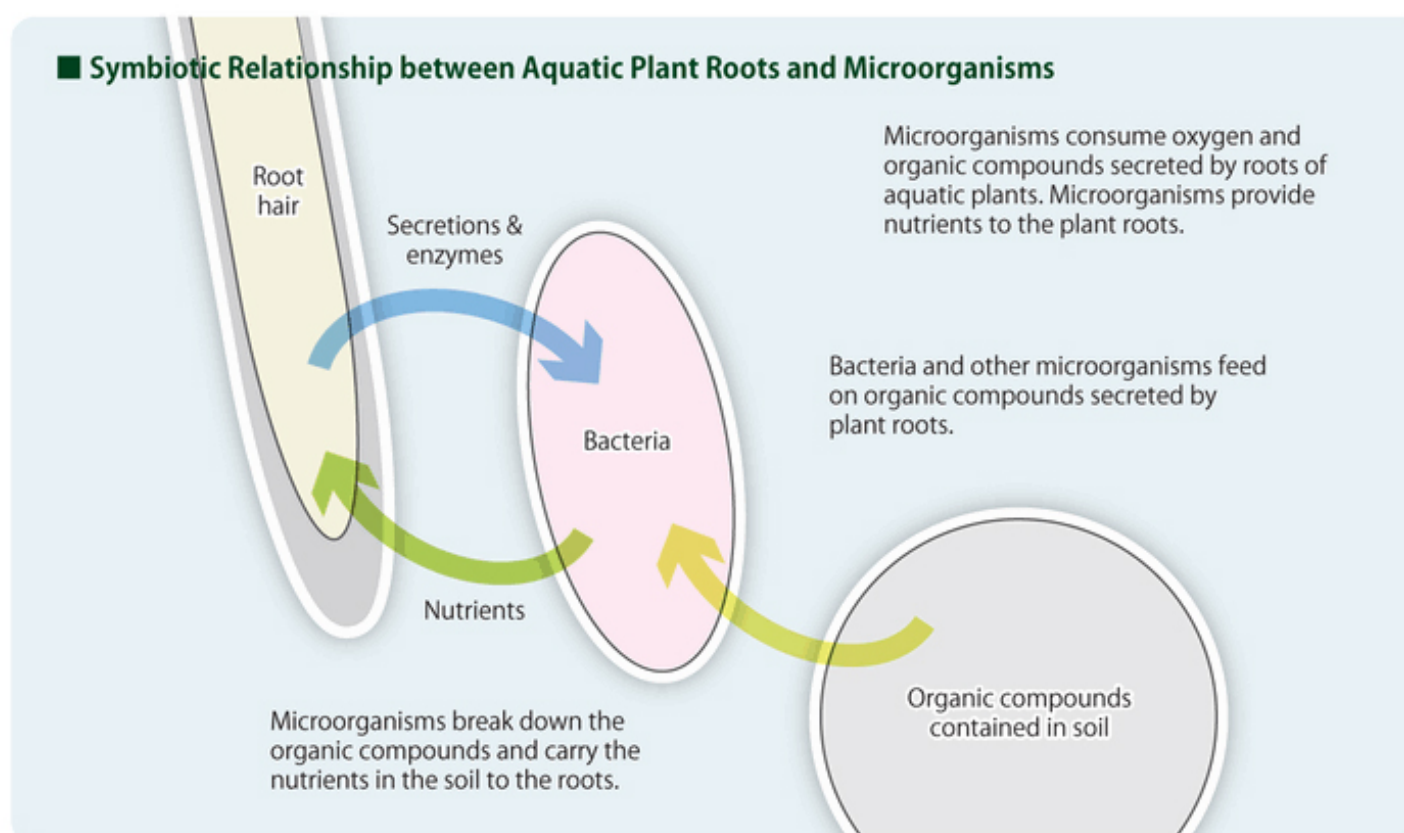


Substrate for the healthy growth of aquatic plants

It has been a common practice to place sand as the substrate in aquariums for ages. Substrate sand plays the role of adding a natural feel to the aquarium and also promotes water purification and the anchorage of aquatic plants. The substrate of Nature Aquarium has evolved from ordinary sand to the current system with the aim of providing the environment close to the substrate in nature. On the bottom of rivers and ponds in nature, aquatic plants thrive by spreading the roots in the substrate. Referring to the substrates in nature, the substrate system of Nature Aquarium using Power Sand and Aqua Soil has been established. Power Sand is placed at the very bottom of the substrate system for the purpose of nutrient supplementation and the prevention of a hardened substrate. In the times when ocean gravel which contained no nutrients was used to build substrate, the organic nutrients in Power Sand placed under the gravel was of particular importance for the growth of aquatic plants. In the current system, Aqua Soil-Amazonia is placed on top of Power Sand. Within this system, the organic nutrients contained in Power Sand promote

the growth of beneficial bacteria in the substrate which enables it to achieve a long-term sustainable substrate. Another beneficial feature of Power Sand is its uneven and porous grain that helps prevent hardening of the substrate under hydraulic pressure. Aqua-Soil Amazonia is a substrate material made of natural black soil that is beneficial to the growth of aquatic plant roots. Natural soil

contains rich nutrients including organic acids and nitrogen that promote the growth of plant roots. It is adequately soft and thus will not hinder the growth of roots. Aqua Soil is made by baking and hardening such a beneficial natural soil into grain form. Roots of aquatic plants grow well in Aqua Soil and form an appropriate weight and excellent permeability characteristics.



“Live substrate” for long term maintenance

Power Sand and Aqua Soil-Amazonia contain abundant organic compounds that serve as nutrients for plants. However, aquatic plants cannot take them up directly. Organic compounds can be absorbed by aquatic plants only after they are broken down into inorganic forms with the help of bacteria. For this reason, a large number of bacteria needs to be present around the roots of aquatic plants. Bacter 100 and Clear Super, which are substrate additives that are sprinkled on Power Sand during the setup of the substrate, promote the growth of beneficial bacteria. Eventually, a lot of bacteria and other microorganisms gather around the aquatic plant roots to consume the organic compounds secreted by the roots and abundant oxygen, creating a symbiotic relationship between aquatic plant roots and microorganisms. This is how a “live substrate” is formed. Meanwhile, feces of fish and shrimp builds up in the substrate as time goes by. Comprised mostly of organic matter, the feces is absorbed by aquatic plants after it

is decomposed by bacteria and the residue that is left over becomes sludge. An excessive amount of feces and sludge buildup in the substrate causes clogging problems within the substrate and creates poor permeability, resulting in an overall deteriorated condition of the substrate in an anaerobic state. However in a “live substrate”, the feces is broken down adequately and thus the long-term

maintenance of the substrate is easy with a lesser amount of sludge buildup. During a layout makeover, you will see some brown water when you remove the substrate. This brown water contains rich microorganisms. Do not completely remove this but leave some of the brown water before setting up a new substrate over the top of the old. This is key to early achievement of a “live substrate.”

■ Substrate system by purpose

Use your own know-how to combine substrate materials. Please refer to the above table when selecting substrate materials.

STYLE \ MATERIAL	Aqua Soil	Aqua Soil Powder	Cosmetic Sand	Power Sand	Power Sand Special	Bacter 100	Clear Super	Tourmaline BC	PENAC W	PENAC P
Enjoy aquatic plants in a mini tank		○								
Enjoy aquatic plant layout with a low budget	○			○						
Enjoy a basic aquatic plant layout	○			○		○	○			
Enjoy split substrate using cosmetic sand	○		○	○ (Only for the portions with Aqua Soil)		○	○			
Enjoy Cryptocoryne and Echinodorus as the main plants	○				○	○	○			
Enjoy aquatic plant layout with an established substrate system	○	○ (Only for the top layer)			○	○	○	○	○	○

Product Features



Power Sand

Using uneven, porous volcanic stones as the base material, Power Sand is a substrate material containing organic and inorganic nutrients. Besides serving as a source of nutrients, it also plays the role of preventing the hardening of substrate and maintaining a good substrate permeability. The uneven surface of volcanic stone is a conducive place for the growth of bacteria, contributing to the long-term maintenance of a “live substrate”.

Bacter 100

There are so many types of beneficial substrate microorganisms and not much effect can be expected if only a few types of bacteria are added to the substrate. Bacter 100 contains more than a hundred kinds of soil bacteria in a dormant state. Various types of microorganisms adapted to the environment will eventually grow by applying this additive to the substrate during the initial set up of the substrate. This helps you to achieve a “live substrate” early on.



Clear Super

Clear Super is a substrate additive to promote the growth of microorganisms provided by Bacter 100. It is made from superabsorbent activated carbon powder and organic acid that serve as an initial food source for microorganisms. Use Clear Super together with Bacter 100 for enhanced effectiveness.



[Nature Aquarium Terminology]

• Organic nutrients

Organic nutrients are mainly matured vegetable matter that has been decomposed by bacteria. Compost and mulch are representative of organic nutrients. Rich organic compounds are further broken down into inorganic nutrients that are absorbable by plants. Since organic nutrients are slowly decomposed, the nutrients are supplied for a long period of time.

• Microorganisms

Microorganism is a general term referring to tiny bacteria, fungi and protozoa that are visible only with a microscope. In an ecosystem, it serves mainly as a decomposer that plays an important role of converting organic compounds into inorganic forms that will circulate within the ecosystem. In the aquarium, microorganisms play an active role mainly within the substrate and filter.

• Anaerobic environment

Anaerobic environments are an environment where there is little available oxygen. In such an environment, aerobic bacteria requiring oxygen can hardly become active while anaerobic bacteria increase and cause nitrite (NO₂) and hydrogen sulfide (H₂S) that are harmful to fish and shrimp. Excessively anaerobic substrate environments can cause deteriorated water quality and unhealthy dark aquatic plant roots.

• Sludge

Sludge is a buildup of the leftover residue of fish and shrimp feces that has not been decomposed by bacteria. In fact, sludge is inseparable from organic compounds contained in feces and also bacteria that decompose feces. In light of this, the term “sludge” covers all these factors. It looks like brown mud and is built up mainly on the substrate and in the filter.

Performance of the Filter Influences Water Quality

Filtration is essential for keeping fish in a healthy condition and maintaining clear tank water. Nature Aquarium uses an external filter that has a high filtration capacity and is free from wasting CO₂.

Roka_Filtration

Filtration



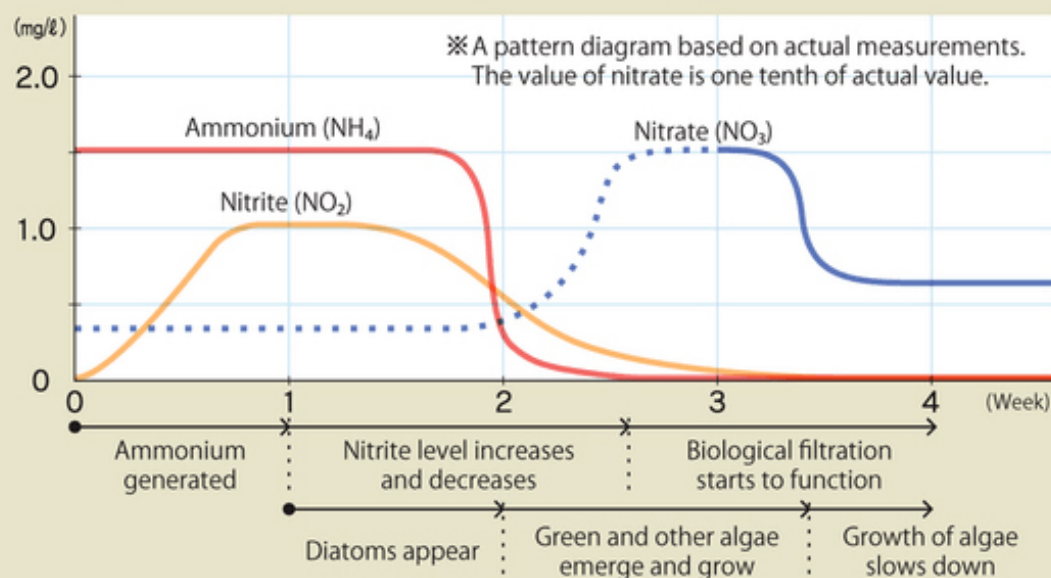
The importance of filtration for maintaining an attractive layout

Clear water in good quality is an indispensable prerequisite to achieving a healthy and attractive Nature Aquarium. Aquarium plants and fish do not look attractive in cloudy water. Besides, poor water quality will result in a significant increase in algae and slow the movement of shrimp. A filter that is installed on an aquarium to ensure water clarity and maintain good water quality. However, a filter installed to the aquarium does not provide the instant

effect of improving the clarity and quality of water. When setting up a filter using brand new filter media, it usually takes three to four weeks until the filter functions in a stable manner. The first two weeks in the initial setup period of an aquarium is called the "terrible two weeks" because the aquarium in this stage is prone to deteriorated water quality and algal growth. Inside the filter, bacteria colonize the surface of filter media and break

down organic compounds and nitrogen compounds (including ammonium) ("biological filtration"). Since it takes about three to four weeks for bacterial colonization on filter media, the tank water easily becomes dirty particularly in the first two weeks when adequate microorganisms have not grown yet. During this period, an excessive amount of organic compounds as well as nitrogen compounds leach out of the substrate. These substances should be removed as much as possible by changing the tank water often. Ammonium (NH₄) in water is converted into nitrite (NO₂) and further into nitrate (NO₃) by nitrifying bacteria. Periodical monitoring of these substances using a Pack Checker helps you identify the bacterial growth within the filter through identification of change in water quality. When no ammonium (NH₄) and nitrite (NO₂) are detected, it can be judged that nitrogen compounds have completely been converted into nitrate (NO₃). This state tells us that the filtration system has been successfully established (i.e., biological filtration has started functioning). Keep in mind that no fish should be added to the aquarium until the filtration system has been established.

Change in nitrogen compound levels during the initial setup period of aquarium

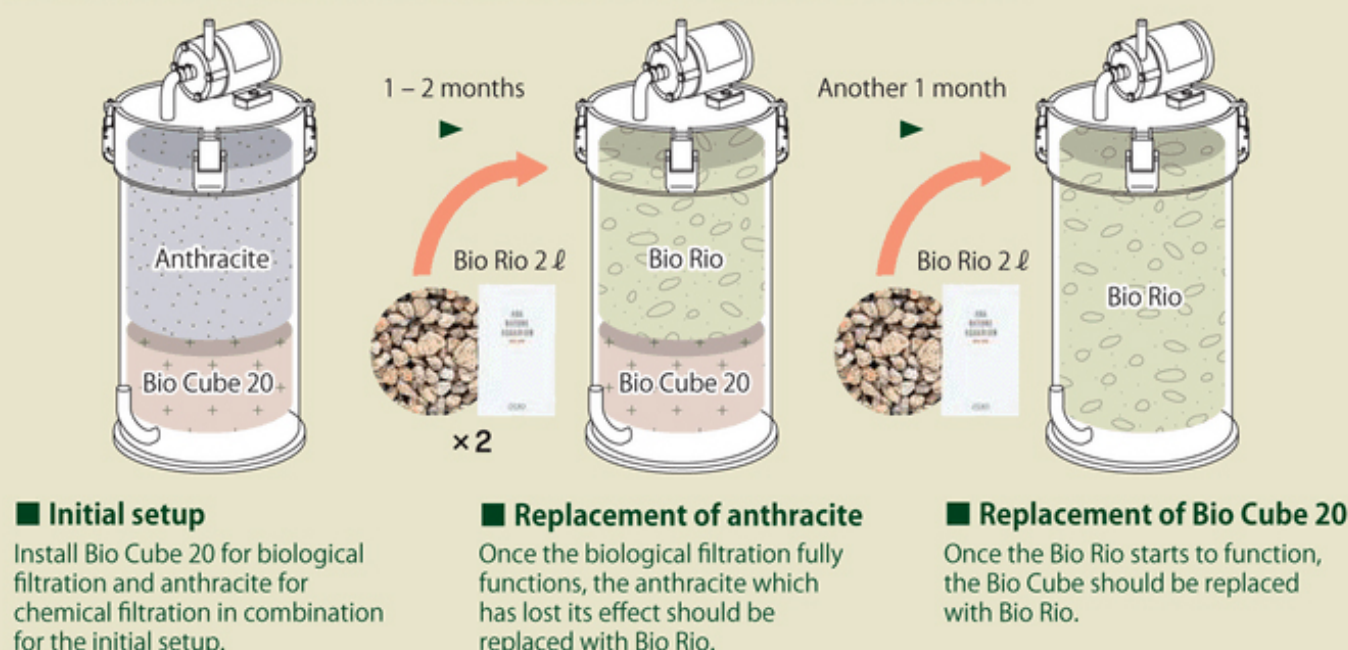


During the initial setup period of an aquarium, ammonium increases, followed by nitrite. They will be mostly converted into nitrate in three to four weeks time.

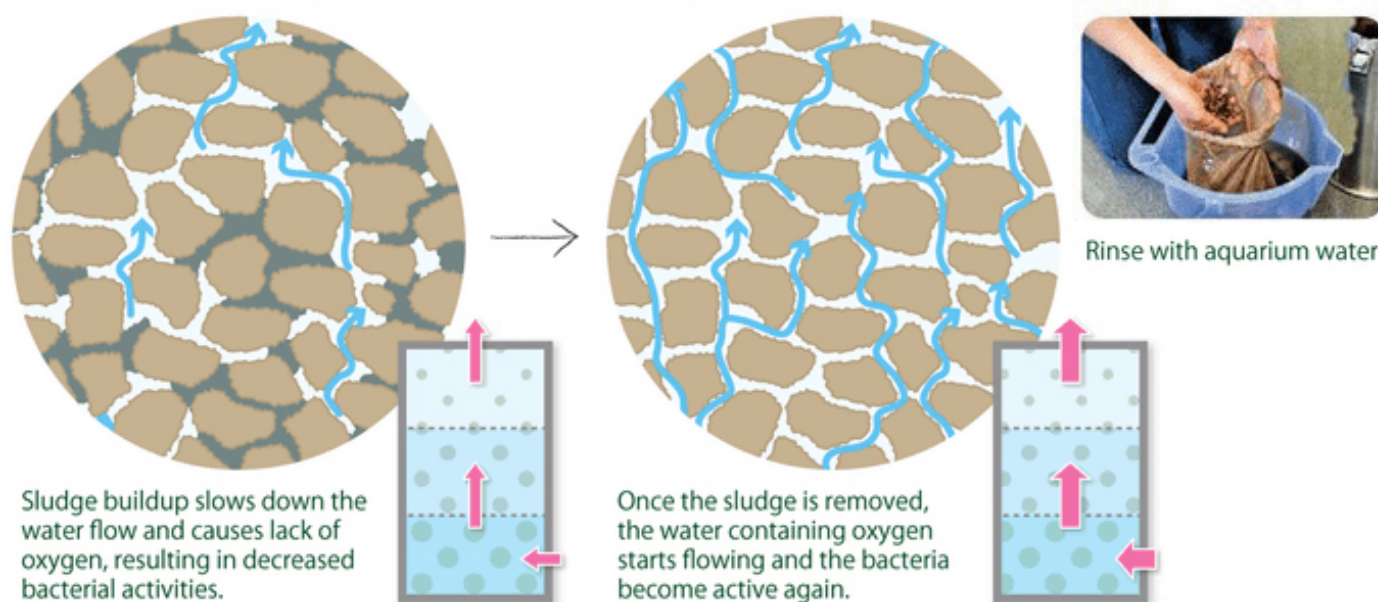
Replacement and maintenance of filter media

Super Jet Filter features high filtration efficiency with a streamlined cylindrical canister that can be filled with a large amount of filter media. Each model comes with different types of filter media, but it is recommended to use biological filter media (Bio Rio or Bio Cube) and activated carbon (NA Carbon or anthracite) in combination until biological filtration starts to function. By absorbing and removing organic compounds in water, activated carbon supplements the functions of the filter until the biological filtration fully works. Once the absorption effect of activated carbon is lost in about two weeks, the carbon needs to be replaced with fresh carbon to maintain the excellent absorption effect of the carbon. In the case where the biological filtration is adequately functioning, it is advisable to replace the activated carbon which has lost its effect with a biological filter medium. The water quality becomes stable once the biological filtration starts to fully function. However, as the sludge builds up on the filter media over time, the filtration performance declines and may result in deteriorated water quality and algal growth. As a measure against this problem, the filter media should be cleaned on a periodical basis, about every two to three months, to remove the sludge and ensure good filtration performance. To clean the filter media, stop the filter and put the filter media which has been taken out of the canister into a pail. Pour some aquarium water into the pail and lightly rinse the filter media. Never wash the filter media with tap water containing chlorine which is harmful to live microorganisms living on the surface of the filter media. When rinsing the filter media in aquarium water, avoid rinsing them hard with force.

