Nature Aquarium information magazine

AQUA JOURNAL

ADA
aqua design amano
NOV.
2011

Special Feature

Layout Material Selection

ADA
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THE GRAND SOLAR SERIES

NATURE AQUARIUM GOODS LIGHTING SYSTEM

REPRODUCING THE SUN OF THE AMAZON

The Sun over the Amazon nurtures millions of life forms.
Inspired by this marvel of nature, we set out on a ten year journey to develop the ultimate functional lighting system that would replicate the sun as it is over the Amazon.
By combining NA Lamps with Metal Halides and a high performance electronic ballast, we were able to achieve our goal and created the Grand Solar series of lighting.

www.adana.co.jp/en

GRAND SOLAR Ⅰ

This is the flagship model equipped with a 150W metal halide lamp and two 36W twin flourescent lamps. This makes it possible to control light intensity and lighting hours

GRAND SOLAR Ⅱ

This model is equipped with four twin 36W fluorescent lamps and provides gentle lighting for aquatic plants.

GRAND SOLAR 250

A single 250W metal halide lamp powers the Grand Solar 250 and provides strong lighting for tall aquariums or the growth of invertebrates.

Early Development of NA Lighting:

Lighting is very important for growing healthy aquatic plants. However, red lights used for growing terrestrial plants is ineffective for aquatic plants because red light is unable to effectively penetrate water. On the other hand, blue light transmits very well under water. The reason everything looks blue under water is simply because water acts as a filter to remove the red light and only bluish light can be seen. Therefore, in order to provide light effectively for aquatic plants, it is necessary to use lamps equipped with the blue spectrum. Based on this idea, Aqua Design Amano developed the world's first fluorescent lamp, designed for growing aquatic plants in collaboration with Matsushita Electric Industry Co., Ltd. By focusing on the spectrum of blue light, we were able to promote optimum photosynthesis in aquatic plants while also brightening the colors of both plants and fish. This light was the foundation for all Nature Aquarium lighting, and would lead to the refined development of the Grand Solar. This is indeed, an idealistic light for the Nature Aquarium.

Electric ballast

Metal Halide Lamp

The Grand Solar I: A Lighting System that Reproduces Sunlight

The Grand Solar lighting fixtures and metal halide lamp was developed based on the successful lighting spectrum of the NA fluorescent lamp for growing aquatic plants. The lighting system has succeeded in reproducing the light of the sun in the natural environment. Grand Solar I is one of the culminations of our development process in lighting and is equipped with two types of lamps: a metal halide lamp and two fluorescent lamps. This enables the fixture to replicate the natural cycle of the sun during the day by allowing for the stronger lights to only come on during midday, promoting the photosynthesis process of plants at noon when the process is most active, and then switching to a more gentle light for both early morning and late afternoon. This cycle is both more efficient for plants as well as for energy saving and allows for the aquarium's light to be enjoyed during more hours of the day.

- The Electronic ballast is of the highest quality available in Japan, ensuring stability.
- Utilizes a simple design that does not detract from the interior decor of the aquarium's surrounding environment.
- Pendant style enables adjustment in distance from the water surface so the light intensity can be adjusted according to the types of aquatic plants.

Product lineups of professional quality

made in japan

Travelling across Japan

Vol.32 Uonuma, Niigata, Japan

ADA
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ADA's original oil film remover with superior effects

NEW

Water surface extractor

VUPPA-I

ADA NATURE AQUARIUM NEW GOODS

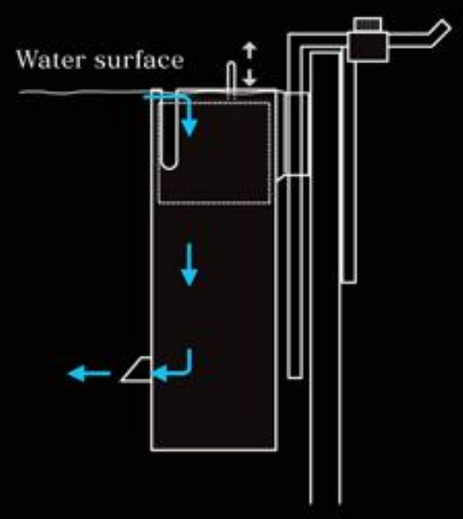
Simple and compact design	Original water volume adjustment function	Robust stainless body with high durability

Removes contamination on the water surface such as oil film effectively

Having oil film on the water surface spoils the allurement of an aquascape.
VUPPA-I developed with ADA's original structure eliminates such film effectively.
And all hand-crafted stainless body does not spoil the appearance of the aquarium.

SIZE : Ø38×H110mm ※Excluding the projection parts.

※The picture only shows the image of the product.
Actual product has the electric cord from the top of the main body.



Ooshirakawa in the Early Winter (Uonuma, Niigata, Japan)

The Ooshirakawa region, formerly known as Iri Hirose Village, is a world-famous heavy snowfall area. The area faced a record-breaking snowfall in January 2010 which forced me to stop photographing at that time. Later in the middle of December that same year, I waited until the mountains in Ooshirakawa started to be covered with snow and went for a photo shoot. Among the trees and mountain surfaces decorated with the first snow of the season, thick clumps of trees and bare ground after an avalanche could be clearly seen. The mountains would then be totally covered with deep snow and eventually turn into an incredible snowscape.

Shooting data / Wisner 8×20, Fine Art 550mm, PL filter is used, 1 sec at f64, Velvia 100F 8×20 inch format film

AQUA JOURNAL

NOVEMBER 2011

Contents

Nature Aquarium Layout

Special Feature

Layout Material Selection Made Simple

"Are you at a loss as to what materials to choose?"

Can't decide whether to choose driftwood or stone for your first planted aquarium?
Even after deciding on either one, how do you select the optimal layout materials?
There are various selection factors such as size, color and shape, just to name a few.
This issue of Aqua Journal introduces you to some tips for the selection and combination of layout materials.

Photographs by Takashi Amano
Text by Masatoshi Abe／Tsuyoshi Oiwa

What Types of Layout Materials are Available?

☐

01. Amazon Wood

An authentic piece of Amazonian driftwood collected from Rio Negro. This wood is full of romantic dreams.

☑

02. Branch Wood

Popular driftwood with its attractive multi-branching form. Your aquarium looks cool just by placing this driftwood in it.

☑

03. Horn Wood

Driftwood of various shapes with surface colors ranging from brown to reddish brown. Keep a stock of well-shaped horn woods.

☐

04. Jati Wood

Usually available in thin branches. Suitably used in combination with several branches.

☐

05. Old Black Wood

Black driftwood in a branch form. This used to be one of ADA's major driftwoods.

☐

06. White Wood

Relatively thick driftwood whitish in color. Has the tendency to leach a lot of tannin.

☐

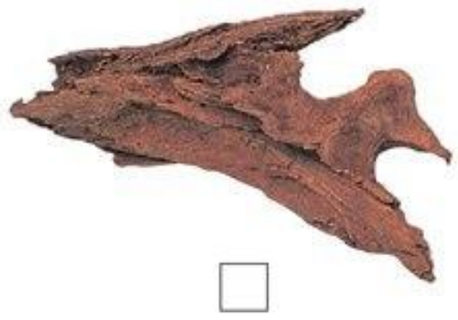
07. Driftwood I

Driftwood in the form of a branch covered by a bark with many cracks. This is a new feature which has not been seen in other types of driftwoods. (Currently unavailable)

☐

08. Driftwood II

Hard, solid driftwood resembling ebony and rosewood. Not released due to very limited availability. (Currently unavailable)



☐

09. Philippine Driftwood

Although not dealt with by ADA, this is a driftwood which is popularly seen. The good thing about this driftwood is easy accessibility.

The perfect match for your needs!

02. Branch Wood

- Most suitable for beginners. This wood features an attractive figure created by branching, and helps you produce an impressive layout.
- For an expression which evokes an image of the driftwood roots spreading under water.

03. Horn Wood

- Recommended for aquarists who can make a composition with a combination of several branches.
- For a wild layout modeled on the wood's native environment which is also a habitat for tropical fish.

The layout materials introduced in this section are mainly products that have been sold by ADA. Even though the type may be similar, no two are ever the same. If you come across material you like, you ought to treasure the discovery, for it will never be repeated.

☑ ··· The items with a tick are currently available for sale. For other items, it may be a real find to come across them in a shop.

☑

10. Manten Stone

This mountain stone has an attractive rugged surface. Most of these stones come in warm colors.

☐

11. Fuji Stone

With its unique texture, this stone is suitable for attaching willow moss.

☑

12. Ryuoh Stone

This stone has many figure variations created by white lines and corrugations.

☐

13. Keikan Stone

This is a stone material produced by cutting out only the portion with a good shape from natural stone. A good layout can be made just by placing this stone.

☑

14. Yamaya Stone

This stone has a rugged, black surface with a simple texture. A wider range of expression can be expected through the effective use of this stone.

☐

15. Yellow Tigereye Stone

With its bright color and uniquely rugged surface, this stone helps you create a distinctive aquascape.

☐

16. Shou Stone

A stone with a lot of depressions. This small-sized stone adds an accent to your aquascape.

☐

17. Guilin stone

This stone features traditional craftsmanship in a Chinese natural landscape. You can enjoy an Iwagumi layout just by placing this in your aquarium.

☐

18. Hakkai Stone

This exquisite stone has a solid, heavy texture. Depressions called "wormholes" add depth to this stone. Requires high skill in stone arrangement.

10. Manten Stone

- Ideal for brushing up your stone arrangement skills in Iwagumi. This is said to be "the official stone for ADA's annual event "Iwagumi Challenge".
- Available in various sizes, this stone is suitable for Sanzon Iwagumi. This is a basic stone for the Iwagumi layout.

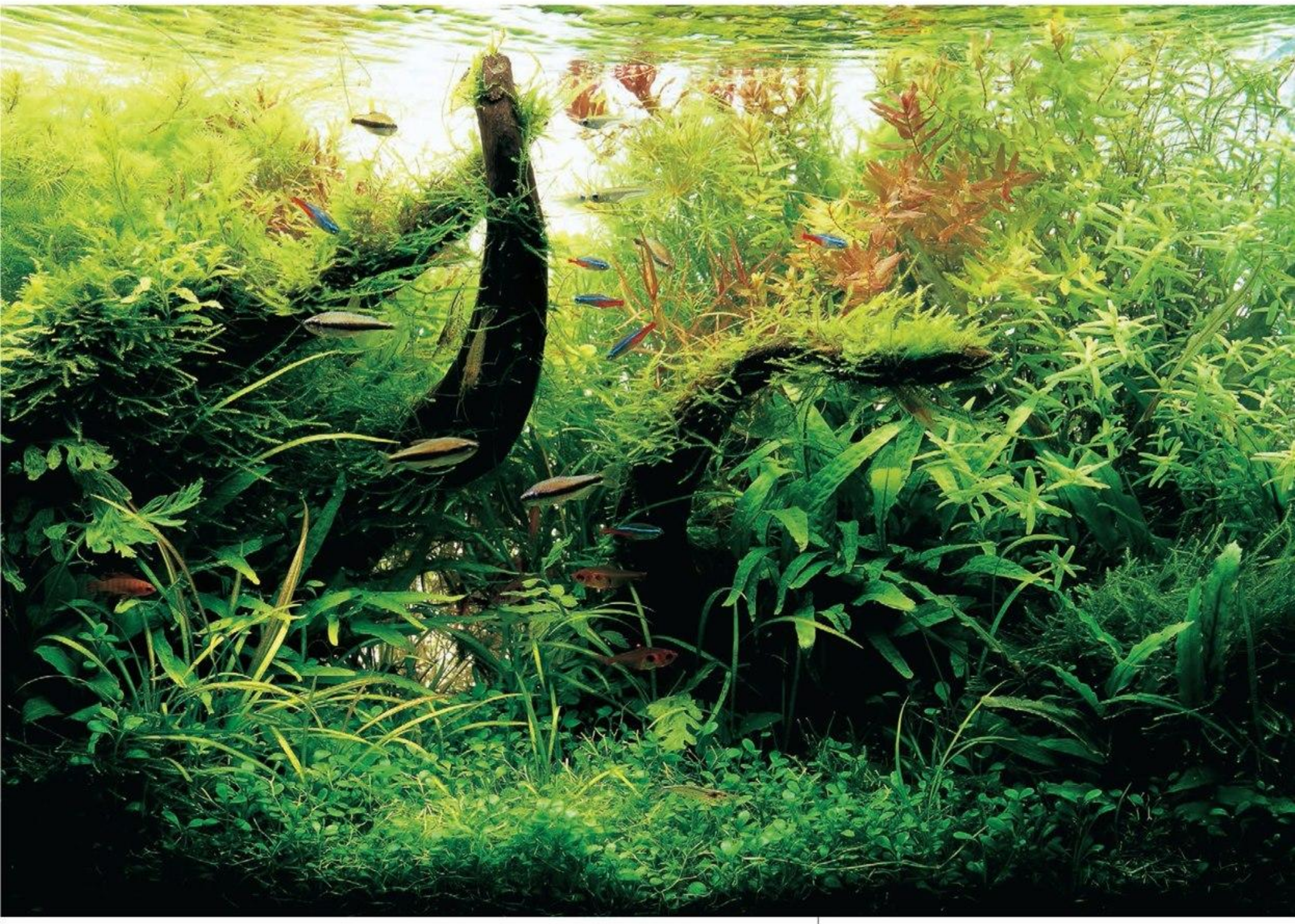
10. Ryuoh Stone

- For those who wish to produce an Iwagumi series besides the layout evoking an image of a rock reef.
- Its cool color provides a fresh, cool and pleasant impression to the Iwagumi.

10. Yamaya Stone

- Suitable for random stacking regardless of stone shape, rather than Iwagumi produced by selected stones with good shapes.
- For fixing the roots of driftwoods and for rubblework.

Is the Ease of Producing a Layout Different between Driftwood and Stone?



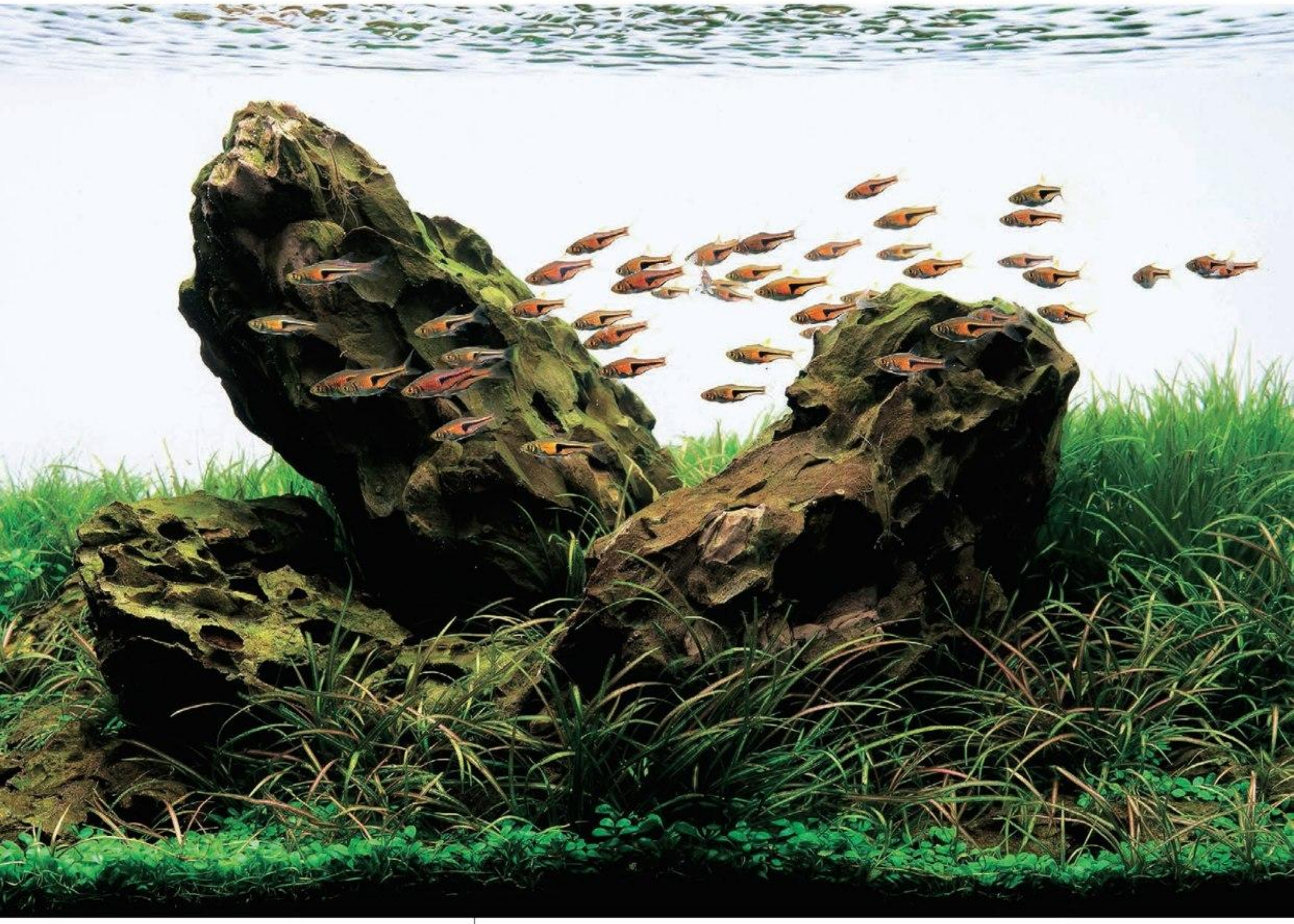
Driftwood serves as the framework of a layout and will eventually be covered and concealed by aquatic plants.

RYUBOKU

In a layout using driftwood, the shape of the driftwood can be seen when the composition has just been completed. However, the greater part of the wood will become invisible as the aquatic plants grow taller. As can be seen from this fact, the driftwood in many cases serves as the framework of the layout. When selecting driftwood as layout material, you do not need to care about the entire shape of the wood as most of it will eventually be covered by the aquatic plants; instead, you should find one which has branch tips or other specific portions of your favorite shape. You may want to hide any unsightly portions of the driftwood with aquatic plants.

The unsightly portion of the driftwood will be concealed by the aquatic plants if it is placed at the bottom. In the above completed aquascape, only a part of the branch tips can be seen.

When producing a layout, we usually wonder whether to use driftwood or stone as layout material. These two types of materials have different roles in creating the layout appearance.



Among the layouts using stones, the Iwagumi layout offers an appreciation of stone arrangement consisting of stones of various sizes placed in good balance. In most cases, short aquatic plants are mainly used for this type of layout to make the stone arrangement viewable. In the Iwagumi layout, the stones are a key aspect of the layout and it is impossible to use tricks to cover any blemishes with aquatic plants. It is therefore necessary to thoroughly examine their entire shape and texture when selecting stones for Iwagumi.

There is not much difference in impression between the image of the completed stone arrangement (right) and the image of the completed aquascape (top). This is why the selection of stones is crucial.

Stones form an Iwagumi by careful arrangement and they will not be covered and concealed by aquatic plants.

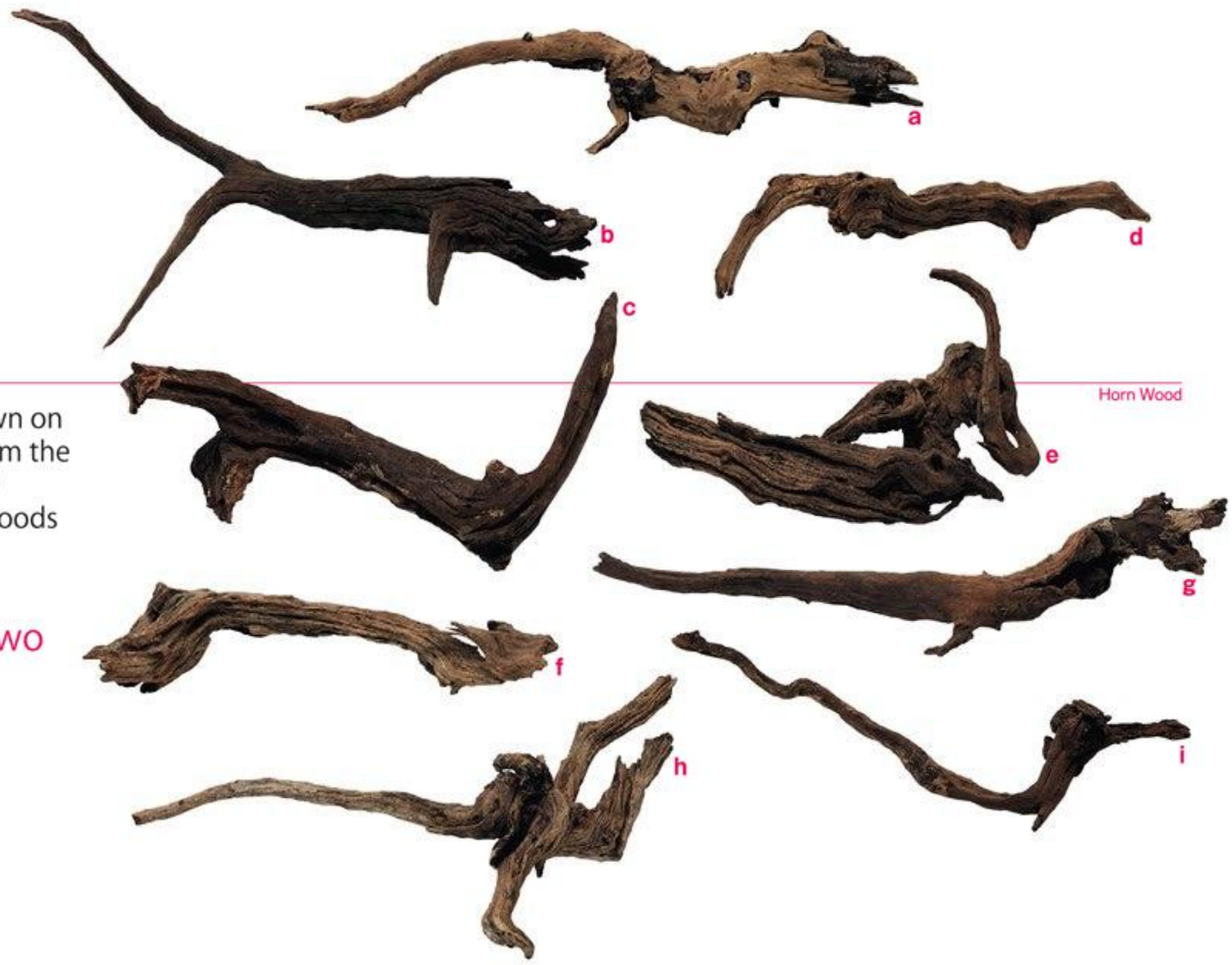
Which Points Should I Pay Attention to in the Selection of Materials?

