Have you ever wondered what is in Koi food!

MARCH/APRIL '22 Vol. 13/No. 02

# THE FISHKEEPER

For the Aquarist: Freshwater & Marine

The website for the aquarist fishkeeper .co.za

## All the Craze!

Carinotetraodon travancoricus the Pea Puffer

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THE FISHKEEPER
For the Aquarist: Freshwater & Marine

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South Africa's only magazine for marine and freshwater aquarium hobbyists.

MARCH/APRIL

Vol 13 / No 2/ 2022

22

## features



## regulars

# Editorial

Over the last year I have watched from the outskirts as a specific small oddball fish has really tugged at the heart strings of many an aquarist in my community. With a cute name and a look that screams adorable the Pea puffer really has become a firm favourite with many a store not able to keep up with the demand. With such a meteoric rise in popularity, we asked Tim Smith to bring us the information everyone so desperately wants.

One of the most frequent questions I have observed on many fish keeping and in particular breeding platforms, is the question on what is the best food to feed Discus. Seen as the king of freshwater keeping by most, nutrition when it comes to Discus plays a massive role in their growth and well-being. Due to this we thought it's about time we feature something with regards to it.

These are two of my picks for this edition which is hard as there are so many quality articles on a variety of topics from Breeding Gramma, too aquarium plant maintenance, what is in koi food and so on.

I have no doubt that you will enjoy what lies within the pages that await you.

We would like to hear from you. Please contact us with any topics you would like to see within the magazine and we will do our best to provide them for you. Also do not be shy in sending us your aquatic questions, yours may get selected to feature within TheFishkeeper.

I hope you enjoy this issue! Happy reading, and happy fishkeeping!

The Editor

Our Ram breeding is going exceptionally well within the fishroom. Pictured here is a pair of our Blue knight rams with eggs.

## DEADLINES

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Cover Photo:
Pea Puffer

# About the Editor!

Matt Needham was born in Durban, South Africa in 1985. His passion for fish began at a very young age with picking up his first aquarium at the age of 10 as a Christmas present. Around the time he was 16 he had 20 tanks and had started working at his local petshop on weekends, where he was approached to run their fish section.

Once he had finished school he attended the University of Kwa-Zulu Natal where he acquired a degree in Environmental sciences life stream. During this period he had purchased approximately 100 tanks and had begun to breed freshwater Angelfish on a commercial scale, with around 20 pairs spawning. After University he moved to the UK for a couple of seasons to pursue his cricket career and unfortunately shut down his breeding operation where he bred well over 50 different species of fish with great success, with the majority of these being Cichlids. During this period he studied a Diploma in Ichthyology through the Institute of Animal Health Care in the UK.

On his arrival back into the country in 2010, he inquired about a potential position at uShaka

Above and Below: The Editor with two different species of *Loricariidae* found along tributaries of the Rio Negro river, Brazil.

SeaWorld under SAAMBR. He started working there as an intern in January 2011 of which he then received a full time position as an Aquarist in the aquarium from April that year, where he works with various species of marine fish, elasmobranchs, corals and other invertebrate species. During his time at SAAMBR he has been involved with numerous projects ranging from the reproduction of fish at the aquarium and helping ORI with coral work in Sodwana Bay. In 2017 he won an award at the Pan African Association for Zoos and Aquaria conferance for his presentation on the captive spawning of the coral *Acropora appressa* and linking it to the wild.

In 2013 Matt was invited along as a representative on an Amazon fisheries project called Project Piaba. The goal of the project was to help the local fisherman improve their methods of capturing wild caught specimens for the aquarium hobby. In doing this it kept them in a self sustainable industry instead of moving over to destructive practices such as forestry and mining.

Matt has well over 20 years of experience in the commercial trade and breeding of ornamental fish and has regularly contributed to The Fishkeeper over the years. He was approached mid way through 2019 with regards to taking over the production of The Fishkeeper.

Freshwater

# All the Craze!

## Carinotetraodon travancoricus, the Pea Puffer

**When these cute little balls become available at a store near you, you best be quick to snap them up. Pea puffer craze is here and we do not see it leaving anytime soon.**

By: Tim Smith

I've had great fun with the growing love for nano-sized aquaria in recent times. With it has come increasingly compact - but efficient - means of encasing functional aquarium systems into neat spaces. But perhaps the real prize has been the increasing availability of nano fishes, which previously have either rarely been available, or perhaps never received the praise that they rightly deserve.

Smack in the middle of the nano craze have been the pea puffers, *Carinotetraodon travancoricus*. These tenacious tidbits are a fraction of the size of most other commonly available pufferfishes, and skirt around the salinity issue of others by being entirely freshwater species. Another bonus is that you can easily keep them as a group, if you play by certain rules.

This article aims to be a quick guide to these personable critters and how to go about the most hassle-free experience of keeping them.

Pea puffers - also going by dwarf, pygmy or Malabar puffers - are proudly of Indian heritage and can be found in sluggish backwater habitats where they live as micropredators. These habitats are truly freshwater, usually well out of reach of any sort of tidal influence. Indeed, the parameters can be quite the polar opposite the marine water, being soft and rich in organics. In this environment, they prey upon the smallest organisms from crustaceans to insects, usually nestled within algal tufts or other plant growth.

With this knowledge in hand, it is best to try to reproduce the same environment within your aquarium, nano or otherwise.

The preference would be to keep these puffers in water close to that of their origins. However, the item of key importance is to keep parameters stable and the water clean. If you can get this right, and keep away from extremes, you're unlikely to face any particular issues regarding water parameters.

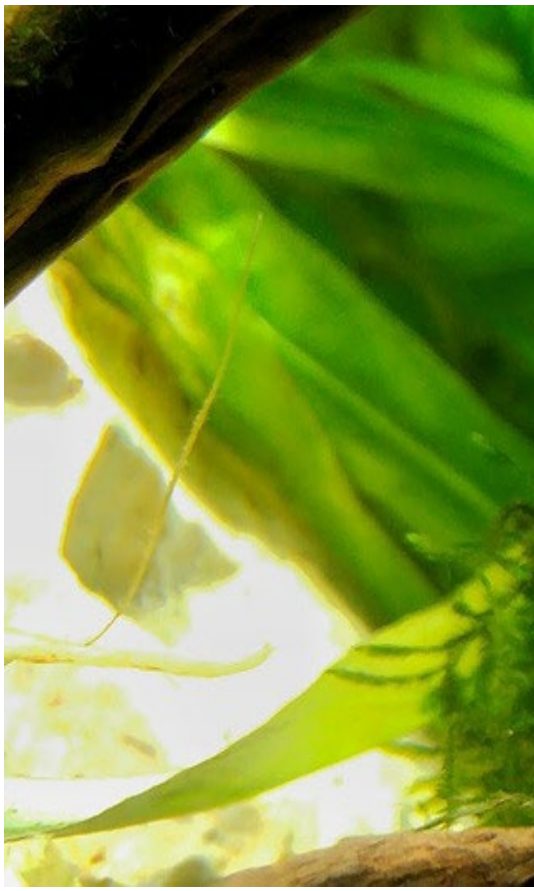
Being poor swimmers, try to avoid powerful flow. They can handle a tiny bit of water movement, but their hovering capabilities are best performed with minimal interference. I've run setups either with something as simple as a large sponge filter, or with a canister's spray bar directed as a trickle

across the water's surface. Both work equally well and ensure that there is still good oxygen exchange.