Example of Installation and Replacement of Filter Media for ES-600/ES-300



Decline in filtration performance caused by sludge



Product Features

Super Jet Filter ES-300 (to be released in November 2012)

New Super Jet Filter ES-300 is an external filter designed for 45cm to 60cm aquarium tanks. The capacity of filter media is 3 ℓ. The canister size of ES-300 is smaller than ES-600, but its flow rate of 6 ℓ/min (at 50Hz with no load) is comparable with ES-600. This model comes with filter media consisting of Bio Cube 20 and anthracite in a net (same as ES-600) to minimize the risk of unsuccessful filtration during the initial setup period of the aquarium. This external filter is easy to handle even for beginners.

(Prototype)



[Nature Aquarium Terminology]

• Organic compounds & nitrogen compounds

The building of a substrate using Power Sand and Aqua Soil-Amazonia in combination can lead to leaching of organic compounds and nitrogen compounds (including ammonium) into water. This is not an abnormal condition. Once the biological filtration starts functioning, these compounds are broken down and will eventually be removed when the substrate is covered by aquatic plants.

• Nitrification

Nitrification is a process in which ammonium (NH_4) is converted into nitrite (NO_2) and further into nitrate (NO_3) by nitrifying bacteria (nitrite bacteria and nitrate bacteria). This process requires oxygen. Ammonium and nitrite are harmful to fish and shrimp, but they will become relatively harmless after being converted into nitrate.

• Free living bacteria

A large number of organic compounds in water can cause free living bacteria feeding on them, resulting in cloudy aquarium water. The cloudy water problem due to free living bacteria cannot be resolved just by water change. To solve this problem in a short period, it is advised to install a UV germicidal lamp on the outlet hose of the filter. Protozoa such as Stentor grown in the filter feed on free living bacteria and are beneficial to control the cloudy water problem.

• Aerobic and anaerobic

Microorganisms including bacteria and fungi are categorized into aerobic and anaerobic groups depending on the need for oxygen for survival. Microorganisms that require oxygen for survival are aerobic microorganisms while those that do not require oxygen are anaerobic microorganisms. The microorganisms that break down organic compounds and nitrogen compounds in the filter are generally aerobic. In view of this, the water containing rich dissolved oxygen should be supplied to the filter by way of plants' photosynthesis as well as aeration.

Nutrients for Bringing Out the Charm of Aquatic Plants

Appropriate nutrients are essential (along with photosynthesis) for the healthy growth of aquatic plants. However, excessive amount of nutrients may cause algal blooms. This section discusses ideal nutrients for the growth of aquatic plants.

Eiyouso_Nutrients

Nutrients



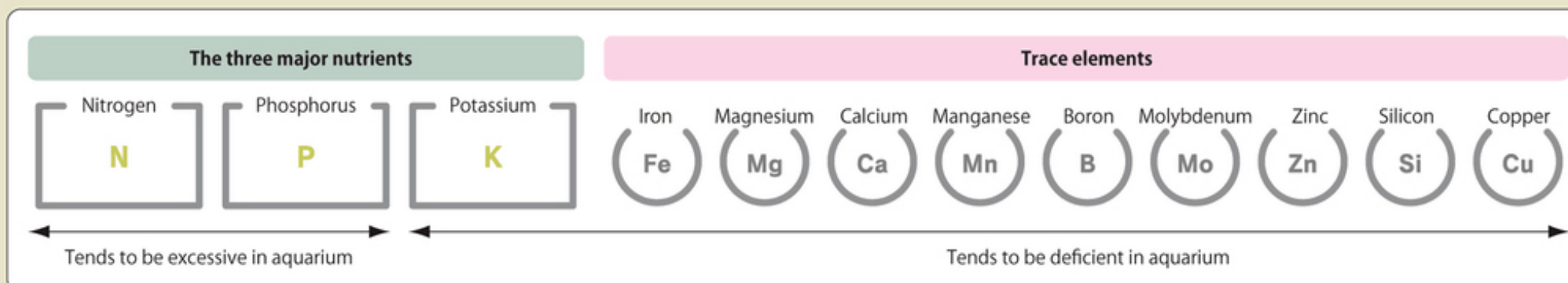
Nutrients essential for aquatic plants

Plants produce organic compounds through photosynthesis. However, it is not sufficient for them to grow healthily. To attain healthy growth, the organic compounds produced during photosynthesis need to be combined with nutrients such as nitrogen, phosphorus and potassium to further synthesize various organic compounds. Unlike ordinary land plants that take up nutrients only through their roots, aquatic plants absorb nutrients through the surface of submersed leaves as well (foliar absorption). That is why the use of liquid fertilizers that is to be applied directly to the water is effective for aquatic plants, along with substrate fertilizers. Nutrients necessary

for plants consists of the three major nutrients, namely nitrogen (N), phosphorus (P) and potassium (K) which are required in large amounts, and trace elements which are required only in small amounts but are extremely vital to the healthy growth of plants. Of these nutrients, nitrogen and phosphorus are abundantly produced from the feces of fish and shrimp and therefore tend to be excessive in the aquarium. On the other hand, potassium and trace elements easily become lacking due to a limited supply within the aquarium. In light of these facts, Nature Aquarium uses the liquid fertilizer that is free from nitrogen and phosphorus, which can

cause algal growth, and contains only potassium and trace elements. Supplying these nutrients makes up for the scarce nutrients and also promotes the plants' absorption of nitrogen and phosphorus, thereby suppressing algal growth. The product lineup for daily-use liquid fertilizer consists of Brighty K containing mainly potassium and Green Brighty STEP 1 to STEP 3. Choose the appropriate Green Brighty product from STEP 1 to STEP 3 according to the period since the initial setup of the aquarium. When the period during which aquatic plants grow vigorously, it is advised to use STEP 2 which contains more iron.

■ Essential nutrients for aquatic plants



Plant nutrients consist of the three major nutrients, namely nitrogen, phosphorus and potassium, and trace elements that are in small amounts but vital for healthy growth of plants.

Liquid additives to supplement the effect of liquid fertilizers

In Nature Aquarium, Brighty K and/or one of Green Brighty STEP 1 to STEP 3 is applied to the aquarium daily. Application of these fertilizers usually supplies sufficient nutrients necessary for healthy growth of aquatic plants. Nevertheless, the aquatic plants of certain species or under certain conditions might not grow well just by using these liquid fertilizers. For example, stem plants that are maintained through repeated trimming may suffer slowed formation of new buds when subjected to the various stresses, such as the rise in water temperature and decaying lower stem portions. In this event, it is advisable to apply Green Gain, which contains plant hormones and highly-concentrated trace elements that work to promote the formation of new buds. Meanwhile, supplementation of concentrated iron is effective for making red

stem plants more vivid and preventing bleached new buds. Red stem plants in particular require plenty of iron for pigment synthesis. ECA is an additive containing bivalent iron, which is easily absorbable by plants as well as various organic acids that promote the absorption of iron by plants. Due to these product qualities, this additive is very effective in improving leaf colors. Just for your information, iron cannot be supplied by adding rusted nails to your aquarium! Rusted iron is trivalent iron and cannot be absorbed by aquatic plants. Bivalent iron is easily oxidized and converted to trivalent iron if unprocessed. As a solution, the bivalent iron contained in Green Brighty STEP2 and ECA has been mixed with a chelating agent so as to maintain a stable formulaic condition for a long time while supplying iron to aquatic plants effectively. Aside



from iron, the vivid coloration of red stem plants is related to light intensity and nitrogen concentration. If the color of your red stems does not improve after using ECA, then check your light intensity and nitrogen levels.

Product Features

Brighty K

Brighty K is a liquid fertilizer specifically designed for supplying potassium. Potassium influences photosynthesis as well as plant growth, therefore it is effective to add this additive to the aquarium when turning on the lighting in the morning. Brighty K also has the effect of enhancing the buffering capacity of water. Daily application of Brighty K helps prevent an excessive decline in the pH of aquarium water.

Green Brighty STEP2

Among the Green Brighty STEP series (STEP 1 to STEP 3), Green Brighty STEP2 is to be used for the period between the third month up to one year after the setup of aquarium. In light of the fact that aquatic plants grow vigorously during this period, this additive contains more iron which relates to the substantial increase in iron requirements for the plants. Green Brighty STEP2 is usually used together with Brighty K.

ECA

ECA is an additive specifically designed for iron supplementation. It contains bivalent iron easily absorbable by plants and organic acids that promote the foliar absorption of iron. Bivalent iron contained in this additive is mixed with a chelating agent for stability. Supplying highly concentrated iron helps make red plants become more vivid and improves the bleached bud problem of plants such as *Rotala rotundifolia* (Green).



Iron Bottom / Multi Bottom

Not only do aquatic plants take up nutrients from leaves, but also through the roots. When heavy root feeders, such as *Cryptocoryne* and *Echinodorus* are planted in the aquarium, nutrient deficiencies may be caused in about one year's time, even if the substrate is built with Power Sand and Aqua Soil. In this event, it is advised to supply additional nutrients to the substrate using Iron Bottom and Multi Bottom. Iron can be supplied with Iron Bottom which contains the nutrients essential for substrate in iron-coated form (for Multi Bottom, the nutrients are coated with trace elements).



[Nature Aquarium Terminology]

• Nitrogen (N), Phosphorus (P) & Potassium (K)

Aquatic plants require the nutrient nitrogen the most, being absorbed by plants in the form of nitrate (NO_3). Phosphorus is absorbed by aquatic plants in the form of phosphate (PO_4). Usually, nitrogen and phosphorus will not be in short of supply because they are contained in Power Sand and Aqua Soil-Amazonia and also produced from the waste of fish and shrimp. On the other hand, potassium, which is supplied from wilted leaves in nature, tends to be deficient in the aquarium environment as it has no supply source.

• Trace elements

Trace elements are nutrients that are required in small amounts but are also vital for plant growth. The major trace elements include iron, sulfur, calcium, magnesium, manganese, molybdenum, boron, zinc and copper. Green Brighty fertilizers use desalinated deep seawater containing rich trace elements.

• Bivalent iron (Fe_{2+}) and trivalent iron (Fe_{3+})

Bivalent iron (Fe_{2+}) dissolved into the water is oxidized and converted into trivalent iron (Fe_{3+}). Bivalent iron is the form of iron that can be absorbed by aquatic plants, unlike trivalent iron which is not absorbable by plants. The irons which were not absorbed by aquatic plants but converted into trivalent irons will be deposited into the substrate in the form of iron oxide hydroxide, which causes the surface of filter media and Pollen Glass diffuser to form brown stains.

• Chelation

When mixed with a chelating agent, metal ions in the water are stabilized by the effect of the chelating agent capturing the metal iron. This is called "chelation". Bivalent iron contained in ECA has been mixed with a chelating agent and is therefore less likely to be converted to trivalent iron.

Effective Daily Maintenance for Long-Term Maintenance of the Aquarium

Aquariums need to be maintained in appropriate ways to maintain in order to obtain an attractive layout. It will become difficult to maintain the layout if the daily maintenance process takes a lot of time and effort. This section introduces many effective ways of performing aquarium maintenance.

Kanri_Maintenance

Maintenance



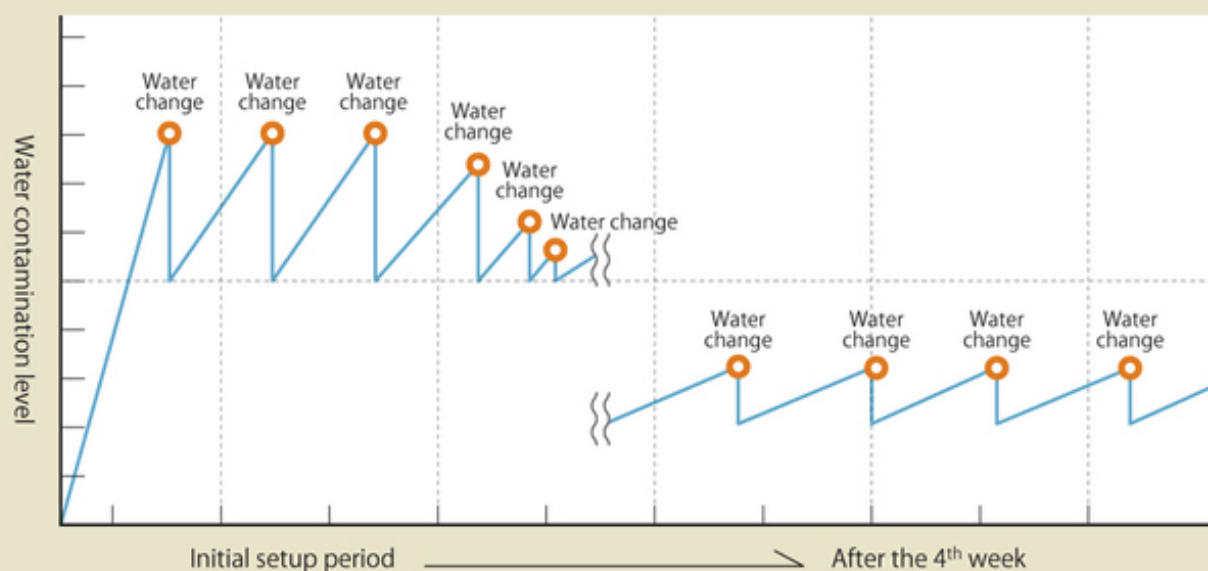
Effective water change

The basic practice of aquarium maintenance is the water change. In Nature Aquarium, fish waste is decomposed by bacteria present in the filter and substrate, thereby nitrate (NO_3) and phosphate (PO_4) are produced and will eventually be absorbed by aquatic plants as nutrients. If the nutrients are supplied in excess of what can be absorbed by aquatic plants, the unconsumed nutrients accumulate in the water (eutrophication). These nutrients promote the growth of not only aquatic

plants, but also algae. Therefore, an excessive accumulation of nutrients can lead to algal blooms. One of the main causes of a contaminated aquarium is algae in the tank. The more that algae grows, the more contaminated the aquarium becomes. By performing a water change, the excess nutrients in the water can be removed, which also is the most effective measure against algae. Particularly during the initial setup period when the biological filtration is not fully functioning, the water change

is the only effective way to improve the water quality. A better effect can be obtained if fish feces and sludge buildup is siphoned out of the aquarium while doing your water change. A key to effective removal of fish feces and sludge is to bring the hose tip close to the ferns and willow moss attached to the foreground plants and driftwood to siphon off the sludge between the aquarium plants. Along with the substrate, these plants are also prone to sludge buildups. Removal of feces and sludge, a major source of nitrate and phosphorus, contributes to the suppression of algal growth. For large aquariums, it is advisable to pour temperature-controlled water from a hose connected to the tap while draining the tank water using another hose at the same rate. This will prevent the sudden change in water level and water quality and thus the stress to aquatic plants and fish can be reduced. It is recommended to install a NA Water on the hose from the tap to get rid of the worries about residual chlorine. If no NA Water is used, it is advised to add Chlor-Off to the aquarium little by little with some intervals to remove residual chlorine.

Change in water quality by water change



The water contamination level reduces by performing water changes. Change the aquarium water frequently during the initial setup period of the aquarium when the water gets dirty easily.

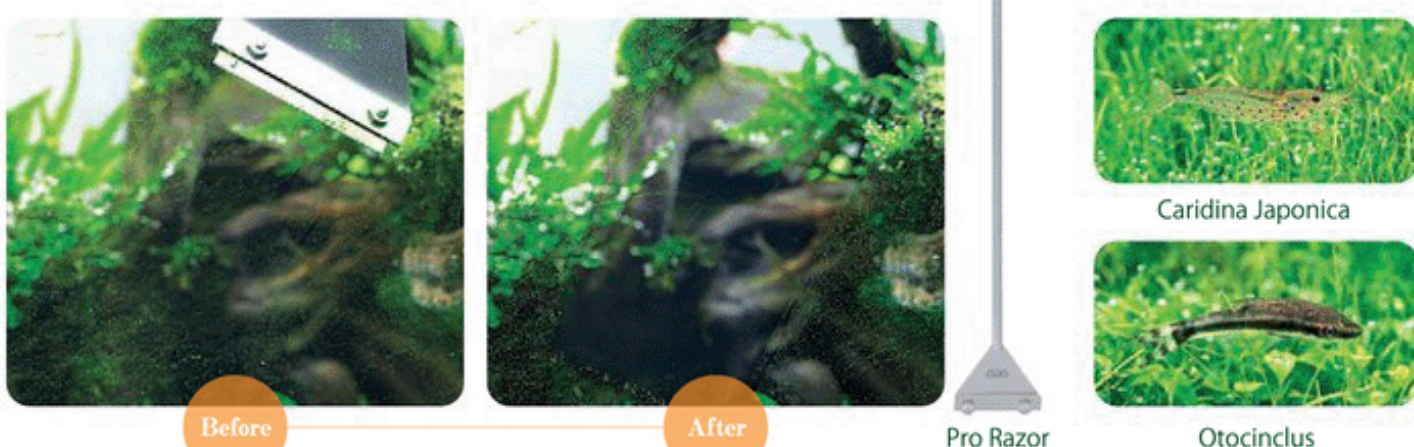
How to Remove Algae

Algae can be removed by way of water change to a certain extent. However, it is difficult to completely remove algae using such a measure. In addition, some types of algae cannot be easily flushed away with water. A thin layer of green algae grown on the glass and stone surfaces must be scraped off before the water change. This type of algae can easily be removed by scraping the glass surface with Pro Razor or brushing the stone surface using a brush available in shops. For black beard algae grown on stones and driftwood, the easiest way to remove them is to use Pro Picker. In the event where this type of algae has spread in a wider area or it has grown on the leaf margin of Anubias, it is effective to drain the aquarium water to expose the affected areas to the air, and then apply Phyton Git which has been diluted with the same amount of water with a brush. Phyton Git is an acidic formula and has a very strong fungicidal effect. Black beard algae will wither if Phyton Git is applied directly onto them. Green filamentous algae tangled in stem

plants can be reduced easily by taking them out of the plant using a toothbrush. In the case where the entire clump of stem plant or *Eleocharis acicularis* is covered by algae, the plants should be pruned to remove algae together with leaves for convenience and better appearance. A good help that reduces our hassles in the fight against algae is algae eaters such as *Cardina japonica* and *Otocinclus*. You may control the algal growth by

adding these algae eaters gradually to the aquarium when algae starts to grow during the initial setup period. To solve very serious algae problems, it is advised to remove the algae manually first and then let the algae eaters eat them. Doing this removes the algae in the aquarium in a short period of time. Rapid growth of algae can be slowed down by rinsing the filter media and reducing the lighting hours to 4 to 6 hours.

