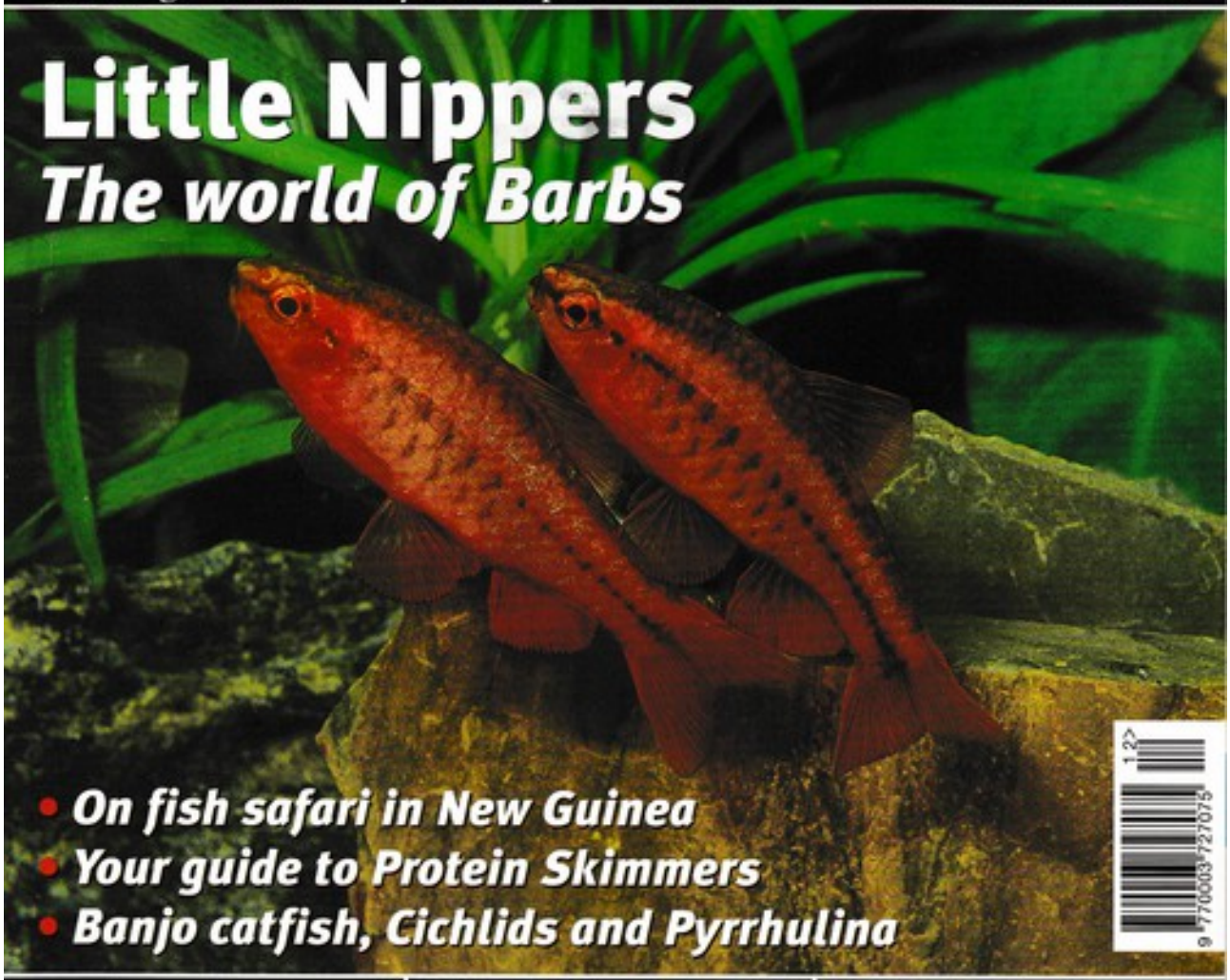
AQUARIST AND POND KEEPER

The magazine for every fishkeeper ~ since 1924 DECEMBER 2000 £2.50

Little Nippers
The world of Barbs



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- Your guide to Protein Skimmers
- Banjo catfish, Cichlids and Pyrrhulina

Keeping Boxfish

The perfect winter pond

Caring for Goldfish

MARINE · PONDS · PLANTS · AMPHIBIANS
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Feature suitable for beginners

AQUARIST AND PONDKEEPER

The magazine for every fishkeeper ~ since 1924

REGULARS

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COMMUNITY · SURFACE · NON-COMMUNITY · MID-WATER · CARNIVORE · BOTTOM · OMNIVORE · TEMP. · HERBIVORE

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COVER PICTURES

Main photo: **Max Gibbs**
Small photos left to right:
Max Gibbs
Gordon Wigens
David Ford

Welcome to another action-packed *A&P*!

I must say 'thank you' to everybody who has said how much they enjoyed the new-look A&P – unfortunately I can't! The sad fact is that as I write this, I have yet to see the new-look magazine in real life. Why? Well it all started a few months ago when I was invited to take part in a television programme entitled Fish People Go Amazon. Anyone who asks "how about spending a month in Brazil catching fish?" really must have known the answer. Ignore the practicalities of how to be away for a month and still produce a monthly magazine, ignore the fact a book on breeding aquarium fish needs completing before you go on the trip, just say yes and worry about the consequences later – which I did.

What I can do at this time is thank all the advertisers who jumped on board for our first new-look issue. Their support is essential for any magazine and for so many of them to become involved at such an early stage is wonderful. I hope you will support them in return by buying their products and visiting their shops.

After the bad news last month about Y.A.F. and the rather disappointing turnout at some of the tropical fish shows this year, it was really good news to hear that the Northern Goldfish and Pondkeepers Society open show was the best ever with 342 entries. This puts all the doom merchants firmly in their place when they say people are not interested in shows any more. The Koi show scene is also very strong at the moment and, as has always been the case, these things go in cycles. A year or so down the line and tropical shows could be recording huge increases in entries again.

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One feature that every reader of *A&P* should look at is the one on Torture chambers for fish. These contraptions need banning – NOW. With your help we will manage this. Contact the editorial office if you see any for sale and we will take it from there. I return on the November 13, so by the time you read this I will be sitting at my computer working furiously away on next month's issue.

Happy fishkeeping.

Derek Lambert, Editor

NEXT ISSUE

Tropical

Derek Lambert on breeding Odessa Barbs and Dick Mills continues with Characins.

Aquarium Technology

The how and why of Calcium Reactors explained.