I only know of a few individuals who have gotten these puffers onto dry food, but in any case, I say don't fret over trying to convert them. Nutritious live and frozen foods will go a long way in maintaining the health and well-being of your puffers, and you won't have to spend worrisome hours over attempting to wean them.

Beak overgrowth isn't so much of an issue with pea puffers when compared to many other species. Owing to their natural diet of smaller, usually softer-bodied prey items, their beaks aren't subjected to the wear and tear that other puffers might experience. As such, their beak growth is slow, and regular offerings of snails (or other hard-bodied invertebrates) isn't so necessary as with other captive puffers.

That isn't to say that they won't eat snails - they certainly do! However, their methodology is remarkably different to that of the "crush and mush" of larger species. Pea puffers approach their snail targets with a hovering precision, buzzing around the snail until an appropriate striking angle is achieved. From there, they quickly grab the exposed soft part of the snail - either the head or the foot - and proceed to extract it from the shell. If you do feed your pea puffers snails, it won't be long until your aquarium is littered with perfectly intact, but empty, snail shells.



Other live and frozen food items

**“The young will need a steady supply of very small foods. It’ll help if you have small live food on hand already, preferably in the realm of vinegar eels and infusoria. It may be a little while before they’re big enough to take newly hatched brine shrimp,”**

are usually taken with some gusto. Bloodworms are taken readily but I'd advise that you don't allow this to be the bulk of their diet. Try an assortment of small invertebrate-based foods and keep things varied to ensure good health. It's worthwhile trying a few items out, since some puffers can be picky with what they prefer to eat. Artemia, mosquito larvae, and Daphnia are great places to start.

These puffers are more sociable than other pufferfishes, if only marginally, but the key difference is the scale you're working with. Due to their diminutive size, it is much easier to provide animals with "full" territories, even with incredibly limited space otherwise.

To further capitalize on limited real estate, be sure to provide a more complex environment, such as the inclusion of densely planted areas, wood and stone. These not only help to define territories, but also prevent individuals from seeing each other at all times. Breaking lines of sight in this manner can help prevent even aggressive individuals from harassing others excessively.
That said, always keep an eye on the dynamics of

**"Being poor swimmers, try to avoid powerful flow. They can handle a tiny bit of water movement, but their hovering capabilities are best performed with minimal interference."**

the group. Singled out individuals should be easy to spot, often keeping to a particular corner, rarely joining in on feeds, and sometimes with physical signs such as weight loss and nipped fins. These situations aren't always easy to resolve, but rearranging the décor around the tank might help "reset" territories and hierarchies, enabling the bullied individual to slot back into the social dynamic.

There isn't a hard-and-fast rule for how many puffers you can keep per litre, but as a rough guide

you'll need about 10 litres (2 to 3 gallons) per specimen, even if you provide the more complex environment as described above.

Mixing pea puffers with other species of fish is a tricky task, and in my view a little unnecessary since this species sufficiently acts as their own centrepiece. Other fishes that move too slowly, especially bottom-dwellers, are liable to be picked at by the inquisitive puffers and often with injurious results. Fishes that move too fast will almost always out-compete the puffers for food.

Pea puffers are also quite readily bred in the aquarium, and usually not intentionally. Mature males and females have a handful of differences to look for: in particular, look for a distinct line along the belly of the males, as well as some lines that run behind the eyes.

Although you might not see the eggs, the two things that tend to be more noticeable are the mating rituals, and then fry popping out of nowhere.

The young will need a steady supply of very small foods. It'll help if you have small live food on hand already, preferably in the realm of vinegar eels and infusoria. It may be a little while before they're big enough to take newly hatched brine shrimp, but once they are, offer it in plenty to ensure good growth.

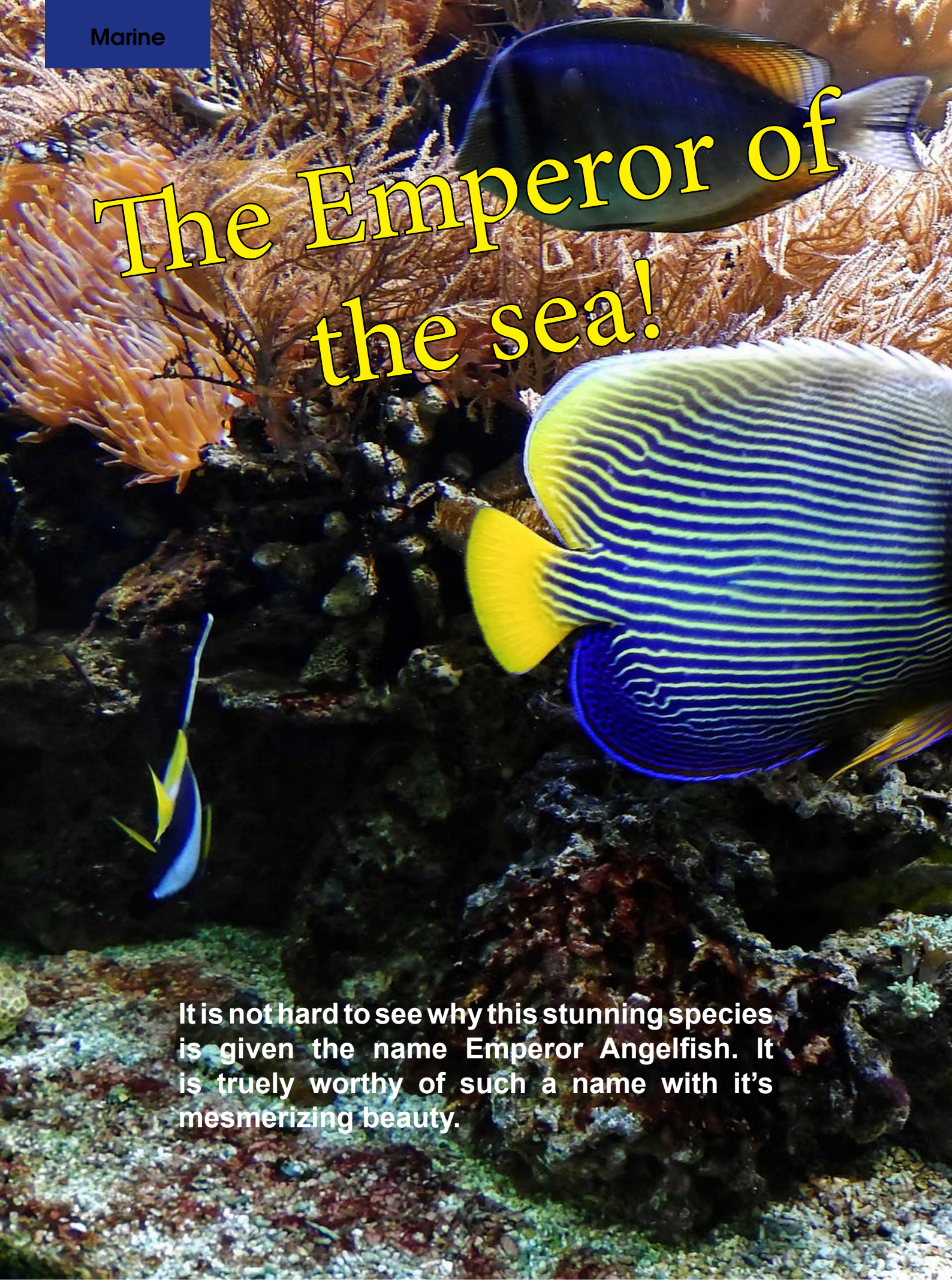
Since fry may pop up unexpectedly, having a mature tank littered with botanicals - such as leaves and twigs, with some good plant growth - will ensure that the baby puffers have a biologically rich environment to feed from.