"Question Section"

Horn Wood

The nine pieces of horn wood shown on the right were randomly picked from the box to be delivered to a shop. How would you divide these nine driftwoods into two groups?

Q. Divide the woods into two patterns.

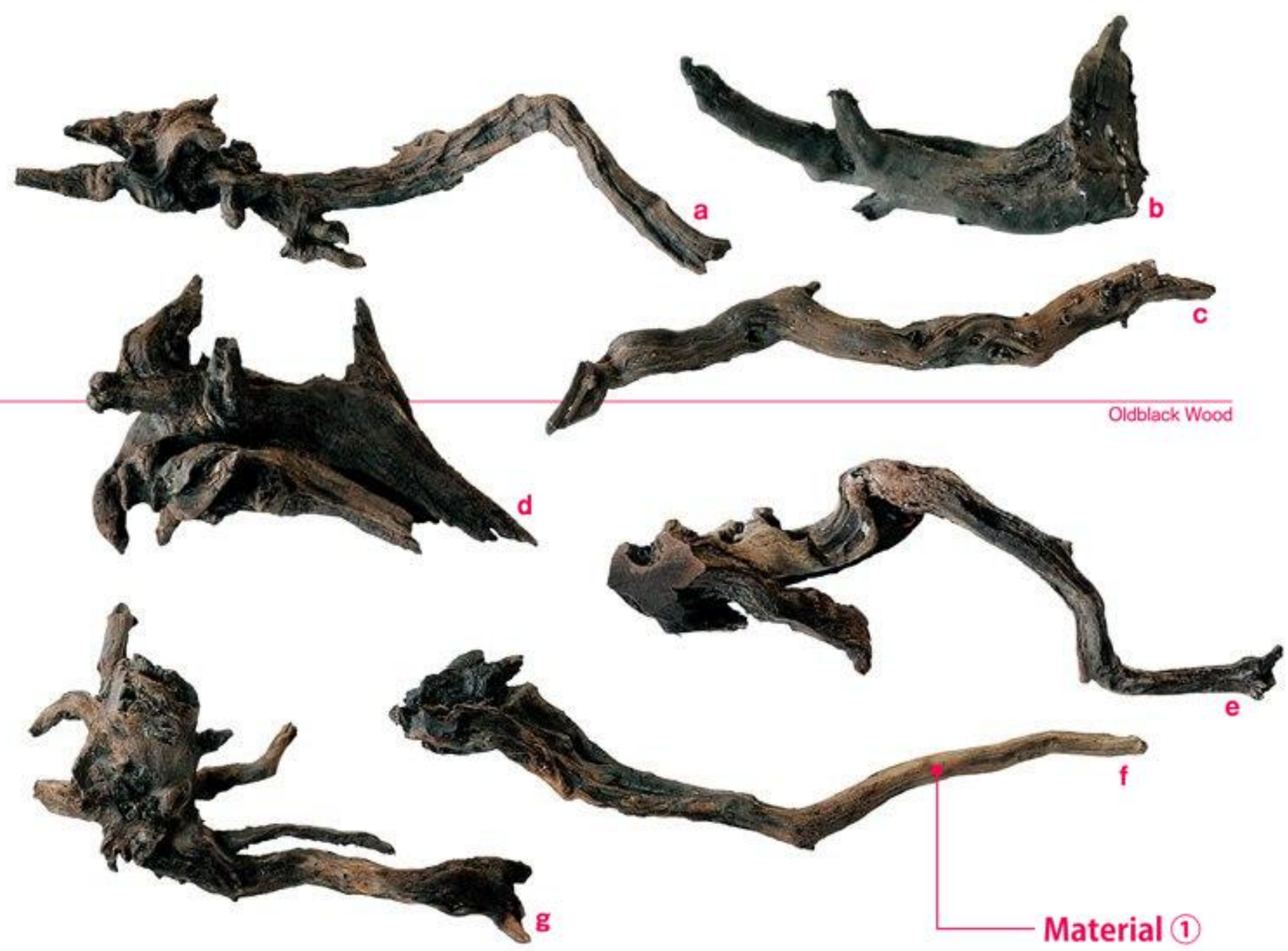


Horn Wood

Old Black Wood

A driftwood layout uses a combination of several driftwoods. Which point should you emphasize to figure out the right combination?

Q. Choose the driftwoods to be combined with material ①.



Oldblack Wood

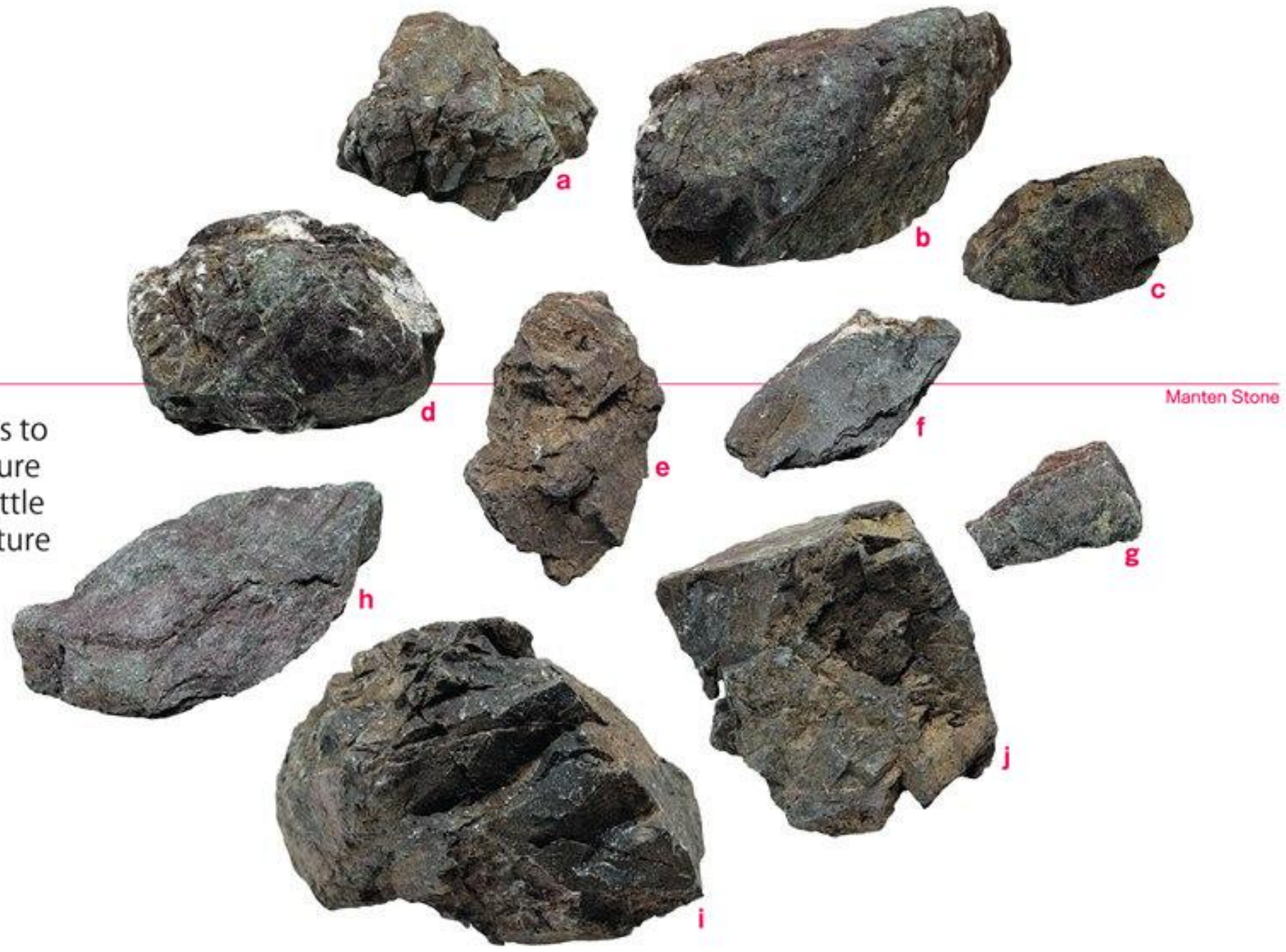
Every layout material is a natural product and has a different shape and appearance. However, it does not mean that there are no specific patterns in these materials. This section shows you how to develop an eye for selecting layout materials.

☞ The answers are on the next page.

Manten Stone

The basic step to an Iwagumi layout is to prepare stones which match the texture of the main stone. You may find it a little difficult to spot the differences in texture among Manten stones, but you will eventually spot the differences by looking at them very closely.

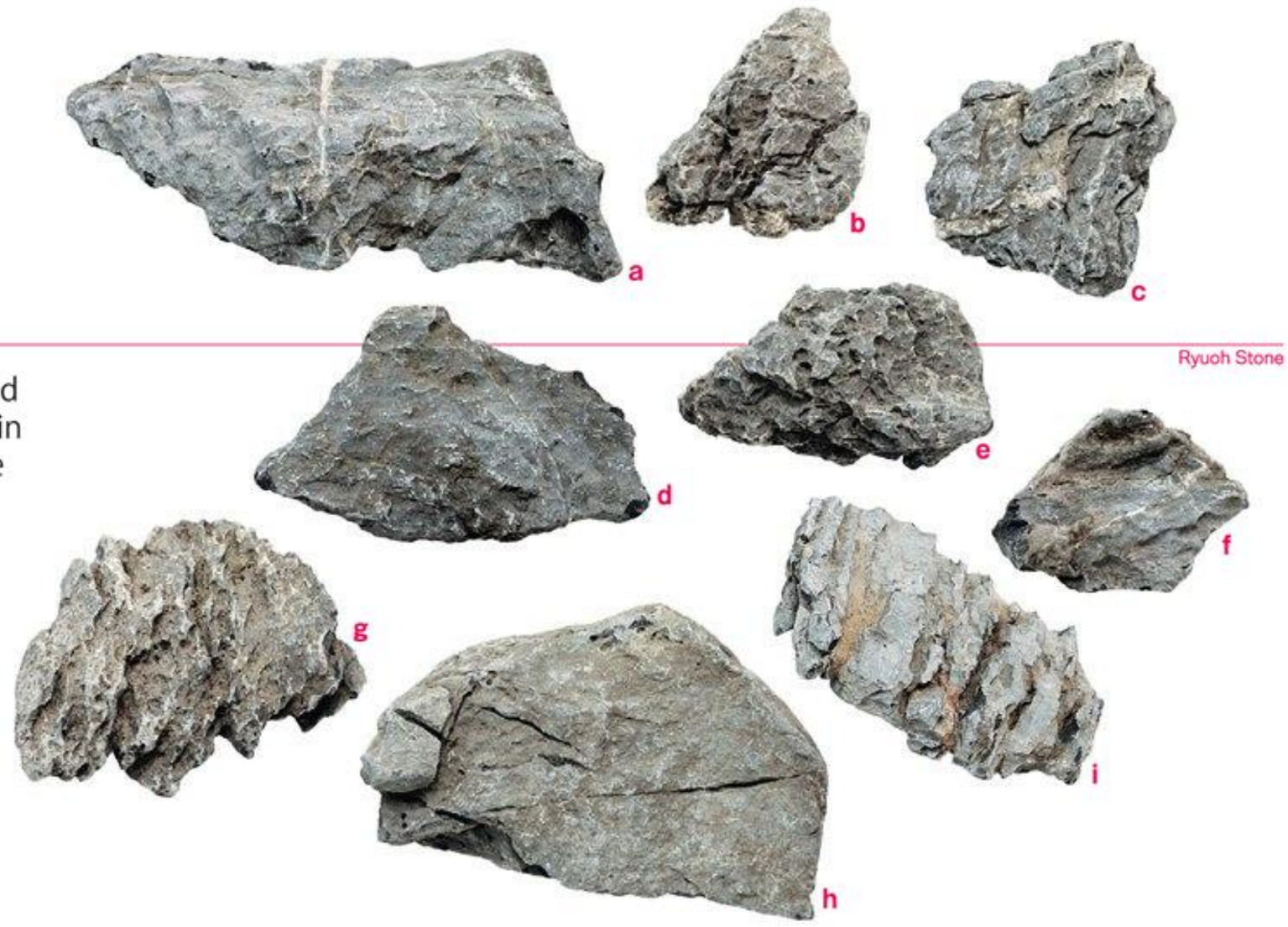
Q. Divide the stones into three groups.



Ryuoh Stone

Ryuoh stone has an expressive look and it is easy for you to find the difference in texture. You should carefully select the stones to be used or else find a lack of unity in the Iwagumi.

Q. Divide the stones into three groups.



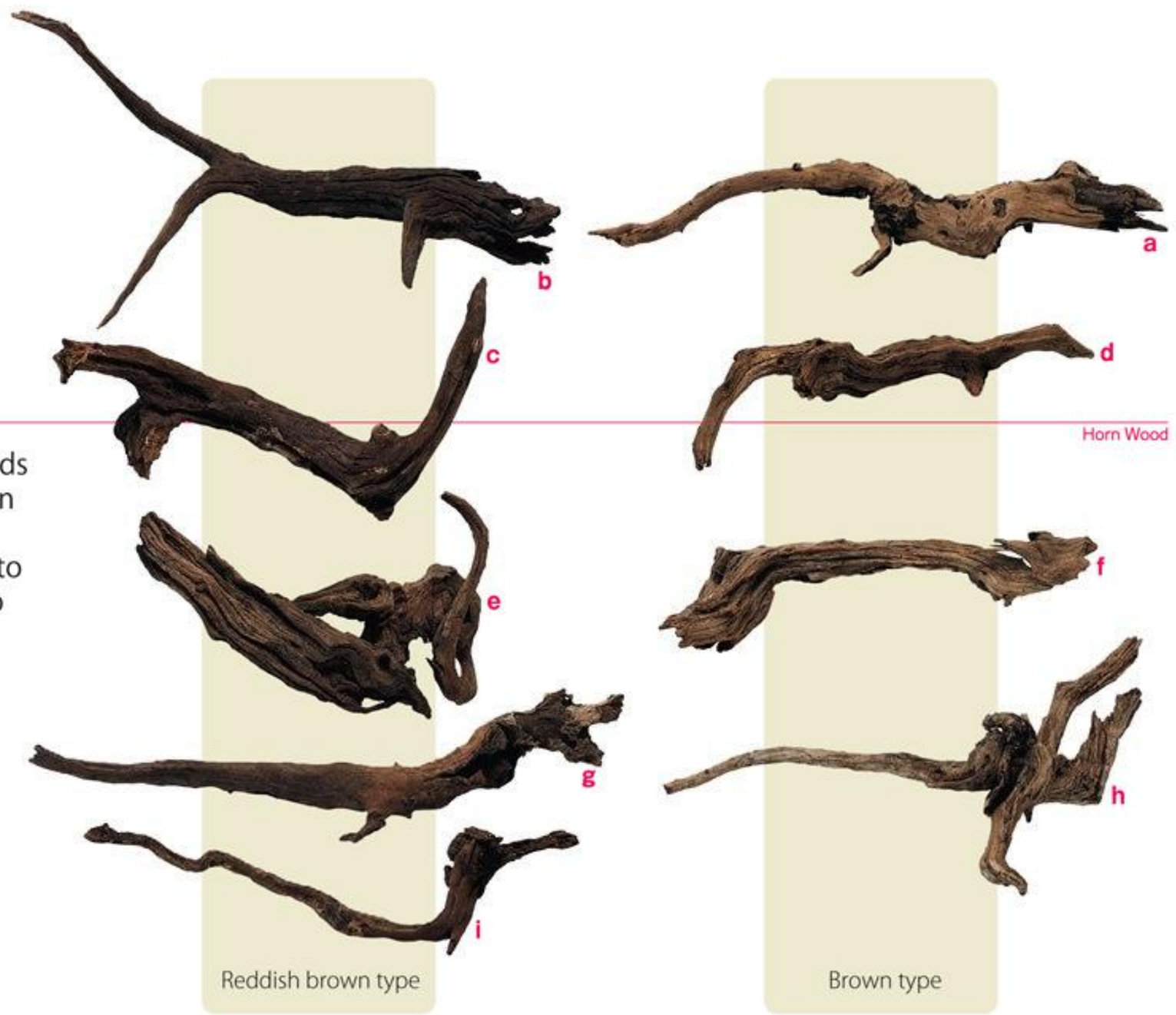
Is it all right if I choose materials with the same texture?

"Answer Section"

Horn Wood

There are mainly 2 types of horn woods – one is the type with a reddish brown bark, and the other is the type with a brown bark. Therefore, the answer is to divide the horn woods into these two types according to the bark color.

A. Select and combine drift-woods of the same hue.

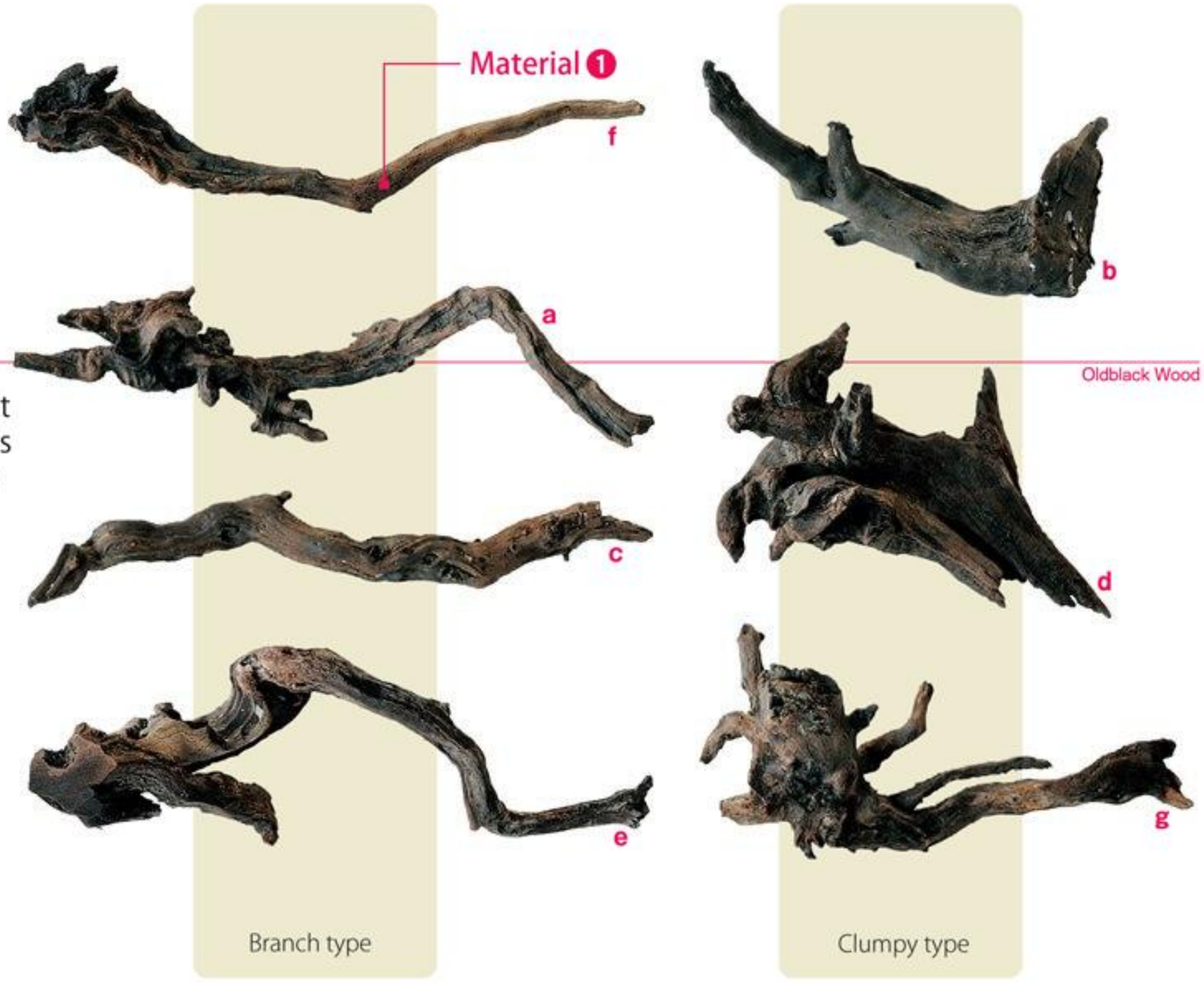


Horn Wood

Old Black Wood

Material 1 is a branch-type driftwood. It is easier to organize if you combine this type of wood with similar branch-type driftwoods rather than thick, clumpy driftwoods. So the answer is to select branch-type woods.

