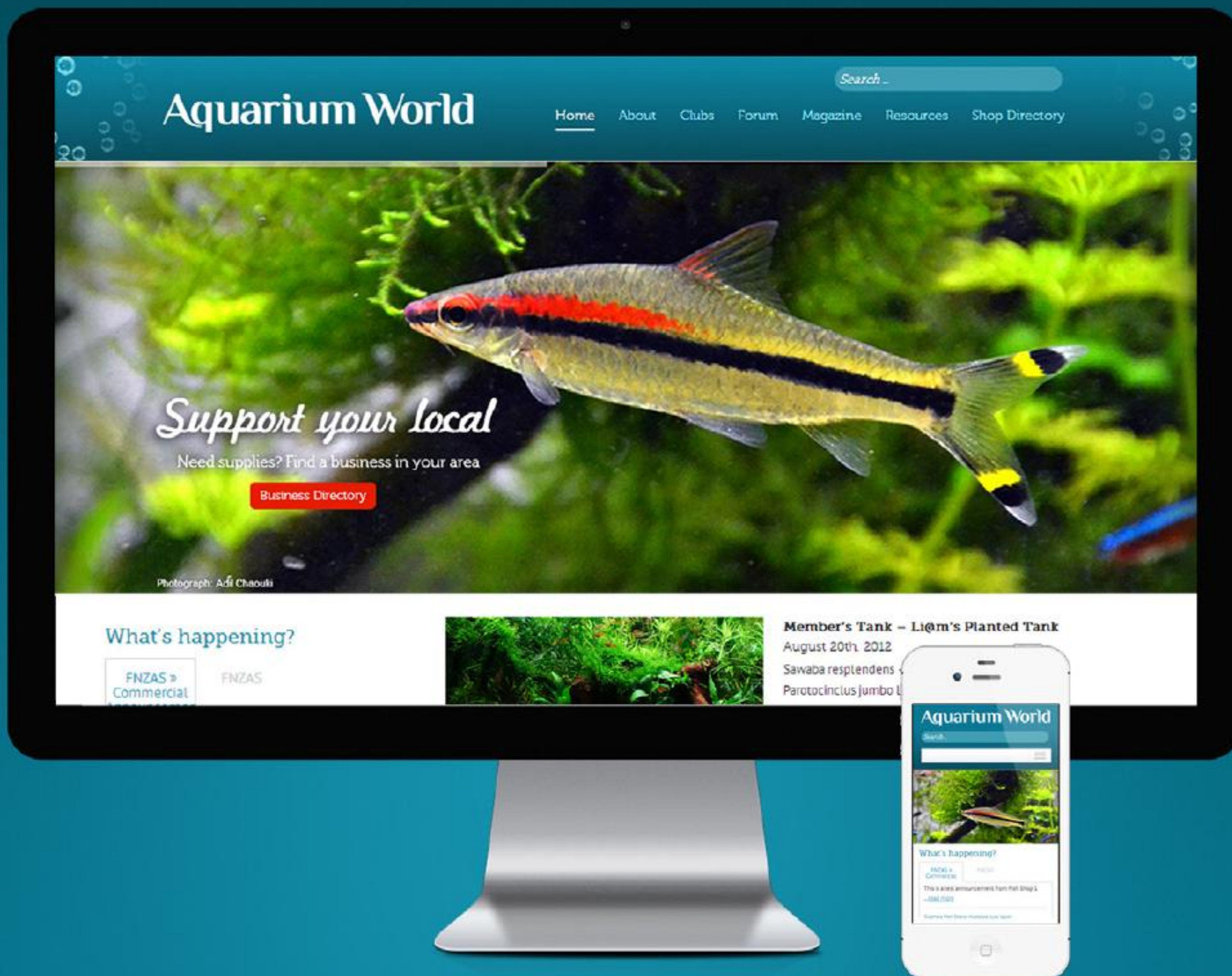


Aquarium World

magazine

Volume 60 Issue 2 November 2013





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magazine

Volume 60 Issue 2 November 2013

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Photo: Stella McQueen



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A new feature de-mystifying the fish list.

Our local businesses ride a fine line. Ensuring compliance with biosecurity legislation and bearing the risks of transporting livestock overseas means that importers frequently take big losses. Similarly, our local shops must risk their bottom line by ordering stock from the wholesalers when they have no guarantee that the customer is willing to buy. If customers don't buy, the shop will take a loss. If shops stop ordering from the wholesaler, the wholesaler will take a loss. If wholesalers stop ordering from importers, the importers can't sustain their business. If just one of our handful of importers stopped importing, we would all take a loss in terms of the quality and diversity of species that we currently enjoy.

Buying rare or unusual fish from your local fish shop is not only supporting the local business, but it is also supporting the industry that takes a lot of risks to import livestock into the country. To help you choose some unusual species to keep, we are introducing a regular feature in this issue called Interesting Imports where we look at the most recent fish being imported and we pick out some that we think are noteworthy. Your local shop may be too small to afford to stock species that they aren't certain will sell, but if you know something is on the list, most shops would be more than happy to allow you to pre-order it from them. If you've ordered something new and unusual recently, let us know how you like it and we'll publish your comments in an upcoming issue.

In the meantime, we hope this holiday edition finds you enjoying some of the relaxation of the season and that you have a safe and happy new year.

We hope you enjoy this issue.

A handwritten signature in black ink, reading "Jennifer Hamlin".

Jennifer Hamlin
FNZAS Editor & President

Paracheiroidon simulans
Photo: Robert Beke



Liam Winterton



Liam is a first year university student studying Landscape Architecture. He caught the aquarium bug about four years ago and has since delved into Aquatic plants and has taken a keen interest in aquascaping.

James Cooper



James started keeping fish early in life and had his own tank at five. At age seven he became fascinated with NZ Native fish when he 'discovered' a population in his local creek. James has worked as a commercial tropical fish farmer, then in commercial aquaculture in Australia, before returning to tropical fish retail. He is currently studying to pursue his passion for NZ Native Fish and Reptiles with a Bachelor in Environmental Management.

Adrienne Dodge



Adrienne has been in the hobby for 32 years. She has bred betta splendens and currently has a high tech planted rainbow tank. She recently spent seven months working for a specialist fish shop which she says has increased her knowledge and has given her valuable insight into the wholesale/retail industry and the challenges faced. Adrienne is the FNZAS Secretary and MAC member.

Robert Beke



Robert was born in Serbia and moved to New Zealand where he worked in the pet industry. Although his background is in chemistry he has been working as a professional fishkeeper since 1996. He currently has one tropical fish tank at home. His interests include ichthyology and particularly fish macro photography.

Darren Stevens



Darren is a marine biologist who has worked for NIWA for about 20 years. He regularly participates in sea trips for research surveys having been around much of New Zealand as well as Oman, and the Ross Sea, Antarctica. In his spare time he enjoys fishing, and is a particularly passionate pleco keeper. Darren has been an active participant in his local clubs and he is also vice president of the FNZAS.

Sam Hendrikse



Sam began fishkeeping when he was fourteen years old and currently has five tropical freshwater tanks. His interests lie in aquascaping and aquatic plants. Sam is studying towards a Bachelor of Landscape Architecture and is AFA treasurer.

Jamie Blanch



Jamie is a 25 year old student who has kept fish on and off for as long as he can remember. He has mainly had planted aquariums with community fish and has just set up his first marine tank which has proven to be quite challenging and expensive. He is also about to set up his largest tank to date which will be 800 litres and will house some large predatory fish like Jack Dempsey and Green Terrors.

Mark Patterson



Mark began fish keeping when he was a child, keeping live bearers and siamese fighters. After leaving school he worked for circus and zoo parks in NZ and overseas. For the last 28 years he has kept many species of aquatic life but NZ local marine is his keenest interest. Mark loves to share this passion and knowledge with fellow hobbyists and is currently running the marine systems at his local university.

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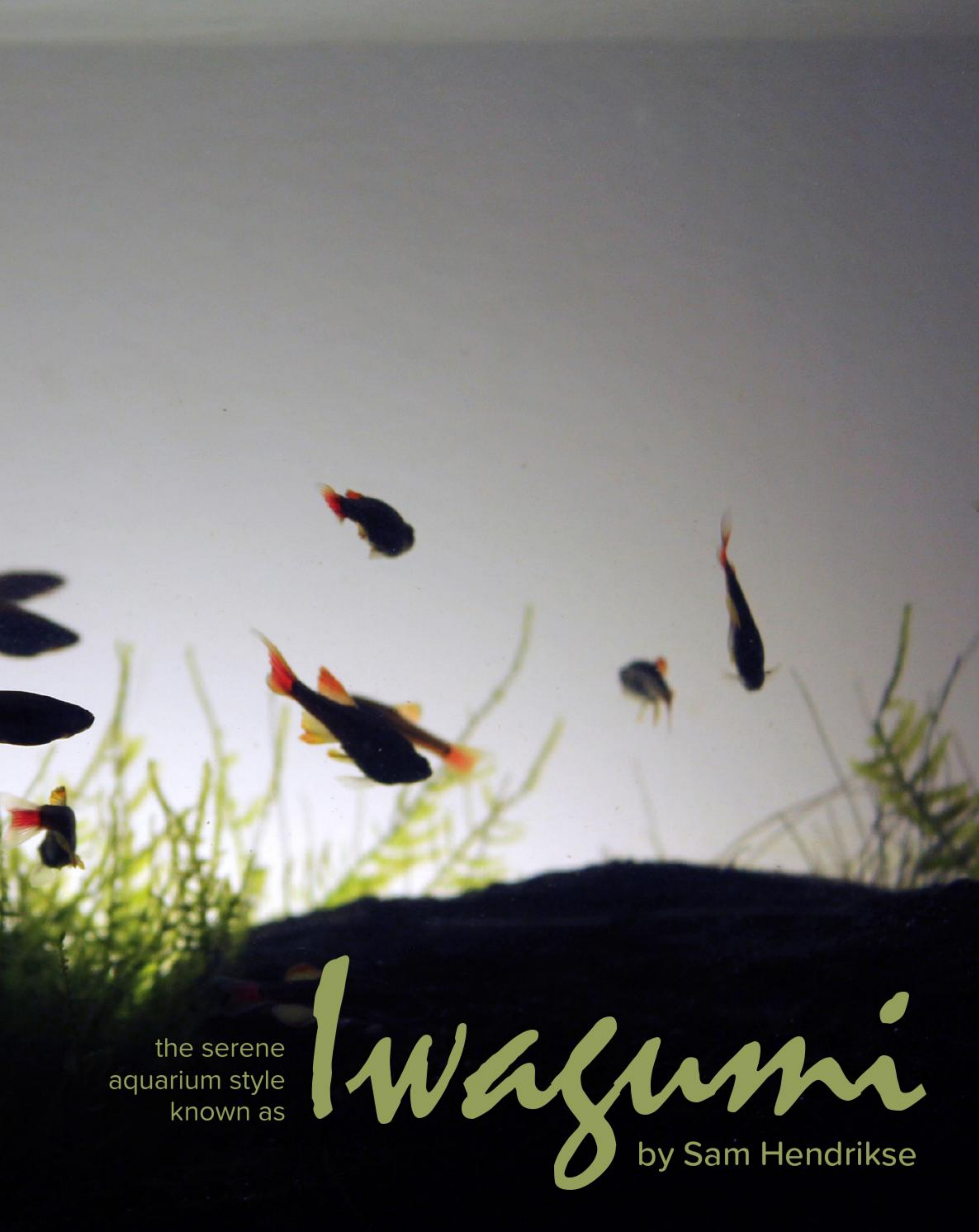
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BACK ISSUES Caryl Simpson caryl@simtronics.co.nz

AQUASCAPING





the serene
aquarium style
known as

Iwagumi

by Sam Hendrikse





The Iwagumi style of aquascaping has taken the fancy of many aquarists worldwide and, when executed correctly, are arguably the most serene aquarium layouts we have today. And although the Iwagumi layout was first showcased by world famous aquascaper Takashi Amano in the early 90s the concept of arranging rocks in the context of a garden has been around in Japan for well over a thousand years. To understand this delicate and intricate art form, we must first understand the principles, concepts and purpose of arranging rocks within the aquarium.