Fish Safaris

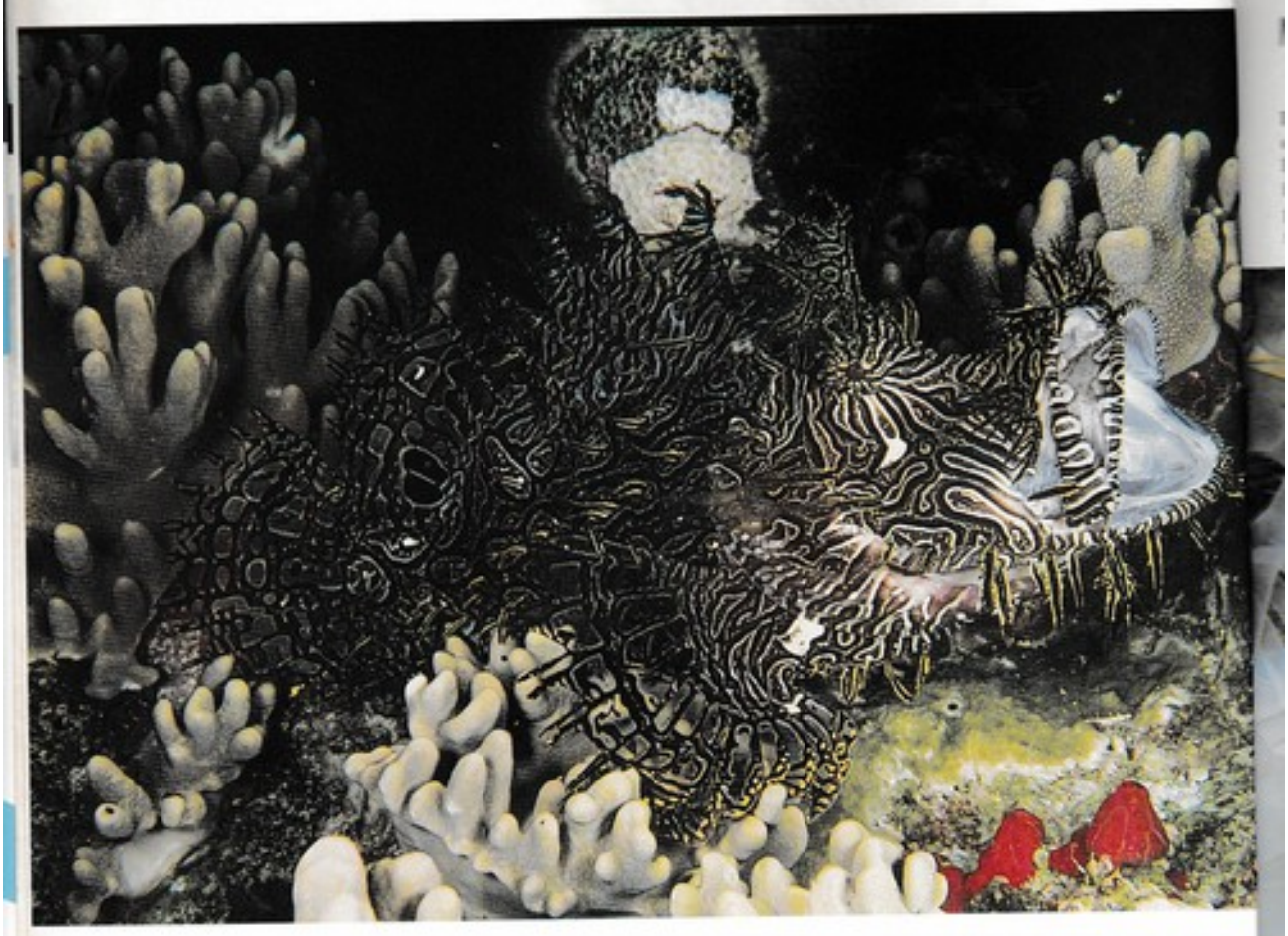
A visit to beautiful Belize.

Coldwater

Bernice Brewster is back with Koi World and Stephen Smith solves some Goldfish problems.

Marines

Dave Garratt's regular marine fish feature moves on to Filefish.



Scorpions, slugs and skulls...

MAX GIBBS HAS TRAVELLED THE WORLD IN SEARCH OF SUBJECTS TO PHOTOGRAPH. HERE HE TELLS THE TALE OF ONE OF HIS LATEST TRIPS TO NEW GUINEA IN SEARCH OF WEEDY SCORPIONFISH.

The massive island of New Guinea is noted for many things, the extraordinary diversity of its wildlife being high on the list. Perhaps the most familiar subjects in this category are the many species of Birds of Paradise. Regrettably the country is also infamous for the notoriety gained from its probably overstated and undeserved reputation for lawlessness.

The island is made up of two distinct territories. To the east is Papua New Guinea, or PNG as it is popularly known, and to the west Irian Jaya. Irian Jaya is part of the sprawling nation of Indonesia. Currently there is a strong movement in Irian Jaya engaged in a violent struggle with Indonesia to break free and become an independent state. That situation limits the area still open to tourism. PNG achieved the status of an independent nation some time ago, after an 'evolving' process of separating from Australian colonial rule. However, Australia remains the single biggest contributor of aid to the country.

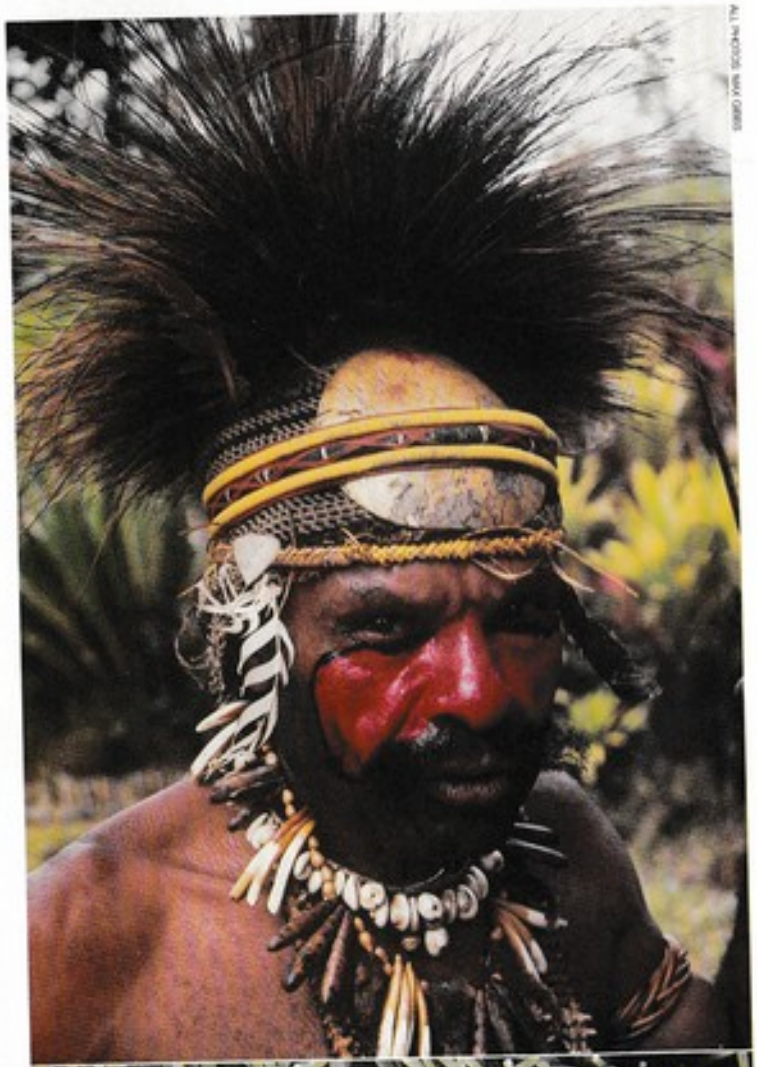
Many species of fish, both freshwater and marine, which are enjoyed by fishkeepers worldwide abound in and around PNG. The freshwater species are best known for the range of beautiful Rainbow fish that come from here. Some of these are wild caught in Irian Jaya and shipped out to the world's fishkeepers, almost invariably via Jakarta. These fish are, increasingly, being domestically bred for shipment from more conveniently situated locations. This reduces the logistical problems involved in bringing them from the point of capture to an available point of shipment. The marine fish, however, remain accessible only from wild caught stock. Since the infrastructure, or lack of it, is such that the traffic in marine fish out of New Guinea is minimal, the result is that the magnificent coral reefs are still pristine on the whole, and put at risk only by the natural elements and possible over-diving in certain 'intensively' dived locations.