A. Select and combine the same type of driftwood.



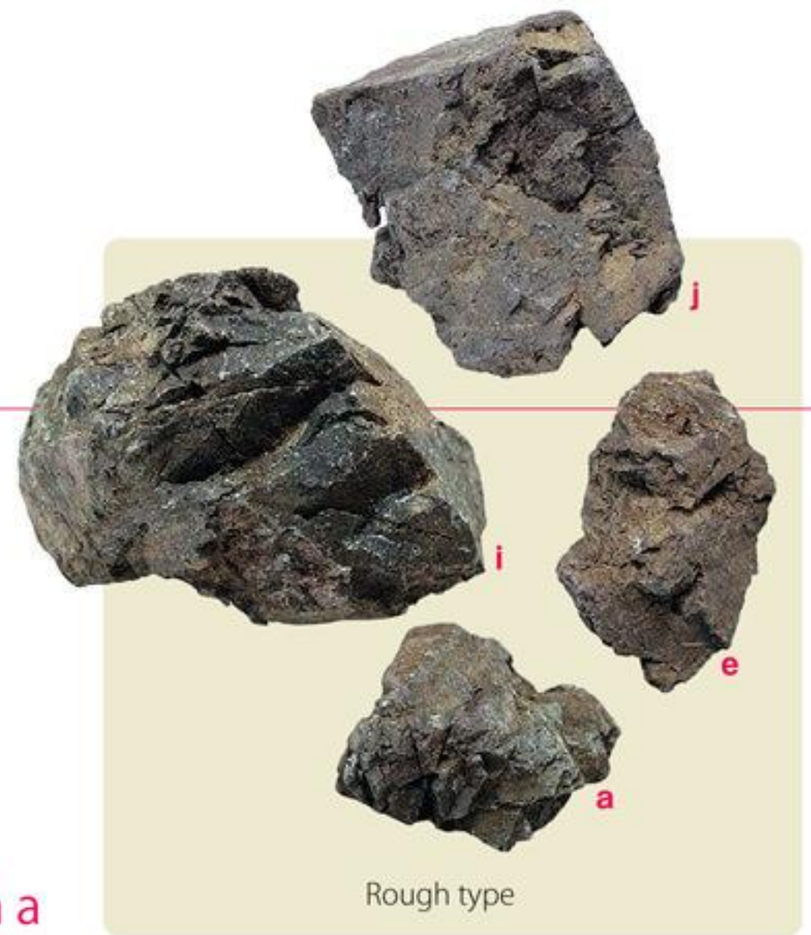
Oldblack Wood

How did you find the questions on page 14-15? The answers contained in this section are, of course, not the absolute answers, but they can be useful tips to help you select materials.

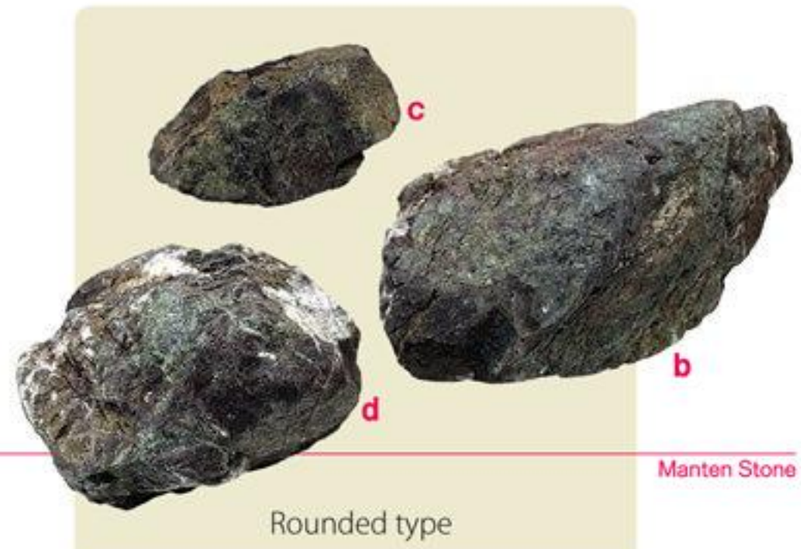
Manten Stone

If you closely look at the surfaces of Manten stones, you may notice there are rough, rounded and flat types. So, the answer is to divide Manten stones into these 3 types. Flat Manten stones should be laid on the substrate without being used for Iwagumi.

A. Combine stones with a similar type of surface.



Rough type



Rounded type

Flat type

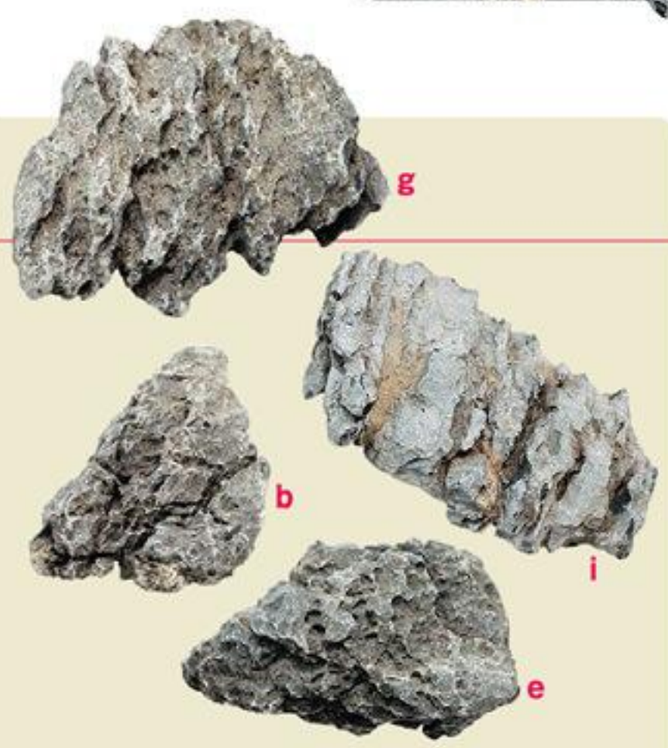
Ryuoh Stone

The answer is to divide Ryuoh stones into these 3 types: the type with a lot of corrugation; the type with noticeable white lines; and the less rugged type. Arranging the stones having the same type of texture enhances unity and the natural feel of the entire Iwagumi.

A. Combine stones having a similar type of corrugation or white lines

The white lines on Ryuoh stone become apparent when the stone is wet.

Type with white lines



Type with a lot of corrugation

Less rugged type

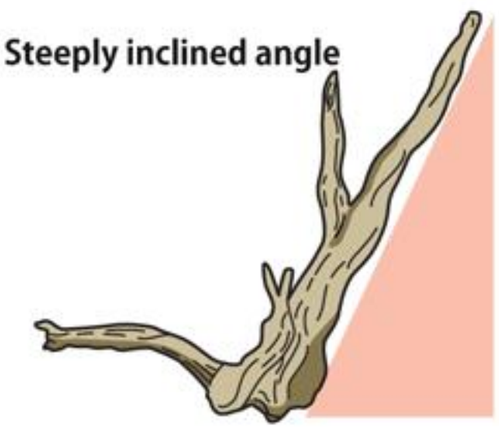
The Basics of Composition Making

[The Basics of Driftwood]

Dynamism in driftwood is determined by angle.

Driftwoods in branch form are relatively difficult to arrange but can be good material for aquarists to learn about balance in composition. This section describes the angle and impression of the driftwood taking a branch-type wood as an example. Driftwood standing at a steeply inclined angle produces the maximum intensity but at the same time its vertical line gives a severe impression. This intensity decreases as the inclination is lowered, while the highest level of stability is obtained when the driftwood is laid flat. However, this state will not convey dynamism which is one of the important expressive elements for layout. In order to express a dynamic vigor, it is necessary to fix the driftwood at an angle which conveys sufficient instability. This instability produces visual intensity which leads to dynamism. Such an angle is the most important key to driftwood arrangement. Develop a better sense of balance with reference to the illustrations below.

Steeply inclined angle



Produces instability and substantial intensity.

Inclination angle of about 45°

Produces both stability and intensity.

Low inclination angle

Produces stability but makes the layout less intense.

Three Basic Compositions

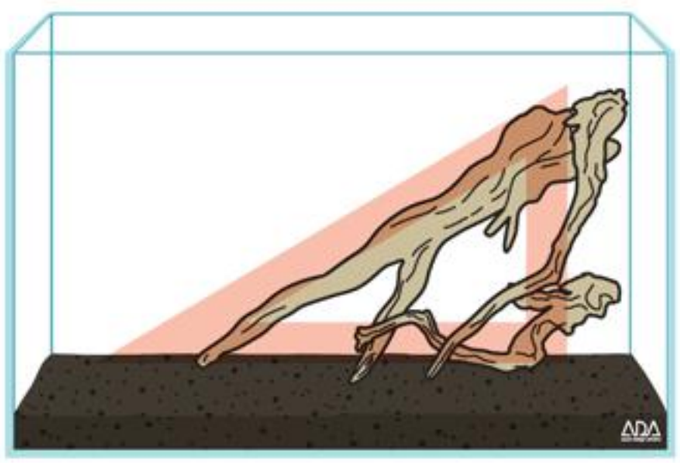
Whether in photography or painting, the works that we consider beautiful are based on solid composition. This also applies to the planted aquarium. Some may think the production of work circumscribed by composition is boring, but originality cannot be achieved if there are fundamental deviations from the basic composition. It is advisable for beginners to choose their preferred composition from three basic compositions, namely, convex, concave and triangular, for the arrangement of driftwoods. Please note that whatever the composition, it is essential to determine the main focal point following the golden ratio.

Convex composition

The most difficult of the three basic compositions to achieve good balance. Balance between right and left open space is critical.

Concave composition

The most popular composition for the planted aquarium. Ensure some open space in the center.



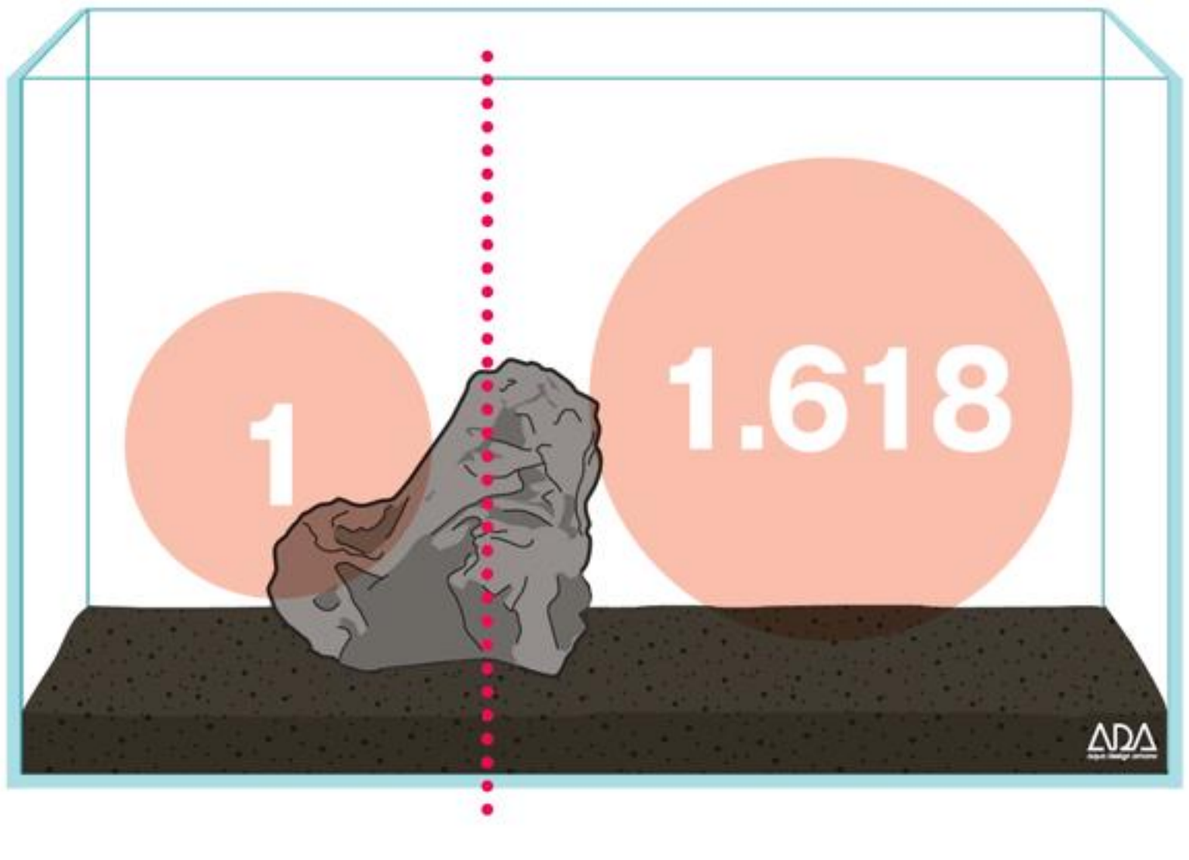
Triangular composition

Composition with wider open space at either the right or left side. Pay attention to the angle of the driftwood which constitutes the hypotenuse of a triangle.

It's no exaggeration to say that the success of the layout depends on the composition. The key point in the arrangement of layout materials is balance. It is a good idea for the novice to begin with emulating the basic patterns.

[The Basics of Stone Arrangement]

Determine the main focal point following the golden ratio.



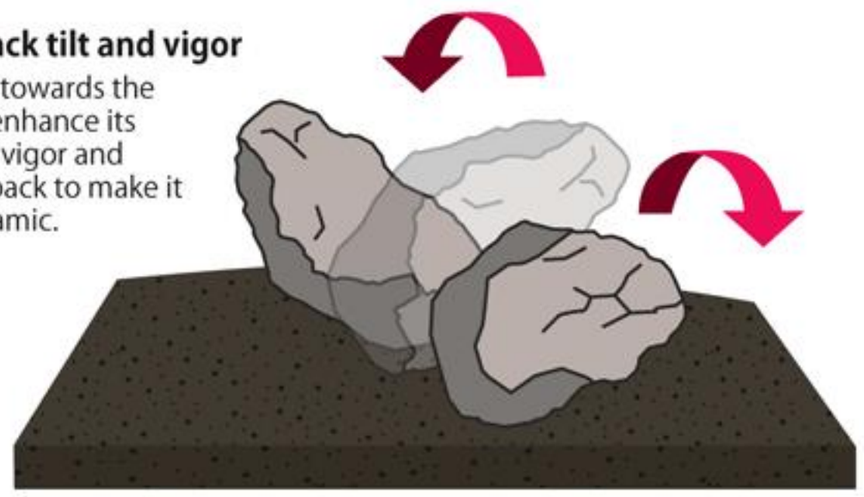
If you need to place only one stone in an empty tank, where it should be placed to bring out its beauty? Simply considering right and left balance, the optimal position would be the center of the tank. However, it is said that most people feel that the object would look more attractive if it is positioned slightly off-center. This balance is called the golden ratio which is expressed by the ratio of 1:1.618 (approximate value is 2:3). Originally founded by an ancient Greek mathematician, the golden ratio is said to be the most harmonious proportion to the human eye and is used as the aspect ratio for postcards and various packages. In Iwagumi layout, the largest main stone which constitutes the main focal point of the layout should be placed in the position determined based on this golden ratio in order to achieve visual balance.

The basics of Sanzon Iwagumi

The most basic composition of Iwagumi is Sanzon Iwagumi consisting of three main stones of different sizes. The main stone (Oyaishi), the largest and most visually appealing is placed first followed by the accompanying stone (Fukuishi), the sub stone (Soeishi) and sacrificial stone (Suteishi) in order of size from largest to smallest. The main stone should be slightly tilted, instead of upright, so that the power of water generated by the water flow is expressed. The vigor of the main stone can be adjusted by tilting it in the front or back direction (refer to the top right illustration). Depending on the relationship with the main stone, the accompanying and sub stones emphasize or support the vigor of the main stone (refer to the bottom right illustration).

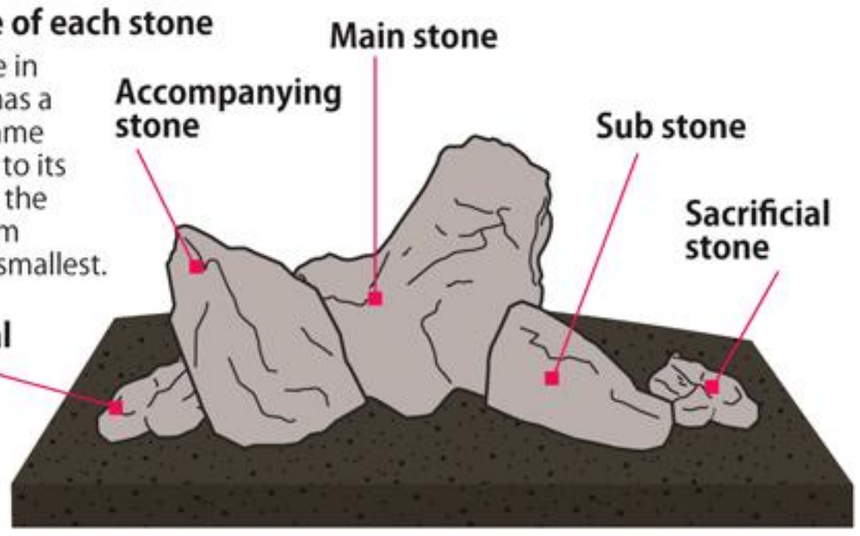
Front/back tilt and vigor

Tilt the stone towards the front side to enhance its dynamism or vigor and towards the back to make it look less dynamic.



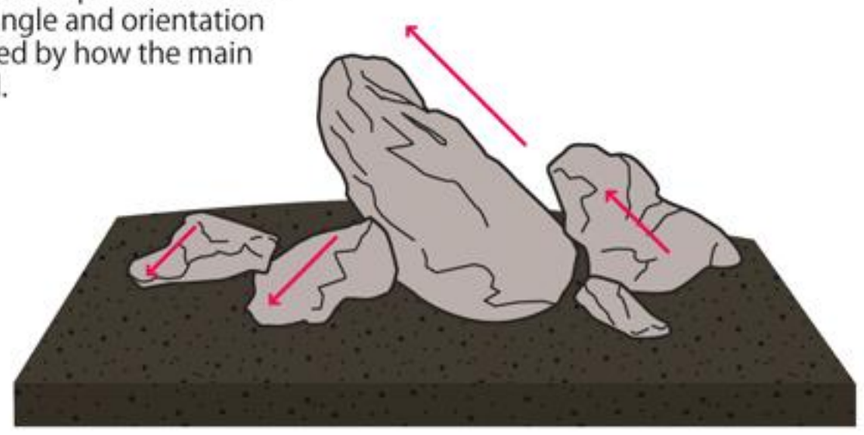
Name of each stone

Each stone in Iwagumi has a specific name according to its role. Place the stones from largest to smallest.



Orientation and angle of stones

Accompanying and sub stones have a strong relationship with the main stone. Their angle and orientation are determined by how the main stone is tilted.



How to Make an Actual Composition

Making a Composition with Driftwoods

Ten pieces of branch-form driftwood of uniform texture have been prepared for this example. If you have a stock of about ten pieces of such driftwood in different sizes, you will be able to make the three basic compositions with ease.

■ Convex composition

Driftwoods used: 4 pieces

Secure some space to plant aquatic plants behind the arranged driftwoods.

■ Concave composition

Driftwoods used: 5 pieces

The open space should be located slightly to the right or left side instead of in the center.

■ Triangular composition

Driftwoods used: 7 pieces

Produces a natural flow which depicts the branches stretching from a single piece of driftwood.

■ Be conscious of the creation of open space

A pitfall we are likely to encounter when doing a driftwood composition is the overuse of woods and excessive arrangement. This problem arises because we place too much focus on the driftwood. We will be able to make a good composition if we understand that the key point is how to create an open space taking into consideration balance. When using more than one driftwood, it is advisable to envision their continuity and flow as if the branches of a single piece of driftwood were stretching out.

10 key points of driftwood arrangement

The following are the points that help you make a successful driftwood arrangement. It is advisable for you to go through these points again before commencing the layout production.

01. Prepare driftwoods of the same type.
02. Avoid driftwoods that are too thick for the tank size.
03. Start the arrangement with larger driftwoods.
04. Be careful not to make the main focal point too far in one direction.
05. Driftwood standing at an excessively steep angle gives a harsh impression.
06. Be conscious of the flow evoking an image of a single piece of driftwood.
07. Unsightly portions of the driftwood can be concealed by aquatic plants.
08. Consider the space for planting the aquatic plants.
09. Be aware that the driftwood serves as the framework of a layout.
10. Avoid being too conscious.

No matter how much we learn and understand, we still find it hard to make an actual composition.
This section introduces you to how to actually arrange driftwoods and stones.

Making a Composition with Stones

25 pieces of Manten stone, a popular Iwagumi layout material, of various different sizes have been prepared. What type of Iwagumi can be made with these Manten stones?

Be conscious of the vigor and flow of the stones

The golden rule of Iwagumi is to arrange the stones in order of size from largest to smallest. The standard size of the largest main stone is about two-thirds of the tank height when it is placed on the substrate. If the main stone is well-shaped but not tall enough, use a flat stone to increase its height. If the main stone is too tall, adjust its height by burying a part of it in the substrate. In Iwagumi layout, the position of the main stone becomes the main focal point, and it is therefore essential to determine the position of the main stone following the golden ratio of 1:1.168. The main stone should be slightly tilted instead of upright so that the flow of water can be experienced. After the main stone has been placed, the accompanying stone and sub stone, which bear a master-subordinate relationship with the main stone, are placed in order of size from largest to smallest taking into consideration the angle of the main stone as well as the balanced flow of power relationship. Arranging each stone considering the overall balance and flow enables a cohesive Iwagumi. The positions of the small sacrificial stones should be determined in view of the entire balance rather than considering the master-subordinate relationship with the main stone. The existence of these small and simple sacrificial stones adds to the spirituality that can lead to wabi-sabi.

In the cohesive atmosphere, the main stone is prominent and its vigor can be felt.

Front-back balance is also important to provide the space for planting the aquatic plants.

10 key points of stone arrangement

Here is the summary of the key points and know-how for acquiring the technique of skillful stone arrangement. Take on the challenge of Iwagumi with reference to these points.

01. Use an odd number of stones.
02. Prepare stones which have the same texture.
03. Arrange the stones in order of size from largest to smallest.
04. Accompanying and sub stones bear a master-subordinate relationship with the main stone.
05. An adequate level of instability leads to dynamism.
06. Be conscious of the water flow.
07. Spirituality dwells in sacrificial stones.
08. Complete the whole arrangement in one go without hesitating.
09. Your energy is passed on to the stones.
10. Deliberate arrangement is not bad but may end up as just another commonplace work.