Every rock in an Iwagumi aquascape has purpose. From the main feature stone right down to the tiny sacrificial stones, each rock is placed in the 'scape for a reason. The main rock, Oyaishi, is always the largest, most interesting rock in the layout and is the first rock to be placed. In accordance with the golden rule, this rock should be placed off centre, roughly 1/3 of the way across the layout. Alternatively, the rock might emphasize negative space, in which case the negative space should exist around 1/3 of the way across the aquarium.



The second rock to be placed is the Fukuishi and it's role in the 'scape is to provide tension and balance for the Oyaishi. The Fukuishi must not be larger or more interesting than the Oyaishi, a rock around 2/3 of the size is suitable. The Soeishi are the next rocks to be placed and serve the purpose of accentuating or reducing the strength of the main rocks. Finally, the Suteishi or sacrificial stone is placed in the layout. This stone is an optional stone that becomes partially or fully hidden as the plants in the aquascape develop and serves the sole purpose of adding subtle detail and complexity to the layout.

Now that the different stones have been identified, it's time to collect rocks for your Iwagumi layout. Inert rocks may be collected from a local stream, river or beach so long as they're inert, of the correct size for the layout, are all the same type of rock and have plenty of character. The character of the rocks is very important in the Iwagumi layout, as rocks are the primary focal point in the layout. Try to select a main rock with interesting texture, colour and shape but make sure any supporting rocks are both smaller and less



impressive than the main rock. When collecting or purchasing rocks, it's important to buy a few more rocks than you think you'll need, this gives you options for changing the layout in future or quickly swapping out a rock that doesn't quite work in the 'scape. Substrate selection for your Iwagumi aquascape will depend on the layout style you're trying to achieve. Generally a fine grit (1-3mm) with additional fertilizer will suffice but any substrate that will be exposed when the plants grow in will need to compliment the selected rocks. A popular method is to use a different substrate such as white sand where the sand is to be intentionally exposed to draw attention to the unplanted area. Care must be taken when using this method as choosing unnaturally coloured sand or drawing focus away from the rocks are common mistakes made. Lay down a layer of substrate no more than 5cm thick sloping from front up to the back of your aquarium and place rocks in the order above. Once you are satisfied with your rock placement, add more substrate around the rocks as needed to make the rocks look natural in the layout.

Now that your layout is pleasing to the eye, it's time to add the final element in your Iwagumi layout, the livestock. Unlike a community aquarium where fish and plants selected are those which the aquarist favours most, the Iwagumi layout demands very specific livestock. Any plants selected must not bolster the strength of the rockwork so very short carpeting plants and grasses, such as glosso and hairgrass, are most commonly used in Iwagumi layouts. These plants generally grow slower and absorb less nutrients from the water than the stem plants found typical planted aquariums, often resulting in algae if too much light is applied. Although light is important to keep the plants growing close to the substrate, gradually lowering the lights as the plants become established or temporarily introducing fast growing floating plants for the first couple of months after setup can be effective in combating dreaded algae issues. Any fauna used in an Iwagumi aquascape must be treated in the same way as flora. Introducing large, colourful fish such as discus would detract from the rock layout so small, subtle fish or shrimp are best. A shoal of emerald eye rasboras or neon tetras would be an excellent choice for almost any Iwagumi layout due to their confidence in open water, small size and schooling habits.



Tank dimensions & materials: 600x300x300mm 6mm glass

Substrate: Coffee grit gravel

Hardscape: Volcanic rock

Water Parameters: pH 6.0, 18 degC

Lighting: Philips 20W 6500k/Cool daylight CFL

Filtration: Eheim 2213

Fauna: 20 Longfin White Cloud Mountain minnow *Tanichthys albonubes*

Feeding: Tetramin Tropical flakes once daily

Flora: Dwarf Hairgrass *Elocharis acicularis* and Christmas Moss *Vesicularia montagnei*

Fertilising regime: Does CO2 count? If so, sodastream CO2 via inline diffuser

Maintenance: 50% weekly water changes

Hydrocotyle sibthorpioides

Profile and photos by
Liam Winterton

Hydrocotyle sibthorpioides is a very demanding plant and requires intense lighting and heavy CO2 supplementation when grown submersed. Growth will start off slowly and then take off rapidly, it will require fairly regular trimming in order to keep it from taking over. This plant is not recommended for low light setups.

Common name: *Hydrocotyle sibthorpioides*

Origin: South Eastern Asia

Temperature: 20-28 degC

pH range: 5.0 - 7.0

Hardness: 2 - 14

Light: High/Very High

Height: 5 - 10cm+ (Depends on light intensity)

Difficulty: Submerged - Hard

Emersed- Easy/Medium

Propagation: Via cuttings

Status: Allowed



Epalzeorhynchus bicolor



Epalzeorhynchus bicolor (Redtail Black Shark or Redtail Shark)

Classification Order: Cypriniformes

Family: Cyprinidae

Distribution: This Cyprinidae originates from the streams and waterways of Thailand and in 1931 was often found in Bueng Boraphet and the streams from it, being located as far South as Bangkok. From 1996 – 2011 it was believed to be extinct in the wild. As of 2011 it is only found in a single location in the Chao Praya basin and has Critically Endangered status. The aquarium trade is not believed to be responsible for this decline as this fish should have been able to withstand heavy harvesting, since it has a minimum population doubling time within 15 months. It is more likely that the draining of swamps during the 1970s, and the building of many dams, is to blame. These days the aquarium trade is supplied entirely by captive bred individuals.

Habitat: The Epalzeorhynchus bicolor has been recorded in clear and muddy waters in permanent rivers and floodplains, and in lowland streams with rocky or sand gravel bottoms. It is a bottom living species but very little is known about its wild habits and habitat due to it not being found in the wild for so long. It is thought that in the wild the Redtail shark is a solitary fish which comes into contact with its own kind only during the spawning season.

Maximum Length: 150 mm.

Life Span: A Redtail Shark may live to be 15 years old.

Aquarium Size: The smallest size aquarium that should be considered is one that is 90cm in length. The Redtail shark will do better in a tank that is a minimum 120cmL x 45cmD. A lid covering the entire aquarium is required, as this shark will jump.

Maintenance: The Epalzeorhynchus bicolor will do best in a tank well decorated with plenty of plants, driftwood, rocks and caves. This will allow it to establish territorial

Epalzeorhynchus bicolor

markers and also provide a place to hide. This fish will thrive in a tank with smooth substrate and a few larger stones to encourage algae to grow. Strong water current is also important as is leaving a clear area in the centre of the tank for swimming activity.

Water Conditions: Temperature: 22-26 degC

pH: 6.5 - 7.5

Hardness: 10 – 15 kH

Nitrates: The Redtail shark is sensitive to nitrates so it is important to keep the tank clean.

Diet: Diet: The Redtail shark belongs to the family of algae eaters. As such, its diet should consist of much vegetative matter. Juveniles who lack plant material in their diets are often stunted in growth and poorly coloured. Zucchini, spinach, lettuce and algae should all be a staple part of the Redtail's diet. Live or frozen bloodworms, earthworms, fruit flies, daphnia and brine shrimp should all be offered. Combining the live foods and vegetable matter with dry foods such as quality flakes and granules will help to bring out its best colours. However, since it is a bottom feeder with an under-turned mouth, pellets are easier to eat than

Behaviour and Compatibility: The Redtail shark is great for a semi aggressive aquarium. Due to aggression issues with fish of the same species keeping a single specimen only in each tank is recommended. The Redtail shark should be kept with fish of similar size and temperament as they may become more aggressive as they age. Individual temperaments of this fish vary greatly and while they may chase other species they will rarely bite or harm them. While it is not recommended to keep this shark with other bottom dwellers they generally do not harass loaches and may even school with them. It is advisable to make the Redtail shark the final addition to the tank to reduce the chances of it claiming the whole tank as its territory.

Reproduction: This species is exceptionally difficult to sex. Males have pointed dorsal fins, whereas the dorsal fins of the females end at right angles. Females are usually larger than the males. The female has a full wide stomach and is less brightly coloured than the slimmer, more streamlined male. Not much is known about Redtail shark breeding habits and it is extremely rare to have them breed in the home aquarium, partly due to the intolerance they show for conspecifics. Most specimens purchased from the local stores are bred in large, heavily planted, outdoor ponds in Thailand using hormones introduced into the ponds.

The Epalzeorhynchus bicolor is an egg layer, depositing between 30 and 40 eggs each spawning. The eggs are usually deposited into rocky crevices or cracks, and are watched over by the male. Eggs normally hatch after two to three days, and by the time they are about two days old the fry are able to swim freely. At this time they should be fed baby brine shrimp and a variety of other fine foods should begin to be offered. Once the fry are about 7mm in length they begin to colour up and by the time they are about eight weeks old their colour is nearly fully developed. Between seven to ten weeks of age the tail of the Redtail shark will turn red.

Adrienne Dodge

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<http://www.aquaticcommunity.com>

<http://www.seriouslyfish.com/species/epalzeorhynchus-bicolor/>

Image: Gerd Moors



Flame Angel

Centropyge loricula

Photo: Robert Beke

Centropyge loricula (Flame angel, Flaming angelfish, Japanese pygmy angelfish or Dwarf flame angelfish)

Classification Order: Perciformes

Family: Pomacanthidae

The Flame angelfish is bright orange-red with a vertical elongated black spot and four or five bars on the sides; if your fish is from the Marquesas Islands in French Polynesia, the vertical black bars will be absent). The posterior part of both the dorsal and anal fins have alternating short purple-blue and black bands. The tail is yellow or white and the fins have blue tips.