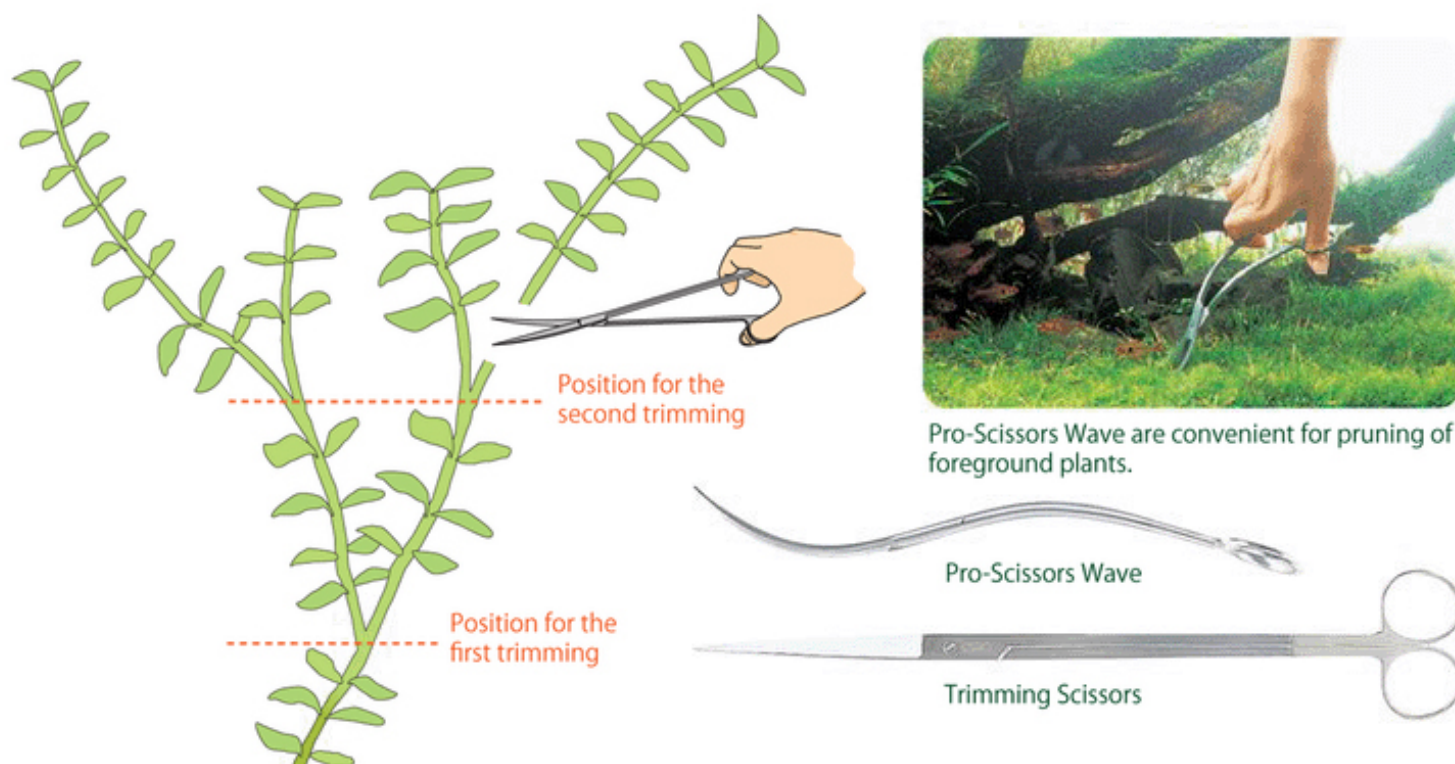
■ Removal of algae using Pro Razor



Product Features

Trimming of aquatic plants

Stem plants are maintained through repeated trimming. They will branch out and grow denser by cutting them short during the first trimming and making the trim position higher for the subsequent trimmings. Foreground plants growing by sending out runners should be pruned before they become too thick with overlapped runners and leaves. If they are left excessively thick without pruning, the bottom portion will not have access to light and will be gradually weakened. Scissors with curved blades such as Pro-Scissors Wave are convenient for the pruning of foreground plants. It is recommended to have a pair of this type of scissors in addition to the scissors with straight blades.



[Nature Aquarium Terminology]

• Eutrophication

The state in which an excessive amount of nitrate (NO_3) and phosphate (PO_4) is accumulated in water. Algae grows in response to the level of nitrogen and phosphorus. Maintaining the nitrogen and phosphorus level as low as possible is key to the suppression of algal growth.

• Algae

Algae are small primitive plants that grow mainly in water. They grow rapidly and cause contamination in aquarium. Algae that grows on aquatic plants and stones are divided into diatoms (cotton or film-like), green algae (filamentous and beard or spot-like) and blue green algae according to color and shape. Effective removal methods differ by type. Never use any algacide sold in shops for planted aquariums as it may hinder the photosynthesis of aquatic plants.

• Residual chlorine

Chlorine is added to tap water for disinfection. The chlorine that remains in tap water is called residual chlorine. It is harmful to the living organisms within the aquarium and needs to be neutralized using a chlorine neutralizer. Residual chlorine levels tend to be higher in water when water temperature is low while it is usually lower in summer when water temperature is high.

• Lighting hours

Though it differs by what light source is used, an appropriate lighting duration for Nature Aquarium is generally 8 to 10 hours. When a strong light source such as metal halide lamp is used and algae are seen to be growing, the lighting hours should be reduced to 4 to 6 hours for algal control. In this case, the growth of aquatic plants becomes slower.

Learning Tips for Layout from Nature Iwagumi Layout

Nature Aquarium is born by learning from nature and incorporating the essence of natural beauty in the planted aquarium. It does not mean to reproduce the exact landscape just like in a diorama, but it is a reconstruction inspired by landscapes to create an aquascape with lush aquatic plants and swimming fish. Tips for creating a layout can be found in nature. Let's look at how the essence of nature is reflected in an Iwagumi layout.

Expression inspired by sheer cliffs

At some coasts lapped by raging waves, we sometimes see a dynamic landscape with cliffs eroded by waves and a number of giant rocks. Inspired by such a landscape, an Iwagumi layout for a 60cm tank has been created by placing the stones in an upright position to give the impression that they have been shaped by water erosion.

Tank size / W60×D30×H36 (cm)
Aquatic plants / *Glossostigma elatinoides*, *Echinodorus tenellus*
Fish species / *Inpaichthys kerri*



Shooting location / Hotokegaura, Aomori, Japan

©Takashi Amano

Expression inspired by a rough rock reef

Ocean rocks spotted above the sea surface are actually connected to each other and form a big rock reef along the beach. To express the uniformity of such a rock reef, this Iwagumi layout used stones which have the same type of texture positioned with mild slopes of soil.

Tank size / W180×D60×H60 (cm)
Aquatic plants / *Fantinalis antipyrretica*
Fish species / *Paracheirodon axelrodi*





Shooting location / Sado Island, Niigata

©Takashi Amano

【Basics of Iwagumi Layout】
Mastering the Stone Arrangement
Technique from Sanzon Iwagumi

Manten Stone

This mountain stone has an attractive rugged surface and mostly comes in warm colors. Some have calcareous lines. Experience and skill is required to produce a stone arrangement which makes the most out of Manten's characteristics.



Ryuoh Stone

Ryuoh stone has many figure variations with white lines and winding grooves on its cold-color surface. It is particularly important to choose the stones that have a similar texture. Water hardness tends to rise slightly with this stone.



Yamaya Stone

This stone is suitable for stacking and random scattering rather than using it as a subject of appreciation. The affordable price is one of the most attractive features of this stone type.

Kei Stone

Most Kei stone comes in thick, angular shapes. This stone looks whitish when it is on sale and dry; however, it turns into a natural brownish red color in water and adds a bright touch to an aquascape.



Unzan Stone

Unzan stone is a natural volcanic stone which has a porous and uneven surface. Featuring a very attractive figure, this stone is ideal for beginners and has pockets to place Wabi-Kusa or to fill with soil and plant additional plants.



Unlike driftwood, which only serves as a framework for the composition, stone arranging is the main figure of an Iwagumi layout. For this reason, what material is used is more important with stones compared to driftwood. There are basic rules of stone arrangement and each stone has its roles. You can learn these from Sanzon Iwagumi, a basic and authentic Iwagumi style.



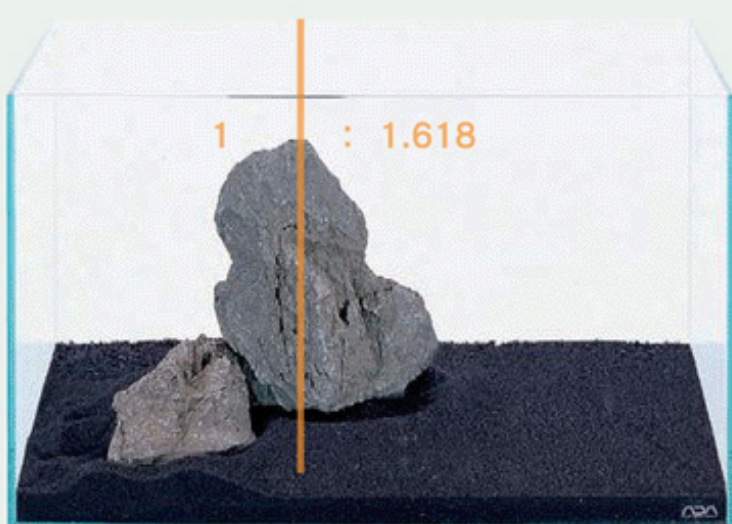
The Selection Tip!

First thing, choose the Oyaishi, or main stone (your largest stone). The most important factor for the Oyaishi is the size and making sure it is suitable for the aquarium, not shape and appearance. Among the candidate Oyaishi stones, which have the appropriate size, find the best angle by looking at it from all angles (360 degrees). Once you have decided on the Oyaishi, choose your Fukuishi and Soeishi stones that match the texture of the Oyaishi. A good Iwagumi cannot simply be achieved just by getting a few shapely stones randomly without following the above procedure. This is most important to ensure the balance of the entire Iwagumi layout.

Basic Arrangement of Sanzon Iwagumi

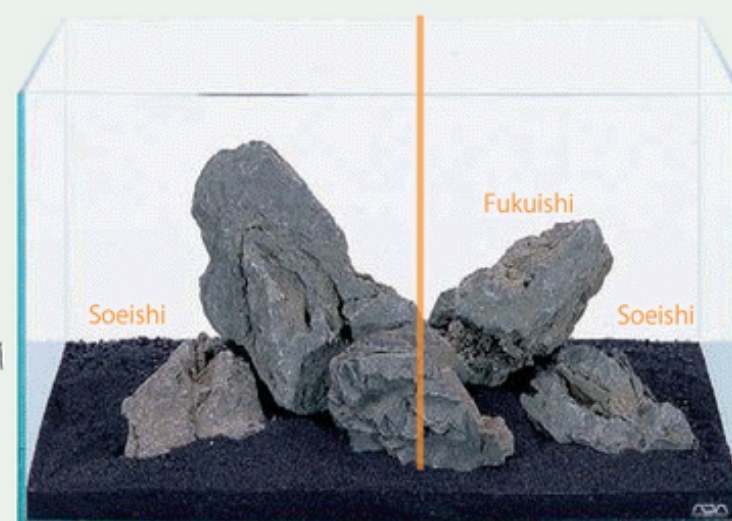
In Sanzon Iwagumi, an odd-number (for example, three, five or seven pieces) of stones are arranged in the order of Oyaishi (main stone), Fukuishi (secondary stone) and Soeishi (accompanying stone) (and may be followed by Suteishi, or sacrificial stone). The orientation and angle of each stone must be carefully decided to make an attractive stone arrangement. Tilting the stones produces a subtle instability and leads to tension and dynamism. Water flow should also be taken into account as an important factor.

1



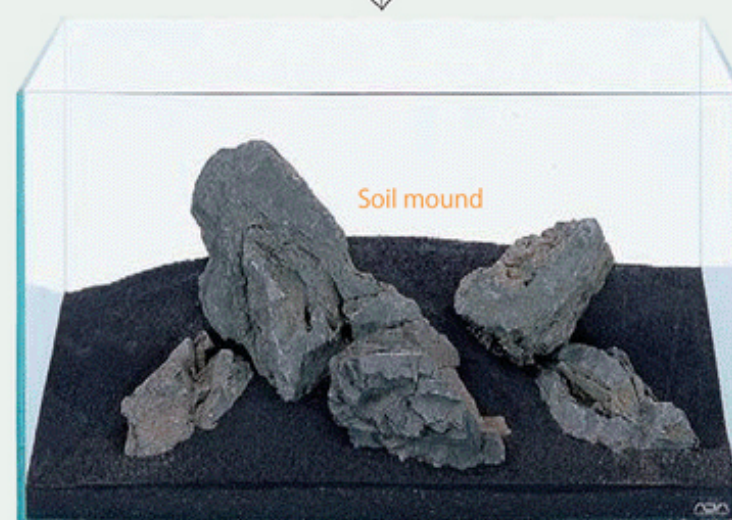
Oyaishi is basically placed according to the golden ratio. The angle should be carefully determined.

2



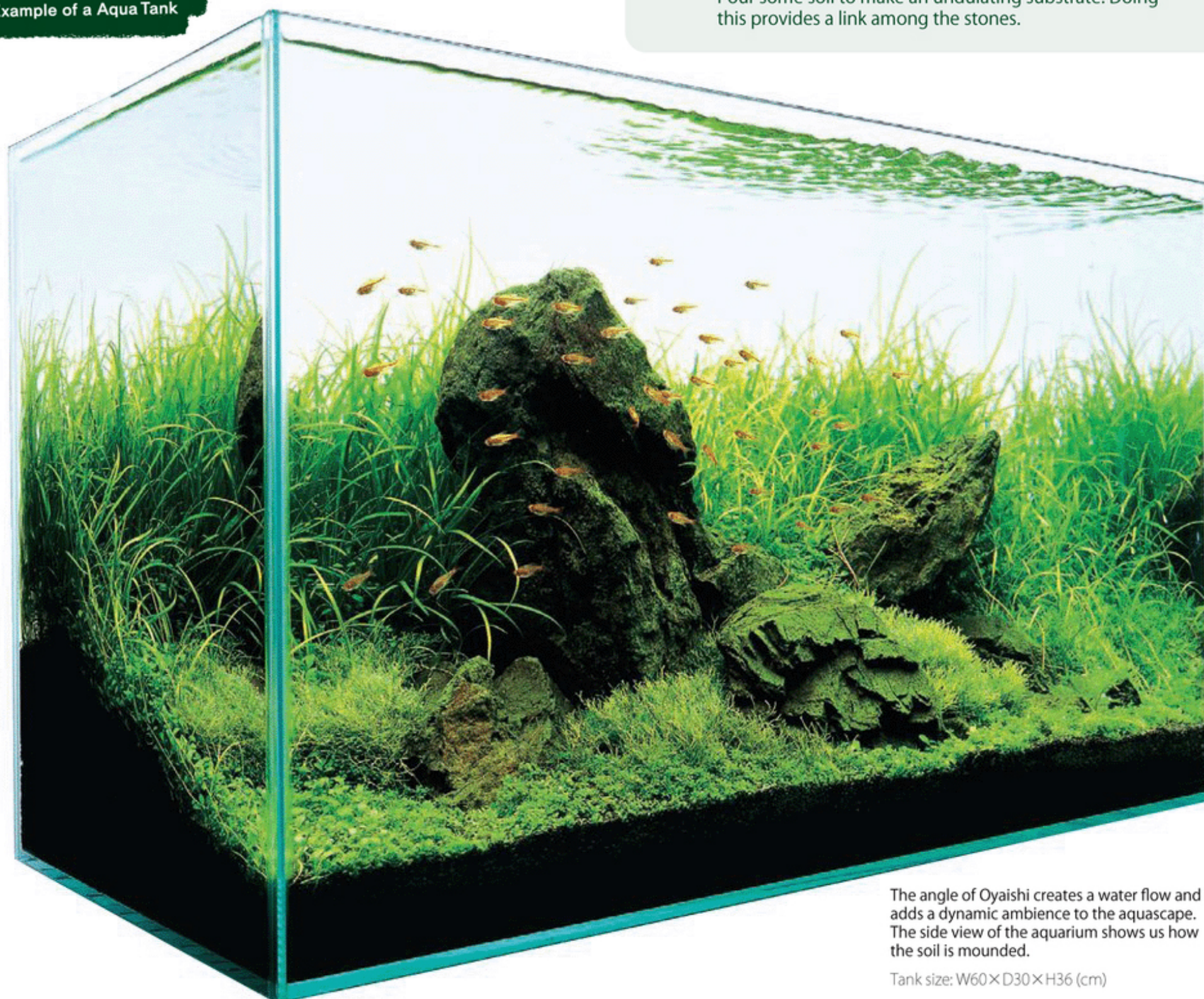
Fukuishi and Soeishi should be placed in such way that the optimal balance and angle are achieved between them.

3



Pour some soil to make an undulating substrate. Doing this provides a link among the stones.

Example of a Aqua Tank



The angle of Oyaishi creates a water flow and adds a dynamic ambience to the aquascape. The side view of the aquarium shows us how the soil is mounded.

Tank size: W60×D30×H36 (cm)



Shooting location / Rio Negro, Amazon

©Takashi Amano

Expression inspired by a fallen tree along the river

The tree pushed down by river water displays its bare roots resembling radiating branches. To express such a sight in a layout, some thin branch-like driftwood are arranged to make the framework of the composition. An enhanced unity is created by attaching ferns to the joints of the arranged driftwood.