NATURE AQUARIUM GALLERY

Expression of Natural Feel by Shape of Branch Wood

Branch wood

+

Manten stone

+

Bolbitis heudelotii

Anubias nana “Petit”

Willow moss

Cryptocoryne albida

Cryptocoryne petchii

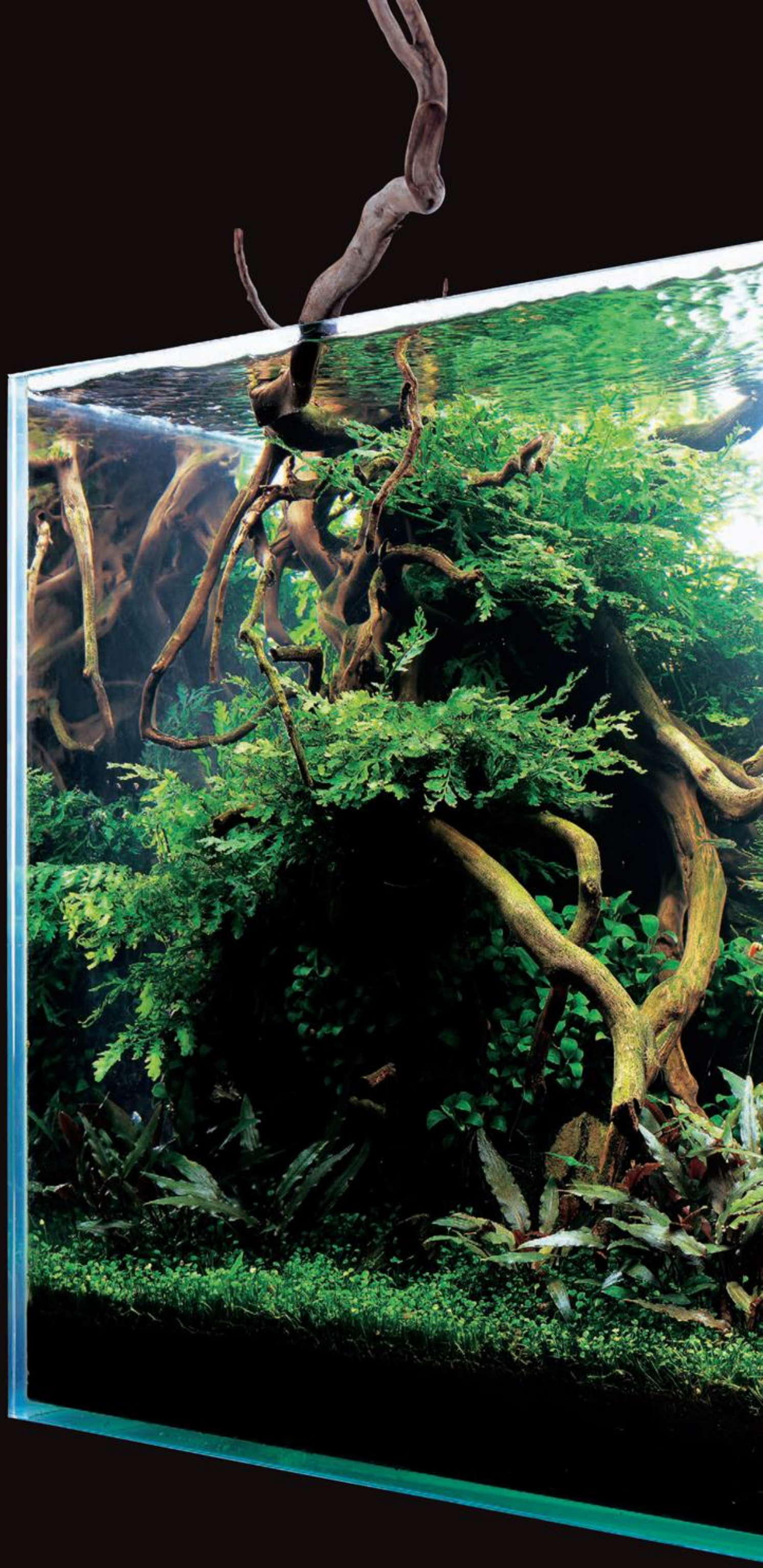
Cryptocoryne wendtii (Green)

European clover

II

Branch wood features a complicated shape formed by its thin, bending branches. In this layout, a branch wood is used as the main material and arranged as in such way that the branches stretch downwards from the top left so that a natural feel is expressed by the unique shape of the branch wood.

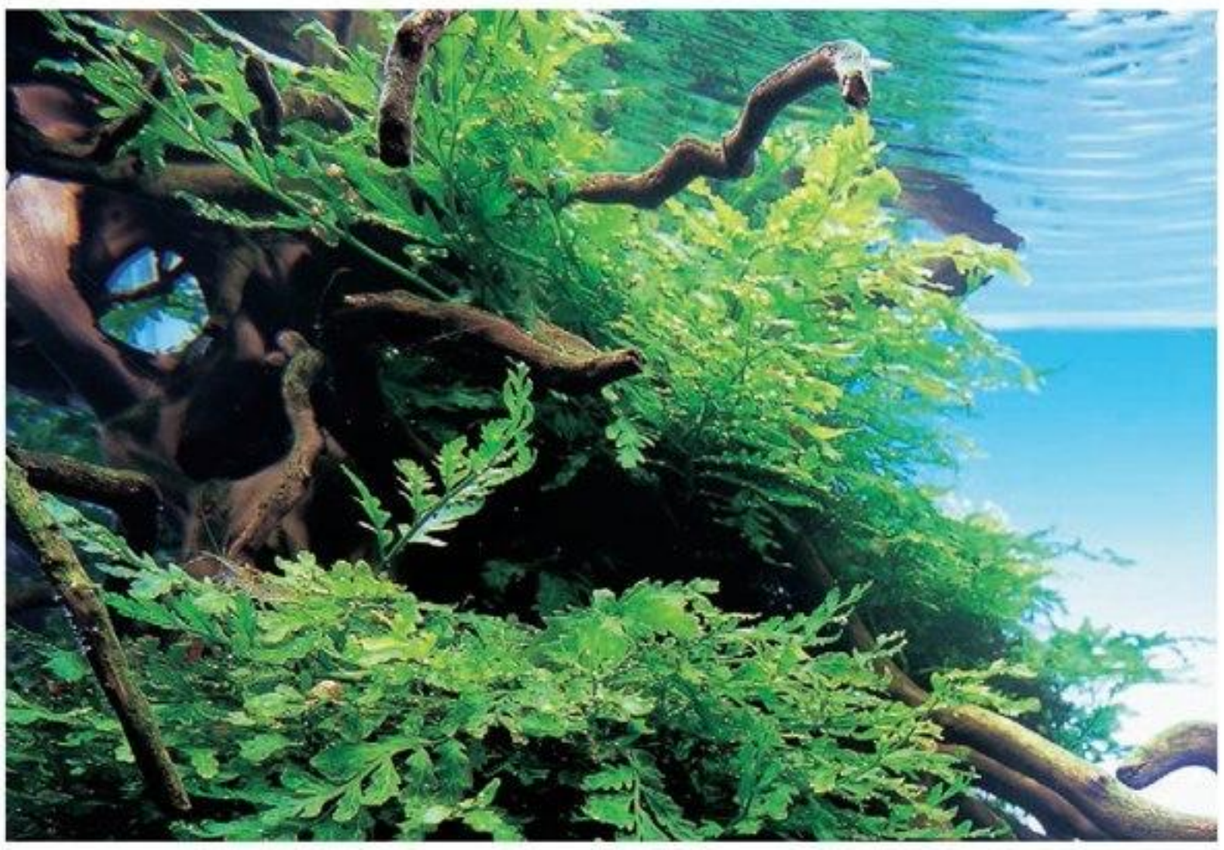
Tank size: W90×D45×H60 (cm)



In order to get the most out of the slender, unique branches of the branch wood, epiphytic aquatic plants are planted in such way that a large part of the driftwood is exposed.

Planting Cryptocoryne around the driftwood

A natural feel is expressed by planting Cryptocoryne around the branches that have reached the substrate.



Planting Bolbitis on the upper part of the driftwood

Bolbitis is planted on the upper part of the branch wood in such a way that its leaves jut out through the branches.

NATURE AQUARIUM GALLERY

Arranging Aquatic Plants Making Use of the Shape of Branch Wood

This layout uses epiphytic aquatic plants and Cryptocoryne as the main plants in order to maximize the natural feel produced by the shape of the branch wood. The layout is created by means of a triangular composition taking advantage of the considerable height of a 60cm-tall tank. For the branch wood and the stack of Manten stones under it, only epiphytic aquatic plants can be arranged. In this example, Bolbitis is attached to the branch wood while Anubias with its small leaves is attached to the Manten stones under the branch wood. Around the branches that have reached the substrate, Cryptocoryne is planted to further bring out the natural feel of the layout materials. All the aquatic plants used for this layout are shade plants as the tank used is a deep type and light hardly reaches the shade of the driftwood. To match these plants, European clover which is from the fern family is used as the foreground plant.

Questions – What to Do in this Case?

Q Does the hardness of water increase if Ryuoh stone has more white lines?

A We have measured the total hardness of water for each case where the portion with more blue-gray parts and the portion with more whitish parts of Ryuoh stone are added in the water, and the result showed that there is no difference in the rise of total hardness caused by these two portions. From this observation, we deduce that the rise in hardness does not relate to the color of the Ryuoh stone. Ryuoh stone is a metamorphosed blue-gray lime stone and the white line observed on it is the recrystallized portion formed through thermal metamorphic process. Despite the color differences, both these portions contain calcium carbonate which may lead to a rise in the total hardness of water.

Q Do Manten stone and Yamaya stone also influence the water quality and growth of aquatic plants?

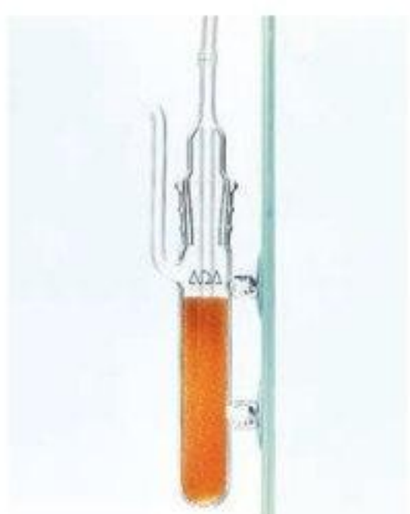
A Specifically, these stones influence the water quality, but they seldom influence the growth of aquatic plants. Both Manten and Yamaya stones contain calcium and magnesium and this feature may lead to a rise in total hardness as well as carbonate hardness. Even if they are used in an aquarium, however, the growth of aquatic plants will not be affected by these stones since the influence of aqua soil is much greater.

Q Are the minerals essential for the growth of aquatic plants released from the stones?

Green Brighty STEP 1 for supplementing the trace elements essential for aquatic plants

A In fact, minerals are released from stones, but aquatic plants will not grow healthily just with these minerals. Mineral contents vary among stones and how the minerals are released from stones differs with water quality. Usually the amount of minerals released with the stones is less in almost neutral water. It is thus hard to supply a sufficient range and amount of trace elements necessary for aquatic plants just relying on minerals from stones.

Q What do I do if total hardness rises after stones are added in the aquarium?



Softenizer

A One of the ways to lower the total hardness is installation of a Softenizer. With the effect of ion exchange resin, the Softenizer removes calcium ions and magnesium ions to lower the total hardness. For your information, scrubbing Ryuoh stone hard with a brush easily causes water turbidity due to the stone powder produced by brushing, and this results in higher total hardness. If you see water turbidity due to stone brushing, change the aquarium water immediately.

Q Does the use of driftwood or stone in an aquarium influence the carbonate hardness?

A Carbonate hardness declines in acidic water and rises in alkaline water. Driftwood usually tends to make water acidic, while stone tends to make it alkaline, so it is suitable to use driftwood if you wish to avoid high carbonate hardness, while stones should be used when you want to raise the carbonate hardness. However, most species of aquatic plants will grow even if carbonate hardness is not controlled too much as long as CO_2 is injected into the aquarium.

Each driftwood and stone has its own features and characteristics. You may face trouble or have questions when you use a new material for the first time. This section features questions regarding materials.

Q Is it true that "It is good to boil drift-wood in a pan before adding it in an aquarium"?

Only water-soluble matter is released at a room temperature.

A You do not need to boil driftwood before adding it in an aquarium. Rather, boiling driftwood has some adverse effects. Organic elements which are released from driftwood at room temperature will be discharged naturally while the driftwood is used in an aquarium. If the driftwood is boiled, the elements which are usually not released at room temperature will be discharged and lost. For certain types of driftwood, black resin may be discharged by boiling; this will spoil both the driftwood and the pan used for boiling.

Q Are there any points I should pay attention to when I use purchased driftwood or stone for the first time?

A Some driftwood may float depending on wood type and dryness. If the driftwood is likely to float, soak it in water in a large pail for some time or place an appropriate size of stone as a weight on the driftwood arranged in an aquarium. In both of these cases, the driftwood absorbs water and sinks in about a week's time. When using a stone for the first time, brush off the dirt or stone powder on the stone surface well before the stone is used for layout.

Q What do I do if water molds have grown on a branch wood?

A Water mold may grow not only on branch wood but on any type of driftwood when they are newly used in an aquarium. This type of mold is naturally eliminated if it is repeatedly siphoned out together with water using a small hose. The period up to the elimination can be shortened if Yamato Numa Ebi or Otocinclus which nibble on or lick the surface of the driftwood is reared in the aquarium.

Q Does yellowing due to the tannins released from driftwood affect aquatic plants and fish?

The cause of yellowing is the same as the cause of black water observed in nature.

NA carbon, solves the yellowing problem

A The elements released from driftwoods causing the yellowing of water are organic acids such as humic acid, fulvic acid and tannic acid. In nature, rivers flowing across tropical rainforests contain these organic acids in abundance. As can be seen from this fact, these elements do not harm aquatic plants and fish; rather they have a calming effect on tropical fish. You do not need to worry too much about yellowing, but if you do not wish the water to turn yellowish from the ornamental point of view, you may use NA Carbon to effectively reduce yellowing.

Q Is there any problem if I keep the stones and driftwoods that will not be used outdoors?

A Basically, stones and driftwoods may be kept outdoors. Exposure to rain and wind may give them a more natural look. It is recommended to keep driftwoods in a place with good ventilation and drainage since they may decompose and decay due to bacteria, or mushrooms may grow on them if they are placed directly on the soil/ground or kept in a badly-ventilated place.

Techniques to Make the Best Use of Layout Materials

Technique for making good use of excessively straight driftwood

Unnaturally straight driftwood should be laid flat instead of upright.

Driftwood is often arranged in an upright position so that an enhanced perspective and dynamic composition can be achieved. However this is made possible only on the precondition that the driftwood has a natural shape. Although the majority of driftwoods are curved in shape, some of them are not and some are even so straight they appear unnatural. It is advisable to use such driftwoods by laying them flat as their unnatural look is more pronounced when they are standing.

Technique to give a natural look to the branch tips of branch wood

Produce a natural look by breaking the branch tip or winding willow moss around it.

Branch wood features thin unique branches, but the tip of the branch has sometimes been cut and looks unnatural. Such unnatural appearance can be resolved by breaking the branch tip or winding willow moss around it. The key point of this solution is to hold the branch tip tight and break it in such a way that the broken branch looks as if it has been naturally torn off. It is advisable to attach willow moss to other parts of the branches, in addition to the branch tips, so that they look more natural.

Technique for concealing the unattractive color or shape of driftwood

Cover the unsightly parts of the driftwood with epiphytic aquatic plants.

Driftwoods often have some unnatural portions such as sawn surfaces and burn marks as well as portions with unattractive shapes or colors. Covering such portions with epiphytic aquatic plants like ferns, Anubias and willow moss can enhance the natural feel of the layout. Block-like driftwood is not very suitable for layout, but even such a type of driftwood can give a softer impression and look better if willow moss is wound around the entire piece.

Technique to judge yellowing of water as an indicator of the need for water change

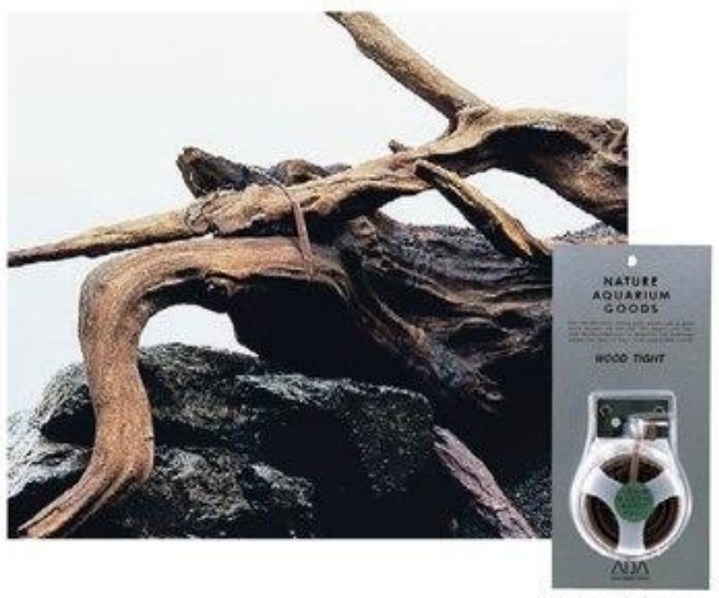
During the initial stage of the aquarium, yellowing of water can be a sign that it's time for a water change.

During the initial stage of the aquarium using driftwood, the tank water sometimes turns yellow. This is due to organic elements contained in the driftwood which, however, will not harm living organisms. However, at this stage, some toxic substances including ammonium are released from the substrate and cause the water quality in the tank to deteriorate. Changing the tank water when the water gets yellow can help eliminate ammonium and other harmful substances and facilitate the establishment of the aquarium.

Technique to fix unstably arranged driftwood

Fix the joints of driftwoods tightly with Wood Tight or Riccia Line.

Riccia



Wood Tight

When using Horn Woods or Old Black Woods for a layout, the composition close to your image can be created by combining several pieces of such woods. However, if they are combined in a complicated or unstable manner, some woods may fall out while planting the aquatic plants or during tank maintenance. If there is such a risk, fix the driftwood joints tightly with Wood Tight or Riccia Line.

The management of layout materials such as driftwoods and stones is made easy with a little know-how. This section introduces you to some convenient and useful techniques.

Technique to make excessively large stone usable

Lava stones can be broken into several pieces with a chisel and hammer.

Fuji stone

Broken Fuji stone pieces

Some excessively large stones can be broken into smaller pieces for the layout. However, the stone types that can break easily with a hammer and chisel and produce naturally-looking broken pieces are limited. Soft and porous lava stones such as Fuji stone can easily break and their broken pieces look natural with adequate unevenness on the surface. This idea has originally been developed in the process of finding an economical way to produce a layout.

Technique to adjust the height of the stone used in Iwagumi layout

Make a stone shorter by burying it in the substrate or taller by placing another flat stone under it.

Basically in Iwagumi layout, stones of different sizes (large, medium, small) are combined, but you don't always get the stones of the desired size. If the stone is too large, make it shorter by burying part of it in the substrate. Stone which is too small can be made taller by raising the substrate or placing a flat stone underneath it. This flat stone will become invisible if it is buried in the mound. This will also help enhance the stability of the stone.

Technique to remove stubborn algae from the stone

Pro Picker is a useful tool to scrape off tufts of stubborn algae.

Pro Picker

If you find tufts of stubborn algae on driftwood or stone, it is advisable for you to scrape them off immediately as they may spread even to the leaves of aquatic plants. Pro Picker is a very useful tool for scraping small amounts of algae. After scraping off the algae, please change the tank water and suction out the removed algae together with water. Adding Siamese flying fox to the tank is an effective way to eliminate and prevent algae.

Technique to remove algae on driftwood and stone

Phyton Git is a solution to get rid of widespread algae.

Phyton Git

Phyton Git is a sterilizing additive and its highly acidic property can kill the algae by direct application. Firstly, drain the water from the tank to expose the affected area to the air. Apply Phyton Git diluted with the same amount of water and let stand for a few minutes, and then pour water into the tank again. Be careful not to allow the aquatic plant leaves to come in direct contact with Phyton Git.

Technique to control the rise in total hardness when using Ryuoh stone

Avoid brushing the surface of Ryuoh stone too much while cleaning.

The rise in total hardness of water is curbed when Ryuoh stone has been used in the layout for some time. This is thought to be because the fine powder on the stone is removed during water change and the stone surface is covered by a biofilm formed through the growth of bacteria and algae. Brushing the surface of the Ryuoh stone too hard may remove this biofilm and cause the fine powder to surface again on the ground stone, which can contribute to another rise in total water hardness.

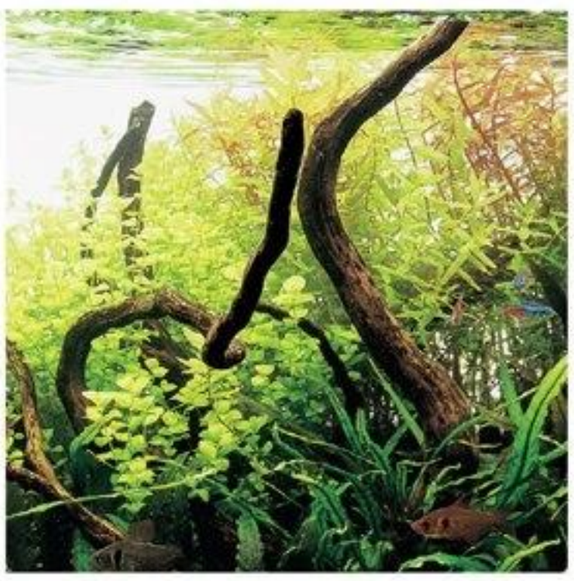
What Kind of Layout Can I Use with Driftwoods?

1 Serves as a framework for lush stem plants, with the shape of branches adding an accent

Curved, thin branches, a feature of branch wood, allow even beginners to enjoy aquatic plant layouts making full use of their wonderful shapes if they are placed facing up.