Distribution

The *Centropyge loricula* is found in the Pacific Ocean, mainly in tropical environments between 28°N and 25°S, and is most commonly found around the Marshall, Line and Cook Islands. It can also be found around the Hawaiian Islands.

Habitat

This fish inhabits clear lagoons and seaward reefs from the lower surge zone to a depth of 57 metres. It is secretive and stays near shelter. Flame angelfish are particularly common around finger coral and lives in harems of 3 – 5 specimens.

Maximum Length

Normally grows to around 12cm. The largest scientifically measured Flame angelfish was 15cm.

Life Span

5–7 years, can be longer.

Aquarium Size

The Flame angelfish is one of the most popular species of dwarf angelfish and is known to adapt well to a life in an aquarium. It is advisable to use an aquarium of at least 375 litres, but a smaller one, minimum 120 litres, can work if you only keep a few fishes and know how to keep the water quality up in a small marine tank.

Maintenance

Flame angelfish should be added to a well-established tank. The aquarium must include plenty of suitable hiding spots. Strong water flow is recommended. Include live rock in the set-up and encourage natural algae growth. On introduction to a new tank the fish can appear shy but within a week it will be out and about, grazing on live rock during the day. While the Flame angel is not as touchy as some of species of angelfish, it still needs good water. Water changes of 30% a month are optimal in keeping the nitrates lower. Keep up with water testing as this will tell you when you need to do a water change.

The Flame angelfish is commonly infested with potentially dangerous protozoans when it is sold to aquarists and it is advisable to keep it quarantined before you add it to your aquarium. In some cases, formalin or some other remedy will be required to handle the problem.

Water Conditions

Temperature: 25- 27° C

pH: 8.1-8.4

Specific gravity: 1.020-1.025

Carbonate Hardness: dKH 8 – 12o

Diet

The Flame angelfish feeds on a variety of algae and crustaceans in the wild. As juveniles they are predominately plankton eaters and when adults they switch to their natural diet. In an aquarium this fish should be kept on an omnivore diet. Feed algae and algae based foods as staple food and supplement with occasional servings of meaty foods, e.g. mysid shrimp, brine shrimp, meat crustaceans such as shrimp and clams. It is important to keep the diet varied; combine fresh marine algae (preferably growing on a rock), algae based flakes or pellets, dried marine algae and spirulina. Rather than feed your Flame angelfish just one or two meals a day feed it many small portions. If it refuses to eat properly

check your water quality and also keep an eye out for aggression within the tank.

Angelfish are generally considered to be reef safe. They quickly adapt to a captive diet but if they are seen to be picking at coral or clam mantles then they are most likely under fed or under nourished.

Behaviour and compatibility

Semi-aggressive – this angelfish can be territorial and aggressive to other dwarf angels and has been known to bully smaller fish. To reduce the chances of this happening, add the Flame angelfish as one of the last fish you add to your tank (this is so previously introduced inhabitants have their own territory). Keep in mind that the more crowded the aquarium, the greater the risk of bullying, violence and nipped fins. If you really want more than one dwarf angelfish in your tank, use decorations to section the tank off into multiple territories. The Flame Angelfish gets along nicely with many invertebrates, but sessile invertebrates have a 50% chance of being nipped at as the angel matures. It is safer to have an angelfish with damsels, tangs and blennies than another of its own kind. In the aquarium, the Flame angelfish will appreciate the aid of cleaning species, such as cleaning shrimps and cleaning gobies, to fend off parasites. If it is matched with proper tankmates the hostility level of this fish should be mild.

While the *Centropyge loricula* is generally considered reef safe this can be a hit-and-miss affair.

Reproduction

The Flame angelfish is a hermaphrodite. All these fish are born as females and each female is capable of turning into a male if it receives the right combination of size and social stimulation. Males are typically larger than the females and have more blue on the outer edge of the dorsal and anal fins.

The Flame angelfish has been known to spawn in captivity. In the wild these fish form a harem but in an aquarium they should be kept in pairs or trios in an extra large tank. A deeper tank is the best to spawn them in as well as stable lighting conditions to encourage spawning. The aquarium should only have one male in it.

These fish will spawn towards the end of the day - they will dance a bit before swimming up towards the surface where they release pelagic gametes (reproductive cells) into the water column. In the wild the eggs and sperm are swept away by current; the eggs are buoyant and will develop while drifting around in the ocean.

In an aquarium the eggs need to be collected. The eggs will hatch in just under 24 hours and within two to three days they need microscopic algae for their very small mouths. Raising the larvae is a big challenge so much preparation is needed.

Adrienne Dodge

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Photo: www.petresearch.net

Setting up a New Zealand Local Marine Tank

by Mark Patterson

New Zealand coastal waters have a unique and diverse range of flora and fauna present as they cover temperature ranges from sub-tropical to sub-Antarctic with major current systems impacting on its shores. New Zealand's waters are thought to contain over 15,000 known species and scientists believe there may be as many as 65,000 marine species present, with many of these species not found anywhere else in the world due to the country's isolation.

There are some very different kinds of marine environments, rocky shore, mud flat, estuaries and varying tidal environments, but most people's introduction to our local marine life is through the rock pools at the local beach. These pools can contain a wide range of creatures and plants which are exposed to a wide range of fluctuations ie exposure to summer sun can create high water temperatures which in turn will lead to evaporation so the salinity can get very high, or rain can drop the salinity rapidly. The sun can also increase the photosynthesis of algae to generate oxygen, which can raise the pH levels so your average rock pool inhabitant can survive a wide variety of conditions.

These pools are generally flushed with new water twice a day due to the tide which keeps them functioning, whereas in the home aquaria doing this can be time consuming and expensive if using artificial salt water. So to compensate for this some care is needed to set up an aquarium that won't end up a smelly soup after a few months of running.

To create a sustainable closed system, the first step is to have lots of patience - a cold water marine system takes longer to cycle than a tropical marine one and both take longer to cycle than freshwater tanks. The full cycling process can take anywhere from three months to a year to attain a mature system. Most aspects of saltwater aquarium keeping are universal. Regardless of whether the ultimate goal is a fish-only tank or a reef style tank, installation of the equipment requires the same steps and water quality is paramount. Similarly, all saltwater tanks require the active participation of beneficial micro-organisms, therefore in the early stages of the tank's development the procedure is focused on getting these unseen helpers established.

Before starting to set up a new tank you need to understand the nitrogen cycle and how the bacteria in the live rock actually break down the wastes excreted by the various living organisms in the tank.

The Nitrogen Cycle

All fish and invertebrates excrete ammonia as a waste product; ammonia is extremely toxic to them. There is a group of beneficial bacteria that convert ammonia into nitrites, which are also toxic; a second group of microbes convert nitrites into nitrates, which are not nearly as toxic. Accumulated nitrates should ideally be kept below 10 ppm, but fish may show no ill effects with slightly higher levels. These two groups of bacteria need to be present and established in sufficient numbers prior to adding your fish and other animals.

Ammonia levels will rise, followed by a rise in nitrite levels as ammonia begins to decline. Then, as nitrite levels begin to decline, you will more than likely see a very slow rise in nitrates. The appearance of nitrates is a good sign that your various bacteria are making all the necessary conversions, however in some tanks with a significant amount of live rock, live sand and macro algae regular maintenance via water changes, you may never see nitrates accumulate.

There are several methods that can be used to cycle a tank and the basics are both cycling with or without fish, but if you don't have access to fresh salt water please don't cycle with fish as they cannot generally tolerate high ammonia levels and the water changes required can be expensive if using an artificial salt mix.



Cycling With Fish

Using fish to cycle a new saltwater aquarium is one way of preparing the new tank for life but nitrite and ammonia can reach toxic levels during the process. There are only a few fish which live naturally in this environment; Triple fins found in pools higher in the tidal zone, parore, rockfish and spotties. Frequent water changes will help to keep the water parameters stable for the inhabitants.

Cycling Without Fish

Ammonia is needed for the cycling process to succeed, so it can be produced in several ways. From dead decomposing matter - a piece of mussel or a fish, to using unscented ammonia that doesn't contain any additives. The goal is to maintain a level of 5ppm of ammonia in the tank which is usually achieved by adding 3 - 5 drops of ammonia to every 20 litres of water on a daily basis. Continue adding the ammonia and testing the water until it shows a nitrite reading. Once a nitrite reading shows, reduce the amount of ammonia you are adding to 2 - 3 drops per 20 litres and continue until both the nitrite and ammonia tests reach 0ppm. Once you have achieved this then a large water change can be done - watch temperature as too large a variance can stress the bacteria; add some activated carbon to help remove any unwanted additives that may have been in the ammonia. Allowing the tank to cycle is crucial, it is this process that creates a chemical balance which can sustain plant and fish life.

Prior to cycling make sure your tank is up and running and your equipment is properly functioning. Circulation and a stable temperature are essential factors for the health of your livestock long-term as well as at the beginning when bacteria levels are establishing. It is good to turn your tank lighting on for several hours each day during cycling as it will help set the balance for when the tank is stocked. For any cycling method you want



Photo: Courtesy of HFF

to use a good quality salt mix or natural salt water (NSW). If you have access to fresh clean natural salt water (NSW) you can set a tank up from scratch by doing 2 x 25% or 1 x 50% water changes weekly with a few hardy fish to help cycle the tank (parore, spotties, rockfish). While cycling (regardless of the exact method), you will need to maintain your salinity around 1.027 and your temperature between 18oC and 22oC.

Collecting Saltwater

Clean natural salt water can be collected locally in many parts of New Zealand; you just need to ensure it is clean. Collecting about half an hour before high tide is best, but not after any recent rain as this can include contaminants from land runoff. Near river mouths or areas where there is a lot of boat activity should be avoided as well for the same reasons. Collected water can be stored indefinitely in sealed containers away from any light sources.

The task of collecting water can be made easier by using a 12V pump that plugs into a vehicle's cigarette lighter and then, by pumping into large sealable food grade plastic containers. The two main essentials for good water filtration are live rock and a good quality protein skimmer.

Coral Rock

You will need some clean coral rock as this is more porous than rocks from the sea and makes a good home to live in for the beneficial bacteria and pods that will help maintain your system. You can use live rock from a tropical marine tank but some of the bacteria etc. may die off in the transition.

Coral rock is often purchased dry, and the bacteria are dead or have formed spores. This live rock has to be cured which means left in water for a period of six weeks or longer, until all the various types of bacteria have established themselves and the rock can be used to provide filtration in a tank. Rock from the sea with encrusting inverts or plants may be added once cycle is completed - if it is added too early the life on it will die and add to an ammonia spike. How do you know when the curing process is complete?