Tank size / W90×D45×H60 (cm)

Aquatic plants / *Riccia fluitans*, *Glossostigma elatinoides*, *Echinodorus tenellus*, *Echinodorus latifolius*, *Echinodorus angustifolia*, *Rotala* sp., *Myriophyllum mattogrossense* (Green), *Ludwigia arcuata*, *Rotala nanjean*, *Rotala rotundifolia*, *Isoetes japonica*, *Microsorium* sp., *Fantinalis antipyrretica*

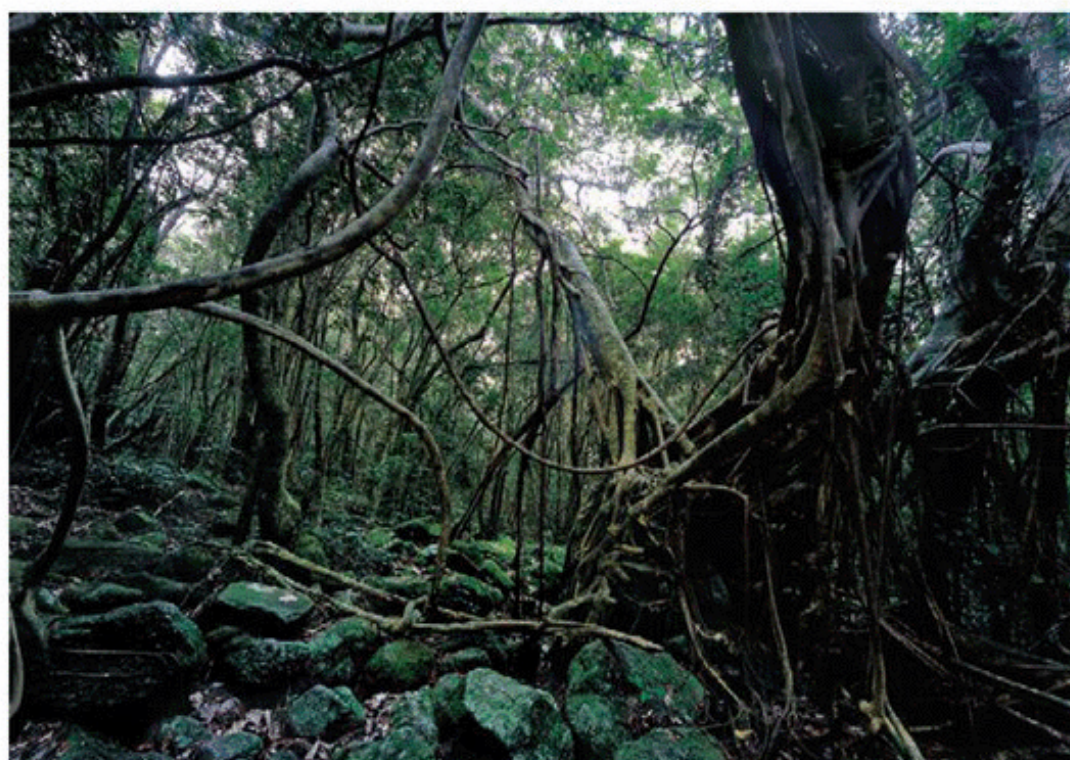
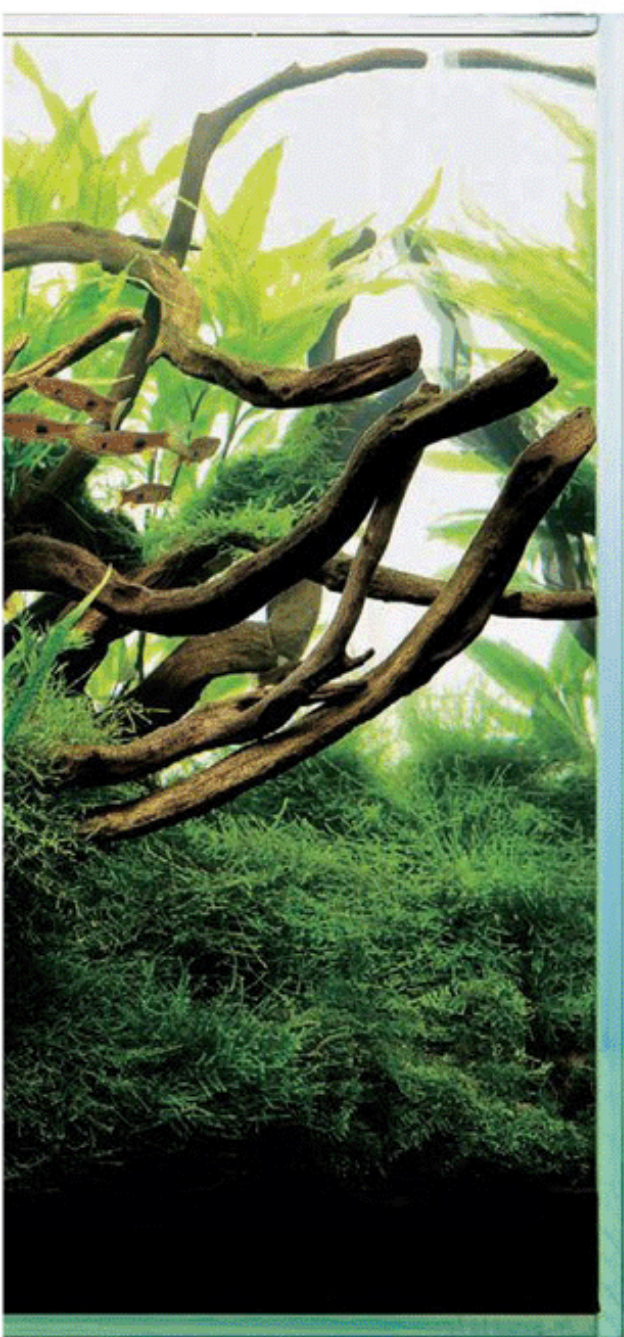
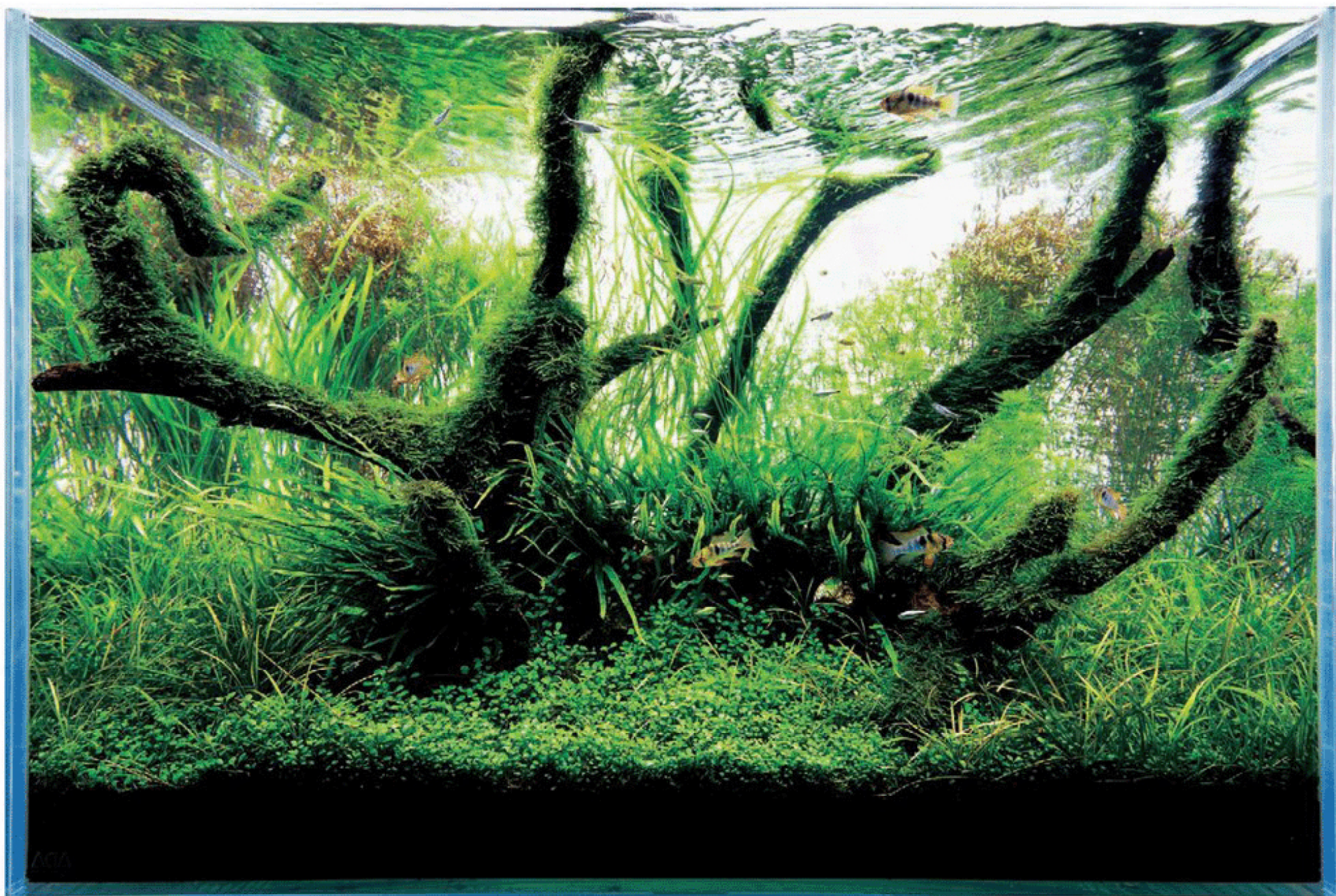
Fish species / *Hemigrammus armstrongi*, *Ladigesia roloffi*, *Microgeophagus ramirezi*

PHOTO GALLERY

Learning Tips for Layout from Nature Driftwood Layout

In Nature Aquarium, driftwood is used as a layout material along with stones. Although driftwood is smaller in size than the original tree, the impression of the original tree is deeply reflected in the shape and texture of the driftwood. That is why a natural feel can be added to the aquascape just by placing driftwood in the aquarium. The tips for the expression of driftwood layout exist in natural landscapes. Let's look at the actual examples of the expressions using driftwood.





Shooting location / Yaku Island, Kagoshima

©Takashi Amano

Expression inspired by supple vines

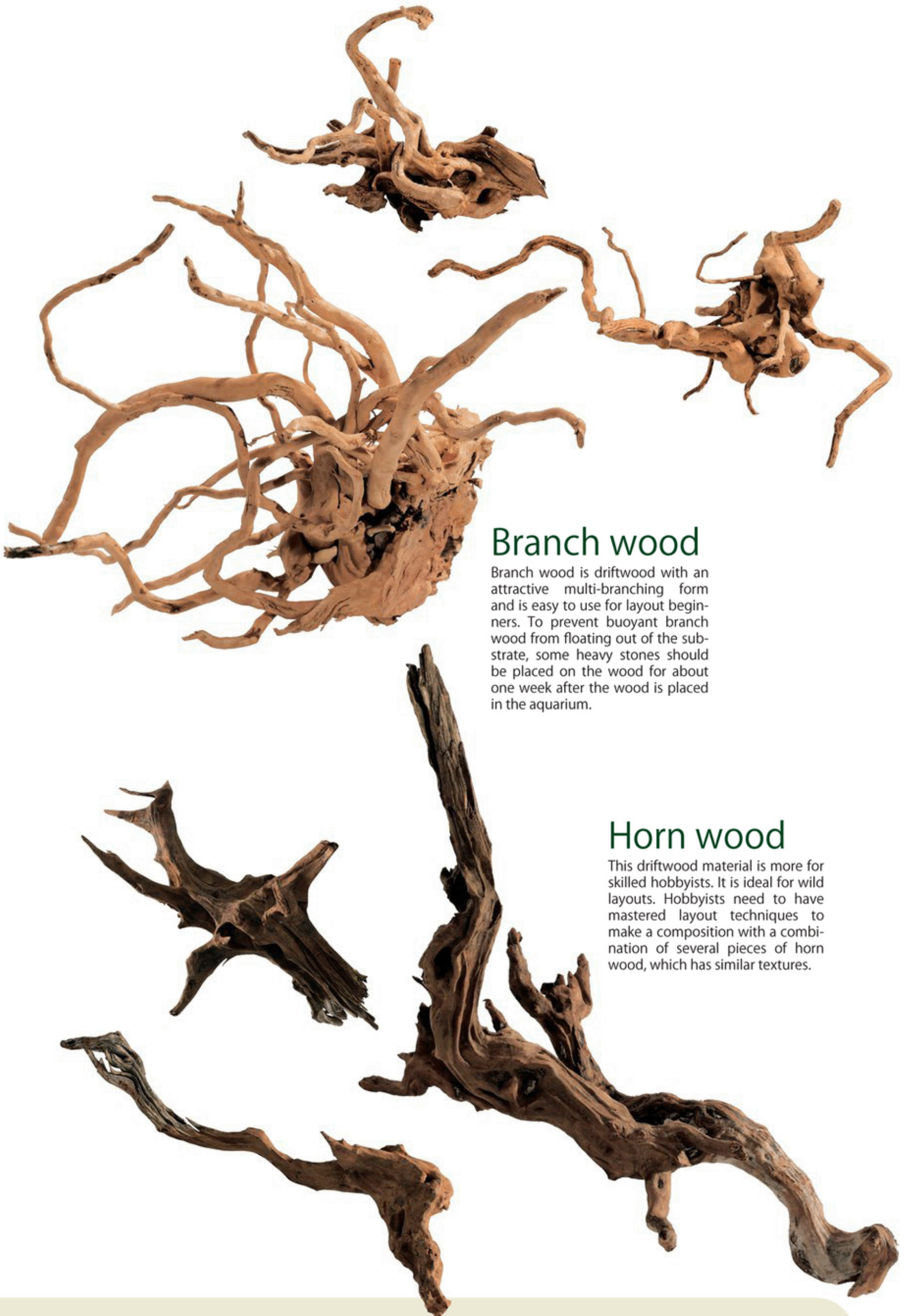
In subtropical and tropical primitive forest, we can very often see woody vine plants tangled around trees. These vines draw flexible curves on the ground, and the trees become a decoration of the forest floor. This kind of landscape can be expressed by using thin driftwood which has a supple impression.

Tank size / W90×D45×H60 (cm)

Aquatic plants / *Fantinalis antipyretica*,

Riccia fluitans, *Microsorium* sp., *Hygrophila stricta*

Fish species / *Rasbora kalochroma*



Branch wood

Branch wood is driftwood with an attractive multi-branching form and is easy to use for layout beginners. To prevent buoyant branch wood from floating out of the substrate, some heavy stones should be placed on the wood for about one week after the wood is placed in the aquarium.

Horn wood

This driftwood material is more for skilled hobbyists. It is ideal for wild layouts. Hobbyists need to have mastered layout techniques to make a composition with a combination of several pieces of horn wood, which has similar textures.

【Basics of Driftwood Layout】 Mastering the Three Basic Compositions as the First Step

Driftwood is an ideal material to enhance the natural feel of the aquascape and enrich the layout image. It also plays the role of serving as the framework of the composition. Let's start with the three basic compositions as the first step of driftwood layout. Stability of the composition made by driftwood influences the long-term maintenance of the layout.



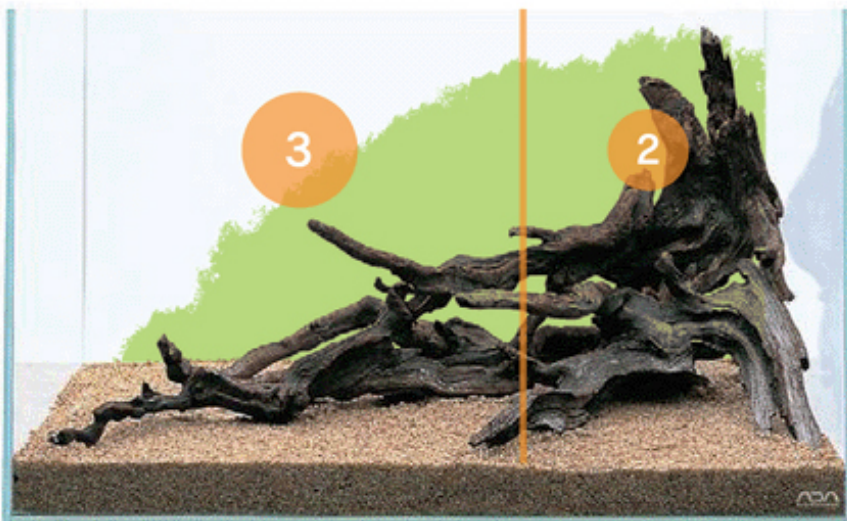
The Selection Tip!

Select a few pieces of driftwood that have sizes which match the aquarium size when they are combined and arranged. As you are selecting the wood, look mainly at the branch tips to locate portions that have attractive shapes or curves. Doing this can broaden the range of options as the unfavorable parts of driftwood can be concealed by attaching moss and ferns to those portions.

Basic Composition Styles of the Driftwood Layout

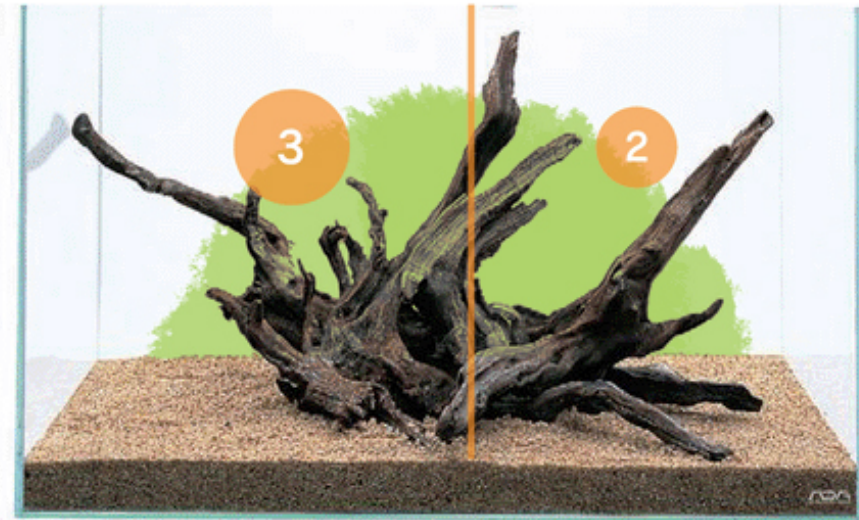
The three patterns shown below are the basic compositions of a driftwood layout. Pay attention to the balance of the right-left weight when making the composition. The layout looks more attractive if the right-left weight is slightly off-center according to the golden ratio. Avoid making a too complicated arrangement, but also make sure that each piece of driftwood is stably placed.

Triangular composition



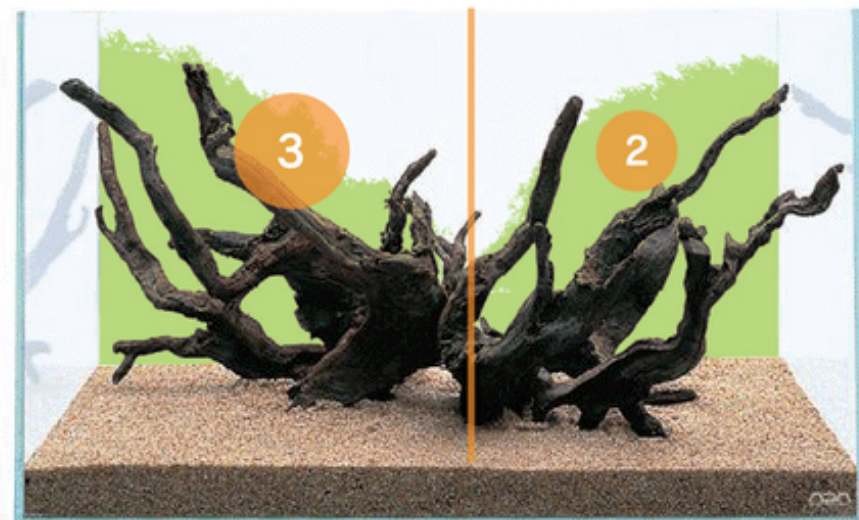
Composition with wider open space at either the right or left side. An important factor is the angle of the driftwood which constitutes the hypotenuse of a triangle.

Convex composition



Composition with open space at both sides. Achieving a good balance is relatively difficult.

Concave composition



Composition with an open space in the center. It is advisable to achieve a balance at the ratio of 3:2 which is close to the golden ratio.

Example of a Aqua Tank



This is a good example of a triangular composition layout that achieved an appropriate balance between open space and the area with dense plants. Red stem plants should basically be planted at the position with the heaviest weight.

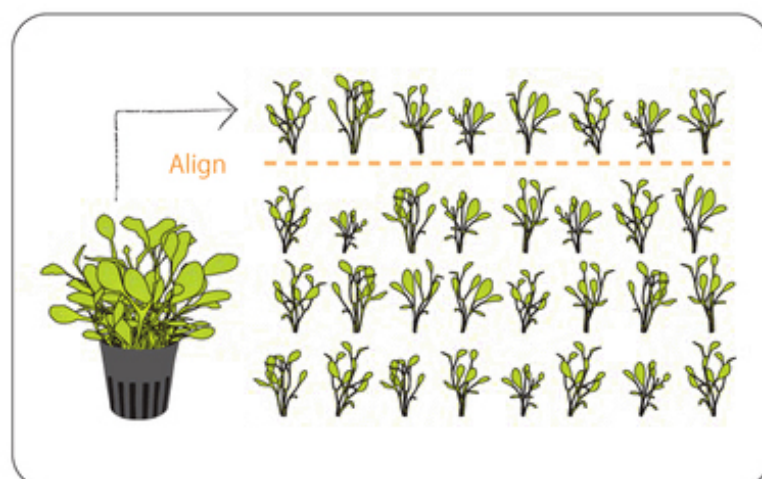
Tank size: W60×D30×H36 (cm)

[Planting and Expression with Foreground Plants] Foreground Plants Influence the Impres- sion of an Aquascape

There are various types of aquatic plants, but not many of them are suitable as a foreground plant. You need to know which plants can be used as a foreground plant and learn their characteristics. The foreground plants support the attractive appearance of the bottom layer of the aquarium. They must be planted and maintained neatly, or the entire aquascape would look untidy.