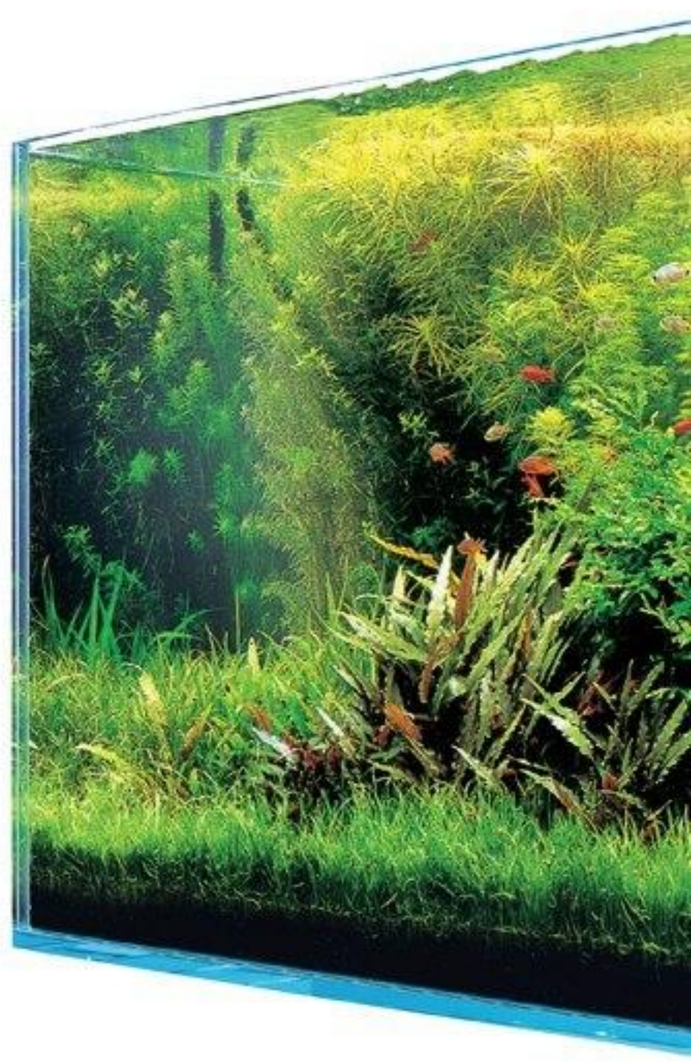
Branch wood

The branch tips of a piece of branch wood can be spotted amongst the colorful stem plants and add an accent to the aquascape. Its presence is not excessive since the branches are thin.

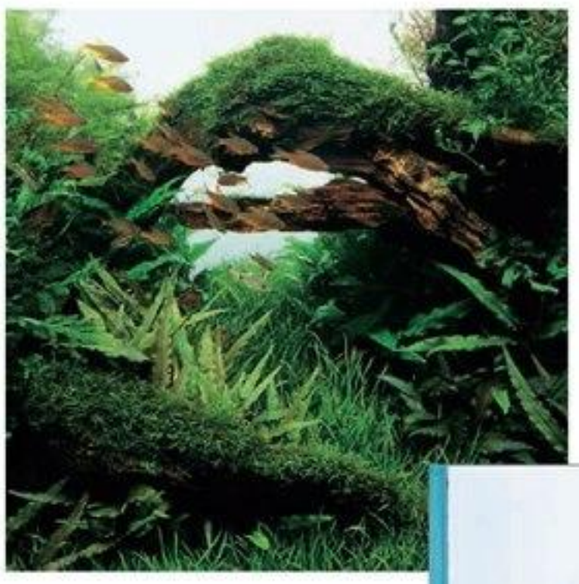


2 Moss attached to the driftwood creates a natural feel

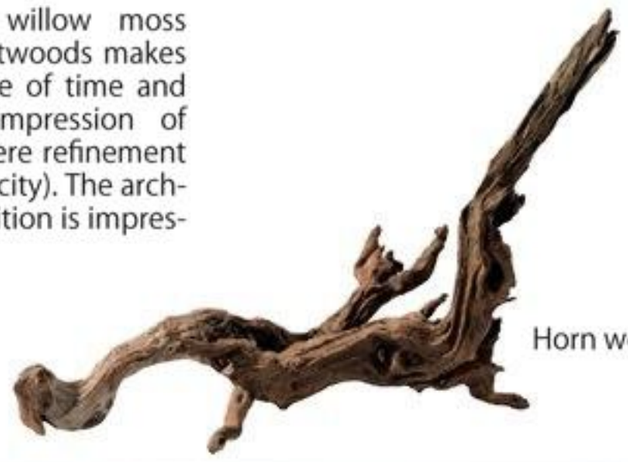
Horn wood with its attractive wild look reminds us of the natural surroundings of tropical fish. Fish show their natural and original style in rich lush aqua- tic plants.



Driftwood adds to the atmosphere of a tropical jungle just by placing it on the substrate. You may enjoy a layout depicting the natural habitat of tropical fish or have lush stem plants growing in dense clusters.



The sight of willow moss growing on driftwoods makes us feel the lapse of time and produces an impression of Wabi-Sabi (austere refinement and quiet simplicity). The arch-shaped composition is impressive.



Horn wood

Composition

What kind of Iwagumi Layout can I Compose?

Composition

Ryuoh stone

The basic Iwagumi layout consisting of main, sub and side stones

2

This is a Sanzon Iwagumi layout using Manten stones. The composition of this layout is simple, and therefore difficult to create. The well-balanced arrangement of the three main stones is particularly important.

Composition

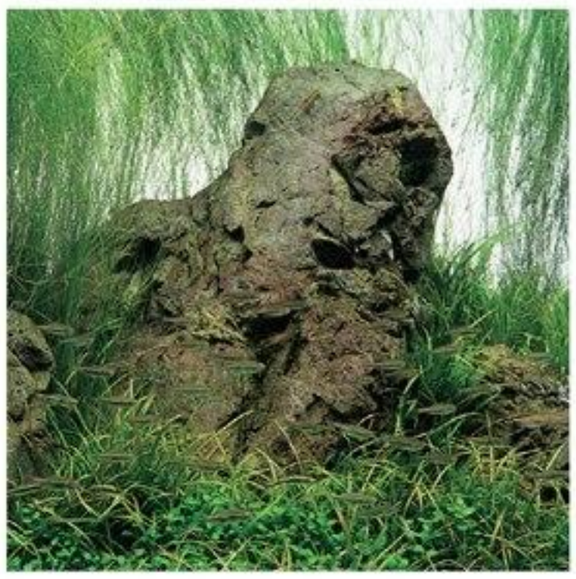
Manten stone

The perfection of Iwagumi layout greatly depends on the technique of stone arrangement. Deep and dense Iwagumi requires a superior technique and sense of stone arrangement. Welcome to the profound Iwagumi world!

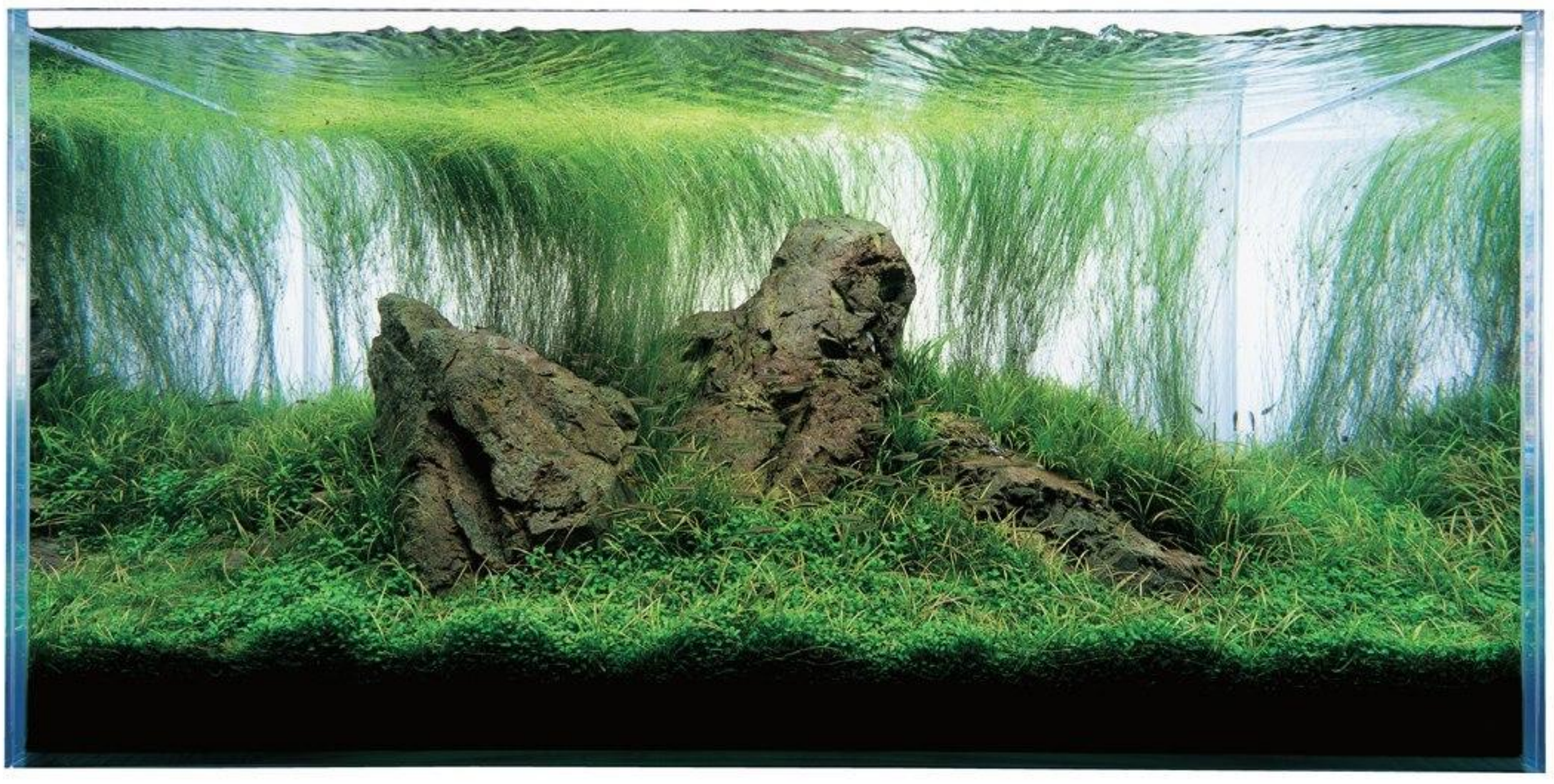
It is very hard to arrange the triangular, thin Ryuoh stones in a balanced manner and considerable skill is required to achieve it. Nevertheless, the challenge of stone arrangement is part of the fun of Iwagumi.

1 Radially-arranged Iwagumi ensuring a wider space

Some of the Ryuoh and Seiryu stones have a triangular shape with a pointed edge. The left picture is a good example of arranging this type of stone in a radial fashion.



If the stone has too strong a presence, add aquatic plants to soften the impression. In this example, Eleocharis vivipara in the background plays such a role.

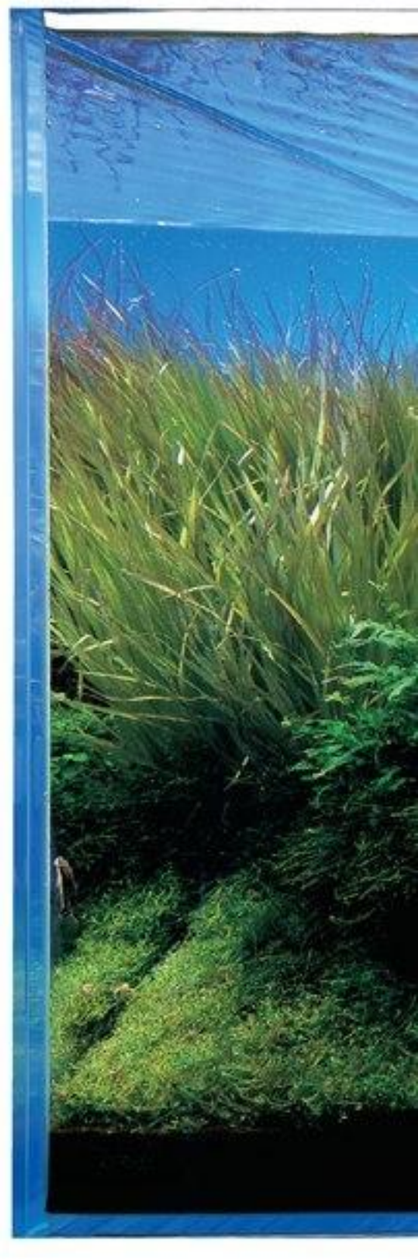


What Types of Layout can be Produced with Driftwood and Stone?

Layout resembling deep forest using driftwood and stones as base material. 1

Yamaya stones are randomly stacked between the branches. They also have the function of preventing the branch woods from floating up. Once the epiphytic aquatic plants are attached to the stones and wood, a layout with a subtle yet profound atmosphere is produced.

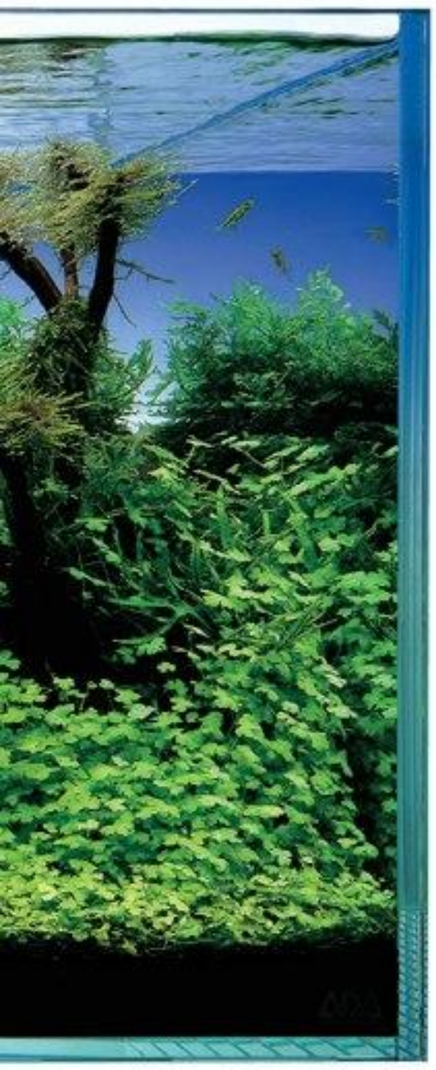
Aquatic plants that go well with driftwood and stone are epiphytic plants such as ferns and mosses. With the advantage of being able to be attached directly to the layout materials, these plants can be used for a broad range of applications.

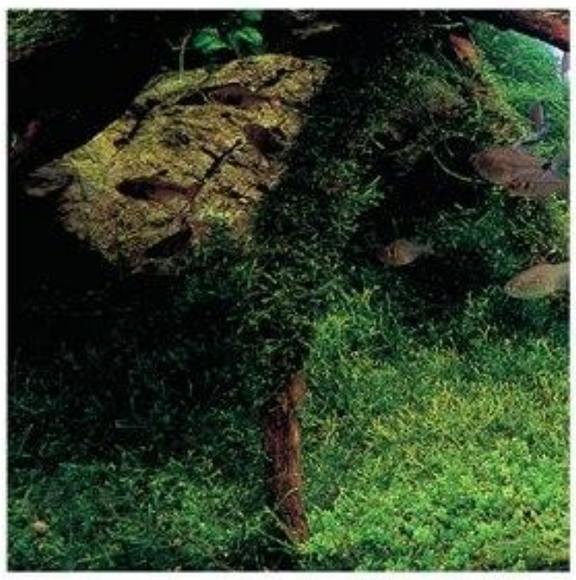


Layout with stones entwined in driftwood which evokes the drama of nature 2

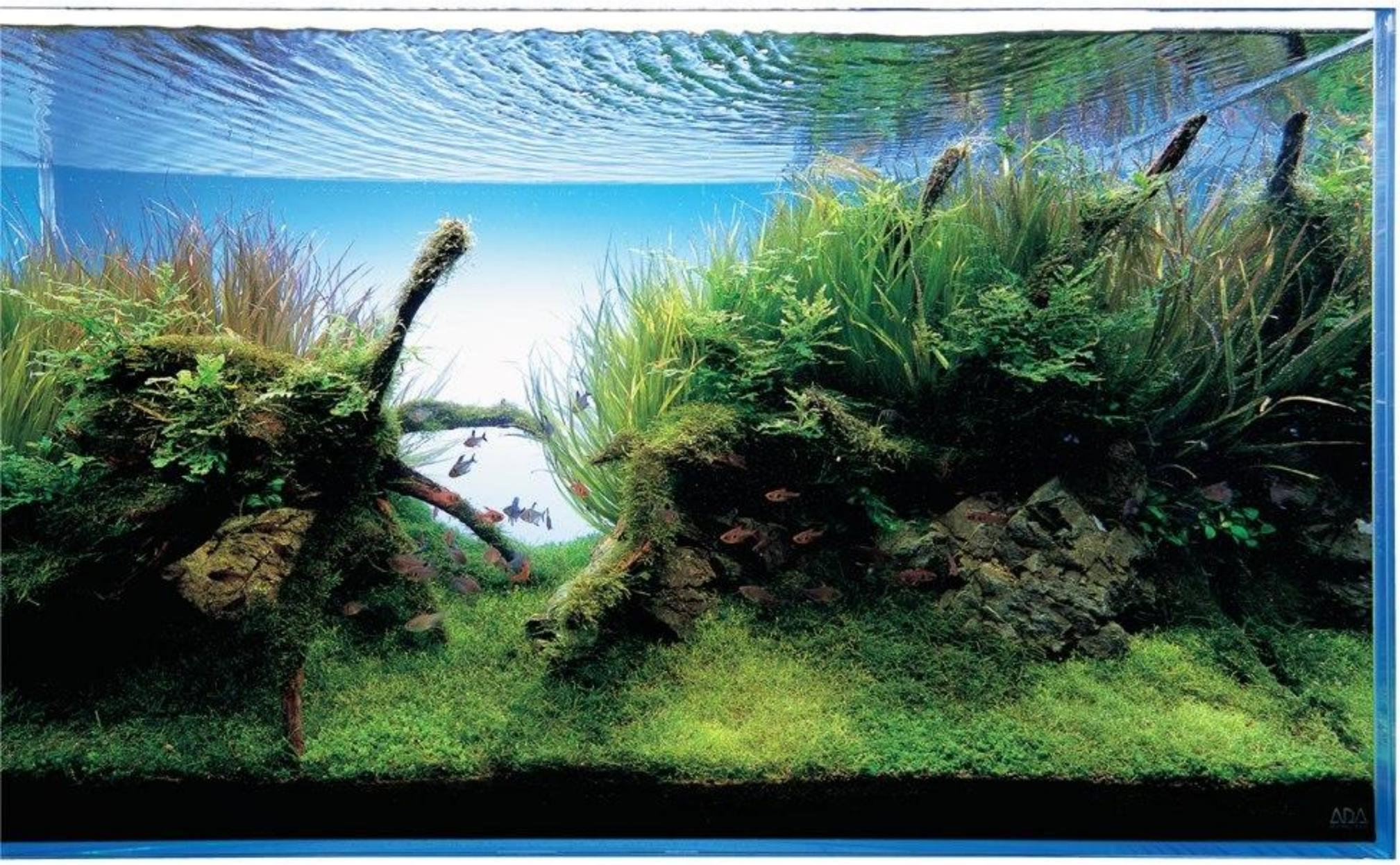
This type of aquascape should be created while imagining how the stone is caught in the tangled driftwood as observed in a natural landscape. Observation of nature provides the best tips on layout production.

Just as in landscapes, the layout looks natural when it has both driftwood and stone. By effectively combining these two materials you can create a layout rich in natural feel. Make good use of driftwood and stone to expand your range of expression.

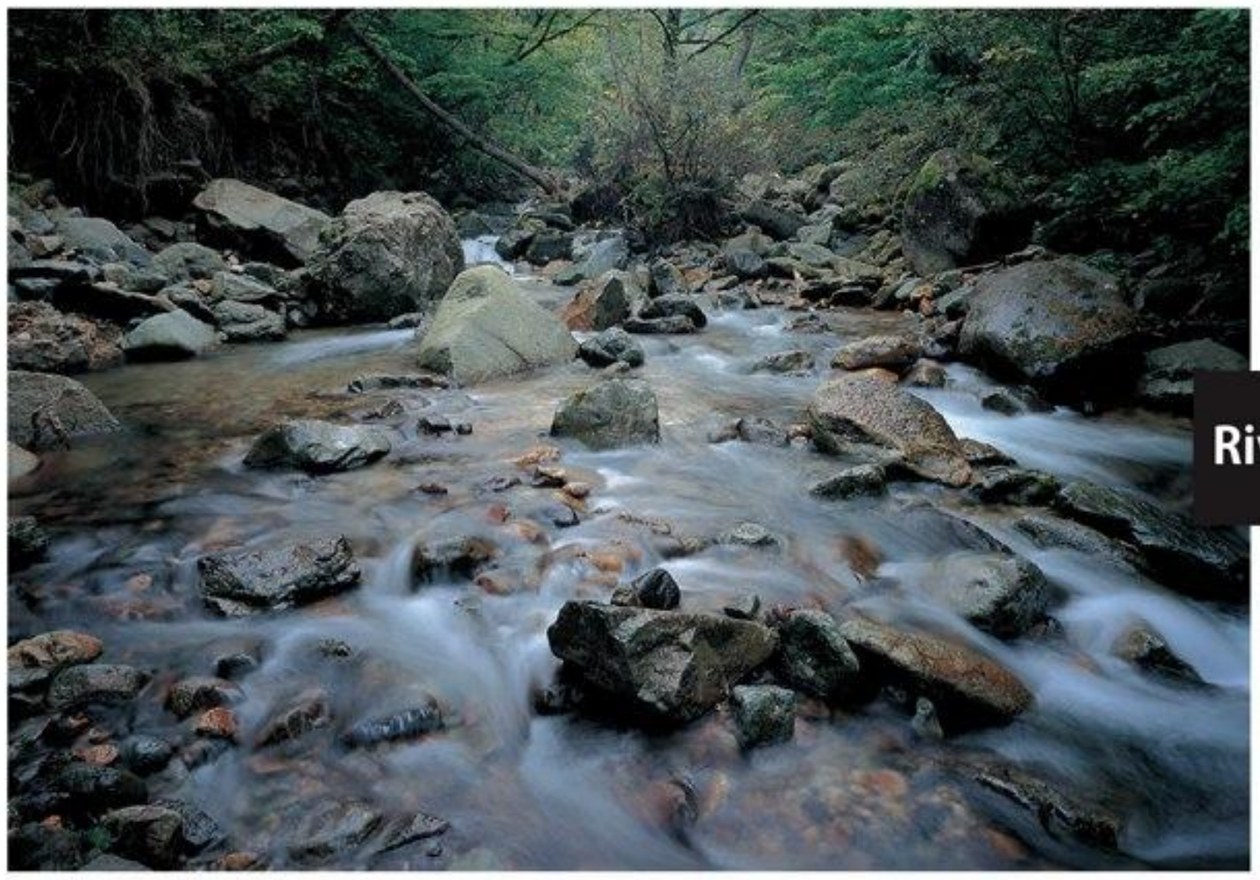




The branches of horn wood entwined around the Manten stones produce shade adding depth to the aquascape. The expression of light and shade is one of the key elements to achieve an enhanced natural look.