Destructive power

Volcanic activity can be overwhelmingly destructive as it was in Rabaul, New England, off the main island of PNG, when in 1994 an eruption smothered the area and submerged Rabaul under six feet of mud. The rich offshore coral gardens were simply smothered in lava, waterlogged ash and mud. Interestingly, it is reported that by now there is already a healthy new growth of stony and soft corals covering the former underwater desolation. This regeneration gives an interesting idea of how long it takes for stony corals to grow, often mistakenly claimed across the board to be even hundreds of years! Sure, we can accept that huge boulder-like *Porites* or *Favites* species of coral will take many years to expand their bulk outwards from small beginnings, but less dense forms of stony coral certainly grow quickly by comparison. The devastating *tsunami* ➡

far left: Weedy Scorpionfish, the object of Max's search.

left: There was a pure white Bulb-tipped anemone quite well down one of these pinnacles, and it hosted two lovely rich crimson coloured Maroon Clownfish.



↦ that crashed on to parts of the northern shores of PNG in recent times, killing large numbers of people and reducing their homeland to a vast uninhabitable swamp, is just another example of how nature has dealt cruel treatment with extreme violence to this exotic land.

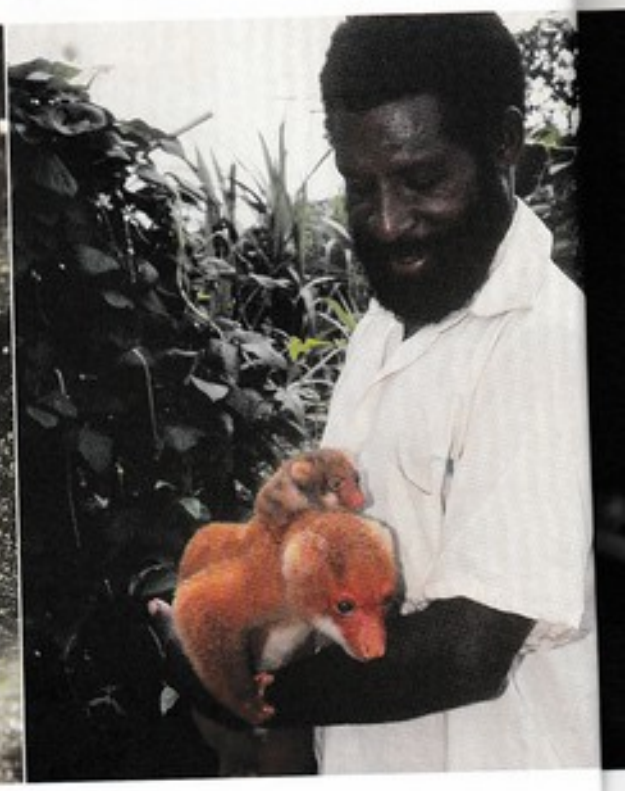
Weedy Scorpions

The famed pristine dive sites of PNG attract globally many scuba diving enthusiasts from Europe and America, and less tiringly from Australia and New Zealand, to enjoy the delight of diving such richly populated areas of coral reefs. There are certain fish and invertebrate species that have a special significance to some ichthyologists and divers, usually able to be located and studied in known sites. For me, there was one fish in particular that caused me to pack my dive and photo gear, go off and live on a custom-built dive boat for almost two weeks, in the hope of finding at least one specimen. The fish in question was the fantastic Weedy or Lacy Scorpionfish – *Rhinopias aphanes*. Some years before, this incredibly ornamental fish had been seen at an importer's premises, where it caused quite a stir. From that encounter stemmed a desire to see a specimen in its natural habitat. At that time it seemed entirely impossible, due to an extreme phobia about going underwater! Subsequent hypnotherapy overcame that condition and in due course diving became a controlling influence in my life.

The long trek to Milne Bay in PNG, however, proved to be fruitless. The crew on the boat seemed incapable of finding much more than one Blue and yellow ribbon eel (*Rhinomuraena quasita*) and a Leaf fish (*Taenianotus triacanthus*) as examples of their 'spotting' skills. I had seen both of these species many times before in the astoundingly richly endowed diving areas around Sulawesi in Indonesia. A conversation with some homeward bound American divers at the airport, however, revealed that they had seen as many as five of the Weedy Scorpionfish during their trip on another liveaboard. So this year I packed ↦

top: This character was part of a staged tourist display but you will still find natives walking around like this in parts of Papua New Guinea.

left: Another fish species that is quite often found in Milne Bay dive sites is the White Bonnet Clownfish (*Amphiprion leucokranus*).



=> up yet again and made the long flight out to Alotau in Milne Bay to board this same boat, the Chertan.

Second time lucky

During the nine nights cruise, two of the *Rhinopias* were found. The first one was green, black and white, and when first located, the wrong lens for taking good pictures was fitted, so a hasty return to the boat was necessary. On returning to the area where the fish was thought to be, a distinctive 'marker' coral formation could not be found at first, and there were several divers in tow waiting to be shown the find! But a further search soon found the fish and the photo session began. After that it must have outdone Posh and Becks for the amount of flashes it attracted.

Another fish species that is quite often found in Milne Bay dive sites is the White Bonnet Clownfish (*Amphiprion leucokranos*). The fish is distinguished by the prominent white spot on top of the head, complemented by a white stripe across the operculum (gill plate). There is a suggestion that this fish may be a hybrid between two other species of Amphiprion, *A. sandracinos* and *A. chrysopterus*, but this remains unconfirmed to date. However, the specimens I have seen always had other species of clown fish inhabiting the same anemone, so maybe this hybridisation theory is correct. But then the cohabiting of a single anemone by more than one species is not an uncommon occurrence with anemone fish species.