As the rock cures, decaying organisms will produce ammonia, which will be converted to nitrite by beneficial bacteria. As curing proceeds, additional bacteria will oxidise and turn the nitrite to nitrate therefore simply test the water for nitrite periodically and keep track of the results. You will see an initial rise, a peak, and then a sharp decline to 0ppm. At that point, the curing process has run its course, usually after

about two weeks. During the cycling process you can test the water every few days until you have the ammonia levels controlled. Once the nitrate levels reach 25+ppm the cycle is complete and you can safely add fish to your saltwater aquarium.

Substrate

The tank can be set up with substrate or no substrate (BB; bare bottomed). Having no substrate can be easier during cycling however substrate can provide a more natural look. If you go for a sand bed, make it either 2cm or a minimum of 10cm and seed it with about 1cm of rich natural substrate collected below low tide mark; keep it wet when collecting or bacteria will die off. You can then top up with whatever you want as long as it's not too coarse and not too fine. There is a lot of debate on sand grain size but I have had good success with the coarser sand that looks a bit like coral sand - aim for around 1mm - 2mm grain size. This can be found at low tide and accumulates on the surface on mid to low tide sandy beaches and on the sandy fringes of rocky headlands. Larger shell fragments can end up trapping detritus and turning your substrate into a nitrate factory causing algae blooms and problems with disease.

Live Rock

Live rock is coral rock that is from an established aquarium. Rock from a tropical system can be used but there may be die off in some of the bacteria. Water changes will help with any resultant ammonia spike. As a simple rule you will need 1kg of live rock per one litre of water. It is imperative that the aquarium be filled with seawater at the correct salinity, pH, etc., and that all equipment is operating properly before the live rock is introduced. The more rock you have, the more bacteria to support your bio load. When the rock has been placed, add dry substrate, live sand, and/or live rock pebbles as your design dictates. You can then top up the tank with seawater.



Water Movement

Another major factor in your tank's health is the gas exchange going on at the water's surface with nitrogen gas leaving the tank and being replaced by oxygen. Sessile invertebrates also benefit from strong currents that wash away wastes and bring nutrients and oxygen to them. The return pipe from the sump discharges water in one direction only and in a continuous stream whereas in nature water movement is multi directional and intermittent. This can be achieved in the aquarium by the use of power heads or flow pumps. Try to set up these flows to create turbulence and current to wash debris towards the outlet to sump. The basic rule of thumb is to have a minimum of 10 times the



Tunze stream
Photo: Diane Wilkie

tank volume in water flow ie. If a tank is 100 litres, you want pumps equaling an output 10 times that, or 1000 litres per hour.

Protein Skimmer

Nearly all reef tanks use a protein skimmer. A protein skimmer removes small particles of dirt, bacteria, and proteins from the water. The skimmer works by pumping the tank water slowly through a vertical or cone shaped tube, fine bubbles are injected into it by either an airstone or an air injected needlewheel pump. The bubbles collect waste on their surfaces and rise to the top as foam, which builds up

and flows into a collection cup. A good quality skimmer is another major tool for ensuring a long lasting tank and it is a good idea to source a skimmer with the capability to handle



Photo: Courtesy of HFF

more than the tanks volume. There are many skimmers available in the marketplace, with the new cone shaped ones seeming to be the most efficient.

Plumbing and the sump

In my personal opinion having a sump on the tank is better than using canister filters - these can be used but may need the filter media washing in NSW frequently to avoid a buildup of detritus in them. Canister filters are also good for running activated carbon in to help remove



Photo: Courtesy of HFF

toxins, phosphate removers to help with water chemistry, or filter wool for polishing your water by removing particles from your water column.

Many manufactured tanks come “ready to go” or you can D.I.Y. (do it all yourself). Drilled holes in the tank and an overflow box with a Durso standpipe allows only surface water to be drained to the sump which is usually set below the main tank. Narrow slots at the top of the overflow prevent large objects from entering the plumbing. In some designs, the return pipe passes through a second hole in the tank bottom and extends up to the top of the pre filter paralleling the standpipe. In other designs, the return pipe passes through the tank bottom at some distance from the drain. In still others, a return hose simply loops over the rim of the tank to discharge water just below the surface. A plastic part known as a bulkhead fitting provides a waterproof seal around the holes in the tank and connects to additional pipes or hoses to transport water to the sump. At the opposite end of the sump from the inflow a pump pumps water back to the main tank.

The protein skimmer can be placed in the sump or adjacent to it. Locate the skimmer where it will be easily accessible for inspection and cleaning. If you are using a chiller, it will be installed in the return line between the pump and the tank. Install the chiller’s thermostat sensor in the sump. It is a good idea to lay out the equipment arrangement on paper before you proceed with installation. You will want to make sure everything can be hidden underneath the tank while remaining accessible for maintenance.

Lighting

T5 fluorescent lighting or LED’s are adequate for most New Zealand local marine systems and will certainly create less heat into the system than metal halides. Stronger lighting at around 10k rating is only required when housing kelp and other macro-algae, if not keeping these then you can use just normal T5 or T8 fluorescent lights in a combination of marine blue and white tubes. You will need a timer for the lighting system to keep the inhabitants in equilibrium.



Testing the System

After filling the tank, plug everything in and allow the equipment to run overnight. Adjust the thermostat on the chiller to maintain the correct temperature. Use an accurate thermometer to check the water and make adjustments to reach the target temperature. The temperature should remain constant within two to three degrees over a twenty-four-hour period. Water should be circulating from the tank to the sump and back. The skimmer should be operating although it will produce little, if any, foam until the tank contains salt. You will make final adjustments to the skimmer after adding the salt mix or NSW, and again later after adding live rock and fish.

Settling In with Your Habitat

Once you have it all in place, full of salt water and circulating, let it settle in and run for a week. You can take a trip to the local shore side and pick up a few critters. Start with a cleanup crew like hermit crabs, grazing snails, chitons and glass shrimps from local rock pools. If you look under boulders (on the sand), try and get some mottled brittlestars. They set up shop beneath your live rock and are brilliant at sorting the accumulating nitrogenous crap. Because of the inevitable algae blooms early in the life of any saltwater aquarium, it is a good idea to choose algae-eating snails as some of the tank’s first tenants. Cats’ Eyes are a good snail to have. Have a look round locally for areas with lots of polychaete worms in a fairly coarse 1mm substrate (if the worms are there, then there should also be all sorts of micro-molluscs, echinoderms and other microbial life) Also

remove any large predatory polychaetes if you encounter them. They are the big pearl white ones, with visible legs, that can swim like eels!) Keep the bio load low for at least 6 months - That's the hard part; Patience, let it balance out and then you can start to add your finds.

Seaweeds

Seaweeds are an important part of natural temperate marine habitats and provide a home for a diverse range of invertebrates as well as add movement to your display. Sub tidal red algae are the best for a closed system, with many attractive species available that will survive in an aquarium.

The slow-growing encrusting coralline red algae are particularly attractive and suitable for aquarium life. Encrusting corallines forming the beautiful pink patches coating rocks will survive quite well under aquarium conditions. Try to avoid exposing them to air. Other species of red algae may be tried and often do quite well, but should be removed when undergoing rapid loss of color or deterioration. Temperate seaweeds that do well in the aquarium are generally sub-tidal species adapted to relatively low light levels. Most of these belong to the red algae group and make very attractive display additions.

A simple light system consisting of fluorescent tubes (one actinic blue and one cool white are a good combination) on a 12 hour cycle should be adequate for a standard tank. Metal halide lamps can damage seaweeds collected from deeper levels than a rock pool as well as add extra heat to your system.

All seaweeds should be collected with the holdfast (root like structure) intact. The holdfast structure can be wedged into crevices or even glued with cyanoacrylic adhesives (super glue gel) onto the smooth surfaces of rocks (both surfaces must be dried before applying glue).

In an aquarium with insufficient water motion, seaweeds may become smothered by detritus

so a good varied flow in the water column is essential to keep them in their best condition. After all, remember they are used to a more rigorous environment than can be provided in the average aquarium and will cause problems if they begin decaying.

A few of the Sea weeds that do well in an enclosed system.

Coralline algae

Coralline algae are hard and come in encrusting and upright branching varieties, extra calcium can be added to the aquarium to enhance growth. When collecting rocks try to avoid exposing them to air for too long a period as they can die off.



Photo: Diane Wilkie

Codium fragile (Velvet Weed)

Feels like velvet. It can, at times, be found above low tide - usually found in sheltered harbours. Grows from a holdfast.



Photo: Jerry Kirkhart

Carpophyllum maschalocarpum (Strap Weed)

Needs good varied flow. Is a slow grower.

Caulerpa geminata (Green Grapeweed)

Is sometimes found in healthy rock pools or growing sub tidally. Its roots form a growing network so can be lifted off the rock it is on in a mat. This can be bound with cotton on rockwork.

Caulerpa brownii (Sea Rimu)

This derives its name from the resemblance to the New Zealand Rimu tree. Found sub tidally in medium shelter, East Coast North Island. This plant grows from runners. Use Super Glue Gel or cotton to reattach.

A Clean-Up Crew for Your Aquarium

The "clean-up crew" is a term used to describe the various small invertebrates that in nature clear up decomposing matter, algae growths and sift through the sand bed to help promote a healthy system. The most commonly used are hermit crabs, turbinaria snails, and glass shrimp though there are a variety of other snails, limpets, brittle stars etc.

One important factor to consider is the type of habitat you are trying to replicate and the compatibility of livestock in the tank. Leatherjackets, puffers or wrasses can predate on hard and soft-bodied invertebrates so you may be limited to animals with a hard shell; large snails and hermit crabs.

You also need to ensure there is enough food in the tank to sustain them.

A newly set up tank may support a few shrimp or hermit crabs as these can be fed easily whereas grazing snails will possibly starve until the algae levels are up in the tank unless you can supplementary feed them. Some clean-up crew members require a sand bed for survival and a new bed may not have enough of the required nutrients to support them.

It's important to check on invertebrates to ensure that they are still alive. It is important to keep track of any livestock you put in the tank as dead animals can quickly pollute the tank water. Sometimes the clean up crew can predate

on each other, ie Hermit crabs are known to kill snails when they need a new home, so adding spare empty shells will help solve the problem.

Turbo smaragdus (Cats eye Snail)

Diet: Foliaceous algae and macrophytes



Photo: Jon Sullivan

Cookia sulcata (Cooks Turban Shell)

Diet: Foliaceous algae and Ecklonia radiata



Photo: Jan Conayne

Maoriculpus rosea (Turret Shell)

Diet: Deposit feeder, filters sediment



Photo: Valter Jacinto

Palaemon affinis (Glass Shrimp)

Diet: Almost anything



Photo: Diane Wilkie

Brittle Starfish

Diet: Sediment deposits detritus feeder



Photo: John Sullivan

Diloma melagraphia atheops (Black Spotted Topshell)

Diet: Grazes on algal film and also detritus

Stichopus mollis (Sea Cucumber)

Sea Cucumber are detritus feeders, they are very good at keeping a sand bed clean.