How We Can Develop a Perspective of Nature



River

Stones positioned in flowing water
The river stones at a glance look scattered randomly but they are all sitting in physically-stable positions at a stable angle by virtue of water flow and river slope. For layout production, a natural impression can be achieved if the positions and angles of the stones are determined while projecting the image of flowing water. This is one of the basics of Iwagumi layout.

Sea

Connected rock reef beneath the water surface
Ocean rocks spotted above the sea surface or along the beach are actually connected to each other and form a huge rock reef under the water surface or sand. This is why these rocks have a uniform color and texture and we do not feel strange even if we see a string of such rocks together. When making a layout using stones, ensure that the stones have the same type of color and texture. A sense of coherence is thus achieved through the arrangement of stones and mounds so that the layout looks more natural.

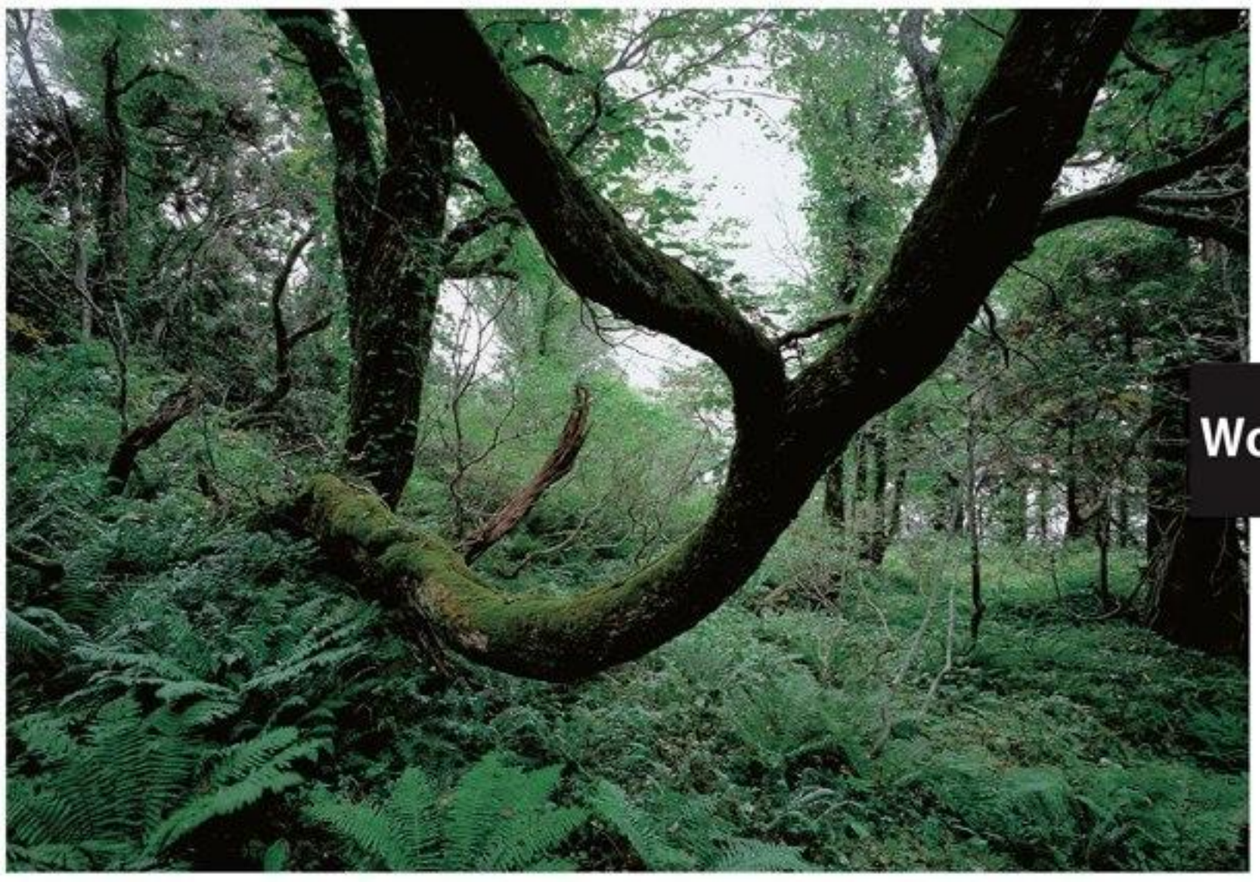
Rock

Odd-shaped rocks eroded by waves
Some large rocks along the coast have an odd shape as a result of erosion by the ocean waves. The scenery of these odd-shaped rocks is overwhelming. Ryuoh stone with its water-eroded surface is suitable for expressing the dynamism of odd- shaped rocks.

In Nature Aquarium, the producer's response to nature is reflected even in the selection and arrangement of layout materials. This section looks into tips for developing a natural perspective with reference to various elements of the landscape.

Wabi-sabi that can be felt from deep green moss

In nature, the surfaces of stones and trees are often covered with dark green moss. These mosses make us feel the long passage of time, the impermanence of nature and wabi-sabi. Reproduction of mossy stones and trees in the planted aquarium will eventually lead to the expression of wabi-sabi.



Figures formed by the environment

Trees, which are a symbol of nature, have trunks and branches of various shapes depending on their natural environment. Through exposure to strong wind, heavy snow or rain or certain sunshine conditions, they sometimes grow into a massive shape. This natural beauty can be expressed by arranging driftwoods in an aquarium.

Different sizes of pebbles in river

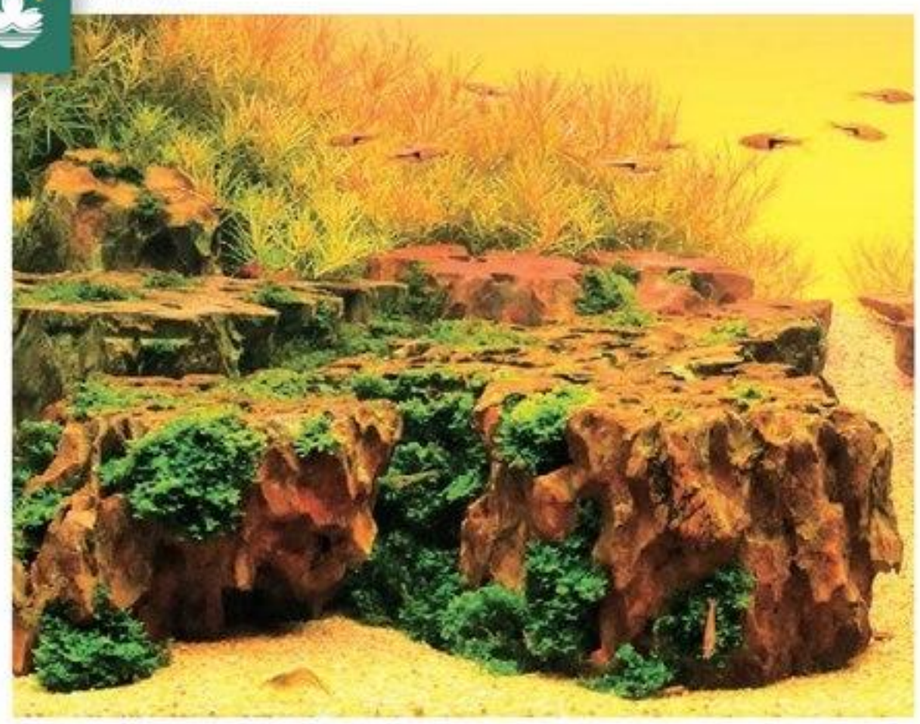
Rocks and stones in nature turn smaller and smaller through the processes of water erosion: from a rock to stones, to pebbles and then sand. When we observe a river scene, we see there are small stones around a large stone, which are surrounded by smaller pebbles and fine sand. In the aquarium, too, a natural feel can be enhanced by using small pebbles as layout material.

What Type of Materials Do Overseas Aquarists Use?

Russia

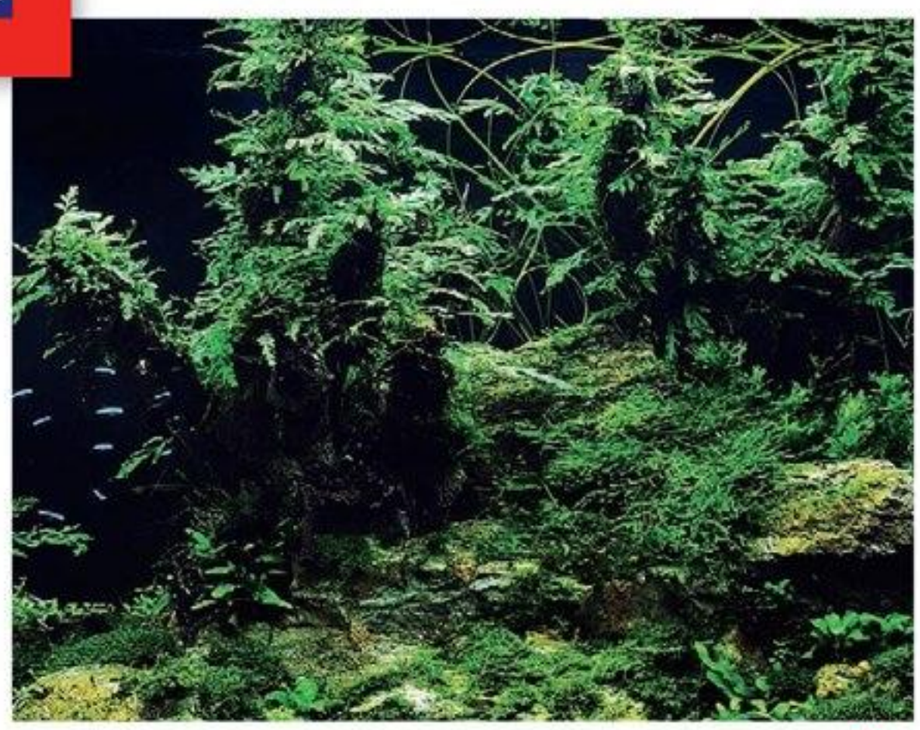
Trunks of fir trees collected from a Russian forest 1

Macau



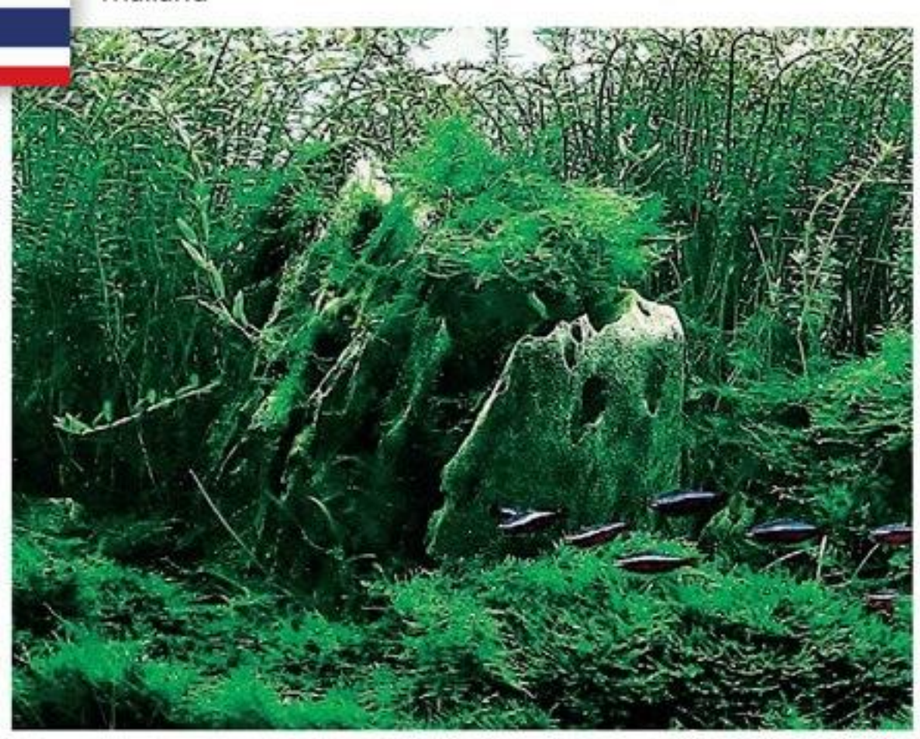
Rare stone named Song Pi 2

Taiwan



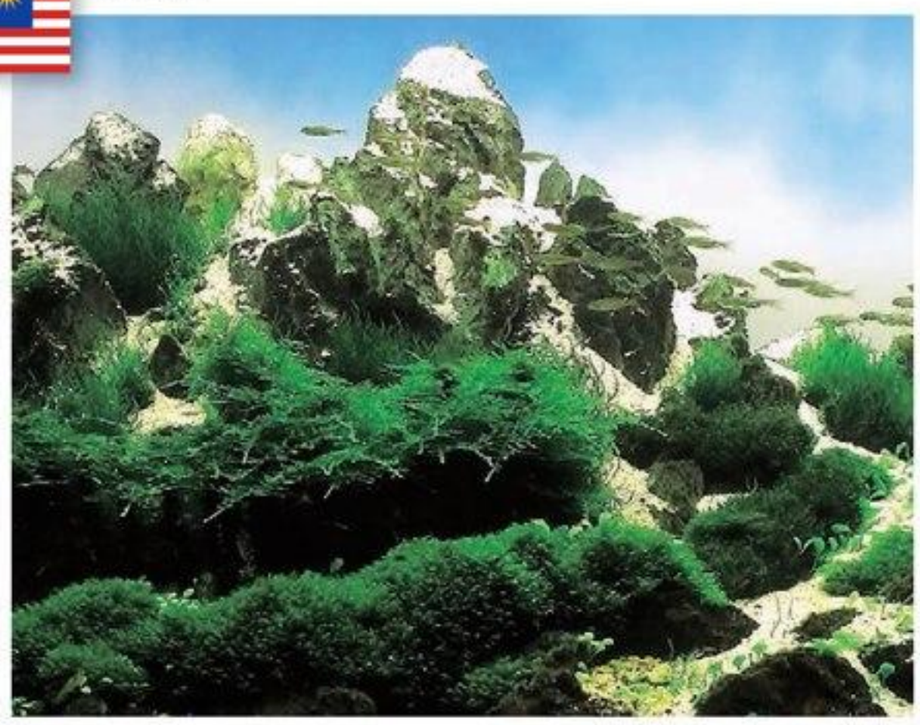
Stone collection and driftwood named Furong Mu 3

Thailand



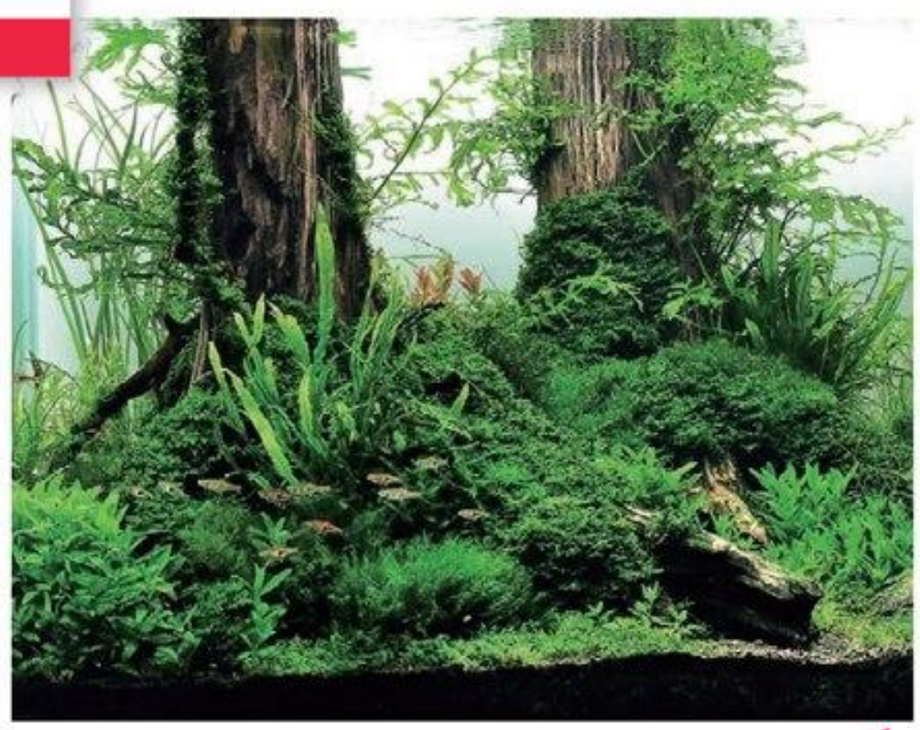
Stone known by the name "Tooth of horse" 4

Malaysia



Ryuoh stone purchased in Malaysia 5

Poland



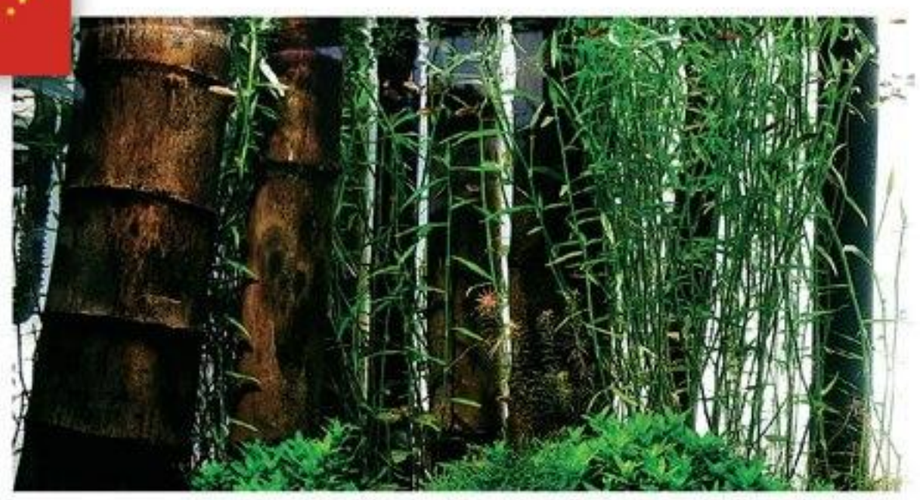
Driftwood called mud pine 6

For natural layout materials such as driftwood and stone, each country in the world has its unique specialties. You have only to look at the works of global aquarists entered in the International Aquatic Plants Layout Contest! All have brilliant uniqueness!

Ireland

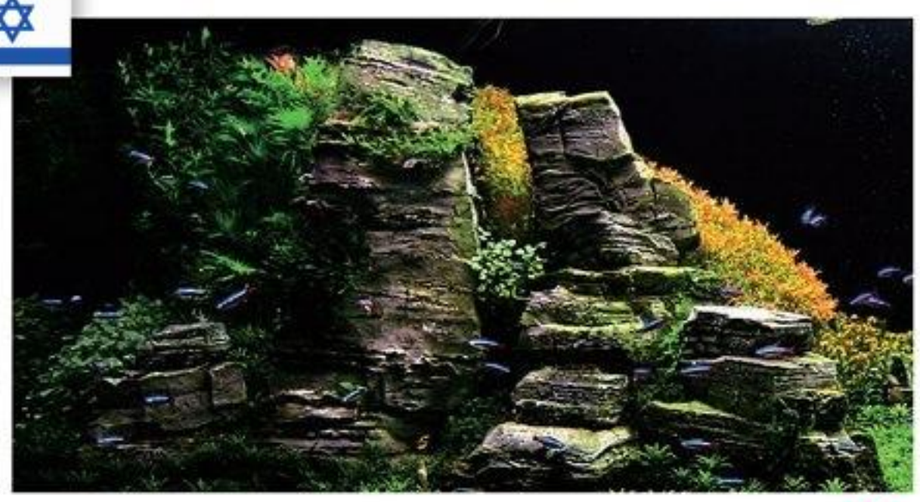
Driftwood with branch tips sharpened by ocean waves 7

China



Moso Bamboo from Guizhou, China 8

Israel



Stones made by bonding natural slate 9

Beautiful slate which Shay Fertig has fallen for

1 With the idea of reproducing a primeval forest in Northern Russia, I went to a forest to look for the material suitable for my layout concept. I collected fir trees of different sizes and made use of their trunks and thin pliable roots to reproduce a wild desolate forest in the aquarium.

Pavel Bautin

2 One day, I came across the picture of the Loess Plateau in the newspapers, which reminded me of Song Pi stone. This is why I decided to use this stone. Song Pi stone is very rare and hardly available. So I went all the way up to Guangzhou with my friend to look for the stone, and I finally found it.

Zhang Jian Feng

3 I went through a lot of trouble to collect the stones used for this layout. I made a trip to Lala Shan and Dabangen in Taiwan to find the stones with the same color and pattern as the composition I had envisioned. This stone is good in terms of not affecting the water quality but at the same time has a problem of crumbling relatively easily. The driftwood used is from a wood called Furong Mu.

Chen I Sheng

4 The name of the stone I used for this layout is "Feuang Maa" in Thai, which means "Tooth of horse". This is a natural stone that can be found in Thailand. It has a mix of rough and fine texture just like ADA's Shou stone. and has a distinctive appearance.

Nobphacha Yimyou

5 I used Ryuoh stone that I had purchased from an aquarium shop in Malaysia. This stone does raise the water hardness and pH. However, the water quality was not affected for this layout as I washed the stone with a mild acidic solution and soaked it in a bucket of water for a few weeks before use.