For greater success at rearing, gently removing any eggs and fry you see - before the parents do - will ensure that you can directly feed the young and run no risk of losing fry to any adults. In this rearing environment, have a little current as possible, in order to allow the little puffers to swim (and hunt) effectively.

There are a number of other species of little puffers in the genus Carinotetraodon, although only a few seem to pop up with any sort of regularity. In practice, many of these species have very similar levels of care to what has already been outlined here, with some deviations in social structure, size, and to some degree, water parameters.

In all, pea puffers are a great introduction not only into the nano world of aquaria, but also to pufferfishes in general. Once you're taken in by their personality, I have no doubt you'll be considering another setup dedicated to other puffer species in the near future.

# The Emperor of the sea!



**It is not hard to see why this stunning species is given the name Emperor Angelfish. It is truely worthy of such a name with it's mesmerizing beauty.**

The coral reef is the usual habitat where you will find *Pomacanthus imperator*. The young fish, like the adults, usually live in areas which are rich in corals and other reef fauna. While the young fish appear more timid and never stray far from an easily reached refuge, the adults move calmly above the reef, often in pairs.

Emperor angels show a marked oddity when it comes to its colouration, which it shares with many other angelfish. The young fish are a dark blue colour and are covered with several concentric blue and white circles. Many angelfish share this similar colouration with their juveniles, although different species will have the dark blue background colouration but a different pattern when it comes to the light blue and white banding. As the adults are extremely territorial and aggressive fish, especially with their own species, this characteristic of juvenile colouration allows younger fish to escape the attentions of adults which may live on the same part of the reef.

**Scientific name:** *Pomacanthus imperator*

**Common name:** Emperor Angelfish

**Family:** Pomacanthidae

**Origin:** Indian and Pacific Oceans

**Natural Habitat:** Sheltered areas of coral reefs

**Size:** Up to 45cm

**Sexual Differences:** No external differences

**Behaviour:** Peaceful. Only fish of the same species are not accepted.

**pH:** 8.0 - 8.4

**Density:** 1.020 - 1.024

**Temperature:** Around 24ºC

**Life Expectancy:** 15 to 20 years

Left: An Emperor angel in juvenile colouration

## Life in the Aquarium

The aquarium which houses *Pomacanthus imperator* needs to have a volume of at least 600 litres. It is a better option to offer one an aquarium of 1000 litres. A peaceful species amongst others, it is best to house only one within the aquarium in order to prevent any aggression that would occur with another of this species. Other Pomacanthus species may be housed, should the aquarium be big enough. Invertebrates are rather left out when it comes to tank mates as the Emperor angel would relish them as a little feast. Provide some rocky décor, utilizing live rocks, whilst providing a broad swimming area.

## Feeding

In the wild, Emperor angels feed predominantly on sponges and other organisms which may be found on the rockwork of the reef. Due to this very specific dietary requirement, the acclimation of this fish may prove fairly difficult. It is always advised to rather acquire a young specimen as they are known to take to prepared and frozen aquarium foods far more readily than an adult specimen. Do not be afraid to ask to see the fish feeding before you purchase. This is highly advised due to the finicky nature of certain species of marine fish. The last thing you want is to take your newly acquired, prized specimen home, only to watch it slowly fade away over time through a reluctance to feed.

Live artemia is a wonderful choice as a first food for finicky species within the aquarium. The movement of the artemia generally results in a feeding response. Over time, frozen foods can be added amongst this with your fish eventually converting fully across.

After acclimation and your fish has started taking to frozen fare, the flesh of white fish, shrimps and open mussels will ad in providing your Emperor angel with a nice variety of food. A vegetable option in the form of blanched lettuce or spinach is recommended to aid with digestion as well as provide some essential vitamins.

## Reproduction

So far this is unknown within the aquarium. Breeding is known to take place in open water amongst pairs. The eggs and larvae will drift in the currents where they will eventually settle upon the reef upon metamorphosis. At present it is not known how to reproduce the conditions similar to those within the wild, all that is known is that they tend to spawn once a year.

Poma labs is doing some fantastic work when it comes to spawning Angelfish within captivity. Hopefully they will hit this species relatively soon.


Bring out the colors of plants.

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# To Maintain the Beautiful Impression of an Aquascape for a Long Time!