Summary

When it comes to setting up a saltwater aquarium big tanks and small ones differ only in the amount of water and materials involved. The basic procedure is the same. After readying the tank and setting it in place, install the equipment. Test the plumbing with fresh water, and make sure everything else is working properly before adding salt mix.

Aquascaping is next, using live rock and sand, or non-living materials, or a combination. Allow for a break-in period as the aquarium develops a population of beneficial micro-organisms. From this point on, you are the custodian of a living ecosystem. You must maintain the aquarium over the next several months to allow basic biological processes to develop appropriately.

The aquarium will continue to mature and change for a period of months. Early on, for about six to eight weeks, you can expect a series of algae blooms to occur. Typically, brownish diatoms and red/purple slime algae appear first, then later filamentous green algae supersede the earlier growths. This waxing and waning of algae blooms is normal, you can siphon out patches of slime algae, and use a pad to clean the glass, but do not reduce lighting in an attempt to limit algae growth. You will only prolong the process as algae grows because the water contains compounds, such as phosphate, that stimulate their growth. Removing algae from the tank helps to export the compounds. Protein skimming also helps. You will note that the skimmer begins to produce foam during the break-in process. As micro-organisms grow, reproduce and die, they release organic compounds into the water. Some is taken up again by other organisms and some is removed by the skimmer. As the developing ecosystem becomes more and more stable, you can introduce additional invertebrates and fish about every two weeks. Although the process of stocking an aquarium can be slow, patience is rewarded with a thriving, easily maintained tank. Maintenance of your system requires little apart from the suggested routine.

Daily: Check temperature, equipment and check and feed inhabitants.

Weekly: Check salinity, adjust as needed; check pH, adjust as needed; carry out 10 percent water change; clean algae off glass

Monthly: Check nitrate; carry out a fifty percent

water change; replace detritus removal pads in sump; siphon out debris as needed

Semiannually: Carry out a fifty percent water change, clean power heads if needed. Replace lamps; service system pumps, skimmer etc.

Go slow, keep your bio load minimised, and you'll be fine.

Feeding the livestock

A proper diet is essential for your livestock for to flourish. Generally fish are not fussy and can be fed squid, mussel, krill, shrimp, fish and commercial frozen foods in pieces small enough to fit into their mouths. It is essential that some species of wild caught stock are fed live foods until you are able to get them onto frozen - seahorses and plankton feeders being prime examples. Live foods can be bred by you such as Brine and Mysid shrimp or supplemented with mosquito wigglers, daphnia or white worms. If you live near the ocean you can collect your own. Running a fine net through seaweeds in a tide pool or around weed covered boulders will usually produce a plethora of various small shrimp, amphipods and copepods. Excess food collected can be kept in fresh NSW with an airstone or frozen and then fed out. This is useful to help wean them onto commercially available foods. Generally fish will eat foods they recognize.

Knowledge gained from natural history guides and from experience should enable you to gain a thorough understanding of all the feeding styles within your temperate aquarium community.

Feeding invertebrates presents more of a challenge because they exhibit a far greater diversity of feeding styles. Some invertebrates, such as sponges and tunicates, filter tiny plankton particles, while others graze or prey on more substantial items. In general, filter feeders are the most difficult to satisfy in the aquarium and should be avoided in favor of those that select larger foods. Some time should be

devoted to learning about the general feeding habits of each invertebrate species you plan on maintaining. This will help to avoid such mishaps as adding large predatory sea stars that will ravage your beds of sessile invertebrates.

Collecting for the aquarium

Some of our local species of fish come under the Quota Management System and therefore have a minimum take size, so some care must be taken when collecting for the tank. Other than these species, one can collect stock from local rock pools or on fishing trips. I use barbless hooks for this and try to catch from shallower water, as catching from deeper water may mean having to deal with an over inflated swim bladder. I always take large plastic containers and ensure the water is changed every 20 minutes or so to keep oxygen levels up for the fish (battery powered air supply or 12v bilge pumps are good for keeping water flow up). Acclimation is ideally the same as for tropicals and having a quarantine setup is best. Beware of fast changes in temperature, as anything more than 30C during collecting or moving temperate species can lead to problems.

Mark Paterson

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The Striped Anostomus (*Anostomus anostomus*) is commonly known as the Striped Headstander due to the head-down posture it takes when camouflaging in its natural environment. Like other members of the genus, it has a small upturned mouth, perfectly designed to nibble algae and microfauna from surfaces in their environment. Found typically in large groups in the wild, these fish are quarrelsome when kept in small groups. If you are thinking about getting some for your tank, ensure a well-fitting lid as they do jump, and prepare for them to grow as they reach a size of nearly 20 centimetres in length. Photo Robert Beke

SPECTACULAR STRIPES



INTERESTING IMPORTS



Badis badis
Photo: Robert Beke

Have you ever wondered what else is available from our tropical fish importers? In this new regular feature we will highlight a few of the more unusual, striking, or rarely imported species that have just been imported into New Zealand. If you are after something different for your tank read on.

We are delighted to see some of the small, attractive, and reasonably priced tropical back on the list including Burmese neon blue metallic danios (*Devario shanensis*), celebes rainbows (*Marosatherina ladigesii*), eight-banded barbs (*Eirmotus octozona*), and chocolate gouramis. These would make interesting additions to most small community tanks. For something a bit more unusual though the blind cave fish, banjo catfish (hara hara catfish), bumble bee gobies or freshwater puffers make an interesting addition for those that can accommodate their special housing and husbandry needs.

There are a range of small attractive cichlids available on the list, including a couple of nice *Apistogramma* sp. including super red cockatoos and viejita. Also nice to see are the Bolivian dwarf rams (*Mikrogeophagus altispinosus*), and the ever popular rams (*M. ramirezi*) in blue, blue balloon, golden, and veiltail varieties. There are also a couple of the spectacular chameleon fishes or badids: the



Dario dario
Photo: Deepsound

rarely imported blue Badis (*Badis badis*) and for fans of nano tanks, the stunning scarlet badis (*Dario Dario*).

If you are after an unusual surface feeding fish then silver and marble hatchets are back in stock, and they look amazing in a large school. For those happy to pay a bit more, another spectacular surface feeder on the list is the freshwater pantadon butterfly fish.



Along with the usual cories, some rarely imported tailspot cories (*Corydoras caudimaculatus*) and the friendly-looking smudge-spot cories (*Corydoras similis*) are back on the list. On the pleco scene, there are several varieties of the ever popular common bristlenose including longfinned GBA and



longfinned calicos (red jewels). There are also some spectacular larger species including snowball plecos (*Baryancistrus niveatus*), gold nuggets, queen gold nuggets, blue phantoms, goldie plecos, and royal plecos.

If you are after something really special for a medium to large sized tank and you are able to spend \$100–200 there are some spectacular feature fish available on the import list including many beautiful discus such as blue diamonds, rose reds, red melons, leopards, pigeon checkerboards, snow whites, super red maps, and gold milleniums.

For those with large to monster tanks there some great options from \$45-100 including silver arowanas, pink-tail chalceus, six-barred Distoichodus, redtail Prochilodus, and Borneo tigers all available.

If your local shop doesn't have these species in stock, you can usually order and pre-pay and they will be happy to get them in for you. Not only will this build your relationship you're your local shop, it will help them get an idea of what their local customers enjoy keeping so that they can serve your needs better.

Remember, if you want to try something new in your tank, do your research first to prevent making a costly mistake. Some of these species will do well in a standard community tank on a varied diet, while others require specific diets such as live food. Some can be territorial and solitary while others will require a group of at least 6 to prevent stress. Some of these grow large and will require forethought when planning how to keep them. Still others will need a tank with a sturdy lid to prevent them leaping out of the water. Plan ahead and you could well be rewarded with a new passion in fishkeeping.

-Ed

HOW TO

Use *Driftwood* in the Home Aquarium

By Jamie Blanch

Using driftwood in your home aquarium is a great way to add a natural look that can really make the difference between just a normal everyday tank and a great piece of art that everyone can enjoy looking at. Using driftwood you can make your tank look just like it is a slice taken straight from nature, nothing looks more natural than a group of your favorite fish swimming around and through a nice large piece of carefully chosen and placed drift wood.

Choosing Suitable Wood

When it comes to choosing what type of driftwood you want there are a few things that you should take into consideration, type of wood being the main one. Generally the harder and darker the wood is, the safer it is for the occupants of your tank. Overseas there are a lot more choices for types of safe driftwood than what we have available in NZ, so personally I try

to stick with hard native wood when I do use it. Types of wood that are safe to use are rimu, manuka, beech, oak and kauri, types to avoid are all soft woods or freshly cut pieces of wood. The general rule is if you can dig your finger nail into it it is not safe or cured enough to use in an aquarium. Also avoid any pieces that have a smell like they are rotting as the bacteria in them rely on air and once placed in a tank can cause a major ammonia spike as they die off.

Finding Driftwood

We are pretty lucky in NZ when it comes to finding driftwood as most of us live within driving (or walking) distance of a beach or waterway, most people have no problems collecting some from the local beaches after a big storm or large tides. River mouths are an excellent place to collect it as that way the wood probably hasn't been in the sea for an extended period of time which means less work when you are preparing it. Another great place is lake edges but you may find that you have less luck finding the right piece as wood is more scarce. Some pet stores sell driftwood that is already been cleaned and is safe to use straight away in your aquarium but it can be expensive and hard to find the right piece.

Preparing Driftwood

There are lots of differing opinions on what you should do to prepare your driftwood for use in your aquarium but this is what's always worked for me, once I have found a suitable piece I



Driftwood on beach
Photo: Brad Wikie



Commercially available driftwood
Photo: Courtesy of HFF

give it a blast with a water blaster, quick scrub with a pot scrubber and then submerge it in a bucket (or bath for the large pieces much to my partners dismay) for however long it takes to become waterlogged and sink. During this time if I don't like the tannins that some wood can release I drain and fill the container every day or so until the water stays clear. Once the wood has sunk I usually add water conditioner for the last dip and leave it soaking for 24 hours just to make sure that none of the bad stuff from tap water has leached into the wood and is going to slowly leach back out.



Soaking driftwood
Photo: Chris Satchwell

Some people also boil the wood to make it sink and release the tannins faster. This is fine and works for a lot of people but personally I don't bother as I think boiling wood can soften it and help it to decompose faster. Also if you don't like the look of tannins you can just add purigen or activated carbon to your filter which will clear it up in no time.