Bernice Sim

6 This driftwood is called mud pine. I found this wood submerged in a swamp located in a nearby needleleaf forest. I then soaked it in water for three months and removed the bark with a knife. Through these processes, I obtained this appealing driftwood with its brightly colored surface.

Piotr Beczynski

7 I found these driftwoods on a mile-long sandy beach on the East coast of Ireland. They feature sharp twig-like branch tips formed by the ocean waves and tide. These driftwoods were all lying in clumps at the same point of the beach.

Peter Kirwan

8 I chose bamboo for the layout material for this work. This bamboo is called Moso Bamboo and is very popular in Guizhou, China. This material is readily available and we can buy it anywhere. It is interesting and has an impact that cannot be found in ordinary driftwoods.

Sun Feng

9 I used the stone made by crushing calcium-free natural slate (which I find very beautiful and reminds me of the ancient remains of the Incas!) into small pieces and bonded them together with epoxy resin. I formed the stone in my backyard which took me more than a week to complete. To ensure the stable condition of these stones which can be as heavy as over 50kg in total weight, a Styrofoam sheet and fine quartz sand are placed under them.

Shay Fertig

Stones formed in the backyard before layout production

Tips for Selecting Materials in a Shop

Unlike aquarium goods such as breeding equipment, the layout materials are handled and sold in different ways in each shop. This is how we can surprisingly discover the shop's unique character in the section dealing with layout materials. In the shops where planted aquariums are the main interest, the staff will help their customers by giving advice on the selection of products. Once you know how to communicate well with the staff, they may inform you which layout materials are expected in the future.

One thing that makes layout material different from standard aquarium goods is price setting. The price of layout materials usually varies with each item and the majority of shops set a different price for each piece of driftwood depending on size and shape. The price setting is slightly different for stones. Some shops set a price for each piece of stone according to size and shape, and some sell the stones by weight. For stones sold at the respective individual price, the price basically tends to be higher if they are well shaped. This system is in a sense good for beginners as the price can be an explicit indicator of quality of material. The system of selling by weight is also advantageous for customers as they can purchase well-shaped materials at a reasonable price only if the purchaser has a keen eye for determining the value of the material. However, under this system, well-shaped stones will sell fast, which makes the optimal timing of purchase right after the arrival of new stock.

In either case, consulting the shop staff is always a good approach. So we asked the shop personnel for their advice on layout material selection. Please refer to the helpful information provided by the professionals.

(In no particular order; Honorifics omitted.)

We show our customers "Glass no Naka no Daishizen", "ADA Catalog" as well as the shop's layout samples to help them choose the materials for which they have a good feeling.

Penguin Village

We explain to the customers that an odd number of stones of the same texture should be used and also provide some tips on actual stone arrangement when we sell the layout materials.

AQUATAKE E

Many driftwood collectors tend to choose "woods of similar shape". You will realize this fact if you open the box of driftwood stocked in your house. You can expand your layout hobby by being exposed to totally new uses of driftwood during your chat with the shop staff and having an opportunity to see the driftwoods chosen by other people (shop staff and customers). If you are a beginner to stone arrangement, you will be able to brush up on your skills faster just listening to the advice provided by others. You can then shop efficiently avoiding unnecessary cost

Penguin Village

AQUATAKE E

An aquarium

Aqua Revue

The best tip on purchasing layout materials from a shop is to ask the shop assistants. We asked the shop assistants how they sell the layout materials and also their advice on the purchase of these materials.

if you simulate the layout at a shop and get the set of items recommended by them. If you wish to do all by yourself, it is advisable for you to purchase the main stone first since this is the basis of a smooth, successful layout.

An aquarium

Firstly, we ask our customers whether they are going to use driftwood or stone for their layout. Then, we let them choose the materials basically by referring to the sample layouts produced in the shop's aquariums. At this time, we support our customers by providing detailed explanations of the features and characteristics of each material and recommending materials which match the tank size.

Aqua Revue

We provide explanations to our customers before purchase to help them understand the negative points of each material such as the fact that it takes some time for branch wood to sink and that stones may raise the water hardness level.

Yoshida Fish Farms

I heard Mr. Takashi Amano saying a while ago that he usually chose dynamic materials according to tank size rather than materials with a good shape. We bear this mind as an important point and provide our customers with advice on the selection of materials. We ask the customers what concept they have regarding the total layout and give advice as to the aquatic plants, fish and layout materials suitable for the aquascape.

MizukusaKobo fin

When asked for our advice by a beginner, we ask the person about his overall layout concept and types of materials desired, and then pick some items of matching size and place them in an aquarium with a sand base. We know that beginners usually get confused with too many explanations about a large number of items. So for beginners, we select a classic combination of materials for their consideration. If the customer wishes to get our advice on the selected layout materials placed in the tank with a sand base, we will advise as to balance of size, angle, open space and planting space when we feel some improvements can be made. If the customer looks distressed after a long selection

session, we encourage the customer to have a break or ask him to view the aquarium from a distance. We also turn up the light above the tank so that the customer can check the balance of light and shade in the layout. This service really enhances customer satisfaction.

Aqua Garden

We recommend our customers to have an overall sense of what kind of aquarium they wish to create. We think layout creation starts with looking at many good works and imitating them. Some layout materials may affect water quality and result in poor growth of aquatic plants and fish. Since there are certain things we cannot anticipate just by looking at the materials, such as a good match of materials and aquatic plants, we hope that our customers will consult with us when selecting materials.

Suikei Kobo

Yoshida Fish Farms

MizukusaKobo fin

Aqua Garden

Suikei Kobo

What are the Characteristics of Layout Materials?

Examination method for material

When layout materials are actually used in Nature Aquarium, it may be difficult to understand their characteristics for the following reasons: the size of the composition materials is small compared to the amount of tank water; the water quality is greatly influenced by the substrate and filter media and the substances leached from the layout materials may be removed during periodic water change. In order to eliminate these factors and deduce the characteristics of each layout material alone, we minimized the amount of water to increase the ratio of layout materials to water for this examination. As a result, the examination results show relatively extreme values. Please note that these are only an indicator of the chemical and physical tendencies and are not reproducible in an actual aquarium.

Examination method for stone materials

Place randomly chosen Manten, Ruyoh and Yamaya stones in their respective beakers and fill with tap water up to the brim. Subsequently, inject an adequate amount of CO_2 and let them stand at room temperature for more than 24 hours. Prior to the water quality measurement, adequate aeration was performed using an air pump to eliminate the excessive impact of CO_2.

Examination method for driftwood materials

Place the horn wood and branch wood in their respective pails filled with tap water and allow to stand at room temperature for more than 24 hours. To ensure that the examinations are conducted under the same conditions, adequate aeration was also performed for the horn woods using an air pump prior to measurement of water quality. The tap water which is a control parameter of this examination was prepared exactly in the same way as the water for the driftwood and with adequate aeration prior to measurement.

Tendency of each layout material and measures to be taken

Branch wood

Although no significant coloration was observed, the water in which the branch wood had been soaked showed lower pH, TH and KH levels and, at the same time, a small amount of NH_4 was detected. This fact indicates that organic acid and nitrogen have leached into the water. Large pieces of branch wood, particularly, contain a large amount of organic matter, which can lead to water molds forming at the initial stage of the aquarium. If water mold is found in the tank, remove it by suctioning it out with a fine hose. Branch wood easily floats immediately after it is placed in the water. The measures against this include putting an appropriate size of stone on the wood as a weight and soaking the wood in a pail of water for about one week before using it in the aquarium.

Horn wood

Just like many other types of driftwood, it was found that horn wood has a tendency to raise the COD level and cause a slight yellowing of the water due to the leaching of organic matter into the water. However, these problems can be easily resolved by the use of NA Carbon (high-performance activated carbon) for water change and filter. Humic acid, the main cause of yellowing water, is not harmful to living organisms; rather, it has a physiological calming effect.

Manten stone

A rise in pH, TH and KH level was observed in this examination. However, in the actual Nature Aquarium, these changes are usually offset by the effect of Aqua Soil a substrate material, and therefore hardly have any negative impact on the growth of aquatic plants. Rather, the appropriate level of mineral has a positive effect on the health of aquatic plants, fish and shrimps.

The stones and driftwoods used for Nature Aquarium are natural products which may affect water color and quality. This section examines the chemical and physical tendencies of the representative layout materials. Use this information to deepen your understanding of the features of each type of material.

Examination results for each type of material

Parameters for the stones	Tap water	Manten stone	Ryuoh stone	Yamaya stone
A Hydrogen ion concentration (pH)	7.16	8.15	8.10	8.02
B Total hardness (TH mg/ ℓ)	50	300	450	200
C Carbonate hardness (KH °dH)	2	16	24	10

Parameters for the driftwood	Horn wood	Branch wood
A Hydrogen ion concentration (pH)	7.17	6.73
B Total hardness (TH mg/ ℓ)	50	30
C Carbonate hardness (KH °dH)	2	1
D Chemical oxygen demand (COD mg/ ℓ)	8	2
E Phosphoric acid (PO_4 mg/ ℓ)	0	0
F Ammonium (NH_4 mg/ ℓ)	0.2	0.2
G Nitrous acid (NO_2 mg/ ℓ)	0	0
H Coloration	Slightly yellowed	NIL
I Floatation	May float depending on its dry condition.	Floats immediately after the beginning of use.

Ryuoh stone

Ryuoh stone had a tendency to raise the pH, TH and KH levels significantly. This can also be observed in the actual Nature Aquarium. Particularly when CO_2 is injected into the tank with the aim of promoting photosynthesis of aquatic plants, the CO_2 reacts with the calcium carbonate contained in Ryuoh stone and causes calcium ions and carbonate ions to leach into the water. The rise in the above parameters can be moderated to a certain extent by the effect of Aqua Soil. However, in the event it has a negative impact on the growth of aquatic plants, you should take effective measures such as installing the Softenizer to reduce the TH level and adding the "be Soft" to lower pH and KH levels.

Yamaya stone

A tendency to increase the pH, TH and KH value was also observed with Yamaya stone. However, the level of these substances was very low and hardly likely to have an impact on living organisms. The rise would be offset with the effect of Aqua Soil laid on the substrate.

A Hydrogen ion concentration (pH)

All the three types of stones had a tendency to raise the pH level. For the driftwood, the water with the horn wood showed no difference from tap water, while the branch wood had a tendency to decrease the pH level.

B Total hardness (TH)

All the three types of stones had a tendency to raise the TH level. Among them, Ryuoh stone caused a significant rise in TH level. For the driftwoods, the water with the horn wood showed no difference from tap water, while the branch wood had a tendency to decrease the TH level.

C Carbonate hardness (KH)

Just like the pH and TH levels, all three types of stone also had a tendency to raise the KH level. For this parameter, too, Ryuoh stone caused a significant rise. For driftwoods, too, the water with the horn wood showed no difference from tap water, while the branch wood had a tendency to decrease the KH level.

D Chemical oxygen demand (COD)

The COD varies mainly with the amount of organic matter in the water. In the light of this, the examination was conducted only for driftwoods containing organic matter. A notably high COD value was observed on the horn wood, while the COD level was relatively low with the branch wood.

E Phosphoric acid (PO_4)

Phosphoric acid (PO_4) leaches from organic matter. In view of this, the examination was conducted only for driftwoods containing organic matter. The PO_4 did not reach a detectable level both for the horn wood and branch wood.

F Ammonium (NH_4)

Ammonium (NH_4) leaches from organic matter. Because of this, the examination was conducted only for driftwoods containing organic matter. NH_4 was detected both for the horn wood and branch wood although the level was low.

G Nitrous acid (NO_2)

Nitrous acid (NO_2) is generated by conversion from ammonium (NH_4). Due to this, the examination was conducted only for driftwoods that can be a source of NO_2. This parameter did not reach a detectable level both for the horn wood and branch wood.

H Coloration

Coloration of water is caused mainly by organic acid such as humic acid. Due to this, the examination was conducted only for driftwoods that can pose a risk of water coloration. Slight yellowing occurred in the water with the horn wood, while no coloration was observed for the branch wood.

I Buoyancy

Buoyancy is a physical force that is exerted in water. Since stones are heavy and almost free from the effect of buoyancy, this examination was conducted only for the driftwoods. Horn wood basically sinks in water but it can float if it is considerably dry. Branch wood certainly floats immediately after the beginning of use. It will sink after it has been soaked in water for about one week when it has absorbed an adequate amount of water.

Takashi Amano

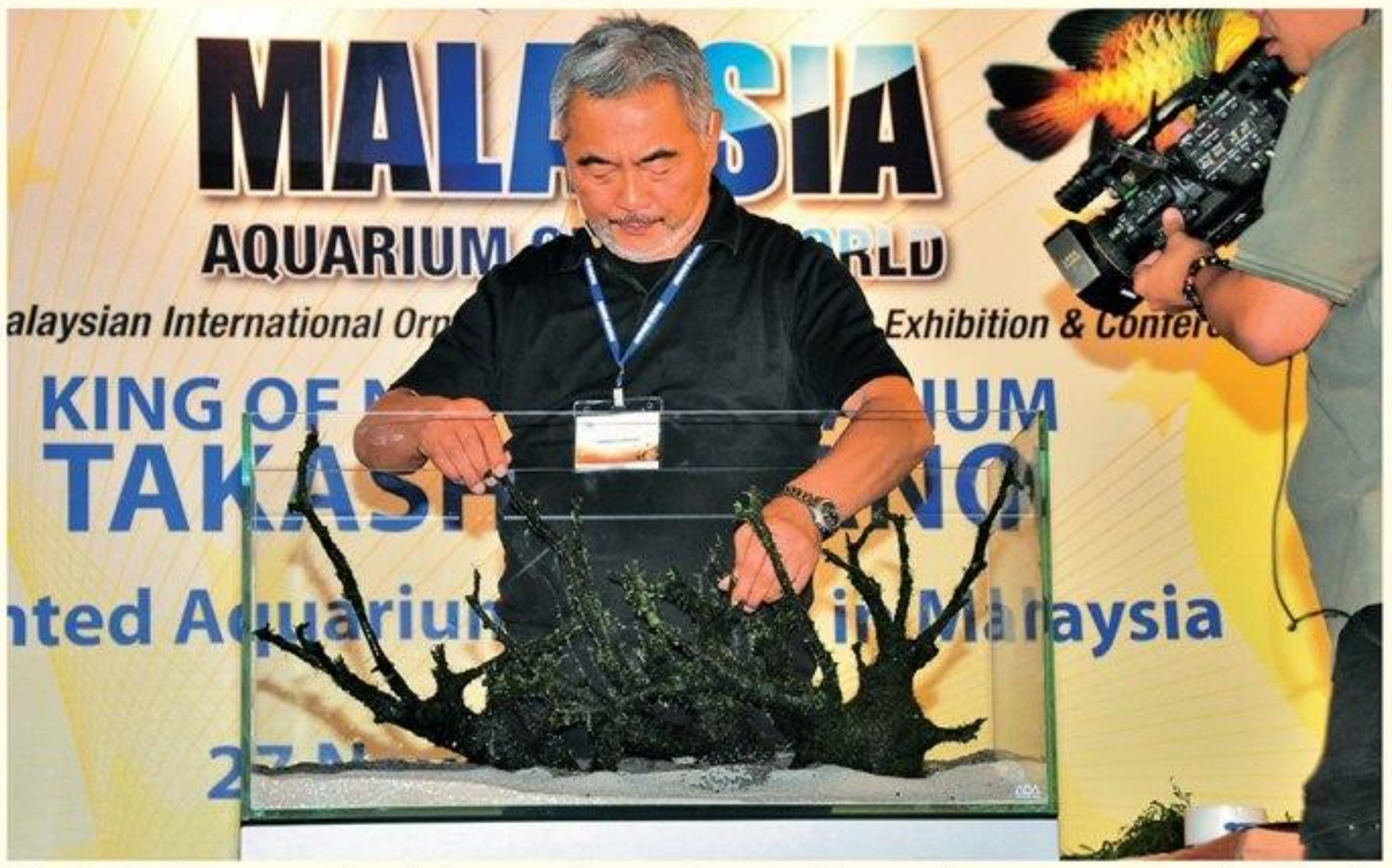
Workshop Report in Malaysia

AQUAFAIR MALAYSIA

AQUAFAIR, a popular exhibition held biennially in the Malaysian capital of Kuala Lumpur, is well known particularly for the fish show covering Discus, Guppy and Show Betta. As the main event of AQUAFAIR 2010 held from November 25 to 28, 2010 at the Kuala Lumpur Convention Centre adjacent to the famous Petronas Twin Towers, a lecture cum workshop by Takashi Amano was organized on Saturday, November 27, 2010. Here is the report of the workshop as well as AQUAFAIR exhibition.

Reported by: Nozomi Hayakawa, International Marketing Department, ADA

452m Petronas Twin Towers adjacent to the exhibition venue



Takashi Amano was invited as the lecturer of Nature Aquarium. He gave a lecture on aquascape layout under intense media attention.

Held under the official name of the "Malaysian International Ornamental Aquatic Industry Exhibition and Conference", AQUAFAIR is organized by the Department of Fisheries Malaysia and endorsed by the Ministry of Agriculture and Agro-based Industries. With its strong emphasis on the export of ornamental fish, Malaysia is now also an exporter of aquatic plants and in recent years has been seeing the emergence of aquatic plant farms within the country. The Malaysian government's ambition to further develop the aquatic plant industry initiated this Takashi Amano workshop, with the organizer's strong aspiration to use the presence of the founder of Nature Aquarium to boost the popularity of planted aquariums among the local population.

The workshop was held at a special venue set up in Hall 4 of the Kuala Lumpur Convention Centre. On the day of the workshop, more than 50 people waiting for the walk-in registration formed a long line for more than a hour before the workshop began. The venue accommodating 200 people was packed to overflowing with an excited crowd, and those who did not get a seat sat on the floor at the sides of the hall. The number of enthusiastic aquarists who desired to participate in the workshop despite the high ticket price testified to the growing interest in planted aquariums among Malaysians. In addition to the workshop, an aquatic plant layout competition was organized by the Malaysian Aquascaping Club during the exhibition, and their aquascape works were showcased at the exhibition venue.

This was Takashi Amano's first workshop in Malaysia and a media conference was held just before the event. A large number of media people gathered at this press conference, including four local newspapers. Malaysian aquarium magazine "Pets Magazine" and Taiwan's "Aqua Pets", to name a few, showed great interest in Nature Aquarium. In conjunction with this AQUAFAIR, the Chinese version of "Glass no Naka no Daishizen", the complete aquascape works of Takashi Amano was published by a Taiwanese publishing company and broadly introduced to the community of ethnic Chinese who make up about 25% of the Malaysian population. The lecture consisting of slide presentation and aquascape layout demonstration was entirely captured on three video cameras, which were projected on to a large screen on stage as well as on two monitors. A DVD of this workshop will be produced and released in the future.

The lecture cum slide presentation featured landscapes and Amano's experiences in the three major tropical rainforests in the world. In this session, the method of replicating a slice of the natural landscape was introduced together with the production processes of Nature Aquarium. After the intermission, the aquatic plant workshop by Takashi Amano finally kicked off. For this workshop, a request had been made by the organizer to use Malaysian driftwoods for Nature Aquarium. To meet this request, Amano selected driftwoods the day before the event and produced a layout in a 90cm tank using those driftwoods as well as aquatic plants grown in a Malaysian aquatic plant farm. In this session, various Malaysian aquarium shop own-


Kuala Lumpur Convention Centre, venue of the workshop.


Amano judging the entries in the aquatic plant layout competition.


Amano's demonstration was captured on video cameras and projected on to the large screen.

Participants eager for Amano's autograph formed a long line.


The layout produced using Malaysian driftwoods at the request of the organizer.

Several local newspapers covered Amano's visit to Malaysia.

ers who took part in the Nature Aquarium Seminar held last October at the ADA head office gathered in support of Amano's production.

Usually Amano needs only about 30 minutes to complete a layout for a 90cm tank, but that day he spent more than 3 times as long providing detailed explanations. The lecture began with the techniques of attaching willow moss around the driftwood and making a substrate consisting of cosmetic sand and Aqua Soil Amazonia. Amano showed the participants important points in the layout production interspersed with jokes. During the session, Amano entertained the audience with a great live performance of sawing the driftwood as he found that one of the driftwoods was not in perfect shape. He also explained how to get rid of unnecessary elements in the layout in an amusing way by randomly adding many stones one after another to the tank and at last shouting "Now it's the time for subtraction!" As to the planting of stem plants in the background, Amano used a bamboo stick to determine the balance in planting. He explained how to take a weight balance by dividing the background in the ratio 2:3 and planting the aquatic plants with darker colors and wider leaves in the section with a higher weight ratio. As the layout neared completion to the feverish excitement of the audience, many questions were asked of Takashi Amano.

During the aquascape production of one and a half hours, Amano carefully answered the questions of almost 30 participants mainly regarding basic matters such as lighting time, water quality, timing to add the fish, application of liquid fertilizer and frequency of water change. The workshop was so active that the organizer had no choice but to restrict the audience's questions. The three and a half hour-long lecture ended with the entire participants' positive response of "YES!" to the organizer's proposal to invite Takashi Amano again for another workshop in Malaysia and the acknowledgment to Amano from the organizer's representative. Even after the lecture ended, some 200 participants formed a long line to get Amano's autograph for the publication including the English version of ADA catalog "THE BOOK OF ADA" which took Amano another 40 minutes.

Following his lecture tours in India in July last year and Beijing in June this year, another Nature Aquarium lecture was held in the Malaysian capital of Kuala Lumpur. As Asian countries are experiencing economic development, interest in planted aquariums and Nature Aquarium is gaining momentum in this region. Without even having to mention that many Asian aquarists won the top rank in the International Aquatic Plants Layout Contest, it is apparent that Asian power is surging even in the world of aquariums. The visit to Malaysia this time reminded us of this fact and also made us realize the Malaysian government's aspirations and strategies.

Interview with Takashi Amano

Visit to a Malaysian Forest

Interview about MALAYSIA Trip

Photographs by Takashi Amano

A few days after the Nature Aquarium lecture in Kuala Lumpur, one of Asia's largest cities, Takashi Amano was at the Royal Belum State Park which is blessed to have the world's oldest tropical rainforest. While visiting a village he had an encounter with the Jahai tribe, one of the nineteen aboriginal Orang Asli tribes.