**By: Aqua Design Amano**

**Tank Data**
Aquarium:Cube Garden W90 x D45 x H45 (cm)

Lighting: Solar RGB, turned on for 10 hours per day

Filter: Super Jet Filter ES-600 (Bio Rio, NA Carbon)

Substrate: Aqua Soil Amazonia, Power Sand Advance M, Bacter 100, Clear Super, Tourmaline BC

CO2: Pollen Glass Large 30, 3 bubbles per second via CO2 Beetle Counter (using Tower)

Aeration: 14 hours after the light is turned off using Lily Pipe P-4

Additives: Brighty K, Green Brighty Iron

Water change: 1/3 once a week

Water quality: Temperature: 25ºC; pH: 6.8; TH: 20 mg/l

**Aquatic Plants**
*Rotala* sp. (Ceylon)
*Rotala rotundifolia*
*Ludwigia arcuata*
*Myriophyllum mattogrossense* (Green)
*Alternanthera reineckii*
*Hygrophila polysperma*
*Hydrocotyle* sp.
*Microsorum* sp. (Narrow Leaf)
*Bolbitis heudelotii*
*Anubias barteri* var. nana "Petit"
*Helanthium tenellum*
*Glossostigma elatinoides*
*Fontinalis antipyretica*
*Riccia fluitans*

**Fish**
*Prionobrama filigere*
*Hyphessobrycon haraldschultzi*
*Hyphessobrycon megalopterus*
*Caridina japonica*
*Otocinclus* sp.

## Background and Maintenance

**A stable composition framework is important for maintaining a beautiful aquascape for a long time**
Takashi Amano produced this layout during a workshop held in Nature Aquarium Gallery, and this photograph was taken approximately five months after the layout production. Although more than two years have passed since the production time, the layout is maintained in a beautiful condition without spoiling the original image. It is important to have a stable composition framework in order to maintain a beautiful aquascape for such a long time. An unstable driftwood arrangement makes a layout difficult to maintain and a composition may fall apart easily. This aquascape demonstrates well that a stable composition framework and regular maintenance enables a layout to be maintained for a long time even when it is produced with fast growing stem plants and Riccia. Let's examine closely how this aquascape is maintained.


**The appearance of the layout two years after the production**
Stem plants have grown into beautiful bushes in the background and the undergrowth plant *Glossostigma* is growing evenly. Periodic trimming is essential for maintaining a beautiful aquascape such as this one.

**Approximately one month after the previous pictures**
Approximately one month has passed since taking the previous photographs, and the volume of stem plants increased and some terminal buds are visible above the water surface. The Riccia that has been planted among Glossostigma has grown and is also noticeable. The time is ripe for trimming.

**[Before the start of trimming]**
The stem plants have reached the water surface and Riccia is also growing long. However, they cannot be cut off really short considering the opening day of Nature Aquarium Gallery. Therefore, they were trimmed lightly so that they are still worthy of viewing after the trimming.

**[Cutting Riccia]**
The parts of Riccia that were sticking out of Glossostigma were cut off by following the contour of the undergrowth plant using Pro Scissors Wave.

**[Cutting the terminal buds protruding above the water surface]**
Although stem plants are usually cut short simultaneously, only the terminal buds were cut off in this case.

**[Suctioning out Riccia fragments]**
The fragments of Riccia should be suctioned out thoroughly. 1/2 inch tubing is convenient for this task. Such fragments outcompete and cause Glossostigma to decline. This applies to Willow Moss as well.

**[Cutting off overgrown stem plants]**
Slightly overgrown stem plants were cut one at a time carefully. The stem plants were lightly trimmed so that they appear well-balanced and beautiful.

**[After trimming]**
The terminal buds of the stem plants that were protruding above the water surface are tidied up, and the open space in the center appears somewhat wider and more clearly defined. The thickness of the foreground plants is also trimmed down adequately.

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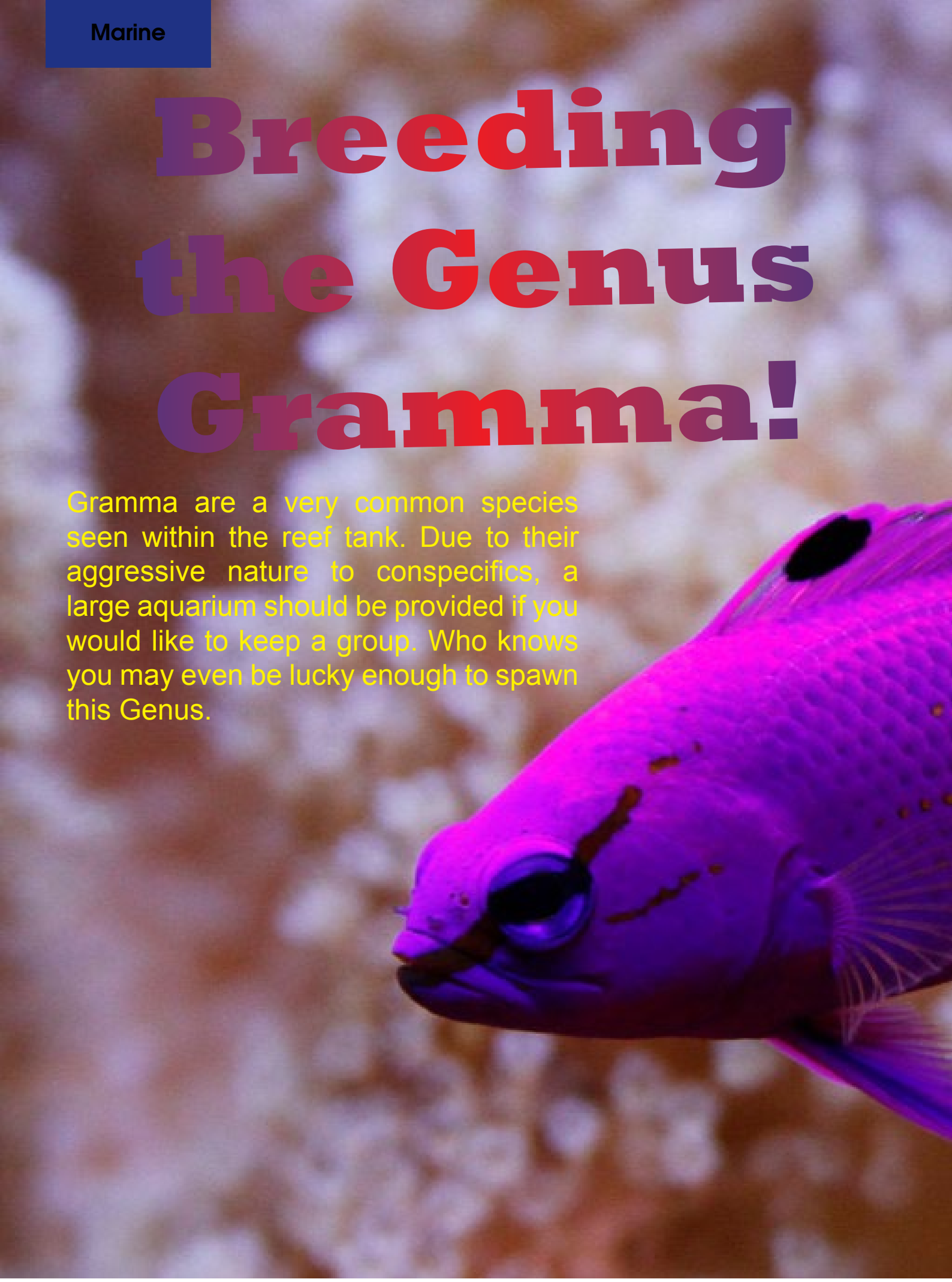
Prevent non-native species from spreading into the environment.