Quite apart from the fish species encountered, there are many fascinating forms of invertebrate life to be found in the less pristine areas. 'Muck diving' is a term that has been coined to describe the type of diving where one needs to go very slowly, looking into every likely crevasse in rock work, turning over pieces of waterlogged wood or coconut palm fronds, searching under stones or dead coral skeletons. Here you may find all manner of strange 'critters' – another term coined to describe the sort of macro life that abounds in the ocean. In Milne Bay there are a few such renowned mucky sites and foremost among these is Lavardi, or Dinah's Beach, which is a great area for the macro-photographer or critter spotter off in one direction, and beautiful pinnacles of coral and walls to dive in the opposite direction to satisfy those divers who find no real interest in the tiny subjects. So something for everybody at this almost unique place.

A similarly diverse diving area exists in the area of Lama on Ambon, but is now closed by the inter-religious fighting and killing that has made the Moluccas, or Spice Islands area a no-go zone.

Slugs and cleaners

Nudibranchs (Sea slugs) are frequent 'finds' in this place and it is always a thrill to find some of these that are not in any of the reference books onboard and nobody seems to have seen before.

At one point there is a small 'cleaning station' where fish congregate in some numbers to await the Athenian of the resident cleaner fish – mostly the Neon cleaner wrasse (*Labroides dimidiatus*) – and an army of 'cleaner' shrimps. The most industrious of these shrimps is the Cleaner shrimp (*Lysmata amboinensis*) followed closely by the Hingebeak shrimps (*Rhinocchinetes durbanensis*). Other shrimp species are also in attendance but in reduced numbers.

This is a great place to stop and just watch the action. Tomato groupers (*Cephalopholis sonnerati*) vie with a shoal of Fairy basslets (*Pseudanthias* species) and numerous other visiting 'clients' for the cleaning service.

Scorpaenid fish are also lurking beneath the rocks and corals ready to take advantage of the abundance of fish prey amassed before them, snapping up a morsel as and when they wish. A big bulb-tipped anemone (*Entacmaea quadricolor*) has a pair of Tomato clown fish (*Premnas biaculeatus*) nestling into the anemone's green tentacles. Even an Ornate ghost pipefish (*Solenostomus paradoxus*) is nose down and close to a Feather starfish it mimics so well. A tiny black and white creature huddled in the shelter of some wiry red algae proves to be a lovely type of Aplysid Sea Hare when disturbed from its slumber. Just a metre or so away there is a 'pair' of nudibranchs passing by nose to tail, as is the habit of *Risbecia tryoni*.

During the night the boat was moored at the edge of a drop-off that plunged some 800 feet down to the bottom. A wire trap baited with chicken and fish offcuts from the galley was lowered down on what seemed to be an endless length of rope and finally secured to a buoy once it had bottomed, and left overnight. The next morning the boat crew gradually raised the trap and as it came to the surface we could see there were nine specimens of the spectacular Nautilus (*Nautilus pompilius*) in there along with a fine red snapper.

The snapper went to the galley to be prepared for lunch. The Nautilus were given out to us divers who took them on a dive to photograph them before releasing them to the preferred territory of the depths they had been raised from. This creature is not a shellfish but, more accurately, a close relative of the octopus and is an interesting subject to examine at close quarters, which only a contrived encounter such as this can provide for the normal scuba diver with compressed air, because of the extreme depths they are normally found at.

Pinnacles of opportunity

Two large pinnacles at another site provided lots of photo opportunities. At the top of each pinnacle there was a concentration of fish life, just as might be found on a reef top but with less territory to spread out over. What a pity these conspicuous fish took the other diver's attention so completely that they overlooked some delightful mini goby species that were abundant on the rocky surfaces of the pinnacle's steep sides. There was a pure white, Bulb-tipped anemone quite well down one of these pinnacles and it hosted two lovely rich crimson-coloured Maroon Clownfish – a wonderful photo opportunity. Around the other side was another anemone – a *Heteractis magnifica* this time – which was closing up and forcing its occupying Anemone fish (*Amphiprion ocellaris*) out of the protecting tentacles, creating a lovely picture.

top (left to right): Nudibranchs (Sea slugs) are frequent 'finds' in Milne Bay, and it is always a thrill to find some of these that are not in any of the reference books onboard, and nobody seems to have seen before. Here we see a Starry glossodoris (*Glossodoris stellatus*).

Papua New Guinea is full of exotic wildlife. Here a Cuscus and its baby are being shown off.

Ornate ghost pipefish (*Solenostomus paradoxus*).

All this excitement underwater is only a part of the overall experience available to the traveller to PNG, of course. I had 12 days to fill between a dive trip around The Marquesas islands and the liveaboard in Milne Bay, PNG, on my first visit. During those 12 days an itinerary prepared by Trans Nuigini Tours took me from Port Moresby to Madang, then on to Mount Hagen. From there to the Karawari River, and onwards to the Sepik River and finally to Tari. A combination of light aircraft and boats provided the transfers and trips. In this short timescale ⇨

⇒ it was possible to see many different tribes and cultures from the comfort of lodges, river boats and a floating hotel-type boat. True, most of the meetings with various cultures were laid on for the tourist, but in places like Tari it was possible to see men from middle aged through to older age groups still walking about their everyday lives with a stick through the nose, cultivated hair 'wigs', and even 'ass grass', a garment made of leaves that covers the backside! There were no penis gourds being worn though, although they were available as souvenir 'artefacts'. It seems these gourds are more often still worn in everyday life in parts of Irian Jaya.

Unforgettable were the groups of various tribes who had stopped along the road near Mount Hagen to decorate their bodies with different coloured muds, according to which tribe they belonged, ready to join a huge gathering in a roadside field to ceremonially mourn the passing of some important local administrator. Both myself and an Italian tourist wanted to take photos of the event but were warned by their courier that this was not wise, and pointed out he could not accompany us because he was not of the same tribe as the onlookers. Sure enough, there were grim looks as we two westerners joined the outer margins of the crowd of onlookers, but the Italian man slipped and fell into a muddy patch as he tried to clamber up a strategic bank. This caused the crowd to burst into laughter and from that point on accepted the two visitors without more malicious looking suspicion.

Skull caves

It has to be said that the highland people of that area generally have a threatening appearance, and scowling expressions are more frequently worn than the sometimes fleeting smiles. The coastal dwellers around Milne Bay have an altogether more pleasant countenance but they do have skull caves containing the skulls of persons from neighbouring tribes who had been captured during skirmishes and cannibalised– and not that long ago either!