Aiming a poison-tipped blowpipe at a bird. The probability of a hit is very high.

Simple dwelling of the Jahai tribe

Editor: What were the Jahai tribe you visited this time like compared with the native people of the Amazon?

Amano: In the Amazon, even the places deep in the jungle also have relatively good access by liner service which ferries quite a lot of supplies. On the other hand, the Jahai tribe live in a true hinterland that can only be reached by a one and a half-hour motor boat trip up the river and dam lake. They used to live in a remoter place seven years ago, but the Government asked them to relocate to an area along the river so that it could keep an eye on the tribe because the area in which the Jahai used to live produced a fragrant tree called agarwood and outsiders might enter the forest to seek this tree. It looks like the tribe received some compensation from the Government for the relocation. You might wonder if the native people would be happy to receive money, but almost all the native tribes know the value of money by now.

Editor: Are the Jahai tribe self-sufficient in terms of livelihood?

Amano: Of course. It seems they can subsist on upland farming. However, elephants come right before the harvest and ruin the crops. They could do nothing about it, so they have stopped farming. The Jahai men go hunting and bring back birds, monkeys and fish. They get married at the age of 12 to 19 and after marriage they start to go hunting.

Editor: Wow, 19 years old!? By the way, I heard you were attacked by leeches and took photographs with a lot of blood on your body.

Amano: Leeches are nothing to me. I did bleed but didn't feel much pain, so I really don't mind leeches. Well, the staff accompanying me seemed to have a big shock with leeches and mosquitoes. I was attacked by a number of leeches when I was in Borneo, too, so I just thought, "Ah, they've come again!" Actually my physical condition was much better in the Jahai village compared with the time I was in my homeland. In Japan, I always stay up till late at night drinking and leading an unhealthy lifestyle, eating and drinking to excess and lacking sleep. I felt really good leading a more orderly life, waking up with the dawn and sleeping at dusk, in a place with no electricity and liquor. I know some of my staff had stomach upsets, but they had such ailments because they expected to, as the saying goes, "All illness comes from mind."

Editor: That's right. So you really blended with the Jahai tribe.

Amano: I am interested in and admire the life of native people. This time I asked the Jahai people whether I could stay with them for a month - I would wear a loincloth and go for hunting together. Unfortunately, I was refused as they don't accept another race. They said they couldn't invite anyone of a different race for a meal or put up in their houses. So I hardly had a chance to see how the Jahais live and how the women cook. It would have been a different story if I had a chance to have a leisurely chat with their chief. I'm the kind of person who is quite carefree and just make myself at home anywhere, even in Jahai homes, if I feel interested. That's why the staff around me always seem a little nervous.

Editor: Weren't the Jahai angry with what you had done?

Amano: They didn't get angry because I was too cheeky. They made a face as if to say, "What nerve!" But I really like the way the Jahai people live and want to get close to them, so I think they understood this kind of attitude. If I thought I didn't want to get close to them, then they would certainly have read my thoughts. When I aimed a camera at them, they didn't look surprised, maybe because they were not interested, though they looked a little annoyed when I went too far in my photography. Some of them even asked me to pay for it. I have really started to enjoy portrait photography of late and want to take more pictures of many people. I now regret that I did not take more pictures of the Indios and their way of life.

Editor: In what way is your fascination for native people different from modern people?

Amano: I feel the life of native people is the root of human existence, and ancient Japanese also had that kind of lifestyle. I think we can find something new by placing ourselves in such an environment. Modern people are full of complex desires, while native people whose primary need is survival have a desire for essentials to live on but not status and fame. As human beings, native people also seem to have a fighting and competitive spirit among them, like he is good or poor at hunting, but their

sense of competition is very pure. What is very important to them is whether strong or weak, they are in a world where only the strong can survive. In such a world, I guess the man with physical strength and vitality must be more popular with the women, than just a handsome guy.

Editor: Well then, what was the world's oldest tropical rainforest like?

Amano: I know the jungle there is more than 10,000 years older than the Amazon, but it was not that astounding to me as both forests don't have much difference in the age of the trees, though there might be a geological difference. By the way, you might think that trees and grass grow so thick in the jungle that you can't even walk through it. But that's actually false. There are a lot of gigantic trees in the primeval jungle but the ground is not covered with bush and is relatively clear of plants, so it's easy to walk in the jungle.

Editor: How can that be?

Amano: The tall and large trees in jungle resemble the shape of broccoli and their canopies block the sunlight. The sunlight doesn't reach ground level much, which hinders the growth of short trees. So primeval jungles are very airy with abundant clearance on the ground. If you see a forest with dense vegetation on the ground, it is usually secondary or tertiary forest. For these forests, openings are created in the canopy to allow sunlight to penetrate the forest floor and therefore dense plants can grow. Isn't it interesting? We usually don't know this kind of thing unless we actually visit the place and see it with our own eyes.

Editor: So primeval forests have developed purely by nature with no human intervention.

Amano: Yes. Some people say human beings should control the forest, but I somehow think it is wrong. In fact, once people start to intervene in a forest, then they should take care of the forest for good, or it will be ruined. Once the trees are cut in the process of human intervention, the primeval forest can no longer survive without continuous human care because the plants will grow dense after the trees have been cut down and this will affect air flow, so more intervention is needed. This will go on and on in order to protect the forest. So if we look at a forest with our own eyes, we can always judge whether it is primeval or not. The same goes for the forests in Sado.

Editor: So with human intervention it will be difficult to restore nature to its original pristine state.

Amano: That's right. I think the same applies to native people. There are some cases where outsiders try to influence the native people who were leading a happy life and denied them their traditional culture, and then the native people also tried to adapt to the ways of the outsiders and destroyed their culture by themselves. In that way, protecting both the natural and human environment are somewhat similar. I believe we must not force our values on the native people. Modern people are content just to be in a garden-like natural setting of their own creation, unlike native people who live in harmonious coexistence with nature. The Jahai tribe is in a transition between uncivilized life and civilization. They seem to have experienced many changes in their lives since they were told by the Government to move to the current site along the river. I heard that an increasing number of them have suffered from diseases hitherto unknown to them. It seems as if they would be happier to continue living deep in the jungle.

Editor: So there is a value gap between native people and us.

Amano: Certainly there is. By the way, there is an interesting story. I bought from the Jahai a blow pipe they were actually using as a souvenir. When I showed it to my staff, some of them thought I had bought a product made for tourists from a souvenir shop. Do you think there are tourists and souvenir shops in such a remote part of the jungle? No way! I know some people who have gone to Africa who say, "I saw wild lions and giraffes there!" But the animals there are all wild animals. Wouldn't it be strange if tourists went to the African savannah and saw animals in a zoo? Probably for those who have never been out of modern society, it is normal that animals should be in a zoo. If these people actually saw wild animals, they must get a culture shock by the tremendous gap to the extent their meters go off the scale. You know, the boats and ornaments decorated in the Nature Aquarium Gallery are all bought directly from the native people.

Editor: Lastly, what can we in modern society learn from the Jahai tribe?

Amano: Native people are very sensitive to nature because nature is their "life". For example, they have a really sharp eye for the weather, which is far more accurate than the weather forecast on TV. And they are conscious that they are allowed to live by nature and have a deep respect for it. The way they live in the presence of nature is really humble with no arrogance. I recently heard the news that Japanese forests are being bought over by foreign capitalists, but I think we should learn from the native people how we should view nature while living in a modern society which is so much controlled by capitalism.

Tropical rainforest with obviously different vegetation from ordinary forests

Rafflesia bud found in the jungle

Found this rare mushroom while photo shooting

Women washing clothes at a jetty by the river. A valuable photo which shows the life of the Jahai tribe

nature aquarium **notes**

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Nutrient Addition for Healthy Growth of Aquatic Plants

Green Brighty series is a liquid fertilizer that has been developed for Nature Aquarium. In order to cultivate aquatic plants, it is essential to promote photosynthesis by providing adequate intensity of light and appropriate amounts of CO_2 injection. However, aquatic plants will not grow healthily with this alone. Sufficient nutrients required for the growth of the plants need be supplied. This volume of Nature Aquarium Notes explains about nutrient addition for the healthy growth of aquatic plants.

● Deficient and Excessive Nutrients

Whether in nature or in the aquarium, aquatic plants grow through photosynthesis. They absorb CO_2 for this essential process but from the viewpoint of nutrients, CO_2 is merely a carbon source. Besides carbon, aquatic plants need nitrogen, phosphorus, potassium as well as trace elements such as iron and manganese for healthy growth. If these plants are given an opportunity for photosynthesis only, they will grow big but may show some growth disorder including thin, poor stems and leaves, yellowed leaves and bleached new buds. The cause of these symptoms is lack of nutrients.

Nutrients are the source of amino acid, nucleic acid and chlorophyll, crucial to the healthy development of the stems and leaves of aquatic plants. In nature, these nutrients are supplied in the form of nutrient salts dissolved in river water or circulating in lakes and ponds. In the aquarium tank, however, a certain amount of minerals supplied through the change of tank water but it is not sufficient in terms of both types and amount. Tap water contains a relatively high level of calcium and magnesium but no iron and manganese in most cases. Even if these elements are contained in tap water, they are most likely to be combined with other substances and become unusable to aquatic plants. For nitrogen, phosphorus and potassium which are actively absorbed by aquatic plants, it is difficult to supplement the required amounts to a Nature Aquarium which has lush plants just by water change. In nature, a sufficient amount of these nutrients is supplied by dissolution of organic matters such as the feces of living organisms and decomposed plants, but they are usually removed from tap water through the purification process.

For Nature Aquarium, Power Sand and Aqua Soil containing nutrients and organic matters are used for the substrate for the purpose of nutrient supplementation to aquatic plants. During the initial stage, mainly nitrogen and minerals are released into the water from the substrate but the amount will be lower once the substrate is covered with thriving aquatic plants. Another issue is insufficient supply of phosphorus and potassium in contrast to sufficient, or at times excessive, amounts of nitrogen in the water. Another source of nutrients in the aquarium is fish feces and unconsumed fish foods. These are a source of nitrogen and phosphorus but cannot be relied on as an effective source of potassium and trace elements. As a result, Nature Aquarium in the initial stage is prone to excessive nitrogen and phosphorus, on the one hand, and lack of potassium and trace elements, on the other. Excessive nitrogen and phosphorus contribute to the growth of algae, which affects the appearance of the layout and hinders the healthy growth of aquatic plants.

● Absorption of Excessive Nutrients by the Law of the Minimum

Excessive nitrogen and phosphorus in the aquarium need to be removed by such measures as water change to avoid algae infestation. When the aquatic plants are not yet blooming, they are unable to absorb such excessive amounts. However, once the aquatic plants have grown healthily and densely, nitrogen and phosphorus are hardly detected even without frequent water changes. Even if fish are present in the tank and fed adequately everyday, the level of these nutrients is extremely low as long as the aquatic plants are dense enough.

This shows that aquatic plants have excellent water purification ability. In order to promote this ability, we should understand how aquatic plants absorb nutrients and then apply the acquired knowledge effectively. Unlike terrestrial plants that absorb water and nutrients from their roots, aquatic plants can absorb nutrients through their surface including leaves and stems. Aquatic plants have developed this characteristic so that they are able to absorb nutrient salts dissolved in water in an environment where they are always immersed in the water. Among the aquatic plants, Cryptocoryne and Echinodorus are the species that actively absorb nutrients from the roots, while stem plants absorb nutrients more from the leaf surface. For stem plants, the roots are merely an organ to anchor the plant body to the substrate. Epiphytic plants such as ferns, moss and Anubias also absorb nutrients directly from the water. Therefore for these plants, the immediate effect of nutrient supplementation can be expected by directly adding liquid fertilizer to the water.

Nevertheless, not all the liquid fertilizers are effective. For example, if liquid fertilizer designed for terrestrial plants is added directly to a tank, the tank will soon be covered with algae. Meanwhile the aquarium with fish has a tendency to experience excessive nitrogen and phosphorus but lack of potassium and trace elements. There is a widely known principle called "The Law of the Minimum" which states that the growth of a plant is limited by the particular nutrient least available in relation to the total requirements of the plant. This principle also applies to aquatic plants in an aquarium tank and, if this Law of the Minimum is applied in reverse, more amounts of excessive nutrients will be absorbed by supplementing the nutrients that are lacking.

This is Nature Aquarium's basic concept of nutrient supplementation. Under this concept, liquid fertilizer containing potassium and trace elements as major ingredients is added to Nature Aquarium daily so that nitrogen and phosphorus that tend to be excessive will be absorbed by the aquatic plants. It can be said that this method is very reasonable as it promotes the healthy growth of aquatic plants and at the same time deters algae infestation.

● Optimal Use of Liquid Fertilizer for Each Aquarium Condition

Nature Aquarium's liquid fertilizers have been developed with the idea of supplementing deficient nutrients to allow excessive nutrients to be absorbed. However, there is an issue in that nutrients required for aquatic plants vary with the condition of the aquarium including the growth stage of aquatic plants. For example, an aquarium with dense sun plants, such as Riccia which actively performs photosynthesis, requires more potassium to have the effect of promoting photosynthesis. On the other hand, stem plants require many different types of trace elements for the development of new buds and also a lot of iron which is essential for the formation of pigments conducive to brighter leaf colors.

In order for aquarists to use the optimal liquid fertilizer for the condition of the aquarium, ADA offers several types of liquid fertilizer including Brighty K designed for potassium supply and the Green Brighty STEP series for supplementing trace elements. The Green Brighty STEP series is further divided into STEP 1 for the new bud stage, STEP 2 for the plant growth stage and STEP 3 for the mature stage. Each of STEP 1 to 3 has different levels of iron and trace elements and potassium is contained only in STEP 3. The newly planted aquatic plants need to form new buds and develop leaves and stems to grow. To achieve this, nitrogen, phosphorus, potassium and trace elements including magnesium and manganese are essential. In particular, lack of each trace element may result in curled buds or twisted leaves due to poor growth. To avoid these problems, it is ideal to supply each type of trace element in good balance during the new bud stage, i.e., from the initial stage up to the third month. Green Brighty STEP 1 is the optimal liquid fertilizer for this stage. Meanwhile in the plant growth stage when the aquatic plants grow vigorously and develop many leaves (3 months up to 1 year after the aquarium setup), the aquatic plants need to form plentiful photosynthetic pigments and also other pigments to regulate the progress of photosynthesis. To achieve this, a large amount of iron is especially required. Once the pigments are actively formed as a result of iron supply, the aquatic plants display a strong green color and, at the same time, the color of red stem plants is enhanced in the bright area which has abundant light. During this stage, application of Green Brighty STEP 2 is ideal. Later on, the growth of aquatic plants will become less vigorous and the stem plants that have gone through repeated trimming will be around one year old after planting. An effective way to slow down the aging of aquatic plants is to supply an increased amount of potassium. This is the reason why potassium is added to Green Brighty STEP 3 which is the most suitable fertilizer at this stage.

● Liquid Fertilizer Designed for Special Environment

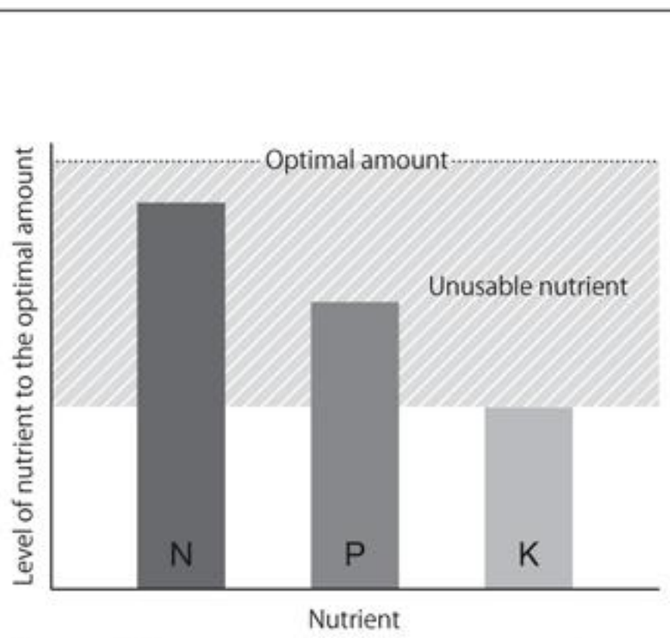
The Green Brighty STEP series is a liquid fertilizer containing trace elements as a major ingredient (STEP 3 contains additional potassium) with no nitrogen and phosphorus. Since these two elements are always supplied from fish feces and unconsumed fish foods, the aquariums with fish usually do not face a lack of nitrogen and phosphorus, but rather are at risk of an excess of these elements, which can result in algae infestation. In the aquarium to which Brighty K and Green Brighty STEP series are added, the aquatic plants absorb nitrogen and phosphorus vigorously and thus nitrite (NO_3) and phosphate (PO_4) can hardly be detected through the check using the Pack Checker even though these elements are always present in the aquarium. This is why it is not necessary to supplement nitrogen and phosphorus, which are in fact essential nutrients for aquatic plants, by liquid fertilizer.

Then, what about the aquarium with no fish or extremely few fish compared to the number of aquatic plants? In this special kind of environment, even nitrogen and phosphorus may fall short. If Power Sand and Aqua Soil are laid on the substrate, an adequate amount of nutrients is supplied from the substrate from the initial stage, but the nutrients from the substrate cannot be expected where the substrate is made up of only sand. When Riccia and stem plants grow slowly or show poor leaf color in this type of special environment even with application of Brighty K and Green Brighty STEP series, lack of nitrogen and phosphorus can be suspected. For the layout using many sun plants that absorb nutrients vigorously such as Riccia and stem plants, Green Brighty Special LIGHTS containing more nitrogen and phosphorus ingredients is an ideal fertilizer. Besides this, there is another type of fertilizer called Green Brighty Special SHADE designed for Anubias and ferns which absorbs nutrients slowly. Green Brighty Special SHADE also contains nitrogen and phosphorus but to a lesser degree than LIGHTS. Instead, the amount of potassium is increased to promote the growth of aquatic plant roots. For Anubias and ferns which are epiphytic aquatic plants, the role of the roots is very important in terms of absorption of nutrients and anchorage of the body. For this type of plant, the supply of potassium is highly effective.

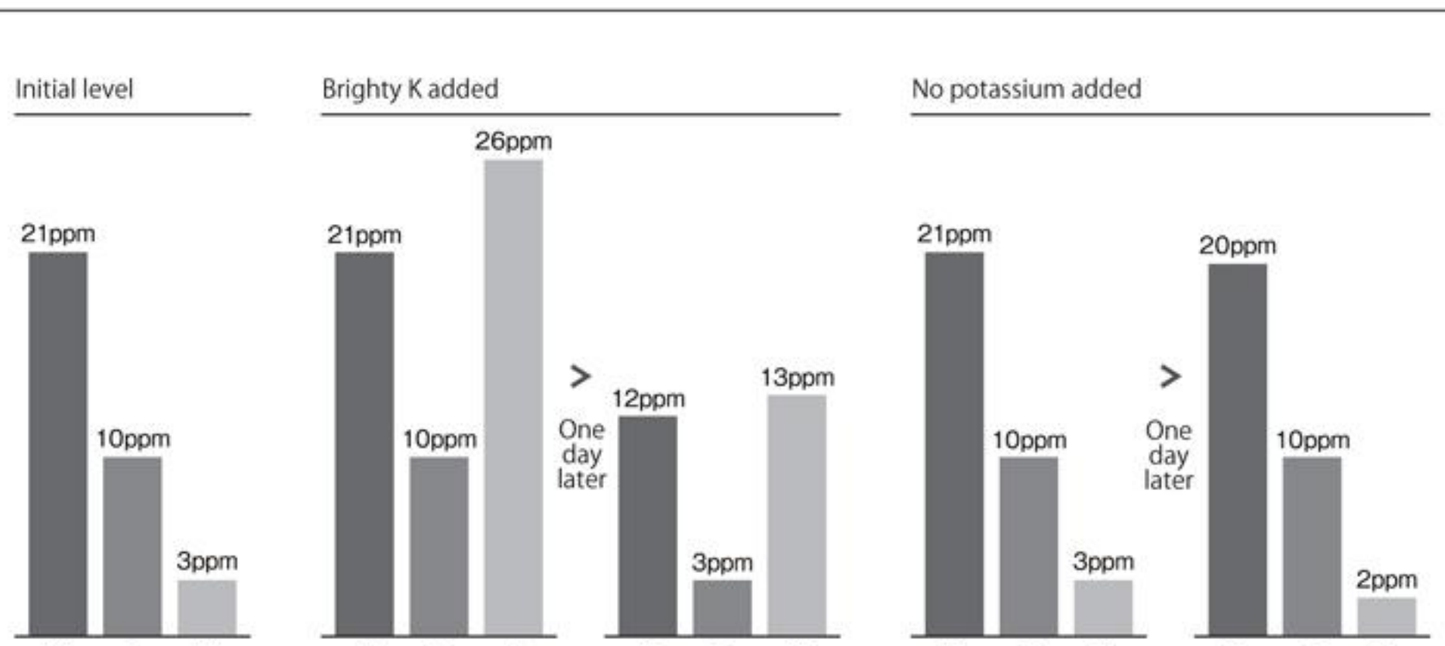
In any of these cases, the key point is to add the nutrients gradually while observing the condition of the aquarium because any excess of nitrogen and phosphorus may cause algae infestation. In particular, filamentous algae are very responsive to the amount of these elements. If heavy infestation of this species of algae is observed, it is advisable to change the tank water immediately and switch the fertilizer to Brighty K and Green Brighty STEP series.

Concept of the Law of the Minimum and Experiment with Brighty K Addition (Refer to graphs below)

Ordinary aquariums tend to have excessive levels of nitrogen (N) and phosphorus (P) and lack of potassium (K). Based on the concept of the Law of the Minimum, potassium is the limiting factor in this case. If the level of potassium is raised by addition of Brighty K, it can be observed that nitrogen and phosphorus will be absorbed together with potassium. If no potassium is added, neither are nitrogen and phosphorus absorbed.



The Law of the Minimum (or Law of Limiting Factors). In the above case, the shortage of potassium (K) limits plant growth.



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