Tips for the effective planting of foreground plants

Foreground plants are small and difficult to plant. The key to easy planting of such plants is pre-planting preparation and adjusting the water level during the planting process. The number of plants to be planted initially should be determined by taking the plant's growth rate into consideration.

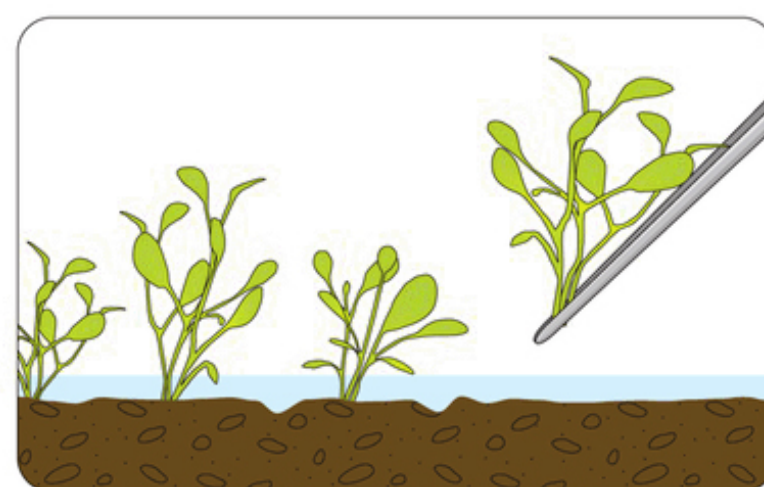


Dividing foreground plants into small bunches

As a part of preparation, foreground plants are divided into small bunches that are easy to hold with tweezers and then placed on a tray. Plants like *Glossostigma* must be as short as about 3cm. It is advisable to align the base position of these bunches to facilitate the planting work.

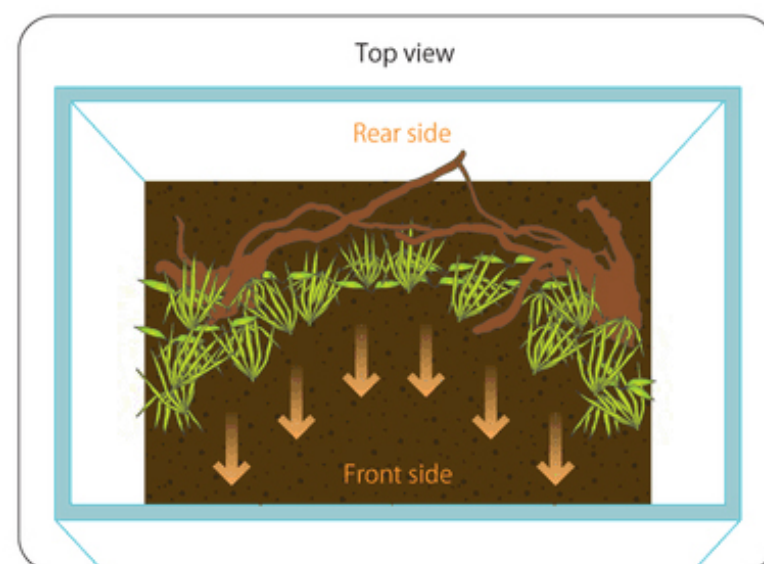
Start planting from the sides of stones and driftwood

If you cannot use plenty of plants due to budget constraints, it is recommended to start planting from the sides of the composition materials towards the front of the aquarium. It is also important to fill the planting area evenly with plants.



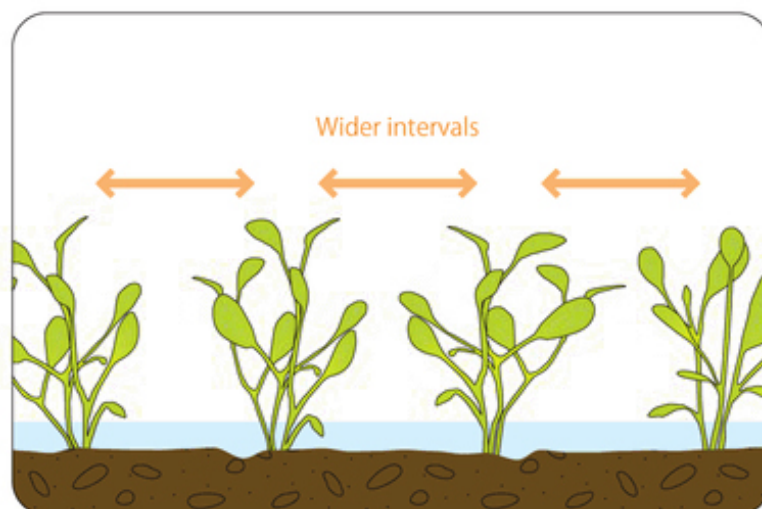
Adjusting the water to the level where the substrate is barely submerged

Planting work will be easier if the water is poured to a level where the substrate is barely covered with water. Long Pinsettes L with pointed tips are an ideal tool for the planting of foreground plants.



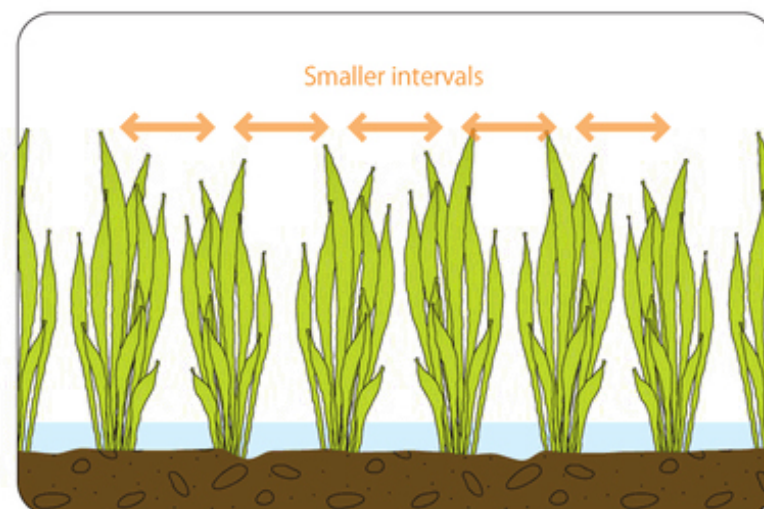
Adjusting the plant density according to the growth rate

Fast-growing plants should be planted with wider intervals while slow-growing plants should be densely planted with smaller intervals. The initial dense planting is vital for plants such as *Hemianthus callitrichoides* "Cuba" and *Lilaeopsis brasiliensis*. Ensuring a good balance with background plants is also important. If fast-growing stem plants are the main plant of the layout, the foreground should be more densely planted.



Fast-growing foreground plants

Fast-growing foreground plants such as *Glossostigma* will cover the entire space very fast even with wider intervals. Planting density should be adjusted according to the growth rate at each location of the layout.



Slow-growing foreground plants

Slow-growing foreground plants such as *Lilaeopsis brasiliensis* should be planted as densely as possible from the beginning as it takes time for them to cover the substrate. Achieving a dense planting of foreground plants at the early stage can prevent algal growth.

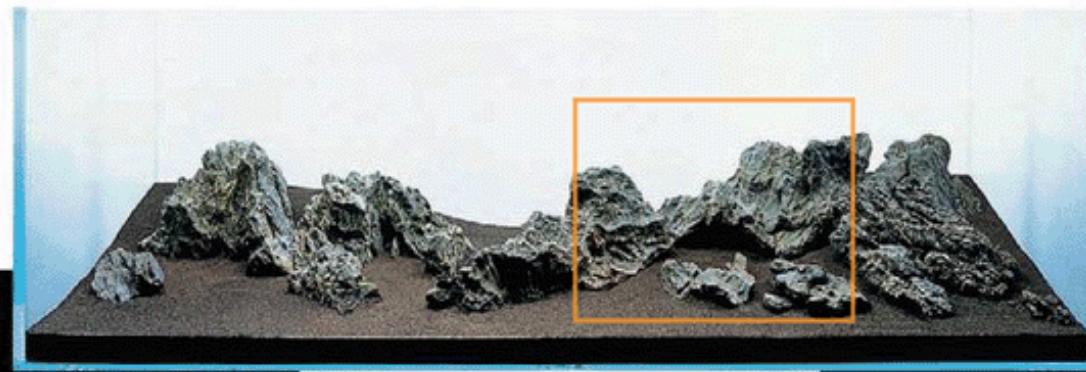


Tips for Selection!

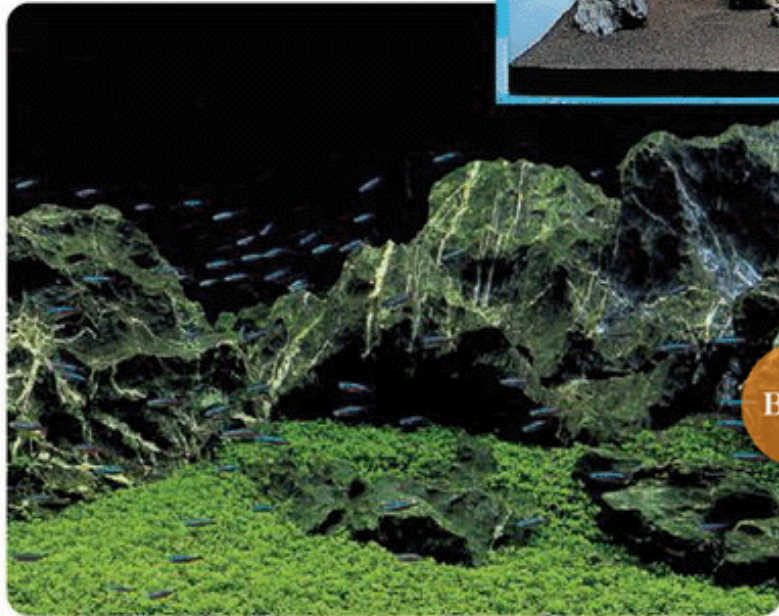
One of the factors to be considered in the selection of foreground plants is the plant height. This is because the plant height will determine how much composition materials such as driftwood and stone will be hidden behind the plants (see the next page). For example, a short plant should be chosen if you wish to show the details of stone arrangement; and on the other hand, a tall plant should be selected if the details of composition material are to be concealed. An additional factor for the selection of plants is the image produced by each aquatic plant. *Eleocharis acicularis* produces an image of a field of soft grasses. *Glossostigma* and *Lilaeopsis brasiliensis* planted as a single species adds a neat and orderly touch to the aquascape.

Different images by foreground plant species

An arrangement of small stones is visible with short *Hemianthus callitrichoides* "Cuba". This plant adds a neat and orderly touch to the aquascape.



Small stones can be occasionally glimpsed between the short *Hemianthus callitrichoides* "Cuba". They produce a natural ambience in the layout.



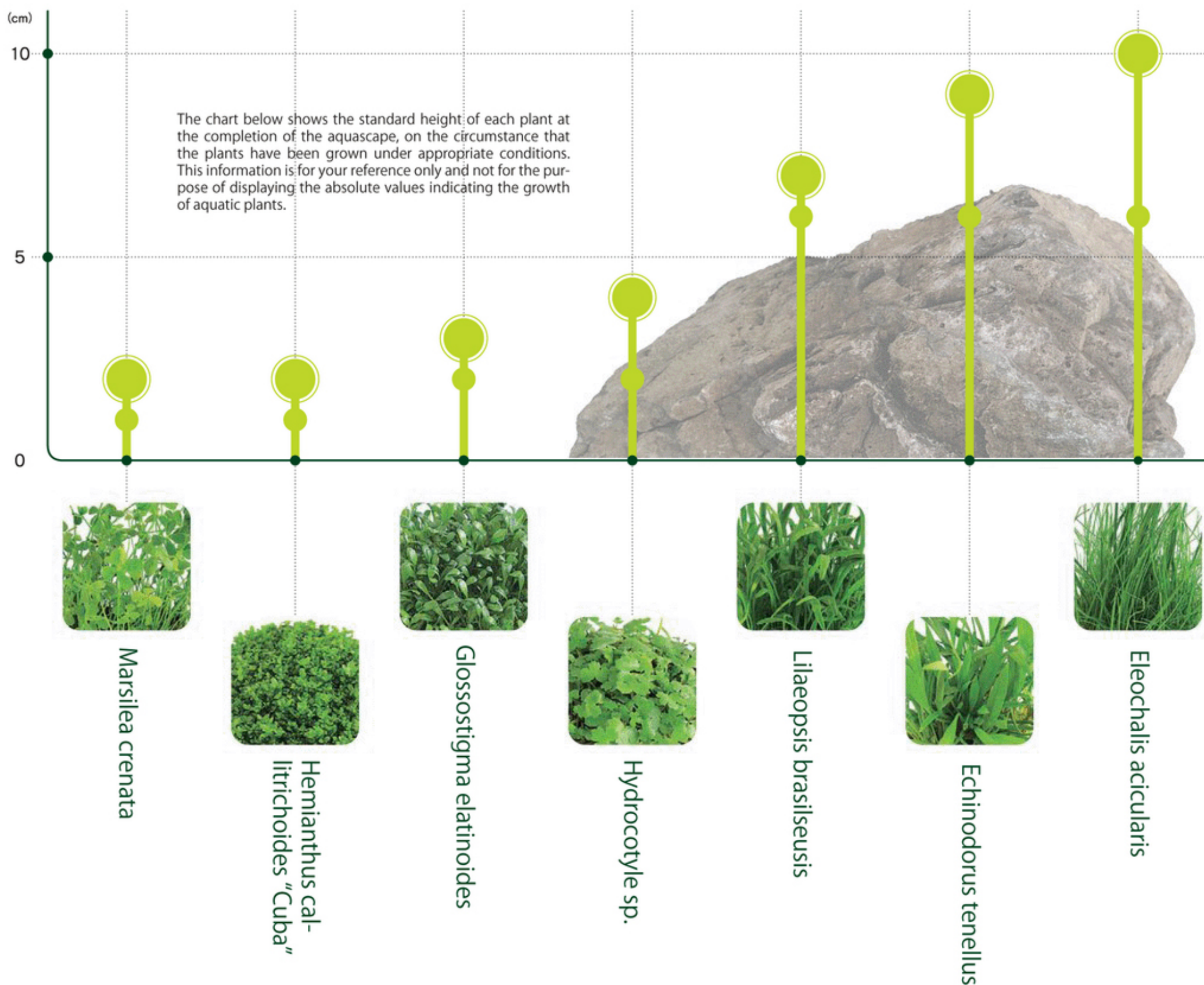
Before

These Iwagumi layouts are made using Ryuoh stones. Even for the same stone arrangements, the expressions and impressions vary with different foreground plants.

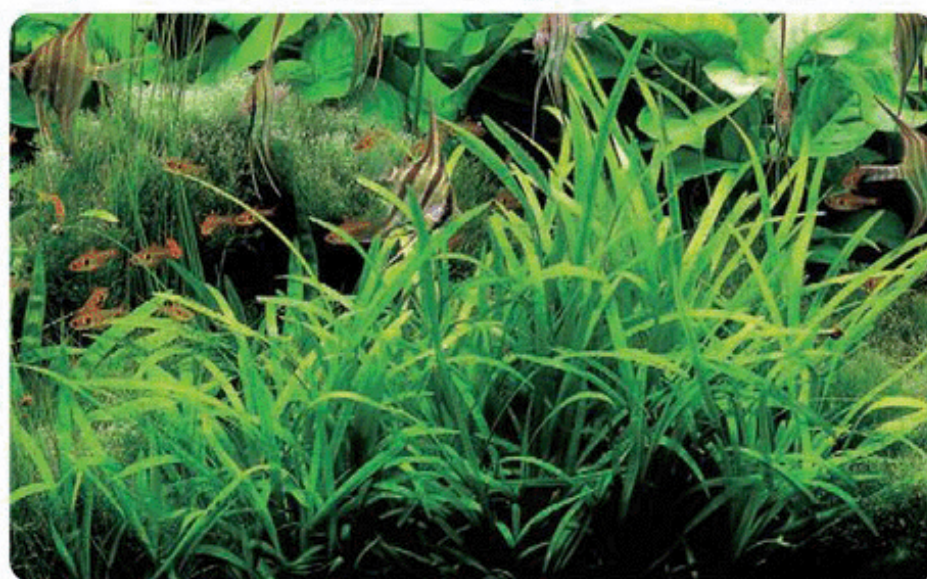
After



Height of each plant



【Planting and Expression with Mid-Ground Plants 1】 Providing a Seamless Link between Fore-ground and Background Plants



Sagittaria subulata

A bright color is added to the aquascape by having a clump of this plant around the sides of the driftwood where it usually gives a dim impression. Avoid planting this Sagittaria too much as its leaves are thick and voluminous.

Blyxa novoguineensis

This is one of the easiest-to-use mid-ground plants. Blyxa novoguineensis looks like a rosette type plant but it is a member of the stem plant family. This Blyxa can be maintained by trimming, but it will ultimately require cutting and replanting to maintain the plant.



Cryptocoryne patchii

Cryptocoryne is the most suitable plant for the shady mid-ground location. Particularly, brown-colored Cryptocoryne patchii with moderately large leaves is good to be used in 90cm or smaller tank.

Cryptocoryne wendtii (Green)

If you wish to use green Cryptocoryne for the layout, this species or Cryptocoryne wendtii "Real Green," a hybrid species, are the only options. The leaf color of this Cryptocoryne is not constant as the plant often develops some brown leaves. The leaves of this plant easily melt away immediately after planting.



Mid-ground plants are planted between the short foreground plants and tall stem plants or tape-like plants, providing a seamless link connecting the foreground plants all the way to the background plants. Shade plants such as Cryptocoryne are suitable as mid-ground plants that are often planted at the side of or behind the stones and driftwood.



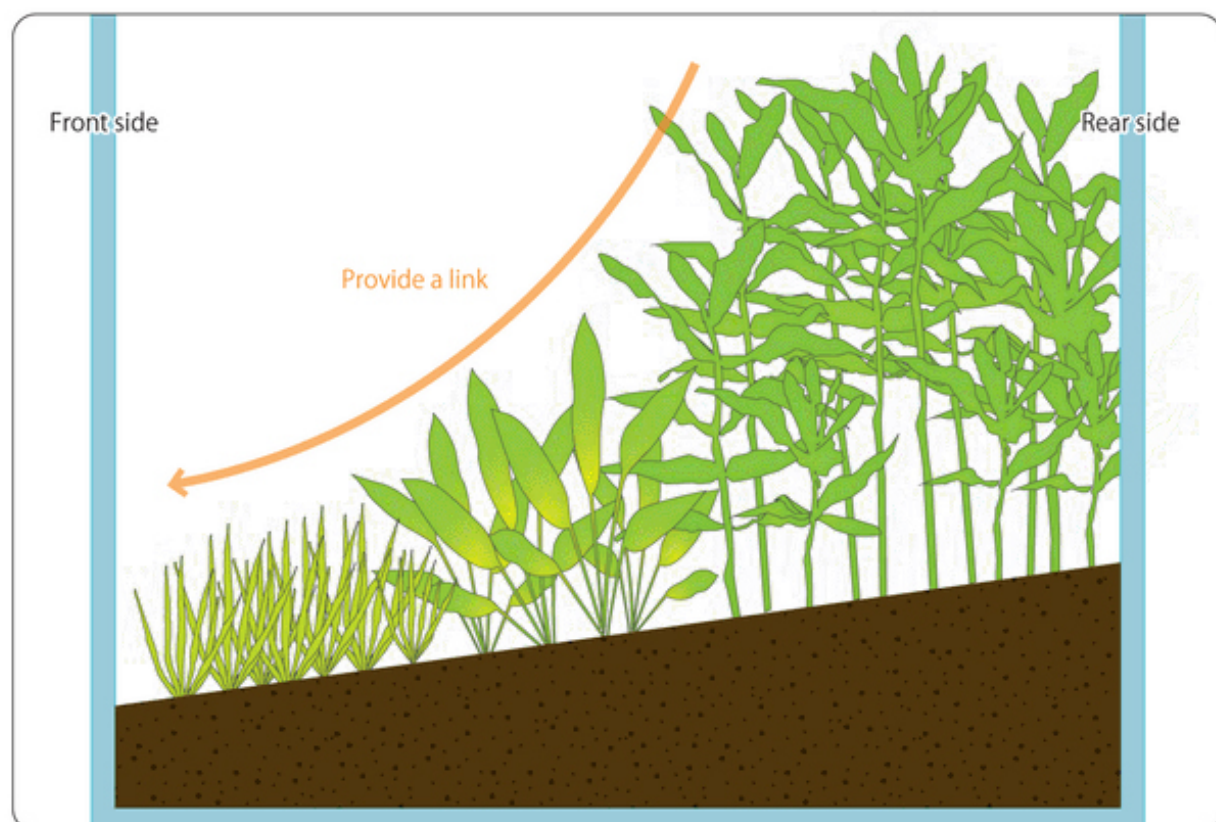
Tips for Selection!