The reputation of places like Mount Hagen and Port Moresby as centres of crime are undoubtedly well founded, but should be regarded as overstated by the media. That said, it is apparent from the lack of shop windows and razor-wire topping perimeter walls of business and other premises, barred windows and doors to banks and post offices, security staff frisking and searching the pockets and bags of customers leaving a 'supermarket', guards outside hotel compounds with clubs or bow and arrows, that there certainly is a crime problem there. I had the good fortune to miss an armed robbery at a lodge in Madang by one night, when six men had entered the lodge and ordered everyone to lie face-down on the floor. They then robbed the few guests of their valuables, airline tickets, and passports, before emptying the lodge's safe. The captain of the river boat on the Sepik River said he would expect 'trouble' about every 18 months, and on that scale it was 'acceptable'.

So be aware of the actual risk element before deciding if it is for you. The land travel is certainly exciting in its own right without any additional dimension a brush with crime might provide. If you wish to join a liveaboard trip out of Alotau into Milne Bay but want to avoid staying in Port Moresby before transferring, the offshore resort island of Loloata has accommodation and diving facilities and will provide a pickup and transfer service at the airport. ■

left: The coastal dwellers around Milne Bay have a pleasant countenance but they do have skull caves!

below: Part of the crowd of various tribes in a roadside field to ceremonially mourn the passing of some important local administrator.

The winner by a nose

CICHLID ENTHUSIAST DAVE TOURLE HAS A PARTICULAR FONDNESS FOR FUELLEBORN'S CICHLID – *LABEOTROPHEUS FUELLEBORNI*.

ALL PHOTOS M.P. & C. PIENAAR UNLESS INDICATED

Most African Rift Lake Cichlid enthusiasts will agree that it is the stunning colours, high activity levels, as well as the many different forms and variants, that makes them so popular with fishkeepers all over the world. This was certainly the scenario, when my partner, Sonia, and I first encountered these fascinating fish during some of our regular tours to various aquatic outlets. After setting up some very attractive Malawian Cichlid communities and having had regular spawning successes with some of the species, one notable exception was *Labeotropheus fuelleborni*, as our original trio had been given to a more experienced aquatic friend. Some of our reference books warned that this species might be aggressive and was therefore probably unsuitable for a "run of the mill" Malawi community tank. However two or three years later, having gained more knowledge on the maintenance of Malawi Cichlids, we decided to purchase some more challenging Mbuna species, which included *L. fuelleborni*.

We already had a 72"x18"x18" tank set up as a Mbuna community and I thought that the most sensible approach

left: This male *Labeotropheus fuelleborni* comes from Katala in Lake Malawi.

above: Female *Labeotropheus fuelleborni* all look very similar. This one is brooding a batch of eggs.

right: Male *Labeotropheus fuelleborni* feeding in the wild.

would be a "resettlement programme", that is, transferring about 30 per cent of the tank population to another smaller tank. This plan would serve two purposes: to make room for the newcomers; and to confuse the existing territorial hierarchy and reduce the inevitable aggression that normally occurs when introducing new fishes to a Malawi community tank. Not only was this an opportunity to set up yet another tank, but the fishes to be moved to the new 48" tank were those at the lower end of the pecking order of the 72" set-up.

The nose knows

I have to admit that I have always considered the *L. fuelleborni* to be a very comical fish as far as looks are concerned – a sort of fishy Jimmy Durante, due to the broad underslung mouth, which gives the fish a large "bulbous nose" appearance. However this fleshy nose plays an important part in the life of these fishes and has a lot to do with their almost unique place in the Lake Malawi food chain.

First described by Ahl in 1927, *Labeotropheus fuelleborni* is found throughout Lake Malawi. The favoured habitat is the upper 5-8 metres of the rocky shoreline or outcrops of rocks in shallow sandy areas. The main source of food for this fish is the tough algal strands that grow on rocks near the surface, where the water is at its most turbulent and strong currents can increase around the wave battered rocks. It is in this environment that the "nose" really comes into play! I was fascinated to learn that the nose is used as a lever against the rock, while biting the algal strands with three or more rows of tricuspid teeth in the outer jaw. The feeding action is therefore reminiscent of a tin opener, with the mouth forced down firmly against the rock and the body held at an angle of 25 to 30 degrees. This enables the fish to stay very close to the rocks and so avoid being swept away by a sudden surge or current of water. The body shape is also important, as *L. fuelleborni* is deep bodied and laterally compressed with a long, large dorsal fin, which is ideal for the fish to remain steady and on an even keel in turbulent water conditions.

On recent diving trips to Lake Malawi, I was able to observe this feeding pattern and behaviour many times and the spectacle never once lost its appeal. I constantly followed browsing groups of *L. fuelleborni*, all the while trying to keep myself steady among the algae covered rocks in my cumbersome scuba equipment. It is interesting to note that the *L. fuelleborni's* nose will actually grow in proportion to its use, as the stronger the current or turbulence, the harder the fish will press into the rock. This causes the nose to get harder or more "callous" and grow slightly larger, so the angle of the mouth and nose on the rock is even sharper. Subsequently, the fish is "closer" to the rock surface and ⇨

⇒ less affected by the stronger current, which is incredible and I had the cheek to think that they looked rather comical!

Many colour variants

The fact that *L. fuelleborni* prefers the upper rocky areas and will not normally venture lower than 30-35 metres means that isolated populations have evolved with distinct colour variations. The females, however, are all very similar and individuals from different locations are very difficult to tell apart. Their coloration ranges from a light rusty brown, to orange or even orange blotch. Most females from the various populations are usually about 25 per cent smaller than the males, but overall sizes at the locales can vary considerably. The largest males can reach 20cm whereas the smallest only achieve about half that size.

Male coloration can be really spectacular, particularly those variants found at Zimbawe Rock, at the southern end of Lake Malawi. These males are solid blue, with faint vertical bars and a hint of yellow in the unpaired fins. At Munbo Island the bars become darker and more distinct, especially around the head. Further north and slightly to the west of the lake, the males were showing more yellow along the flanks. I observed some very attractive light blue and yellow males at Nakantenga Island and a pale ice blue specimen with an orange dorsal fin at Mbenji Island. There is also a rarely seen orange blotch male, the "marmalade cat", which is always sought after by Malawi Cichlid enthusiasts.

Our three fishes, bought from a London retailer, were simply labelled wild caught *L. fuelleborni* and there was no collection data available. From their coloration and the information available, I was fairly certain that they were from one of the eastern or possibly southern locations of Lake Malawi. The male was a solid dark blue with faint barring and about 12cm TL, the females were an attractive orange blotch colour and slightly smaller in length. Initially, the trio was housed in a quarantine tank, which had plenty of hiding places for the females, as we were not too sure how the "aggressive" male would be. It was actually the male Fuelleborni who remained hidden for most of the time!

above: The unique nose and rows of tricuspid teeth enable *Labeotropheus fuelleborni* to feed on tough algae strands.