# Breeding the Genus Gramma!

Gramma are a very common species seen within the reef tank. Due to their aggressive nature to conspecifics, a large aquarium should be provided if you would like to keep a group. Who knows you may even be lucky enough to spawn this Genus.



There are only two members of the genus Gramma which are of interest to us in the hobby. These are *Gramma loreto* (The Royal gramma) and *Gramma melacara*

## Choosing a pair

*Gramma loreto* is without a doubt the most famous of the two species mentioned above. It is one of hobbyists' favourites when it comes to potential occupants of a reef aquarium. It is one spectacular specimen with an iridescent skin, small of stature and is generally fairly inexpensive with regards to marine fish. It is also fairly easy to acclimate and get onto food. *Gramma melacara* is a lot harder to find whilst fetching a much higher price. It is a vivid purple in colouration, being no less colourful than that of its cousin. Gramma unfortunately have the drawback of not tolerating each other within small aquariums. Due to this, selecting a pair can prove quite challenging.

Sexual dimorphism is not very noticeable between males and

females although the male tends to often be bigger than the female who is also more rounded in comparison. In order to achieve a pair, an aquarium of around 600 litres will suffice for a small group of which a pair will eventually separate out.

## The Breeding Aquarium

The volume of the breeding aquarium should be no less than around 150 litres. Gentle lighting should be supplied as these fish tend to prefer subdued lighting. Temperature should be within the range of 24°C with the water having a density of 1.024.

Filtration can be provided by a trickle type filter which can be attached to a decent sized protein skimmer. UV is always a good option for aquariums in which spawning is done. Gravel is not necessary and the absence of it will aid in the hygiene within the aquarium. The only décor supplied should consist of some live rock with a few cavities.

Since Gramma lay their eggs within caves, it is essential to provide them with enough options for them to choose from. Either rock, pvc piping blocked at one end or terracotta pots will provide the right medium for them to spawn in.

## Preparation for egg laying

Once a pair has established itself within the aquarium, they will choose a site in which to spawn from the many options that are provided to them. They will carefully clean the chosen site very carefully and remove any unwanted items such as algae and substrate. They tend to like to block the entrance to their cave using plant matter with caulerpa tending to be a favoured option. Once the entrance to the cave is partially blocked, the male coaxes the female within. The eggs are deposited on a carpet of algae

*Gramma melacara*

and immediately fertilized by the male. Several spawnings may occur over several days within the same nest. At the end the male takes sole responsibility for the eggs, frequently taking them within his mouth to aerate and change position.

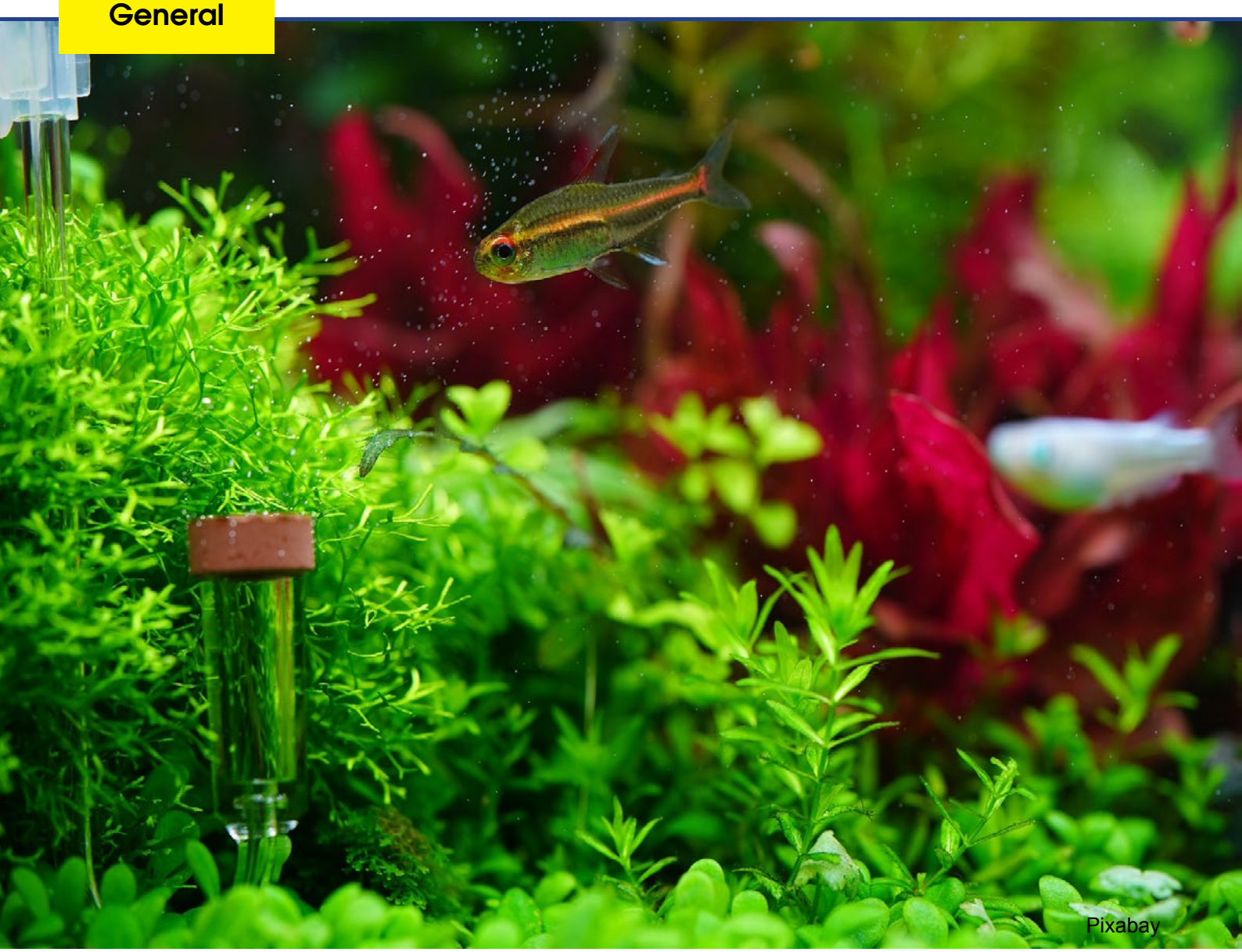
## Rearing the larvae

The eggs tend to hatch on the seventh day, one to two hours after the lights go out. The larvae are small and measure 3mm in size. With the fry being drawn to light, it is possible to use this tactic to coax them close to a siphon in order to be removed to a rearing aquarium. It is vital that they are provided with the same water chemistry as the breeding aquarium in order to prevent any shock which may kill them. The water should not be filtered whilst they are so small but rather an airstone should be used to break up in surface tension and provide oxygen turnover within the water.