In the mid-ground of the aquascape, the plants are usually planted in shady locations such as in close proximity to stones and driftwood. The plants suitable for such locations are Cryptocoryne and epiphytic plants (see page 36-37). Among Cryptocoryne members, Cryptocoryne wendtii is strong and easy to use. You can select brown or green Cryptocoryne wendtii according to the image you wish to achieve for the layout. In addition to Cryptocoryne, the Blyxa and Sagittaria members can also be used in places with adequate levels of light.

Providing a seamless link

The planting space for mid-ground plants would be clearly identified if the composition of the layout is planned on the assumption that the mid-ground plants play the role of linking the foreground and background plants (mainly stem plants). In the initial draft layout plan, the border between the foreground plant and the background

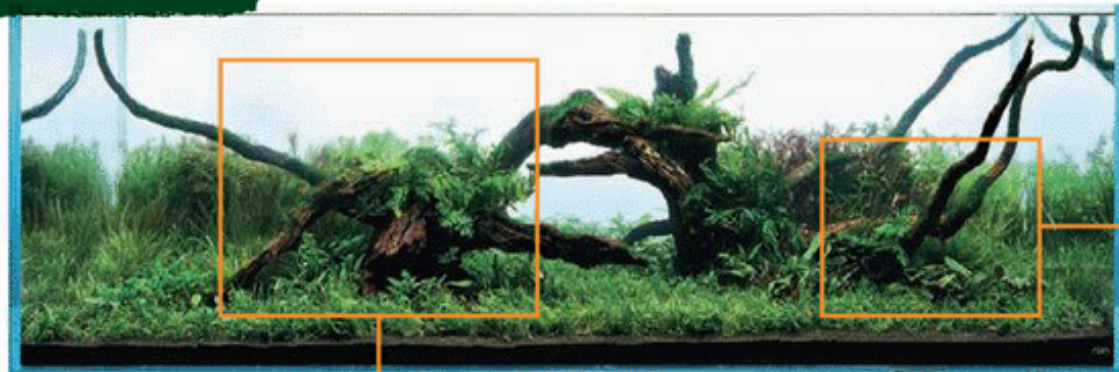
plant sections will usually be the planting space for mid-ground plants. Planting the mid-ground plants in such a location provides a slope-like seamless link connecting the foreground, mid-ground and background plants, which enhances the naturalness of the layout.



This is the rear side of a concave composition. *Cryptocoryne* planted between the open space and dense stem plants serves as a link connecting them.

Expression of the mid-ground location

Example of a Aqua Tank



(Immediately after planting)



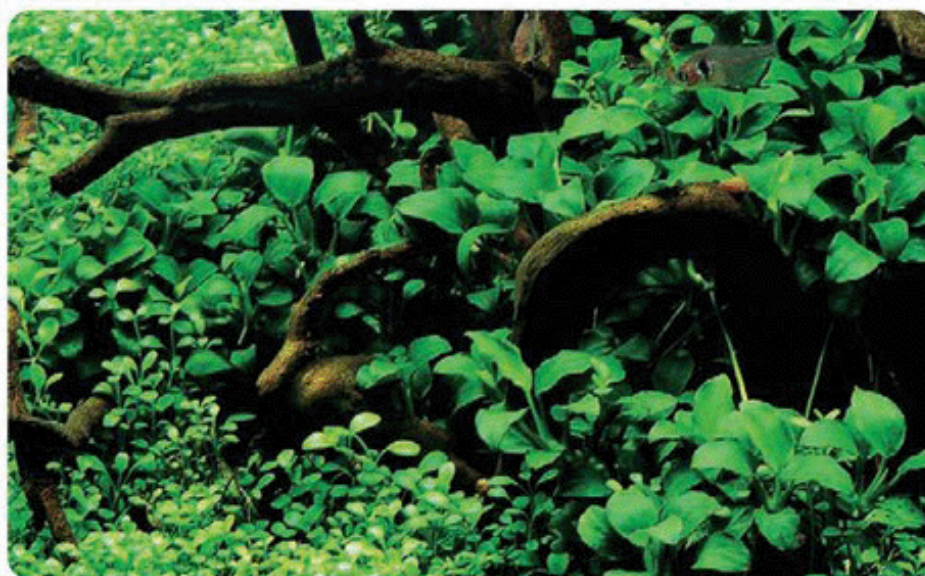
In a large aquarium that has a considerable depth, more than one species of plants can be planted even in the middle ground. In this layout, *Blyxa* is planted behind *Cryptocoryne*.



Cryptocoryne is used to elaborate the look and feel of the area immediately around the stones and driftwood. Together with *Lilaeopsis brasiliensis* planted in front, the plant adds an enhanced naturalness to the layout.

【Planting and Expression of the Mid-Ground Plants 2】 Providing a Seamless Link between Foreground and Background Plants

Epiphytic aquatic plants always play important roles in the mid-ground location of the layout where composition materials such as stones and driftwood are placed. Creating an elaborate mid-ground using epiphytic plants helps conceal the unsightly bottom part of stem plants in the background and also helps improve the appearance of the layout after the trimming of stem plants. How to create the mid-ground greatly influences the long-term maintenance of the layout.

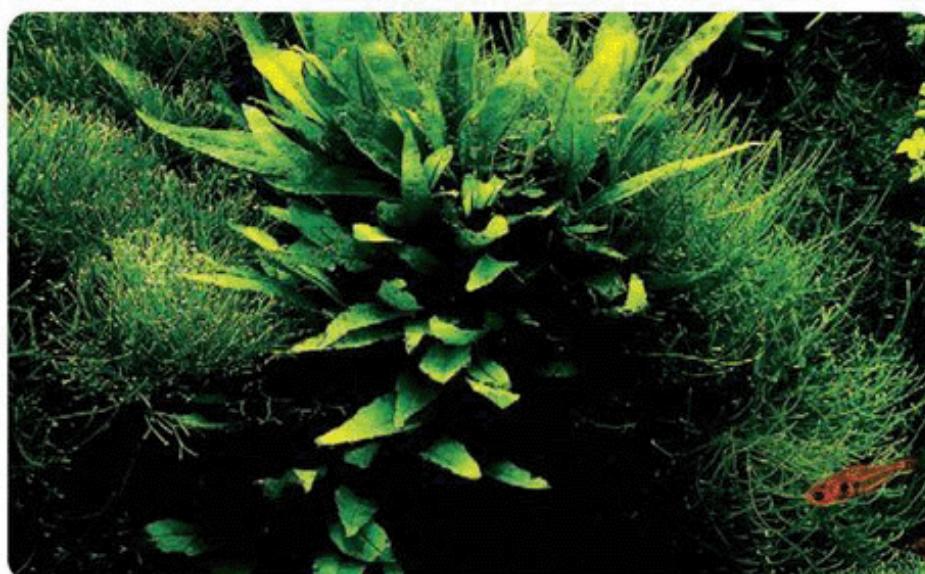


Anubias barteri var. nana "Yellow Heart"

Unlike the most popular Anubias var. nana that is suitable for large tanks, this Anubias with smaller leaves is more useful and suited for detailed expressions within a 90cm or smaller tank. Be careful of residual pesticides on newly-purchased plants.

Bolbitis heudelotii

Bolbitis heudelotii needs a longer time to adapt to a new environment and grows slower than other epiphytic plants. Frequent trimming of damaged leaves is essential for the plant to display beautiful translucent leaves.

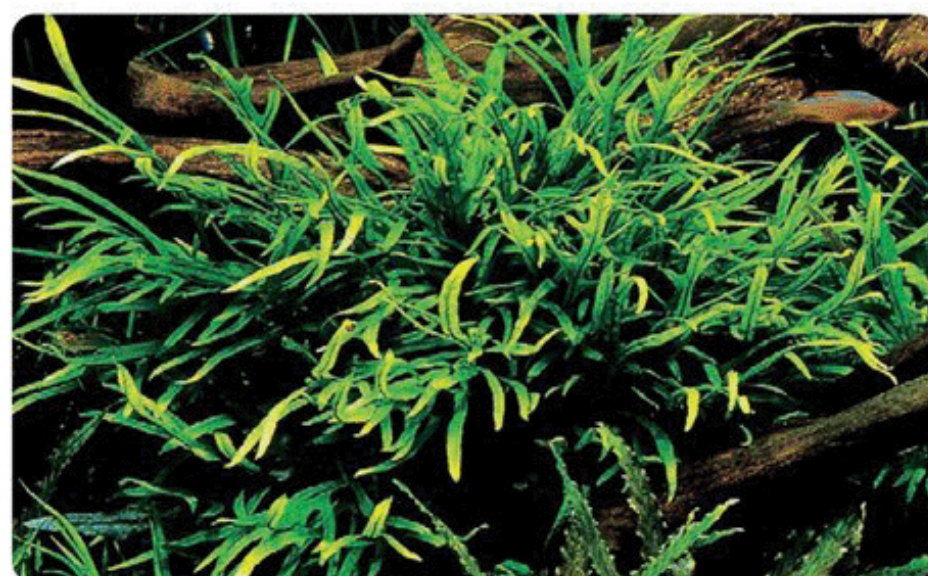


Microsorium pteropus

This popular species requires clean water and frequent trimming to grow attractive. The grown size depends on how this plant is maintained. Hobbyists can brush up their skills with this Microsorium.

Microsorium sp. (Trident)

This Microsorium features multi-forked leaves and is seen more in the market compared to years past. It is relatively fast growing and easy to grow. This plant is prone to a disease that causes a tumor-like symptom on the leaf surface.



Tips for Selection!

Among epiphytic plants, Anubias species that have rigid leaves gives a neat image while Bolbitis has a tidy impression. Microsorium creates an image just between these two plants. Taking into consideration these images of the plants, the species that best matches the atmosphere and helps elaborate the details of the layout should be determined as the plant to be used for the layout. It is advisable to select epiphytic plants that have leaves maintained in a good condition, in addition to having a thick and rigid rhizome.

The pre-planting preparation of epiphytic plants

Epiphytic plants are attached to stones and driftwood instead of being planted in the substrate. As you prepare these plants for use in a layout, they will need to be attached to small stones in advance. When placing epiphytic plants along the edges of composition materials on the substrate or in the depressions in driftwood, all you

need to do is place the epiphytic plant, which is already attached to a small stone, in the desired location. If the plant is to be attached to a driftwood branch, you need to tie Wood Tight around the rhizome in order to tightly attach the plant on the branch. Wood Tight can be removed once the plant is completely attached to the branch.



1
Cut off all the damaged or senescing leaves. The plant can be trimmed down all the way to the rhizome if necessary.



2
Tie Wood Tight around the rhizome. Wood Tight features its brown color that is not very noticeable on wood.



3
Twist the Wood Tight to fix the rhizome tightly to the stone.



Putting Wood Tight between the leaf stems grown from the rhizome is a good tip for effectively fixing the plant to a stone.

Creating an elaborate mid-ground

The photograph below is an image of an actual aquascape which has been processed to display how it would look after trimming. We can see how the mid-ground that consists of epiphytic plants is important in maintaining an attractive aquascape.

Example of a Aqua Tank 1



(Image after background processing)

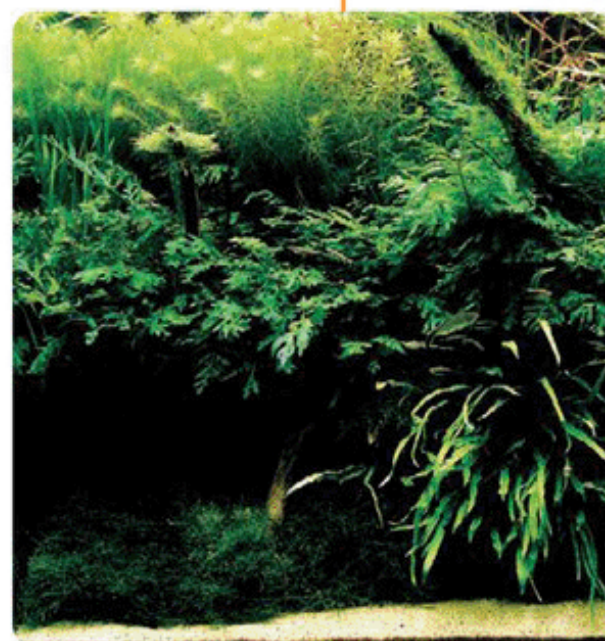


The mid-ground created using ferns and Anubias conceals the bottom part of Hygrophila. The mid-ground also serves as a trim line for stem plants.

Example of a Aqua Tank 2



(Image after background processing)



When compared with the above processed image, it becomes known that an aquascape remains attractive even with only mid-ground plants. Growing stem plants add a colorful touch to the aquascape.

Leaf size and Impact

Stem plants have various leaf shapes. Large leaves give a strong impression while narrow leaves give a mild impression. The photos and illustrations below show some examples for green stem plants.



Mayaca sellowiana



Narrow



Rotala rotundifolia
(Green)



Small



Ludwigia palustris



Medium

Leaf color and Impact

Leaf color is also a factor that influences the impact of each plant. The more red the leaf is, the stronger the impact it has. Between two leaves that have the same size, the leaf with the redder color has the stronger visual impact.



Rotala rotundifolia
(Green)



Rotala rotundifolia

Planting and Expression of the Background Plants **1**

Adds a Bright, Colorful Touch to an Aquascape

Stem plants are the aquatic plants that play an important role in the background of the layout. They need to be planted to ensure a good color balance according to the composition so that the beautiful clump of the stem plants will stand out in the aquascape. What we have to remember is that the impact of each plant varies by leaf size and color. The planting space should be determined by taking into consideration the balance of this impact.



Tips for Selection!

Among the various stem plants, Rotala, Ludwigia and Hygrophila are easily available in shops. Since many species of Rotala plants have a good tolerance to trimming and are suitable for planted aquarium, it is recommended for the beginner hobbyist to use Rotala as the main plant and add some Ludwigia and Hygrophila as an accent. It is hard to make a well-designed layout using many different types of stem plants. If you are still a beginner, keep in mind that you should use a limited number of stem plant species, but planted in larger numbers per species.

Planting the stem plants has a strong impact on the side with the greater weight.

We have learned about the impact of stem plants on the previous page. Now we move on to the planting of stem plants. Basically, stem plants that have a strong impact should be planted on the side with the heavier weight. For example, when only one species of red plant is planted in a concave composition designed at the ratio of 2:3, the plant should be planted at the side with a heavier weight (and at the

position to be determined according to the golden ratio). Particularly in the case where only a few stem plant species are used for a concave composition, you should evaluate the impact each plant will have and decide which stem plant should be planted on which side (see the charts below).

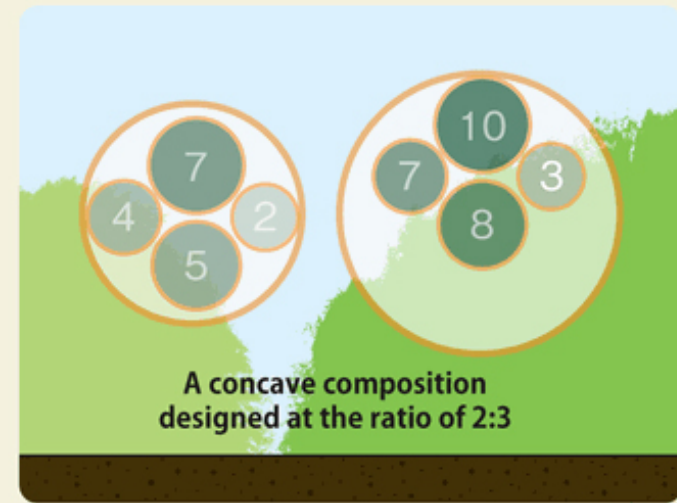


Sorting by impact

If the leaf size is the same, the impact of each stem should be arranged and distributed according to the balance of the composition.

Red plants to be planted at the position with the heaviest weight

Red stem plants having the greatest impact should basically be planted to the position with the greatest weight (according to the golden ratio).



A concave composition designed at the ratio of 2:3

Expression of the background

In addition to determining the planting patterns that takes into consideration the compositional balance and weight, it is important to consider color balance with the surrounding plants (to the front, back, right and left). Here we discuss planting arrangements that make the best use of the complementary colors of red and green.

Example of a Aqua Tank 1

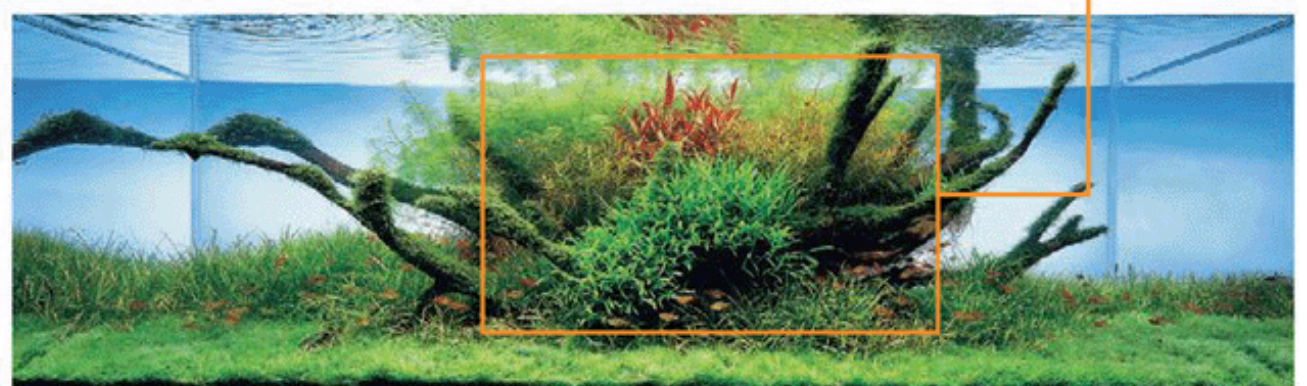


Rotala macrandra, which has the largest leaves in a vivid red among the stem plants selected for this layout, is planted at the center of the weight following the basic method.

Example of a Aqua Tank 2



In the convex composition, *Alternanthera* has a strong impact and is to be planted in the side that has the greater weight. The red color stands out based on the effect of the surrounding supplementary colors.