Also I have heard of people who collect driftwood from a beach worrying about salt and other nasty critters getting released into their tanks but I have never had an issue with it. I personally don't think that there would be enough salt stored in the wood to make any difference to salinity or any other negative effect on your tank or stock. Also if you give the piece of wood a good wash and scrub most critters etc should be washed off or destroyed.

If you are impatient and really can't wait to get the driftwood in your tank you can cheat by tying it onto rocks or other items that can't float and you can just put it in your tank straight away, just make sure you have given it a scrub first.



Photo: Sam Hendrikse

Bullies

by James Cooper

Attractive, tough and full of character, Bullies are a hardy and easy to obtain New Zealand native fish. The name bully is short for Cock-a-bully, a name given to these fish by the early European settlers; it is thought the name is a mispronunciation of 'Kokapuru' the Maori word for small fish.

Bullies live in a wide range of habitats throughout New Zealand and most varieties are common, although this status is being threatened by the spread of predatory Brown Trout and invasive pest species such as *Gambusia* as well as the reduction of habitats. Most species are endemic to their specific habitat but occasionally species can be found co-habiting in prime areas. Bullies can change colour depending on season, mood, and breeding behaviour. Colouration can even vary within the same species for specimens found in different environments around the country so it can be a real challenge to definitively identify

Redfin Bully *Gobiomorphus huttoni*
Photo: Charles Fryett

them. Bullies are generally hardy and easy to obtain, living for around 3- 5 years, and they have an inquisitive personality so are the perfect candidate for someone interested in having a go at keeping New Zealand natives.

Setting up an Aquarium for Bullies

Bullies are cold water fish and need to be kept below 20°C to be comfortable. The best way to achieve this is to keep an eye on the room temperature and if it is nearing 25°C, a few ice cubes, floating a frozen bottle of water, or a fan directed at the water's surface can bring the temperature down. If you are serious about keeping New Zealand natives it is wise to consider a chiller unit and although rather expensive, they allow you to keep the tank consistently cooler which will ensure you have happy, healthy and therefore beautiful fish.

Most bullies are medium sized fish (10-25 cm) so they are one of the best native species for smaller tanks. A good minimum size tank for 3-4 adult 10 cm bullies is a standard 2ft tank (600mm x 300mm x 300mm) however they are bottom dwellers so it is more important to have a large footprint rather than a lot of height in the water column. As is standard for all fishkeeping, the bigger the better and a larger tank will allow you to keep water parameters more stable as well as allowing the introduction of other New Zealand native mid-water fish such as Inanga (*Galaxias Maculate*) or Smelt (*Retropinna retropinna* or *Stokellia anisodon*).

The tank substrate should be fine sand or gravel substrate and include lots of rocks, driftwood and other areas of cover for the fish to reduce stress. Tank lighting is not essential for Bullies as they are normally nocturnal in the wild and bright lighting will usually make them run for cover. To allow for good viewing of the

aquarium, dim lighting can be used and as they get used to this, they will come out more often.

Collecting Bullies in the Wild

Taking fish from the wild is a big responsibility. Once a fish is removed from a native habitat, it is illegal to release it back into the waterway (this also includes plants and invertebrates) so you must be prepared to care for it before you go out collecting. Most native fishes are nocturnal so catching them involves venturing out in the evening for spotlighting in waterways. To capture Bullies, it is best to use a two-net approach, with one large net slowly drawn up behind the fish and another used to scare the fish downstream into the waiting net. A good quality headlamp is a must in this situation. Another approach is to set bait traps with a bit

| Spotlighting
| Photo: Charles Fryett



of bread into a quiet pool or along the river bank or lake; these traps can be purchased at most fishing tackle stores.

Once captured, it is important to identify the species. Juveniles (around the 3-5cm mark) are the best as they will adjust to the home aquarium a lot better than an older specimen. Once you have your fish home it is important to acclimate the fish very slowly. The easiest way to do this is to use the 'drip' method favoured by marine fish keepers. This is accomplished by placing the fish in a bucket below the tank, and using a length of standard air-hose. Start a siphon down to the bucket, clip or a loose knot in the hose will allow you to control the flow of water - the aim is for the water to flow at around one drip per second. Once the bucket is full you can net out the fish and add it to the tank. It is best to avoid adding the water from the bucket as it may contain high levels of fish waste.

Behaviour

Most bullies are rather peaceful and tend to be friendly to other tank mates except around breeding time, even then most squabbles are harmless. They will however eat anything that they can swallow whole so this must be taken into account when choosing tank mates. Apart from this, they are very well behaved and inquisitive, known for spending a lot of their time watching the outside world and enjoying vantage points on which to perch for a better view, often pushing each other out of the way to get the best spots.

Feeding

Most bullies will transfer onto a diet of standard dry food quickly, however it is best to use a sinking pellet type rather than a flake as it holds together better and causes less pollution in the tank. Frozen bloodworms are useful as a treat but should not be used as a staple diet as they are nutritionally lacking. Another good alternative is a prepared food with ox heart

and a variety of vegetables, there are a range of recipes out there and a quick search will provide you with one you can use. The benefit of this food is that you can control what goes in to it and ensure your fish get a balanced diet. If available, live food is a great option, there is a variety of easily cultured foods available such as daphnia, whiteworms, blackworms, maggots or earthworms which provide a lot of nutritional value as well as promoting the fish's natural hunting behaviour.

Breeding

All bullies are cave spawners. Normally during spring or summer the male will set up a territory within a cave-like structure, normally the side under a rock or log. The male adopts a dark colouration, almost black in some species. The female will deposit a number of eggs inside the cave and then leaves so the male can guard the nest until the larvae hatch. This takes up to several weeks, the time is temperature dependant. Some species spend their larval stage around the place they were born; some migrate down to sea and return once they have reached a certain size. One (the Tarndale Bully) even has free swimming pelagic¹ larvae. The only types that can be successfully bred in the home aquarium are the Upland Bully, Cran's Bully and some landlocked populations of the Common Bully.

Common Bully

Gobiomorphus cotidianus

Found throughout NZ and the most common bully as its name suggests, it is found in lowland areas around coastal rivers and lakes. It is normally not found far inland as it is not known to be a great climber like some of its counterparts. This bully is one of the best for beginners due to its amazing hardiness - this is not to say it should be mistreated as a well kept specimen is a sight to behold. Grows up to 15cm, matures at around one year old and lives for 4-5 years.



Gobiomorphus cotidianus

Photo: Charles Fryett

It is a sea run spawner but there are landlocked populations that complete their entire lifecycle in fresh water.

Giant Bullie

Gobiomorphus gobioides

The largest of the native Bullies gets to a length of 24 cm and is commonly found in the lower reaches of rivers and even into brackish water of estuaries. They rarely travel far upstream from their home habitat. Juvenile Giant Bullies and Common Bullies are hard to distinguish from each other; the rule of thumb is that Common Bullies have seven spines in their first dorsal fins and Giants have only six. Another clue is that the lower jaw of Giant Bullies extends past the top



Gobiomorphus gobioides

Photo: Charles Fryett

lip where as in Commons the jaws tend to be more equal.

Giant Bullies can be a bit aggressive to other smaller tank-mates and they also like to hide under overhanging banks and in heavy cover so they not only require a larger aquarium than other bullies, but they also appreciate adequate cover and hiding places.

Redfin Bullie

Gobiomorphus huttoni

The jewel of New Zealand native fish is the spectacularly coloured Redfin Bullie where males of the species have brightly coloured finnage and variable body colouring with bright yellows,



Gobiomorphus cotidianus

Photo: Charles Fryett

reds and iridescent greens. During breeding they will turn a solid black with a bright green edge to their first dorsal fin. Females have fewer colours but still have the diagonal facial stripes that are a tell-tale sign of this species. They are a smaller bully only reaching a maximum of 122mm (females are smaller growing) so are perfect for the smaller aquarium or species only tank. They are found NZ wide and are well accomplished climbers found well inland even past significant barriers such as waterfalls. Unfortunately, they are a sea-run² fish so have not been successfully bred in the home aquarium.

Bluegill Bully

Gobiomorphus hubbsi

This little stunner is an inhabitant of faster flowing water and loves a strong current to play around in. Bluegill Bullies have a longer more streamlined body-shape that is perfectly adapted for living in fast flowing rapids of new Zealand rivers. The Bluegill Bully is also a smaller growing species, only reaching 93 mm. An aquarium for these beauties requires a strong water flow and a lot of surface movement to ensure high amounts of oxygen like those found in its natural habitat. With careful placement of stones you can create calmer areas for the fish to rest and feed right. Found New Zealand wide, the Bluegill has a sea-run larval stage and are very short lived, living only to around 2 or 3 years maximum.

Cran's Bully

Gobiomorphus basalis

Short and squat, these fish can only be described as cute. Crans Bully bodies are mottled with sandy browns and olive greens, the males sport a bright pink/orange margin



Gobiomorphus basalis male left, female right

Photo: Charles Fryett

to their first dorsal fin. As the males age their heads become more blunt and bulbous. They are found mainly in inland rocky streams throughout the North Island except in the Bay



Gobiomorphus basalis male displaying breeding colour

Photo: Charles Fryett

of Plenty region from Waihi to East Cape. These Bullies are one of the landlocked bullies that can be successfully bred in the home aquarium. It is one of the most common species in the North Island and grows to a maximum of 92 mm.

Upland Bully

Gobiomorphus breviceps.

A distinctive bully with a lighter grey/brown base colour than most of the more coastal bullies and irregular brown patches and orange/brown spots. Males are stouter and have a blunter head that gets more blunt with age and a orange fringe to the first dorsal fin and a light orange patch at the base of the pectoral fin. Females lack the orange. As its name suggests it is found in upland areas throughout the South Island and in a few rivers and streams of the southern North Island. It is a fully freshwater species and can be bred in the aquarium. This is a slightly larger species growing to a maximum of 135 mm.

Tarndale Bully

Gobiomorphus alpinus

Here more out of interest than for actual keeping, the Tarndale Bully is NZ's smallest bully with a maximum recorded size of 75 mm. It is also interesting in that its larval stage, although freshwater it is also pelagic¹. It is only found only

in the Lakes of Tarndale Station in Molesworth, near Marlborough and in the upper Clarence river system and Wairau river. The Tarndale Bullis are slender and rather big-headed but otherwise hard to distinguish from the Common Bully. They are not technically protected, as are none of our living native freshwater species, but considering their rarity, it would be considered ethically wrong to attempt to collect it without proper consent and knowledge of the relevant authorities. Being only found on private property, trespassing laws would also apply.

1. Pelagic fish live near the surface or in the water column of coastal, ocean and lake waters, but not on the bottom of the sea or the lake.
http://en.wikipedia.org/wiki/Pelagic_fish
2. Sea run – Spawning takes place in fresh water and after hatching the larvae are swept out to sea. As juveniles they return to fresh water where they spend their adult lives.