When doing small water changes, it is best to conduct these using a small length of airline tubing with an airstone at the end. New water can be added via the same airline with a tap at the end in order to allow the change to be gradual.

Adding some unicelluar algae in the form of *Nannochloropsis* of *Isochrysis* species gives the rearing aquarium a nice green colour, which from experience not only provides food for the fry's first food source of Brachionus plicatilis rotifers, but aids them in finding their prey.

After less than ten days, the larvae can be weaned onto newly hatched brine shrimp nauplii until the point at which their metamorphosis occurs which takes place beween the 20th and 35th day. Once they have passed this point, they can then be offered more common dry food options of which they will thrive on.



Pixabay

# Aquatic Plant Maintenance

**Plant harmony within an aquarium is the result of a fine balance between form and colour. Regular maintenance prevents one or a number of competitive species from outcompeting less dominating plants, allowing such harmony to exist.**

With aquatic gardening, the minimum level of maintenance consists of removing all leaves or any parts of a plant that may be dying. This avoids needlessly drawing the rest of the plant for nutrients and prevents the decomposition process from producing undesirable pollutants, such as a buildup in nitrates. Snails, such as planorbis are valuable allies in this area, since they predominantly eat damaged leaves and help in their removal. Beyond this, maintenance work must be carried out to offer optimum conditions for growth, by making sure they benefit from sufficient light and growing space.

### Stemmed plants

Stemmed plants consist of species which require the most frequent attention as their growth is often very rapid. When they reach the surface of the water, they tend to grow outwards, forming a plant screen which blocks out light. In this instance, the solution is to shorten then stems. Cuttings can eventually be taken and anchor in the substrate via aerial roots which often develop from nodes along the length of the stem. If the lower parts are still robust, they can be left in place as most will branch out and form new growth from the node which is situated just under the cut. In some species the lower leaves deteriorate as the plant grows, which is not very aesthetically pleasing. In this case, it is best to uproot the stems and replant the tips which are bearing leaves, which should rapidly take route. It may be necessary to thin out a well-established clump by removing some of the stalks. If this is neglected in can result in straggly bushes caused by a lack of light reaching the lower ends as well as an alteration in the nutritional quality of the substrate.

### Rosette plants

Rosette plants incorporates a grouping of species where all their leaves emerge from the same point at the surface of the substrate. Those which self-propagate by forming runners which are developing stolons that root at intervals to give birth to a new plantlet, can rapidly become invasive. The large vallisneria are the most well-known at taking over, as are foreground-covering species such as

**“Some floating plants such as duckweed, very often develop against the aquarist’s wishes, from an unwanted addition through hitchhiking on other plants.”**

Above: *Elodea densa*

Below: Duckweed, a major bane of home aquarists

Botton right: *Echinodorus cordifolius*

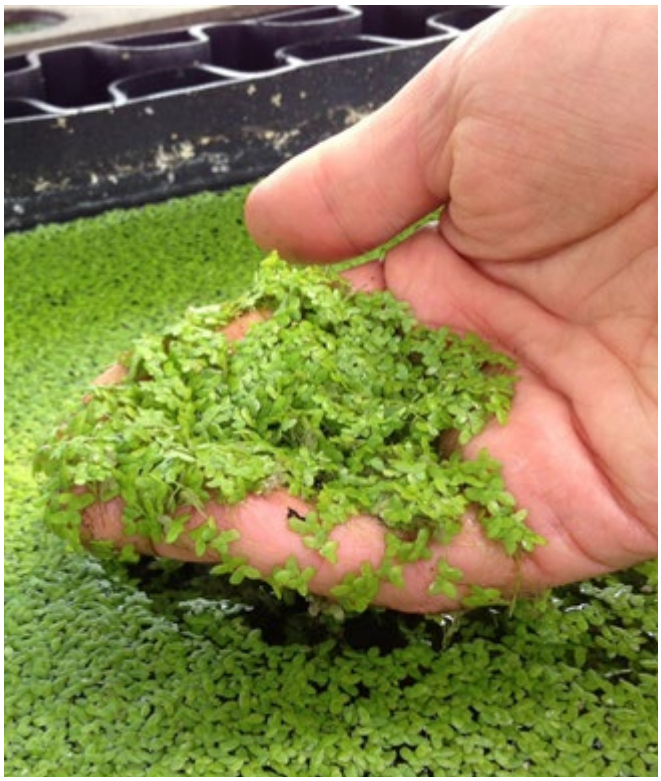
*Echinodorus tenellus*. To prevent them eventually covering the whole surface area of the aquarium, it is essential to pull out excess stems regularly. These can then be used within another aquarium or given away. In an open aquarium, the large *Echinodorus* sometimes form flower spikes, which develop additional shoots that can be picked out when they have roots. This sequence of events is often an opportunity to observe the evolution between surface and submerged foliage.

## Bulbous plants

The life cycle of some bulbous plants, such as certain *Aponogetons*, requires a rest period from November to February. If they cannot be transplanted into an aquarium with a temperature range of 10°C- 18°C depending on the species, the bulb must be stripped of its leaves and transferred into a container housing sand and gravel. This should be maintained at a slightly humid temperature and kept within a dark location for the period of two months. When the bulb germinates again, it can then be replanted.

## Floating plants

Some floating plants such as duckweed, very often develop against the aquarist's wishes, from an unwanted addition through hitchhiking on other plants. Their growth is extremely rapid and can easily result in blocking all light from entering the aquarium at the water's surface. Although their presence is sometimes useful to species that prefer the shade like *Cryptocorynes* or species of fish which may eat it, it is essential to control their growth by regularly removing them with a net.



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# Your Questions Answered!

Send your questions through to **editor@thefishkeeper.co.za** and we may pick yours to feature.

## Marine

**Q** In my marine aquarium I have noticed pinkish worms with tufts of white crawling around on the glass and rocks. They are particularly noticeable after the lights are turned off. What are these creatures? They look like something out of a sci-fi movie. They appear to be multiplying at a rapid rate with the aquarium crawling with them in comparison to a few months ago.

**A** The creatures you describe are infact bristle worms, a very common nuisance within marine aquaria. The white tufts you mention are spines of silica which can irritate the skin on contact. Bristle worms usually enter the aquarium as hitchhikers on items such as live rock. They are known to browse on live coral and other invertebrates, causing these to die off slowly. High levels of leftover food will also be fed on and results in the numbers growing quite quickly.