After two weeks, it was time to implement the "resettlement" operation for some of the Mbuna. We had decided to remove some of the *Metriaclima zebra* species, all the *Melanochromis johanni* and one or two odd single fishes from the lower end of the pecking order. All the recent purchases, the trio of *L. fuelleborni*, a trio of *Pseudotropheus crabro* and a trio of *Pseudotropheus socolofi* were to be added to the established 72" tank, so should be sufficient in numbers to cause confusion to the existing tank residents. These species consisted of *Melanochromis auratus*, *Pseudotropheus lombardoi*, *Metriaclima* sp. "Metangula" and *Pseudotropheus elongatus*.

After much swearing, splashing and long periods of waiting, with fish net in hand at the ready, for fishes who had absolutely no intention of co-operating, Sonia and I finally succeeded in moving them to their correct, respective aquariums. The confusion tactics worked well and after a relatively short period of time, the fishes in both tanks had sorted out a new pecking order. Once they realised that food was still available on a regular basis, some of them turned their attentions to more important activities, such as digging holes in the substrate and spawning!

Five months to breed

About five months later, it was the turn of the *L. fuelleborni* to spawn and it was very interesting to observe that, unlike other Mbuna, the female laid three or four eggs on the chosen spawning site, a piece of rock in the entrance of a small cave at one end of the tank. She allowed the male to pass over the eggs, fertilising them, before taking them into her mouth and then laying a few more, as the process was repeated. This may explain why the eggspots on the anal fins of male *L. fuelleborni* are quite small in proportion to his size, as though their importance in breeding has become somewhat diminished. The eggs, however, looked quite large and following spawning, the female's bucal cavity looked ludicrously large, especially with the combination of that "bulbous" nose.

After a week and a half, we decided to move the brooding female to a small breeding tank, so I carefully caught her, trying not to stress her unnecessarily. She released her 15 fry about 10 days later and was immediately given some very welcome food. She remained with the babies for a further five days, but then she lost interest, so she was moved to another small tank to continue with her fairly intensive feeding. This built up her strength before returning her to the main Mbuna community tank. The fry grew on well and we successfully raised all 15 of them.

Some years later, while diving with this species in its natural habitat, I was able to appreciate the reasons for its unusual appearance and actions. I took great pleasure in having the opportunity to observe a delightful character and who is certainly a "winner by a nose". ■

Deadly Defe

DAVE GARRATT CONSIDERS THE PECULIARITIES OF BOXFISH AND TRUNKFISH.

The Boxfish or Trunkfish belong to an unusual family of fish, the Ostraciidae, unusual on account of their 'armour-plated' bodies. The bodies consist of hard, inflexible bony plates covered by a delicate skin. The only flexible body parts are the eyes, mouth, gill openings, dorsal, pectoral and caudal fins, otherwise their bodies are completely enclosed and protected. They are usually found close to the sea bed where they feed on algae, sponges, corals and small crustaceans.

The Boxfish make for very appealing (or in some eyes even cute) inhabitants of a marine aquarium. Unfortunately this appeal leads to the demise of many Boxfish at the hands of inexperienced aquarists. For a number of reasons they are not easy to keep and cannot be considered a beginner's fish.

above: A beautiful male Hawaiian Spotted Boxfish, *Ostracion meleagris camurum*.

Toxin alert!

Many Boxfish have a potent form of self-defence in the shape of toxic secretions. When threatened they can emit a powerful toxin aimed at disabling any aggressors and enabling the Boxfish to make their escape. In their natural coral reef habitat the aggressor can easily distance itself from the effects of these toxins but, in the closed confines of captivity, there is no escape, only certain doom for all concerned. The toxin is very potent and is none too selective, meaning the Boxfish itself does not have immunity to it. Consequently all the fish in the tank, the Boxfish included, suffer a rapid death.

A conversation with a well-respected importer demonstrated to me the potency of this toxin. He said that he had seen an entire 100 gallon tank of fish wiped out by the smallest amount of water transferred from a toxin affected tank to an unaffected tank. The unsuspecting employee had seen the problem in one tank and attempted to catch the fish and place them in a nearby tank. The water transferred on the body of the affected fish and the net used for the transfer had been enough to wipe out the inhabitants of the new tank.

Having raised all sorts of alarm bells concerning these toxins I have to say I know of very few aquarists who have suffered a wipe-out although, as I will mention later, it is fair to say the odds do appear to be species related.

Hovercrafts

The Boxfish, and in particular the species *Tetrosomus gibbosus*, are commonly called Hovercraft. Because of the restrictions and lack of flexibility that their armour-plated body endows on them, all the species swim via rapid sculling movements of the dorsal, anal and pectoral fins, while using the very flexible caudal fin as a rudder. This slow and ponderous locomotion can, with a lot of imagination, be likened to a slow hovering style of swimming.

Their slow nature leads to another problem in captivity, albeit one that is easily avoided. They are driven to distraction by the attention of cleaner fish such as the Cleaner Wrasse. Whether the outer skin covering the bony plates is extremely sensitive I am not sure, but there is no doubting how unhappy a Boxfish is with any fish that wants to clean it. The two species should not be housed together or you might see a demonstration of the previously discussed problem of toxin emission.

High juvenile fatality rate

Some Boxfish, in particular *Ostracion tuberculatum*, are seen for sale as tiny juveniles. The smallest I have seen were unbelievable and could only have been about 0.5" square, I have also regularly seen 1" square specimens. Bearing in mind that this species grows to 18" in its natural environment you begin to realise just how small these specimens are. These tiny colourful fish (bright yellow with blue spots) have enormous appeal but unfortunately, and perhaps not unsurprisingly, many of them suffer a slow demise once in captivity. It has been suggested that an inadequate diet at this crucial stage of development may be one of the reasons behind such high fatalities. I am sure some readers can dispute this, but I know of only a tiny number of aquarists who have raised one of these tiny specimens to any reasonable size or reasonable life span – surely a case for not importing them? Other species such as the Cowfish, *Lactoria cornuta*, do seem to be hardier beasts and perhaps offer a better alternative.

ender

Available species

The Boxfish are a smallish family of fish with around 50 species of which only four Indo-Pacific species are regularly available to the hobbyist. I have already suggested that none of these are easy fish and I have placed them in order of hardiness based on fellow aquarists' experiences, beginning with the hardiest, the Cowfish.

The Cowfish, *Lactoria cornuta*

The Cowfish is so-called because of the two elongated horns on the top of its head. The fish also has two similar projections at the rear of its body. The body colour is a very attractive yellow with blue spots. This species can reach 20" in the Indo-Pacific and I have friends who have raised a small specimen to a very healthy 8" or 9" in a 150-gallon tank, representing the largest specimen I have seen in the home of a hobbyist.

The Cowfish feeds on algae and small Crustaceans but appears to be omnivorous, readily adapting to a varied aquarium diet. A Cowfish cannot be trusted with its own or similar species, although I have seen it kept successfully with large Puffers. Unfortunately it has a habit of pecking at Tubeworms or Coral polyps and so cannot be trusted with these or similar sessile invertebrates. While the fish seems hardier than some of its relatives, it has been associated with toxin emission and tank wipe-outs.