【Planting and Expression of the Background Plants 2】 Expression of Water Flow and Natural Ambience



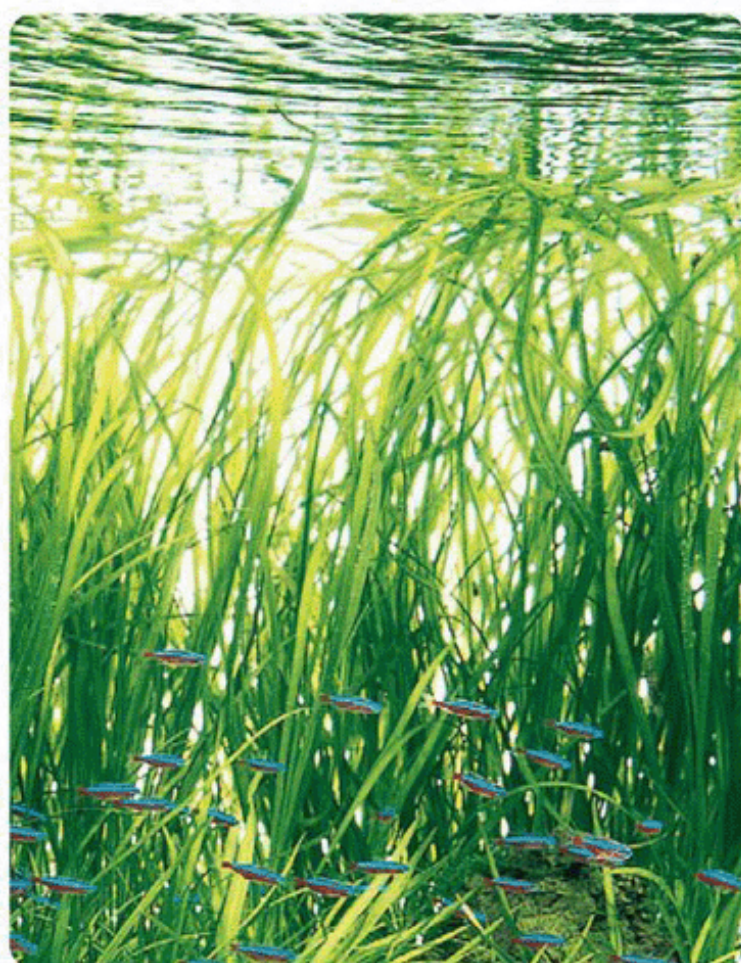
Eleocharis vivipara

Eleocharis vivipara looks like Eleocharis acicularis, but it does not send out runners and grow sideways. This is a rare plant where we can adjust its leaf density and impact by reducing the volume of its long, fine leaves.



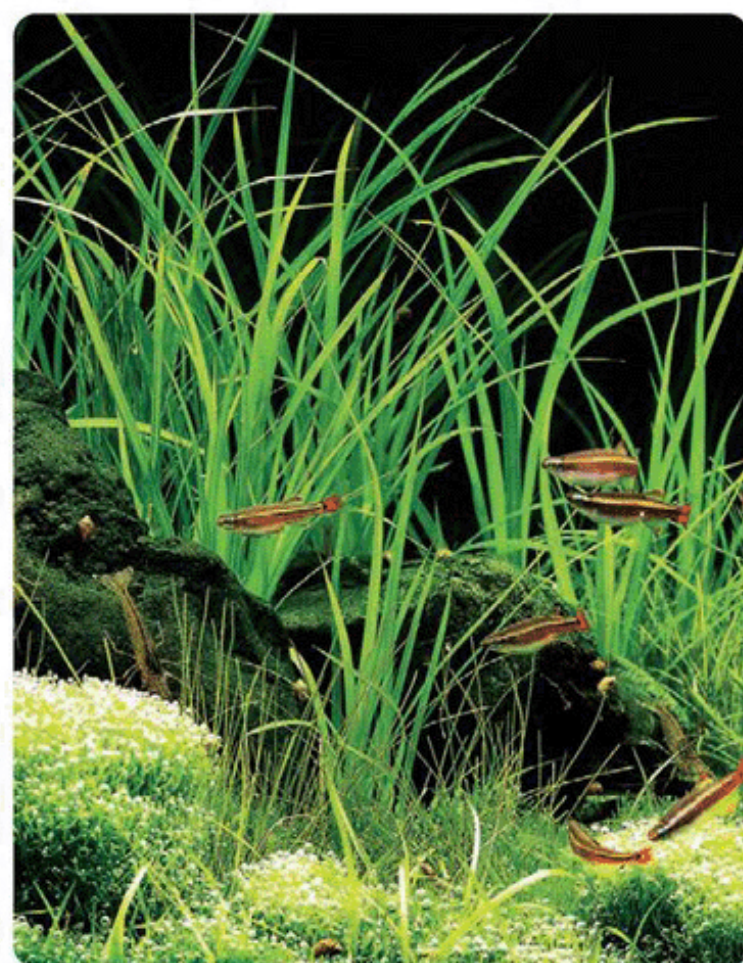
Vallisneria nana

Vallisneria nana is one of the smallest members of the large Vallisneria species, which is suitable even in a 60cm tank. If it spreads its runners to an unintended location, cut off the runners to maintain the neat appearance of the layout.



Echinodorus angustifolia

The vertical lines of Echinodorus angustifolia leaves can have a subtle variation by mixing with Vallisneria nana which has similar leaves. Regular supplementation using substrate nutrients in addition to liquid fertilizer addition is required for this plant to not suffer from fading leaf coloration.



Cyperus helferi

Cyperus helferi has a fresh impression like summer grass and adds a refreshing touch to the aquascape. The leaves easily overhang along the water surface. To prevent this, excessively long leaves should be cut as early as possible. Be aware of algae that may grow on the hard leaves of this plant.

Besides stem plants, tape-like aquatic plants are also used in the background of the layout. These plants swaying in the water makes us feel the visual flow of water. The planting of a single species of a tape-like plant tends to get monotonous. This type of plants can produce a natural feel by mixing more than one species with different leaf widths.



Tips for Selection!

Besides the plants introduced in the above photographs, you can choose Isoetes japonica, Crinum aquatica (Narrow Leaf) and Cryptocoryne retrospiralis as one of the background plants. When planting only one species of tape-like aquatic plants (single planting), the plant can be chosen according to the image of the layout. If more than one species of aquatic plants is planted (mixed planting), on the other hand, the base plant should be determined first and then mixed with other plants with different leaf widths.

Mixed planting provides an enhanced natural ambience

The use of tape-like aquatic plants in the background has the effect of making us feel the flowing water with their overhanging leaves along the water's surface. This type of plant also produces an atmosphere that resembles a grassy field when only a few species are planted in combination. With such features, the tape-like plants are suitable for driftwood layouts that focus on the expression of a natural ambience. *E. vivipara* and *Cyperus* that do not grow sideways can be planted in their originally intended planting space in a balanced manner.



Planting techniques

During the planting process, it is advised to tilt long-leaf tape-like plants against the planting direction. If the roots are about to come out of the substrate, some substrate soil should be sprinkled on top.



Immediately after mixed planting

Four species consisting of *Eleocharis vivipara*, *Echinodorus angustifolia*, *Crinum aquaticum* (Narrow Leaf) and *Cryptocoryne retrospiralis* are planted in combination.



Expression of the background

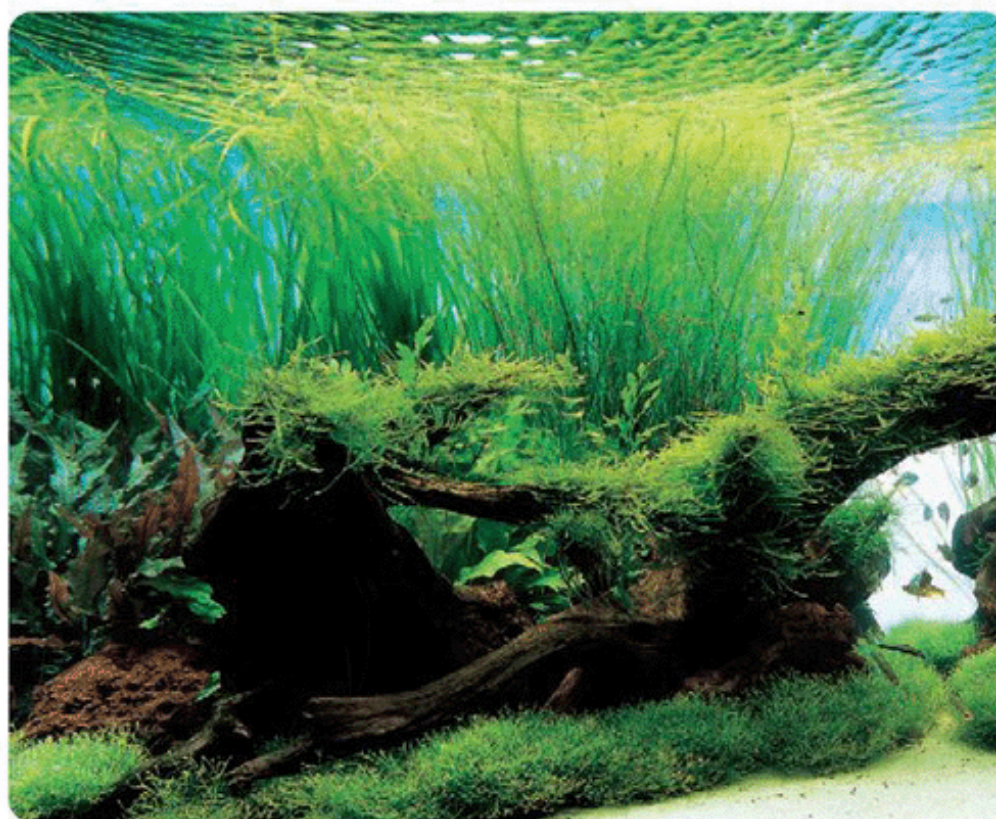
The choice of single or mixed planting of tape-like aquatic plant is in accordance with the intention of the layout. Planting a single species of tape-like plants is suitable when you wish to ease the impact of Oyaishi in an Iwagumi layout. On the other hand, the aquascape

looks attractive with a few species of tape-like plants in a driftwood layout pursuing natural ambience or in an aquascape with various types of aquatic plants. An example of each pattern will be shown in the photographs below.



Single planting of *E. vivipara*

Planting *E. vivipara* behind the Oyaishi has the effect of easing the impact of the stone. The planting area corresponds with the positioning of the Oyaishi.



Mixed planting of *E. vivipara* and *E. angustifolia*

Mixing an appropriate amount of *E. angustifolia* among the clump of *E. vivipara* adds depth to the expression of the background.

Aquarium Layout Making Process

[The Planting Process in a 60cm Aquarium Tank]

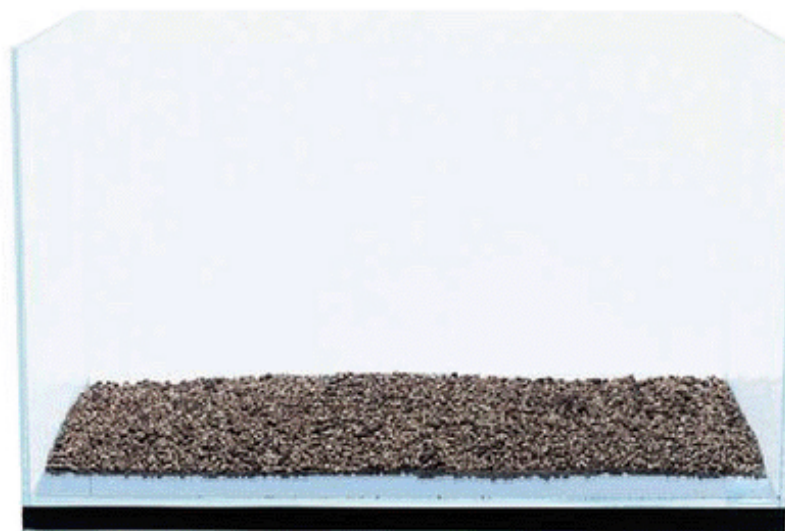


1 Installation of aquarium tank

Make sure that the aquarium tank is installed on the level surface of an aquarium cabinet. Be sure to use a Garden Mat, which will absorb even a slight distortion of the top panel of the cabinet.



Garden Mat



2 Sprinkling substrate additives

Nutrient-rich Power Sand Special S is used for Cryptocoryne to be planted. The substrate system will be made more perfect if other types of substrate additives are applied in addition to Power Sand.



Bacter 100 PENAC P & W

Power Sand Special S



3 Pouring Aqua Soil

Aqua Soil-Amazonia contains abundant organic nutrients and is poured on the base of the aquarium. Avoid making the foreground substrate excessively thick. It is recommended to flatten the substrate surface with Sand Flatteners for a neat-looking aquascape.



Sand Flattener

Aqua Soil-Amazonia



4 Placing branch wood

The branch wood should be placed in such way that its branch shapes are highlighted. It is also important to arrange the wood in a stable manner for easy maintenance.



Branch wood



5 Planting foreground and mid-ground plants

Planting work is made easy by pouring some water into the tank and by maintaining a shallow layer of water as part of the pre-planting preparation. Pinsettes L with pointed tips are convenient for planting of Lilaeopsis brasiliensis while Pro Pinsettes Grip type is ideal for planting Cryptocoryne.



Pinsettes L

Pro Pinsettes Grip type L



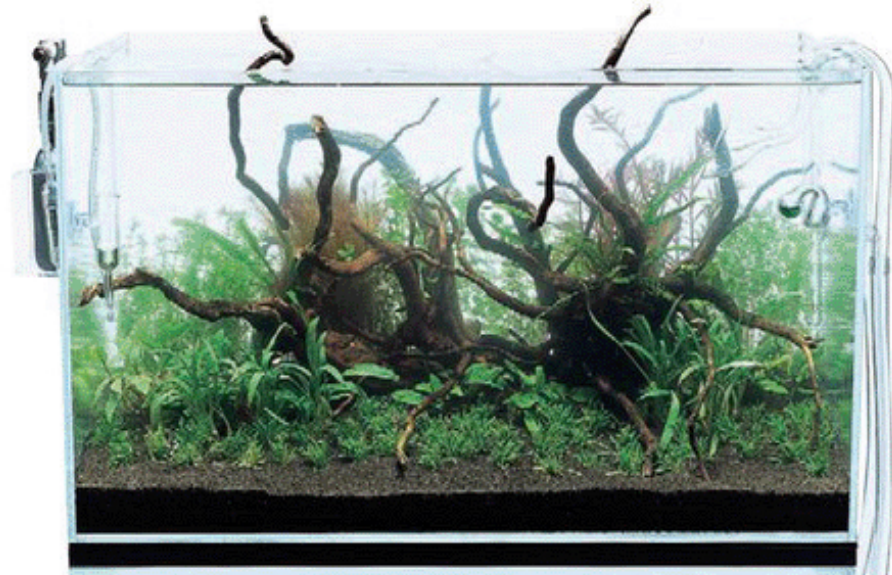
6 Planting background plants

The planting space for each stem plant is determined using bamboo sticks as a guide to visualize the balance of the plants. Pinsettes L is also convenient for planting of stem plants.



Pinsettes L

This section introduces the most standard aquarium layout making process in a 60cm tank.
The planting of each plant is determined by considering the characteristics of the plants.



7 Completion of the planting

Planting is completed when Microsorium that is attached to small stones with Wood Tight are placed in the indented portions of the branch wood and/or other composition materials. Both sun-loving plants and shade plants have been planted in their respective appropriate locations.



Wood Tight

8 Installation of the equipment

Slowly pour the chlorine-neutralized tap water into the tank. Once equipment, such as the CO2 supply system, Lily Pipes and Drop Checker are placed and installed, your setup of the aquarium is complete.



Chlor-Off



DATA

Tank	/ Cube Garden W60×D30×H36 (cm)
Lighting system	/ Solar 1, NAG-150W Green, 10 hours per day
Filtration system	/ Super Jet Filter ES-600 (Bio Rio, NA Carbon)
Substrate system	/ Aqua Soil Amazonia, Power Sand Special S, Bacter 100, Clear Super, Penac W for Aquarium, Penac P, Tourmaline BC
CO ₂ system	/ Pollen Glass, 3 bubbles per second with CO ₂ Bubble Counter (Tower)
Air	/ Aeration with Lily Pipe P-2, 14 hours per day after the light turned off
Additives	/ Brighty K, Green Brighty STEP 2

Water change	/ Once a week, 1/3 of the tank
Water quality	/ Water temperature 25 degrees Celsius, pH: 6.8, TH: 20mg/ℓ
Aquatic plants	/ <i>Hemianthus micranthemoides</i> <i>Rotala wallichii</i> <i>Micranthemum unbrosom</i> <i>Rotala macrandra</i> (Green) <i>Rotala rotundifolia</i> <i>Cryptocoryne albida</i> <i>Cryptocoryne petchii</i> <i>Cryptocoryne wendtii</i> (Green)

Fish species	/ <i>Lilaeopsis novae-zelandiae</i> <i>Microsorium sp. Narrow Leaf</i> <i>Fontinalis antipyretica</i> <i>Paracheirodon innesi</i> <i>Hyphessobrycon megalopterus</i> <i>Hyphessobrycon sweglesi</i> <i>Hyphessobrycon sp.</i> <i>Hyphessobrycon robertsi</i> <i>Crossocheilus siamensis</i> <i>Otocinclus sp.</i> <i>Caridina japonica</i>
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Knowing the Natural Habitats of Aquatic Plants

The optimal aquarium conditions for each aquatic plant vary by plant type and species. It is because their native habitats are different. This section introduces the native environment of their representative aquatic plants.



Introduction of the natural habitat of aquatic plants.

GROUP 01

A sunny open field was entirely covered with a carpet of emerged leaves of *Echinodorus tenellus*, resembling a grass field.



Foreground plant



Eleocharis acicularis grown in paddy fields in Japan. This is one of the aquatic plants that grow in bright, sunny locations.

This is a member of the *Eleocharis acicularis* species that grows in Amazonian wetlands. The stream is covered by this plant stretching its long emerged leaves out of the water's surface.



Cryptocoryne albida spreading out its submersed leaves. This place is not so dark under the sunshine filtered through the foliage.

Mid-ground plant (Cryptocoryne)



A cluster of *Cryptocoryne* grown on the bottom of a shallow river. The plant is surrounded by trees and gets light only for a few hours a day.

Cryptocoryne siamensis covers the entire bottom of a deep river. The plant spreads large submersed leaves in low light environments.



GROUP 02



- ① Anubias grown in a swiftly-flowing stream. They firmly cling on to stones so that they survive even in high water levels during the rainy season.



- ① Microsorium grown on a rock face not exposed to sunlight. Most of the ferns are shade plants that have a high tolerance to shady environments.