Although we may think the fish would eat these worms, the opposite is quite often the case. When the fish pick at them, the worms cling to their mouths with the fish not being able to shake them off. The worms then proceed to make a meal of the fish's mouth.

Bristle worms can grow to a really big size and it is best to try eradicate them sooner rather than later. The only safe and easiest way to eliminate them is through the use of a small trap, with this trap containing bait in the form of food. The trap can then be removed every morning and the contents emptied out due to these worms being nocturnal in nature.

## General

**Q** I have seen a few wild caught species within my local shop being offered for sale. is'nt it irresponsible to keep wild caught species, due to their collection impacting native fish populations?

**A** These days, somewhere between 90 and 95% of all freshwater species that are for sale come from farmed fish. Places such as Sri Lanka, Singapore, Malaysia, Indonesia, Hong Kong and so forth, breed millions of exotic species each year with an ever increasing number of species being added as we learn how to spawn them. The majority of these end up in the Europe, USA and Japanese markets.
A large portion of wild caught freshwater species come from the Amazon basin. These are caught in the dry season, when the river depth drops significantly, with alot of fish being cut off from the main river systems, ending up in pools which eventually dry up. Fish are harvested from these pools and these are used for the trade. A large portion of species enter the trade through this manner but a fair portion are still caught in the main systems. Research has shown this method to be very sustainable and keeps the native South American indians out of practices that are far more harmful to the environment such as logging, mining and farming.
When it comes to marine fish, a small portion of species have been bred successfully in captivity, with a smaller number in quantities large enough for the trade. The majority of marine fish entering the trade are still wild caught, although this is changing over time.

## Freshwater

**Q** I have just bought six small pencilfish from my local pet store. Are they easy to breed and what sort of conditions would I require for success.

**A** You have done the right thing in purchasing a small school of six individuals as this gives you a good chance of getting at least one pair out. The males are slimmer in appearance with reddish fins and sometimes shows a red tint to his body with the female being deeper bodied with clear fins.
In order to breed these fish, you will require a temperature of 23-26°C and an aquarium of 60cm in length. Deep and width are not of much concern as it is the length of swimming space which is important. They will require soft, slightly acidic water, dim lighting and a spawning material of sorts. Spawning mops are of great use with these fish. It is vital to condition your fish first before breeding which is best done in the original aquarium with a wide range of dry and frozen foods.
A pair can then be selected from the group and added to the breeding aquarium. Select the brightest male and the largest female. Eggs will be laid within the spawning mop and some may fall to the bottom of the aquarium. It is best to remove the pair as soon as they look like they are finished spawning in order to prevent them eating their own eggs making the whole procedure fruitless.
Raising the fry can prove difficult to the immature aquarist as they are very small when they become free swimming and do not go straight onto baby brine shrimp. A smaller food item such as infusoria would need to be offered for at least the first week. You may then start offering them baby brine shrimp in small quantities. Once they are onto brine shrimp, you have passed the most difficult stage. Keep up with regular water changes and after a few months they should reach adult size.

# A Quick Intro into Feeding Discus!

Keeping Discus must be every aquarist's secret dream. According to myth, this legend of a species is only suited for the most advanced of aquarists due to their special requirements. Although they do require more care and maintenance than the bread-and-butter species of the trade, the Discus' reputation as an extremely difficult species has faded in recent times. In order to get the best out of this Genus of fish, diet plays a key role with regards to their health. No shortcuts should be taking, with only the best foods being offered to a fish worthy of them

**Multiple demands**

To keep Discus, you will need to provide an environment with the correct water chemistry, although this is not the only crucial factor. Food also plays a huge part. Its quality will determine not only the longevity of the fish but will help with parasite prevention as well as spawning ability. Variety of food is key in keeping healthy individuals. Discus will take a variety of food options from quality flake and pellet foods, to frozen fare which can be bought or made. Variety will offer them not only the protein they require but also a variety of vitamins and minerals of which they need. Various food options will also aid in bringing out the colours of your Discus with foods rich in beta carotene such as brine shrimp strengthening your fishes colours, especially reds. Live feeds are used by many to help bring their fish into spawning condition. It is of great importance to know where these live foods come from as certain live feeds have been linked with bringing certain pathogens.

**Quality and Quantity**

The teeth, mouth and gut system of the Discus, indicate that they are primarily a carnivore in the wild, preying upon items such as insects, larvae of various animal types, small shellfish and even the fry of other species. Many Discus breeders prefer to produce their own home-made food, with some guarding their recipe as if it was Gold. Whatever your choice of ingredients may be, it

**"Discus were first introduced to the hobby in 1933, when they were imported into New York. Although they did occasionally breed, the fry generally died soon after becoming free swimming."**

is essential not to compromise when it comes to the quality of the ingredients and the quantity given. The most commonly used mixture over time has been based upon raw beef heart as the main ingredient with a variety of other items being added such as garlic, spirulina, various vitamins and so forth.

**Cooking and storing**

Whatever the recipe, it is always better to cook a larger amount in one go which can then be split, rather than preparing small portions each day. Prepping each day is a time-consuming exercise with cooking larger amounts not only saving you on the amount of time you spend on making this food, but you will have a higher chance of incorporating fresh ingredients. The various ingredients need to be carefully mixed or blended with the resulting paste breaking up quite easily which can be bonded using a small amount of gelatine. Mix the gelatine with boiling water before adding to

Above: Home made Discus food.

Left: A Discus showing signs of malnutrition due to the wrong diet and conditions.

Right: The fry feeding off the bodily mucous secretion of one of the parents.

the paste and mixing it in evenly. The resulting mixture can then be packed into zip lock bags, flattened out and placed within the freezer or into an ice block tray with the size dependent on how much you will generally need per feed.

**Feeding and raising fry**

It is essential to defrost the food before adding it to the aquarium. Adults who are required to breed can be fed two to three times per day, with a general consensus of about 3% of their body weight per feeding. Juveniles on the other hand will require feeds of up to five times per day for good strong growth. Young Discus are known to put on 0.7g for every 1g of food that has 40% protein within. If they are not fed properly then they may become stunted as a result. Due to most foods being high in protein, watch out for overfeeding. Discus are generally less hardy when it comes to the quality of the water within their aquarium. Many breeders tackle this feeding issue by doing very large daily water changes.

Discus were first introduced to the hobby in 1933, when they were imported into New York. Although they did occasionally breed, the fry generally died soon after becoming free swimming. It wasn't until the mid 1950's that English aquarists were able to raise the fry successfully. It was discovered that the newly hatched fry, required to feed on the bodily secretion that is emitted by their parents. It has since been shown that this mucous is controlled by a hormone similar to that which controls lactation in mammals. The fry feed on the mucous for a few days and can then be offered small quantities of brine shrimp nauplii until at the age of 12 days, they can feed independently.