Further reading on Bullies:

The Reed Field Guide to New Zealand Fishes; R. M. McDowall; 2000

Ikawai – Freshwater fishes in Maori culture and economy; R. M. McDowall; 2011

The New Zealand Native Freshwater Aquarium; S. McQueen; 2010

A Photographic Guide to Freshwater Fishes of New Zealand; S. McQueen; 2013

FNZAS Native Freshwater Fishes; FNZAS/C. Fryett; To be published

A PHOTOGRAPHIC GUIDE TO
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STELLA MCQUEEN
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Darren Stevens

Neons & Cardinals

Photo: Aakash Sarin

Few tropical freshwater fish are more popular in aquariums than the delightful neon tetra (*Paracheirodon innesi*). These small striking vivid blue and red fish look stunning in a school, and are an ideal addition to a well planted community aquarium with other small peaceful fish. Neons are often confused with their equally impressive relly, the cardinal tetra (*P. innesi*). Both species look similar but they differ in the amount of red on the lower body. In neon tetras the red area runs from the middle of the fish to the base of the tail while in cardinal tetras the red area covers most of the lower body. There is also a third species of *Paracheirodon*, the green neon tetra (*P. simulans*) which is rarely seen in the hobby and will only be briefly discussed here. It is similar to the neon tetra but the red patch is shorter and less obvious. The black neon tetra (*Hyphessobrycon herbertaxelrodi*) may share part of its common name, but is only distantly related and is placed in a different Genus.

All three *Paracheirodon* species are found in very soft, acidic black or clearwater streams and rivers in the Orinoco and Amazon Basins in northern South America. Neon tetras have also become established in the wild in Singapore. It is thought that the vivid colours of neon tetras

make them visible to their own species when they are in black water streams.

Neons and their rellys form large shoals in the wild and should be kept in schools of at least 6 fish in aquaria. As many fish keepers have found out, including myself, don't keep them, or for that matter other small tropical fish, with larger species such as angelfish as they will likely be considered a tasty snack. In the wild neon tetras are found in waters of 20 - 26°C (often cooler than most community aquaria), while cardinals are found in slightly warmer waters of 23 - 27°C (in aquaria they seem to prefer 26 - 28°C). Both species grow to about 3cm and may live for several years in an aquarium although in the wild they may only live for a year. In the wild cardinals (and probably neons) are predators of small invertebrates (small crustaceans and chironomid (midge larvae) found among submerged leaf litter, aquatic plants, and tree roots. In captivity both species will accept a wide range of aquarium foods, providing they are sufficiently small.

Most neon tetras in the hobby are farm raised in Hong Kong, Singapore, and Thailand, although wild caught fish are occasionally available. It is estimated that on average 1.8 million neon

tetras are imported into the USA every month. A long-finned neon has recently become available. Cardinals are more expensive than neons because, until recently, they were regarded as difficult to breed in captivity and were mainly wild caught. However many are now captive bred and a golden variety has recently been developed. Wild caught cardinals are still available in the hobby. Every year millions

water. Wild caught neon tetras and cardinals can occasionally have neon tetra disease which is caused by a tiny parasite (*Pleistophora hyphessobryconis*). Although most neons and cardinals are likely to be captive bred, when you are buying either species look out for less active fish with pale patches as this disease can be difficult to eradicate.

Neons and cardinals can be bred in aquaria but



Neon tetra
Photo: Britta Niermeyer



Green neon tetra
Photo: Robert Beke



Cardinal tetra
Photo: Marcin



Black neon tetra
Photo: Alex Flemming

of cardinal tetras are exported from the Rio Negro and they are Brazil's most economically important ornamental fish export. In the Barcelos region there is a controlled sustainable fishery for cardinals and other aquarium fish. Perhaps due to the wild-caught origins of some fish, cardinals have a reputation for being more delicate than neons. However providing they are kept in stable well planted tanks with clean water they both seem relatively hardy but do best and will live longer in soft, acidic

this is tricky as they not only require soft acidic water but the eggs, and in the case of cardinal's young fry, are photosensitive and will die if exposed to strong sunlight. If you are wanting to breed either species there are excellent articles online on how to attempt this.

References

Cardinal tetra, *Paracheirodon axelrodi*. Practical Fishkeeping. <http://www.practicalfishkeeping.co.uk>
Walker, I. (2004). The food spectrum of the cardinal - tetra (*Paracheirodon axelrodi*, Characidae) in its natural habitat. *Acta Amazonica* 34: 69–73.

Borneo Suckers



Usually, here in New Zealand, the Borneo Suckers are a mix of several specimens, *Gastromyzon ctenocephalus*, *G. scitulus*, *G. ocellatus*, *G. stellatus*, and occasionally *G. zebrinus*. As a big Borneo Suckers fan I am always looking to find some new additions to already available fish. Then one day, while observing the new import of Borneo Suckers, the small yellow tail attracted my attention. Wow, *Gastromyzon punctulatus* was my first guess but I was wrong. The fish has complete cream bars on the body so it can't be *G. punctulatus*. I tried to identify the specimen but it was almost impossible to do on a live fish. Anyhow, not long after the fish was positively identified by Dr Tan Heok Hui as *Gastromyzon viriosus*. Words cannot express my happiness when I once owned that beautiful fish. *G. viriosus* is very rarely imported into New Zealand and Borneo Sucker lovers should look carefully at the fish tanks in the fish shops. There might be one lonely *G. viriosus* waiting to be picked by you.

Scientific name: *Gastromyzon viriosus*, Tan 2006

Distribution: Currently only known from the Tatau River basin in central Sarawak.

Etymology: Species name is from the Latin *viriosus*, meaning robust and strong. This is in allusion to the thick-set body.

Reference [CITATION]: Tan, H. H., 2006. The Borneo Suckers. [Revision of the torrent loaches of Borneo (Teleostei: Balitoridae: *Gastromyzon*, *Neogastromyzon*)]. Published by Natural History Museum Publications (Borneo), 2006

Robert Beke



Obituary Francis Scott - Scottie

The last couple of years has seen the passing of a number of FNZAS's stalwarts and characters.

A few months ago, another joined the ranks. Francis Scott, known to all and sundry as "Scottie". It is with fond memories that I write this short note on a tough and stubborn man who molded many of us, both knowingly and unknowingly, into becoming greater fighters for the cause, our hobby. When it came to the hobby, "Scottie" had three great loves:

Being an active participant in the politics (sorry management) of the FNZAS.

Controlling and raising the profile of the "Judges and Standards Committee"

and the seemingly mundane but (to him especially) extremely important job of being chief historian and archivist for the FNZAS

All jobs were performed with relish.

I remember how on many occasions as a newbie Exec member, or later as President, the battles I had to fight to push a cause or win an argument.

He taught me to be prepared, to be flexible in my arguments, to be humble in my success and to be gracious in my defeat. If these are not signs of a great man, then tell me what is.

Rest in peace Scottie.



Top: Scottie

Bottom: Eddie Bowen, John Eastwood & Scottie at conference

Photos: Caryl Simpson

Dominique Hawinkels



Conference 2014

Dunedin was rated in the top 10 NZ destinations to visit in the Tripadvisor Travellers' Choice vote for 2013. So... when were you last in Dunedin? Isn't it time you came for a visit? We might not be able to put you up in Larnach's Castle, but we'll give you a good time at CONFERENCE 2014.

For those who want to stay with club members, we'll have beds available in members' houses on a first-in basis. If we run out of beds, or you prefer to be in your own space, we'll point you towards handily-placed motels.

As well as the conference discussions and decisions, we're hoping to entertain you with some or all of the following activities:

- Relaxed dinner at a DAPS member's house for those who arrive on Friday night .
- Dinner out at a reasonably priced restaurant on Saturday night.
- Visit to the University's zebra danio breeding facility, where they breed thousands of danios for genetic research.
- Visit to Portobello Aquarium
- Visit to the tropical house at the Museum (butterflies, goldfish, turtles, tarantulas)
- A fossick in a local river to find interesting plants and perhaps fish
- A look at members' tanks

dunedin

APRIL 12 & 13

If that's not enough, you can squeeze in visits to Larnach's Castle, The Railway Station, St Clair Esplanade, Penguin Place, Settlers Museum, Otago Museum, or Olveston. Or you could explore the various attractions of Otago Peninsula, the Chinese Garden, Glenfalloch Gardens, the Botanic Gardens, Aramoana Beach, Signal Hill, or Tunnel beach. You can take a ride on the historic Taieri Gorge Railway, or climb the steepest street in the world (Baldwin Street).

Here's a great opportunity to spend some time with fellow fishkeepers, and visit one of NZ's top 10 tourist towns at the same time as contributing to the 2014 conference. So, grab some cheap airfares and let us know you'll be joining us!





Pet Fever

93 Collingwood Street
Nelson
03 545 9991

Hours: Mon-Fri 9am - 5.30 pm
Sat 9am - 5pm
Sun 10am - 5pm

Facilities: 28 tanks including 4 display tanks
6 coldwater
22 freshwater tropical

Discount of 10% for Tasman Aquarium Society members and has a customer loyalty program.

Pet Fever is located in central Nelson. It is the only pet shop and fish supplier in the city. There are six free car parks for customers at the side of the building and three or four out the front which are paid parking. The shop itself handles kittens, puppies, rabbits, rats, birds, turtles and fish and is the only store in the Nelson region that carries livestock other than fish.

Pet Fever always appears tidy and the animals are well cared for. This is visible with the way the animals' enclosures are kept. The shop is roomy with lots of space for people to walk around in. (It also has a candy dispenser for those with a sweet tooth, this supports the local Scouts).

The staff are always welcoming at Pet Fever with three working at all times, often with one solely working in the aquatic section of the shop. They are very approachable if questions need to be asked.

The fish on display at Pet Fever always look healthy and all the tanks run on their own filtration system. There are four Juwel corner tanks assembled to make a round display. One





tank contains African Cichlids, one is planted with a variety of rainbows and corydoras, one has goldfish and the last has an American display with clown loaches, angels, silver dollars and hatchet fish.

The fish in the display tanks have information labels about the fish and the environment in which they should be kept, some even have Latin names for identification.

The sales tanks always look clean, they are all substrate free and very little, if any, algae and debris are in the tanks. There are visible tick and sign charts for feedings, water tests and water change routines in this area.

Pet Fever carries a massive range of food from JBL, Tetra, Hikari and Nutrafin. This ranges from flakes, cichlid food and sinking catfish food to fry food. There is a freezer beside the counter for frozen bloodworms, brine shrimp, mysis shrimp, axolotl food and turtle food.

The main brands that are carried in Pet Fever are Blue Planet, Elite and Jebo however there is an extensive range of Aquaone replacement parts, some Aquaone canister filters and Fluval heaters. There is a big section for the planted aquarium with most of the Seachem range being carried as well as some JBL products.