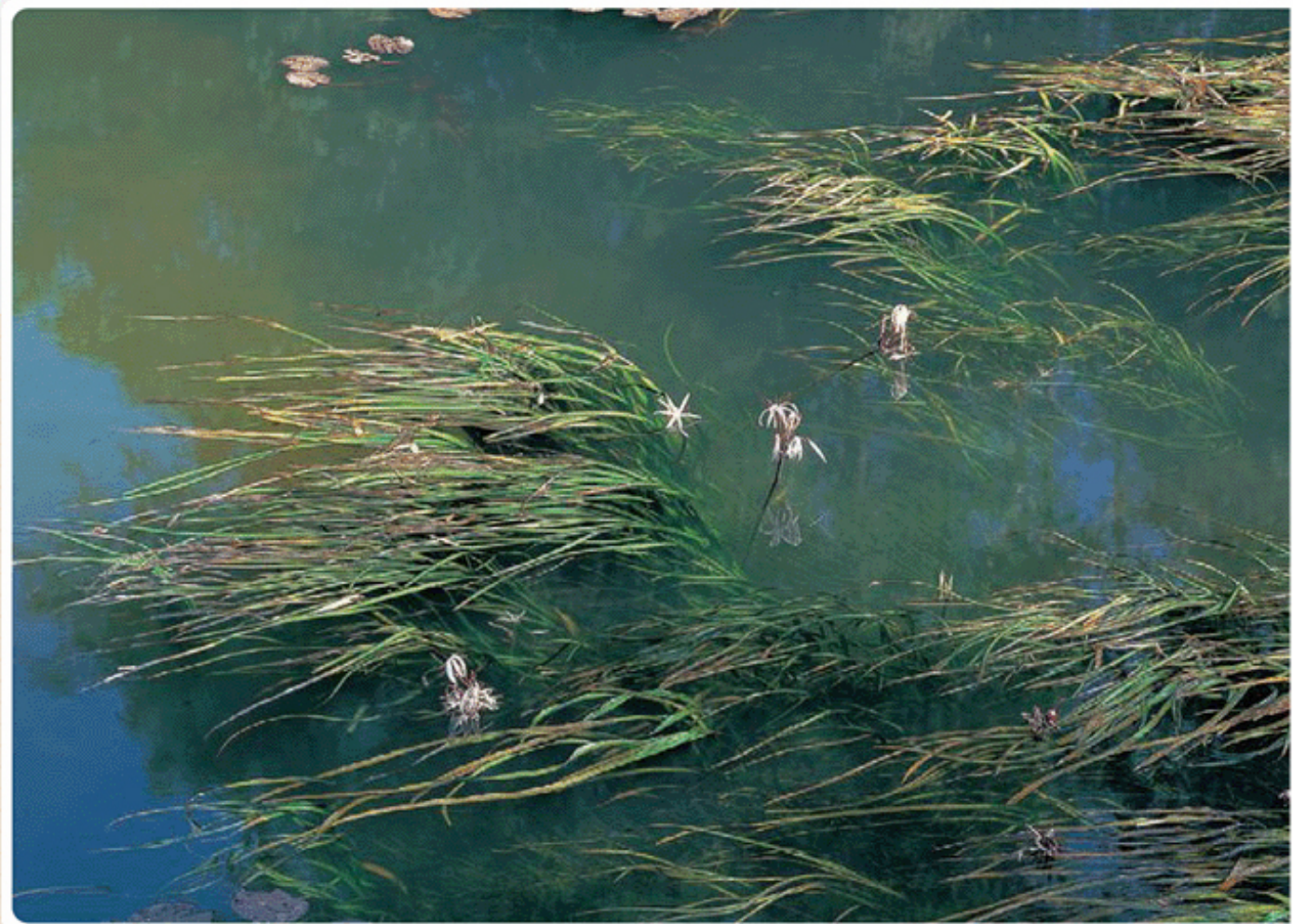
Mid-ground plant (epiphytic plants)

GROUP
03



- ① Bolbitis grown on a large stone in a stream flowing across a tropical rainforest. It spreads relatively large submersed leaves in this low-light place.

- ① Crinum thaianum with long tape-like submersed leaves swaying in water.



Background plant (stem plants & tape-like plants)



- ① A cluster of Tonina fluviatilis in shallow water near the river bank. This plant requires low-pH and low-KH water to thrive.



- ① Ranunculus nipponicus var. submersus originated in Japan and grows in a clear water stream. This plant forms a beautiful cluster only in streams with cool, rapid water flow.

GROUP
04

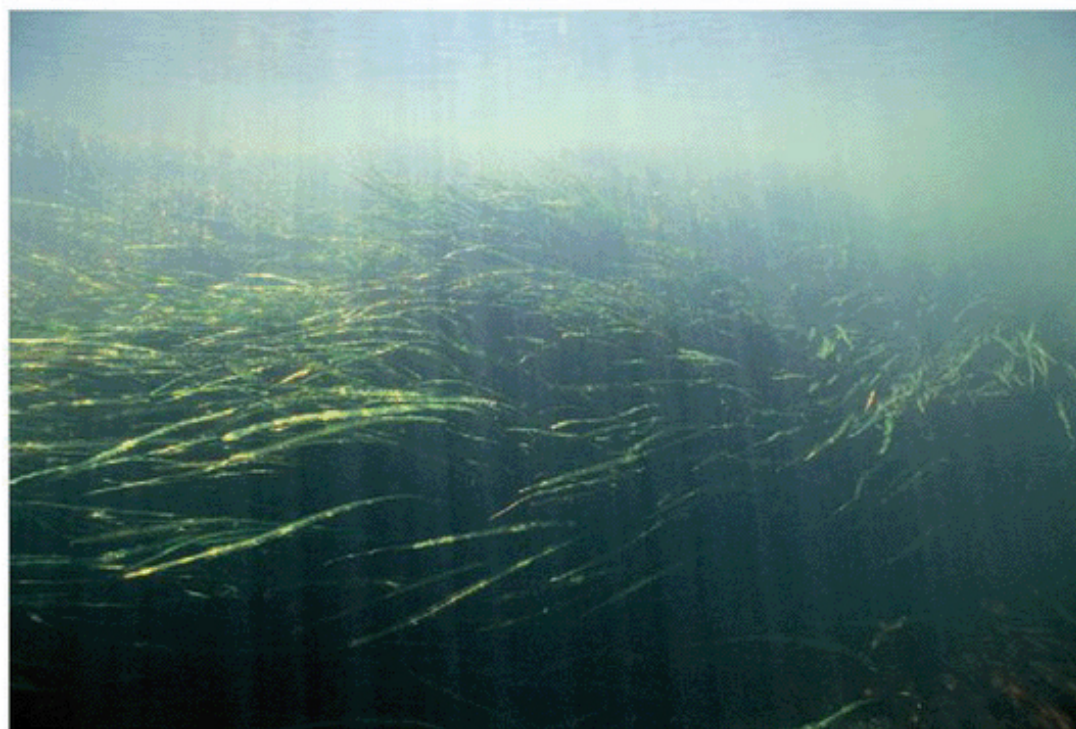
Learning Tips for Layouts from Nature The Planting of Aquatic Plants

How to use stones and driftwood is not the only layout expression we should learn from nature. There are a lot of things about the planting of aquatic plants that we can learn from nature. Reproducing the original state of the aquatic plants we spot in their native habitat leads to the expression of a natural ambience. Furthermore, learning how aquatic plants grow and survive in their natural environment enables us to take care of the plants used for a layout in a plant-friendly way according to their biology.

Learning how to use *Cryptocoryne* from nature

Cryptocoryne retrospiralis grows in dense clusters and has long tape-like leaves in order to survive in an environment that has rapid water flow, while utilizing weak light efficiently. In this layout, a cluster of *Cryptocoryne* is expressed by planting *Cryptocoryne balansae*, which has similar tape-like leaves densely in the background.

Tank size / W90×D450×H45 (cm)
Aquatic plants / *Cryptocoryne beckettii*,
Cryptocoryne willisii,
Cryptocoryne parva,
Cryptocoryne wendtii (Tropica),
Cryptocoryne undulata,
Cryptocoryne balansae
Fish species / *Trigonostigma heteromorpha*



Shooting location / Southern Thailand

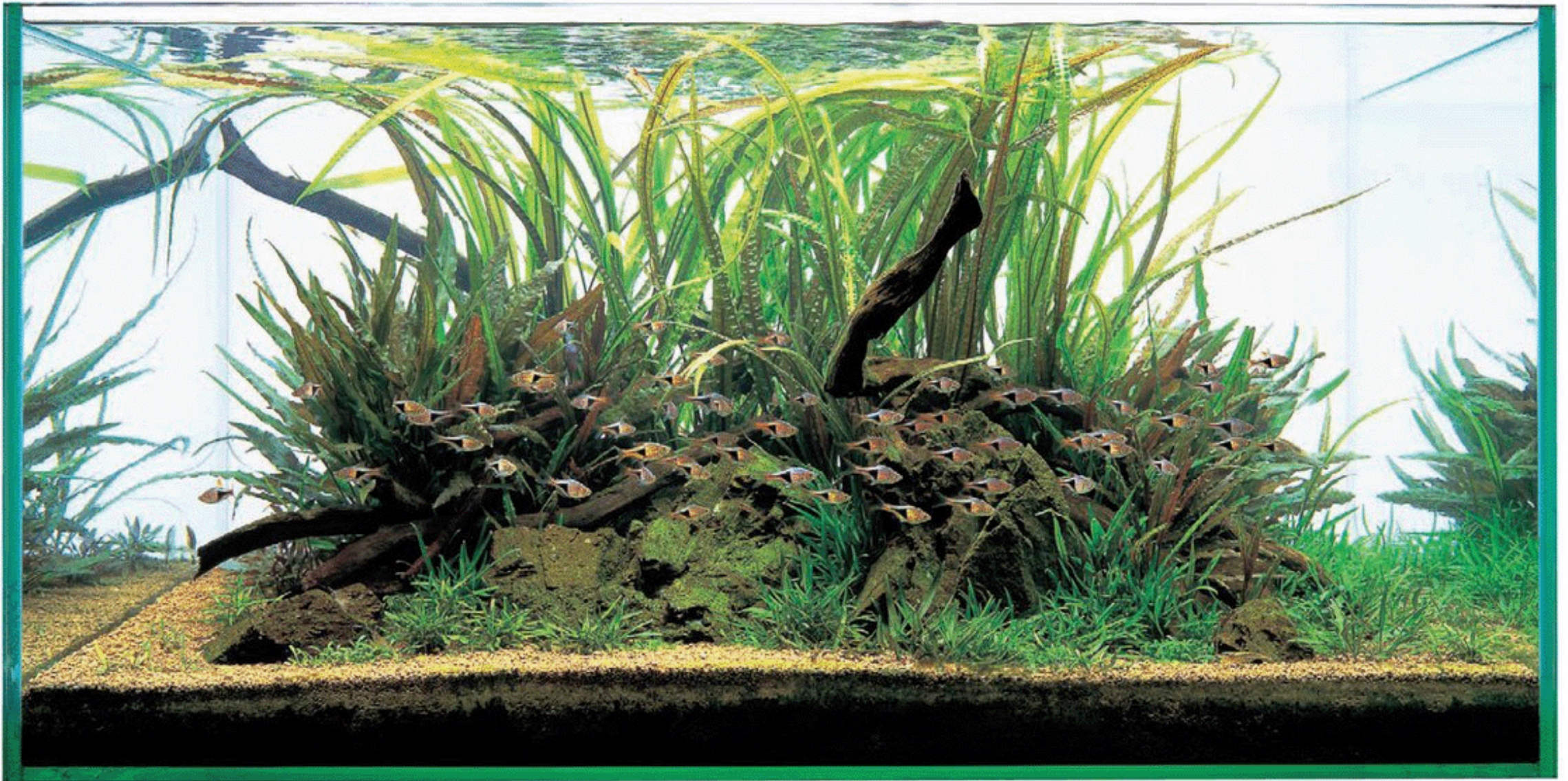
©Takashi Amano

Learning how to use *Anubias* from nature

Anubias grows on stones and fallen trees in their habitat. The roots of *Anubias* are not meant to spread under the ground, but rather they are intended to cling onto something. In the planted aquarium, too, *Anubias* grows more healthily when it is attached to stone or driftwood. This is because the method used here is natural and has a less stressful impact on the plant.

Tank size / W120×D45×H45 (cm)
Aquatic plants / *Glossostigma elatinoides*, *Lilaeopsis novae-zelandiae*, *Anubias barteri* var. *nana*, *Anubias barteri* var. *nana* "Narrow", *Sagittaria subulata* var. *pusilla*,
Hydrocotyle maritima
Fish species / *Ladigesia roloffii*, *Pelvicachromis taeniatus* "Dehane", *Pelvicachromis taeniatus* "Kienke", *Pelvicachromis taeniatus* "Nigeria Red", *Anomalochromis thomasi*





Shooting location / West Africa

©Takashi Amano

nature aquarium notes

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Component Items of Nature Aquarium

As mentioned in the special feature pages of this issue, various products are used to create a Nature Aquarium. You do not have to own all of these items, but the maintenance of the aquarium over a long period of time will be made easier by selecting and efficiently using the appropriate items according to the required functions of maintenance and the purposes of the products. The Nature Aquarium Notes of this issue introduces how to use these items in order to achieve a successful Nature Aquarium.

● Items relating to CO₂ supply

【Features of each type of Pollen Glass】

Pollen Glass, a product for diffusing CO₂ into water, is the most important item among the CO₂ supply products as it influences the CO₂ supply efficiency. Pollen Glass features a basic but sophisticated design and is incorporated in the CO₂ Advanced System. Pollen Glass offers wide variations. (See the column below)

【Which CO₂ Bubble Counter to be Used?】

CO₂ Bubble Counter is used in combination with Pollen Glass for the purpose of measuring

the CO₂ supply amount. CO₂ Beetle Counter should be used when combining with a large-sized Pollen Glass Large. CO₂ Beetle Counter is suitable for large aquarium tanks and produces larger bubbles that rise in spirals, making the bubble counting easier. CO₂ Diffuse under the Do!aqua brand adopts an integrated design with a CO₂ counter for enhanced usability. Still, the CO₂ Bubble Counter offers a higher measurement accuracy and better viewability.

● Items relating to light

【Effective use of metal halide lamps】

There are two types of metal halide lamps for growing aquatic plants, namely NAMH-150W that offers a high color rendering property and NAG-150W-Green that produces a vivid green color. Under NAG-150W-Green, the green color of aquatic plants looks very vivid but the red color does not show up well. To enjoy great red and green colors, it is advisable to use a Grand Solar I equipped with NAG-150W-Green and NA Lamp Twin 36W featuring high color rendering properties. Metal ha-

■ Variations of Pollen Glass

Pollen Glass TYPE-2

The only difference from the original Pollen Glass is the higher position of the CO₂ diffusion filter. Nevertheless, the design image is significantly different from Pollen Glass. Pollen Glass TYPE-2 prevents some living organisms from entering the pipe of the Pollen Glass.



Pollen Glass TYPE-3

Pollen Glass TYPE-3 has the CO₂ diffusion filter at a higher position. Its silicon tube connection pipe on the side surface of the body is bent upright. This product offers all the features of TYPE-2 and is free from the concern of a bent silicon tube.



New Pollen Glass

New Pollen Glass features a diagonally-cut body and also a silicon tube coming from the bottom of the body and bent upright. It can be installed neatly in a 60cm aquarium tank with a dedicated joint glass provided.



Pollen Glass Mini

Pollen Glass Mini has a shorter body and offers an integrated silicon tube connection pipe with a hairpin-like joint glass. The installation is as easy as just hanging on the aquarium. It is ideal for small aquarium tanks, such as Mini S and Mini M size.

Pollen Glass Large (200 / 300)

Pollen Glass Large has a larger diffusion filter to supply a larger amount of CO₂. With a silicon tube connecting pipe which runs from the bottom of the body and is bent upright, Pollen Glass Large features an improved design along with a higher CO₂ diffusion efficiency.



Pollen Glass Beetle (300 / 400 / 500)

Pollen Glass Beetle features a very big CO₂ diffusion filter and a silicon tube that runs from the side surface of the body and is bent upright. This product can be installed on the side panel as well as in a corner of the aquarium.



lide lamp 10,000K and Blue Light (20,000K) are designed for marine aquariums. These lamps are not intended for fresh water aquariums as they do not help produce great colors on aquatic plants and tropical fish in fresh water.

【Controlling lighting hours with a timer】

Excessively long lighting hours leads to algal growth. On the other hand, excessively short lighting hours affects the growth of aquatic plants and may result in the elongation of stem plants. In light of these facts, it is important to set the lighting hours to 8 to 10 hours a day and ensure a regular daily lighting ON/OFF time. The maintenance of the layout is made easy with the NA Control Timer which turns on and off the CO₂ supply in tandem with the ON/OFF cycle of the light.

● Items relating to substrate

【How to select Power Sand】

Power Sand is available in three different grain sizes (S, M and L) to cope with different hydraulic pressure in each tank depth. The suitable depth of the aquarium tank for Power Sand S, M and L are below 40cm, 40 – 60cm and above 60cm, respectively. Power Sand is used during the setting up of a new aquarium. In case of a makeover of an aquarium for which biological filtration is already working, Power Sand Special that contains rich organic

nutrients can also be used. Power Sand Special is designed for an aquarium with heavy root feeder plants such as Cryptocoryne and Echinodorus. When biological filtration is still not fully functioning, this substrate material may lead to contamination of the aquarium water and therefore will affect the setup process of a new aquarium. For this reason, Power Sand containing less organic nutrients is more suitable when setting up a new aquarium using a brand new filter.

【Effective use of substrate additives】

The various types of substrate additives are mentioned in the Nature Aquarium Data under the “Substrate” section. Applying substrate additives to the substrate system that consists of a basic combination of Power Sand and Aqua Soil promotes the growth of substrate bacteria and microorganisms (Bacter 100 and Clear Super). It also prevents the hardening and anaerobic environments of the substrate (PENAC and Tourmaline BC). These substrate additives are not really necessary for small aquarium tanks. For large tanks to be maintained for a long time, it is strongly recommended to apply the substrate additives as much as possible.

● Items relating to filtration

【Super Jet Filter with wide variations】

The Super Jet Filter series offers multiple variations to cater to a wide range of tank sizes and applications. The key to a successful selection of a Super Jet Filter is the combination of the pump flow rate and canister capacity. The numerical figure in ES-600, ES-1200 and ES-2400 indicates the canister capacity which serves as the base for the compatible pump flow rate (the greater the figure, the larger the pump flow rate). “EX” and “EX2” at the end of the model name indicates that the canister has 1.5 times and 2 times larger capacity, respectively, than the ordinary models without “EX” and “EX2”. For example, Super Jet Filter ES-600 (with a canister capacity of 6L) is suitable for 60cm to 90cm tanks. If a higher filtration capacity is required, you may choose ES-600EX (which has a canister capacity of 9L) or EX-600EX2 (with a canister capacity of 12L) which will accommodate a larger amount of filter media.

【Features of the outflow pipes】

An outflow pipe is attached to the outlet of the Super Jet Filter. The direction and volume of water flow vary depending on the shape of the outflow pipe. In Nature Aquarium, Lily Pipe provides the standard water flow. The outflow pipe should be selected according to the tank size and purposes.

(See the column below)

■ Variations of outflow pipe

Poppy Glass

Poppy Glass creates a gentle water flow with its ball-shaped outflow pipe that features a diagonally-cut top opening. Under a metal-halide lamp, you can enjoy light dancing on the rippling water produced by the upward water flow from the Poppy Glass.



Violet Glass Jet

It is suitable for making a strong current in a fish aquarium, but not in a planted aquarium. Metal Power Pipe also produces a strong current like this product.



Violet Glass

The smaller outflow pipe of Violet Glass creates a relatively rapid water flow. The slightly-downward water flow provided by this product has the effect of eliminating stagnant water around the substrate. Violet Glass Mini for smaller aquarium tanks is also available



Metal Jet Pipe

Metal Jet Pipe is equipped with a mesh strainer on the outlet, creating a very gentle water flow via the diffusion effect. This outflow pipe is suitable for the aquarium in which water flow is to be avoided. The inflow pipe needs to be installed on the opposite side of the outflow pipe to prevent poor water circulation within the tank.



Lily Pipe Spin

The newly released Lily Pipe Spin has a loop-shaped tip with large openings on the sides. This allows the water flow to slow down while circling inside the tip portion, causing the water to eventually flow out from the sides. A gentle water flow is created in the front of this Lily Pipe, which produces adequate water circulation for smaller aquariums. Lily Pipe Mini is suitable for small aquariums that require a more rapid water flow.





Announcement of the AQUA JOURNAL digital discontinuation

Aqua Design Amano Co., Ltd. discontinues the publication of
AQUA JOURNAL Digital Edition in English at January 2013 issue.
Thank you for your patronage toward the AQUA JOURNAL digital.

ADA continues to provide the Nature Aquarium information
and ADA products news in English through the video broadcasting
ADA view on Youtube, e-mail newsletter, SNS and a newly designed
web site which will be launched soon !!

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