The Hovercraft, *Tetrasomus gibbosus*

The Hovercraft is often available as small 1" specimens and is a great favourite among hobbyists. They can quickly become very tame and will readily feed from the hand giving the fish such great appeal that it has almost attracted a cult following, especially with the ladies. While it does seem hardier than some other Boxfish, its thin, delicate skin is prone to injury, infestations and infection hence it must still be classed as a difficult species. I have never heard of a Hovercraft being associated with a toxic induced wipe-out.

It can be raised in captivity to a size of 5" or 6", small compared to its fully mature natural size of 15". The Hovercraft generally adapts to a varied aquarium diet, but bear in mind it only takes small particles of food and it also relishes live Brine shrimp. Like the Cowfish it will not tolerate its own kind and it has a taste for Tubeworms and other sessile invertebrates. The Hovercraft is a shy fish and harassment can be a real problem, therefore, it must not be kept with over boisterous tank-mates. Having said that, I have seen a robust 4" specimen thrive in a 200-gallon tank with a much larger Cowfish and four very large Puffers.

Ostracion meleagris

With its yellow spotted, purple flanks and dark topside with white spots, the male of this species is a very attractive fish. The less striking female is entirely black with white spots. While the colour differences make them easy to sex you can forget about breeding as it is virtually unknown in captivity – and all your time will be spent keeping them alive and healthy. They have the reputation of being very demanding fish that may not feed or settle into captivity. A peaceful, shy species with a predilection for juicy sessile invertebrates, the species has definitely been associated with toxin release and subsequent wipe-outs in captivity.

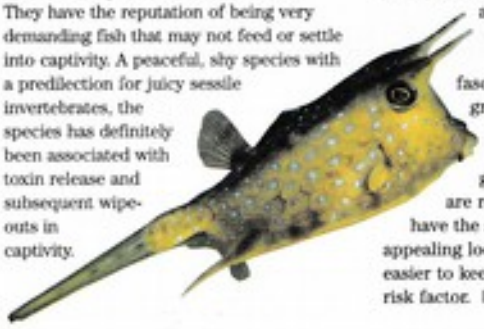
Spotted Boxfish, *Ostracion tuberculatum*

I have already discussed the fatal attraction of this species and cannot really add much more from a personal point of view. If you are lucky enough to succeed with this species, the yellow coloration will change to a yellowy/green as the body changes from cuboid to an elongated form with a large caudal fin. They are peaceful, shy fish that must be housed with docile tank-mates, but as they grow (or if they grow) they are not to be trusted with sessile invertebrates.

Final advice

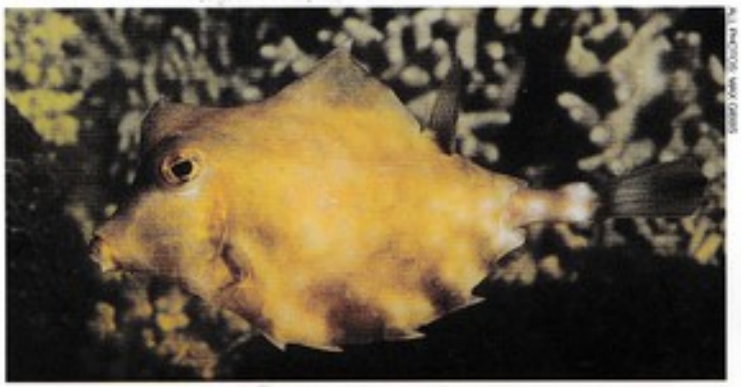
This article is in contrast to my recent ones that have generally focused on fish that are suitable for the beginner – Gobies, Blennies, Surgeons and even some of the Dwarf Angels. However, the Boxfish are an entirely different proposition. They are tremendously attractive, odd shaped fish with quirky swimming habits, bright colours and appealing looks. Unfortunately they are difficult to keep and could present a hazard to your entire stock. The Hovercraft is probably the least risky although it is probably not as hardy as the Cowfish.

The Boxfish are fascinating fish presenting a great challenge for the experienced aquarist. There is a possible alternative in a group of fish that the Boxfish are related to – the Puffers. They have the same quirky actions and appealing looks but are generally much easier to keep and much less of a toxic risk factor. ■



above: The Cowfish, *Lactoria cornuta*, feeds on algae and small Crustaceans and has a habit of pecking at Tubeworms or Coral polyps, so cannot be trusted with these or similar sessile invertebrates.

below: The Hovercraft, *Tetrasomus gibbosus*, is often available as small 1" specimens and is a great favourite among hobbyists.



No strings at

A visitor to any aquarium shop at the weekend is likely to encounter a wide range of the populace marvelling over the flashy little fishes glinting around the tanks like multicoloured jewels. Few will take the time to examine the bottom of the tanks, and, if they do, their eyes pass swiftly over what appears to be piles of detritus at the bottom. This is where Banjo catfishes are to be found (assuming the shop even bothers to stock them) and, while the fishes in the upper reaches are undeniably more beautiful, the fish lurking at the bottom hold a fascination for those who take the time to get to know them.

Banjo catfishes gain their common name from a passing similarity to a banjo in shape, albeit one made out bits of dead leaf. The body is flattened, and roundish in shape, followed by an extremely long tail that is the 'neck' of the banjo. There any resemblance stops – musicality is not one of their many interesting features, although, like many catfish, some species can make noises when perturbed using their pectoral spines and swim bladder.

Identifying which particular Banjo catfish you are looking at is not the easiest of tasks and can fool even experts. Although about 60 members of the Aspredinidae have been described, a large number of these are now considered merely to be forms of already described species. There are currently about 35 five accepted species but probably still more yet to be described!

Immense maw

They vary greatly in size, from the tiny Ecuadorian *Hoplomyzon papillatus*, achieving the unassuming length of about 20mm, to the considerably larger *Aspredo aspredo*, which grows to over 12" long. Size is quite an important consideration when introducing one of these to your tank. Not only do you have to consider the space that the fish will actually fit into but the size of the fish's mouth! Banjo catfishes can eat amazingly large pieces of food for their size and, as is usual for fishes with a short digestive tract, they are predators. Lurking at the bottom of the tank, immobile for the most part, and often semi-submerged in the substrate, they may look harmless but are unlikely to look so harmless to a small fish investigating the bottom who has just witnessed an immense maw open in front of him.

A commonly available Banjo, *Chaca chaca*, the Squarehead (or Frogmouth) catfish, is particularly well known for quietly devouring small fish in the tanks of unsuspecting aquarists. This fish is also known as the 'angler catfish' and, although the concept that they might lure small prey to them by angling with their

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CATFISH EXPERT, KATHY JINKINGS, STRUMS ALONG WITH BANJO CATFISHES.

top left: Banjo Catfish look like they are made out of bits of dead leaf. This is *Dysichthys amaurus*.

top right: *Amaralia hypsiura*.

right: *Aspredo aspredo*.