A full range of test kits is available in store including digital pens.

Any product that is not carried in store can be potentially ordered in for clients.

Cam Scott

Interesting species

Discus: \$149.99

Port Hoplo catfish: \$42.90

Marble Hatchet fish: 39.90

Snow white Scofoli: \$24.99

Big Red comet goldfish \$ 39.99

Rainbow fish starting from 19.00

Assorted Crypts \$3.50 or 3 for \$9

Rank	
Tropical fish	★ ★ ★
Catfish	★ ★
Cichlids	★ ★
Oddballs	★
Coldwater fish	★ ★ ★
Marine fish	None seen
Marine inverts	None seen
Marine corals	None seen
Display tanks	★ ★ ★
Pond plants	★
Tropical plants	★ ★
Dry goods	★ ★ ★ ★
Pond supplies	★ ★ ★

SHOP TOUR



Kapiti Kritters

186/1 Kapiti Road
Wellington
04 904-4584

Hours: 9am till 6pm Mon to Thurs
9am till 5pm Fri & Sat
10am till 4pm Sun and public holidays

Facilities: 9 x freshwater tropical tanks
3 x cold water tanks
1 x Discus display tank
1 x African cichlid display tank
1 x American cichlid display tank
1 x tropical marine display tank
1 x plant tank

Located approximately half way between
Paraparaumu's Coastlands Shopping Centre
and Paraparaumu Beach (opposite the airport)

is Kapiti Kritters. A medium sized pet shop that has been open for about 18 months. As you enter the shop, you immediately notice that it is pleasantly spacious. Easy to identify areas are laid out in front of you – window displays, pet cages & baskets, misc cat & dog products, cat & dog dry foods, fish foods & equipment etc.

Located towards the rear of the shop are spacious glass units housing the birds, cats, rabbits, guinea pigs etc. As you head towards these you pass the puppy play pen. Against the right rear wall your target, the fish tanks housed in a polished stainless steel display unit containing 12 medium





sized tanks in 4 columns. 3 for cold water, 3 mainly for cichlids, and 6 containing a wide variety of tropicals. The fish tanks have ID photos alongside the prices. On the side wall are more detailed fish profile cards if you want to check out the compatibility of something that has caught your eye.

For those interested in African cichlids, there are also 2 large display tanks in the middle of the shop which contain more stunning fish, and some of the larger fish items like Oscars, ghost knife fish, and leopard tenopoma.

The staff are friendly and willing to help with any questions you have, help you with items you are looking for, or you can simply browse knowing that they are there if you need them.

Definitely worth stopping in if you are in the area. Have a word to the staff if you are looking for something special, they will do their best to help you or to order it in for you.

If you are interested in African cichlids, make sure you meet Mike or Harry – they keep them too.

Kevin Rowe

Interesting species

Electric Blue Rams \$45 ea
Tiger Pleco \$50 ea



- Spotted Headstanders \$10.90 ea
- Red Phantom Tetras \$6.90 ea
- Diamond Tetra \$9.90 ea
- Upside Down Cats \$20.20 ea
- Geophagus Surina \$22 ea
- Fire mouths \$13.40 ea
- OB Red Top Trevasae \$30 ea
- Tabera Rainbow fish \$17.90 ea
- Boesimani Rainbows \$13.90 ea
- Neon Dwarf Rainbows \$13.90
- Melon Barbs \$14.90 ea

Rank	
Tropical fish	★ ★ ★ ★
Catfish	★ ★
Cichlids	★ ★ ★ ★
Oddballs	★ ★
Coldwater fish	★ ★
Marine fish	Display only, will order
Marine inverts	Display only, will order
Marine corals	Display only, will order
Display tanks	★ ★ ★
Pond plants	None seen
Tropical plants	★ ★ ★
Dry goods	★ ★ ★
Pond supplies	★ ★



The Federation of New Zealand Aquatic Societies is a group of aquarists dedicated to supporting and promoting fishkeeping as a hobby, both in our local communities and globally with regard to conservation of aquatic species and their environments. The organisation is dedicated to the improvement of the aquarium and fishkeeping hobby and it has a 60 year history of representing aquarium societies in New Zealand.

There are currently 14 affiliated aquarium clubs around New Zealand:

AUCKLAND FISHKEEPERS ASSOCIATION

Contact: Liam Winterton aucklandfishkeepers@hotmail.com

BAY FISH & REPTILE CLUB

Contact: Fiona Sytema sytema@vodafone.co.nz

CHRISTCHURCH TOTALLY TANKED

Contact: James Butler muh47_6@hotmail.com

DUNEDIN AQUARIUM AND POND SOCIETY

CONTACT: dapsdunedin@gmail.com

HAWKE'S BAY AQUARIUM SOCIETY INCORPORATED

Contact: Chris Drake cdrake@paradise.net.nz

KAPI-MANA AQUARIUM CLUB

Contact: Dominique Hawinkels kmacnz@yahoo.co.nz

MARLBOROUGH AQUARIUM CLUB

Contact: Deidre Wells deeken@xtra.co.nz

NZ KILLIFISH ASSOCIATION

Contact: secretary@fnzas.org.nz

SOUTH AUCKLAND AQUARIUM & WATERGARDEN SOCIETY

Contact: Paul Munckhof monkie@orcon.net.nz

TARANAKI AQUARIUM & POND SOCIETY - IN RECESS

Contact: Mitch Minchington & Debbie McKenzie, 21 Maire St. Inglewood 4330

TASMAN AQUARIUM CLUB

Contact: Glen George hellcazy@hotmail.com

UPPER HUTT AQUARIUM SOCIETY

Contact: Amy Curtis ayglitch@gmail.com

WAIKATO AQUARIUM SOCIETY

Contact: Zara Titko zarast@windowslive.com

The following businesses offer discounts to our members, remember to ask politely, this is a privilege not a right. You must show your current FNZAS Membership card at the time of purchase.

AUCKLAND

Hollywood Fish Farm - 10% discount on selected non-sale items

36 Frost Rd. Mt. Roskill Ph 09 620 5249
10/2 Tawa Drive, Albany Ph 09 415 4157
www.hollywoodfishfarm.co.nz

The Bird Barn - 10% discount on fish and accessories

158 Lincoln Rd. Henderson. Ph 09 838 8748.

New Pupuke Aquarium Centre - 10% Discount

1 Lydia Ave, Birkenhead Ph 09 480 6846

CHRISTCHURCH

Organism - 10% discount on all dry goods.

Cnr Ilam & Clyde Rd, Ilam, Christchurch. Ph 03 351 3001 Fax 03 351 4001

GISBOURNE

Eastland Aquariums - 10% discount as well as great in-store specials.

Grey St, Gisborne Ph/Fax 06 868 6760

HAMILTON

Pet World - 10% discount on fish products

Cnr Anglesea & Liverpool Sts. Hamilton. Ph 07 834 3426 Fax 07 834 3424

Goldfish Bowl Aquariums - 10% discount on everything.

966 Heaphy Tce. Hamilton. Ph: 07 855 2176

World of Water

7 Kaimiro St, Te Rapa, Hamilton Ph 07 849 1117 email: info@worldofwater.co.nz

HASTINGS

Aqua Fever Aquatic Shop - 10% discount on fish and fish related products.

Shop 3 Pacific Boulevard, 103 Market St South, Hastings. Ph. 06 8782 271

HAWERA

Wholesale & Industrial Supplies - trade price, equating between 15 - 40% off retail prices

49 Glover Rd, Hawera Ph 06 278 7525

MT MAUNGANUI

Animal Antics - 10% discount

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NAPIER

Carevets N Pets - 10% discount on fish & fish related products

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Pet Essentials - 5% Discount

11 Croucher St. Richmond, Nelson Ph 03 544 4379

TAURANGA

KiwiPetz - 10% discount

Shop T30, Fraser Cove Shopping Centre, Tauranga Ph 07 578 8623

email kiwipetz@xtra.co.nz

Carine Garden Centre & Water World - 10% discount on fish, fish related products & aquatic plants

Cnr SH2 & Te Karaka Drive, Te Puna Ph. 07 552 4949 www.carine.co.nz

WELLINGTON (and Greater Wellington area):

Animalz Petone - 15% off all fish and fish related products

376 Jackson St. Petone. Ph 04 380 9827 www.animalz.co.nz

CareVets@Johnsonville Pet Centre - 10% discount

31 Johnsonville Rd. Johnsonville Ph 04 478 3709

CareVets 'N' Pets - 10% discount

Porirua Mega Centre, 2 - 10 Semple St. Porirua Ph 04 237 9600

Paws and Claws - 10% discount on all fish & fish keeping items

Logan Plaza, 207 Main St. Upper Hutt. (opp. McDonalds) Ph 04 528 5548

The Pet Centre - 10% discount on all fish and aquatic products

Lower Hutt, Harvey Norman Centre, 28 Rutherford St. Lower Hutt. Ph 04 569 8861

Upper Hutt, 82 Queen St, Upper Hutt Ph 04 974 5474

Porirua, 3/16 Parumoana St. Porirua Ph 04 237 5270

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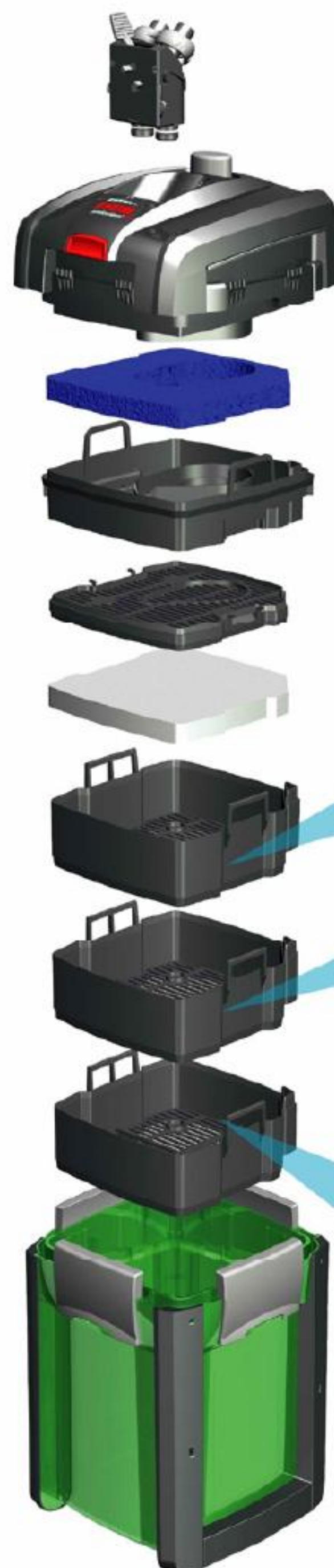
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