# Have you ever wondered what is in Koi food?

By: Angela Beckx
(Koi@jungle)

Koi love to eat and they love their food, so what is in their food that makes them love it so much?

There are many different elements such as proteins, fats, carbohydrates, vitamins, and minerals, which are essential for koi to maintain a healthy body shape, grow well and reproduce. The body shape of a koi is the most important feature that judges, and breeders look at. Koi nutrition is very important for your koi to develop a good body shape and if you underfeed your koi, you can destroy their shape. If this happens you may not be able to correct the damage that underfeeding has done. Look at your koi and make sure they have a nice cigar or torpedo shaped body. If they do not, increase their feeding immediately as you may be unintentionally starving them. If you find you are too busy to feed them at least once a day, it may be an idea to buy a koi feeder that can feed them small amounts but often. It must be your priority to provide a well-balanced diet that will build up the muscle, but not the fat in the koi, and enhance their colours. How big your koi will grow, depends on the quality of koi food, genetic background, and the water temperature of your pond.

**Proteins**

Thirteen essential amino acids should be included in your Koi's diet. Koi need essential and non-essential amino acids to allow them to grow, repair damaged tissue and produce either eggs or sperm. If you feed a food with inadequate protein your koi will grow more slowly and can eventually get deformation of the spine.

**Fats**

Fats provide a source of energy to your koi. An interesting fact is that koi can make most of the fatty acids they need with the exceptions of linoleic and linolenic acids, which are essential and must be provided in the food. Linolenic acids are important as they are needed for growth. If you are not giving your koi the essential fatty acids, symptoms of fin erosion, heart and liver problems may occur. Fatty acids are found in fish, soya, corn oils and wheatgerm.

**Carbohydrates**

These give koi energy, however too many carbohydrates are not good for koi. If too many carbohydrates are given it can cause degeneration of the liver or an excessive storage of glycogen, which can lead to heart failure.

**Minerals**

These help the basic metabolic functions as well as build skeletal structures, nerves and maintain

the efficiency of gaseous exchange in the blood system. Minerals are found in fish food in the form of ash.

## Vitamins

These are essential for the normal metabolism and growth of koi. If your koi are spawning giving them more vitamins is beneficial to them. Koi only need small amounts of vitamins in their diet and all good koi foods will have the required number of vitamins.

The type of food you feed your koi and the quantity will vary according to their size and how many koi you have in your pond. Feed them enough food so that after five to ten minutes it has all been eaten, if there is left over food then you are over feeding them.

Koi also love to be spoilt with treats. Silkworm selects made by Hikari in Japan is a very popular treat for Koi fish available at Koi stores. It has natural lipids and proteins that offer koi the building blocks they require for superior growth. It is a treat food and you only feed a small amount to your koi every other day or when you wish to spoil them. Meal worms are also a fun snack to feed your fish and they absolutely love them. The protein levels in this treat are great for them and the worms are available in multiple sizes. Fruit and vegetables are also fun to feed, however like children getting koi to enjoy their fruits and vegetables can be a challenge for some. How to feed them watermelon is to cut it into wagon wheel shapes and pull out the center and then float the watermelon in the pond and pour some koi pellets in the center of the wagon wheel shaped watermelon. That way you outsmart the Koi, and they go to eat the koi pellets and then taste the melon and realize how delicious it is. They do enjoy eating lettuce and it is fun for them to pull the lettuce apart and munch on it. Koi food pellets do have all the nutrients you need for your koi fish, so the treats are just that treats and something fun for you and your koi to try.

Above & Below: Koi food can look vastly different depending on the brand. Generally all foods are made with the same basic ingredients with the odd addition of vitamans such as vitaman C and so forth. Before purchasing it is advisable that you read the contents of the food to see whether it meets your personal requirements.

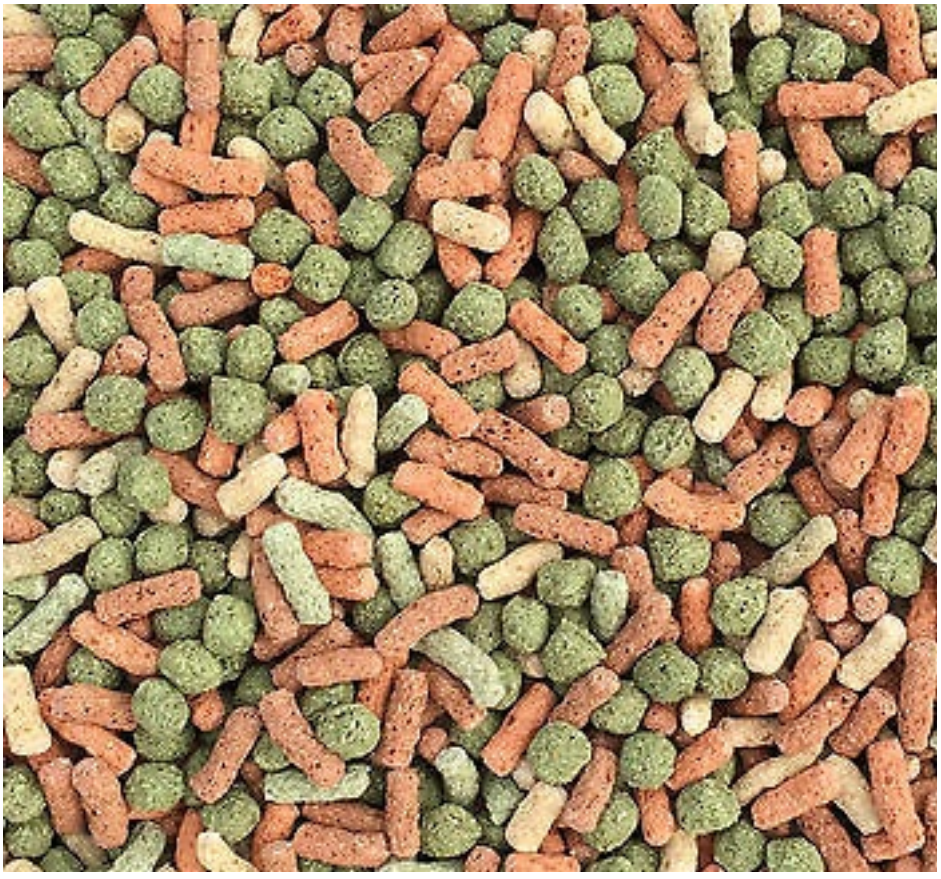


Photo: An aquascape using Aqua Soil–Amazonia Ver.2
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