ALL PHOTOS DAVID SANDS UNLESS INDICATED

barbels is a good idea, there seems little evidence. It is quite sufficient for them to lie in wait quietly until a small fish approaches, and then open their mouths wide. Water is expelled through the gills creating a vacuum, which sucks the unsuspecting prey in to its doom.

Species tanks, or at least those with larger tank-mates, are a good idea for these fish, although fish that can be relied upon to remain in the upper water layers are relatively safe. In the aquarium they can be kept happy with large quantities of live or frozen Blood worm, tubifex and other sinking meat foods, on which they will gorge themselves thoroughly. ⇨

left: A female *Aspredo cotylephorus* imported by Dr David Sands with eggs already on the belly. This unique photograph shows the eggs developing

below left: Squarehead (or Frogmouth) Catfish like this *Chaca bankanensis* are well known for devouring small tank-mates.

Remarkable features

➡ This family of catfishes has a number of remarkable features. Although not one of the mailed catfish groups, the head is shielded by a bony shield that is visible through the skin and gives them a mailed appearance. The skin itself is completely keratinised and ornamented with tubercles, and is shed periodically, like that of a snake. They are marked to allow them to be as unobtrusive as possible, with 'dead leaf' patterns in varying shades of brown. These patterns can be different between individuals of the same species, and the effect, coupled with bumps and knobs on the heads and bodies of some species, make them almost indistinguishable from the vegetation and leaf litter of their native South American streams.

They are so good at staying still that some specimens have been found in the wild almost entirely surrounded by sheets of algae, that must have taken some time to grow. Nonetheless they are indeed capable of movement, and can not only swim by undulating their bodies but also by squirting jets of water from their opercular openings, moving along the substrate by jet propulsion.

Unique spawning method

Although many fishes practise parental care, often guarding their eggs with great diligence, there are few that carry their eggs around with them. One group of the banjos, including the genera *Aspredo*, *Aspredinichthys*, and *Pterobunocephalus* care for their eggs by attaching them to their bodies. While in *Pterobunocephalus* the eggs are directly attached to the body, the others have their eggs joined on by fleshy stalks. These grow out from the female in the spawning season, and may allow interchange of nutrients between the mother and the developing fry. These stalks, known as cotylephores, remain on the female after the fry have hatched and become free-swimming. It has been suggested that the eggs are attached in this way in order to be carried from brackish spawning sites into freshwater for the fry to hatch, although little is known for sure on the subject. *Aspredo cotylephorus* (named for the egg stalks) is reported to have spawned in aquaria, and it has been theorised that the females lay their eggs in a hollow depression and then lie on them when they become joined to the cotylephores. It is suggested that the fish actually spawn in brackish water and then migrate against the current into fresh water, carrying their eggs with them to an environment where the fry can hatch safely.

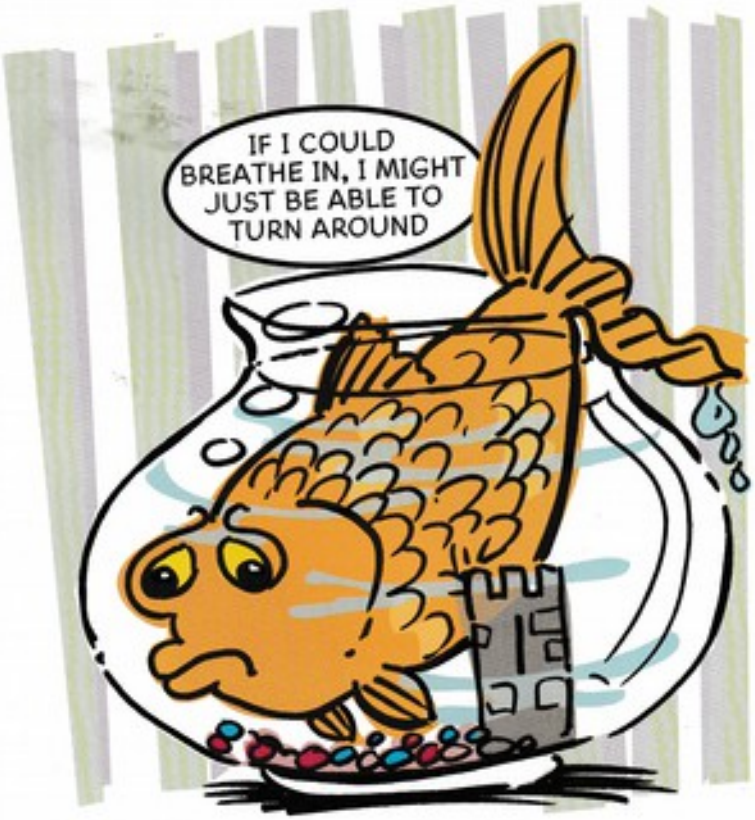
A female imported with eggs already on the belly by Dr David Sands resulted in the successful hatching of fry in fresh water, after which the female, who had been ignoring food, returned to her normal voracious feeding habits.

Bunocephalus do not carry their eggs around, but have been known to spawn in the aquarium. Usually in the spring, after the fishes have been well-fed for several months, the male chooses a spawning site and excavates a hollow, wherein the female deposits a large number of eggs – between 4,000 and 5,000. The male guards the eggs until they hatch, when they can be fed on Micro worms and Rotifers before graduating to larger live foods. This fish, known as the 'little guitar' in parts of South America, is relatively often available in shops, and will give even the experienced aquarist a new challenge in spawning, as indeed will all the banjo catfishes.

Although these fishes have been found in aquarists tanks for some time, their habits remain largely uninvestigated and unknown. The fish pretending to be a pile of rubbish on the tank bottom offers one of the best opportunities around today for an aquarist to try something new, observe, and return information to the hobby, and deserves a closer look next time you are in the shop being dazzled by the fast swimming beauties in the upper reaches! ■

Micro madness!

WITH THE GOLDFISH BOWL HAVING BITTEN THE DUST IN THE UK, *A&P* DISCOVERS ANOTHER TORTURE CHAMBER CROSSING THE ATLANTIC...



WITH THE SCIENCE behind good fishkeeping being well understood, an aquarium design that breaks almost every rule in the book should never be allowed. But those of us who have been surfing the aquatic Internet sites for some time have been horrified to see a tiny 4"x4"x5" aquarium being sold by mail order in the USA. This complete set-up comes with gravel, coloured stones, a piece of plant, a snail, several fish or, possibly, a frog. It is claimed that these baby aquaria are a perfect ecosystem: 'The tiny fish, aquatic plant, live rocks and natural water share their habitat in balance and beauty'.

They contain 'hardy fish species that are grown specially for small aquariums and live comfortably from 60-85°F. If properly cared for, cleaning is seldom necessary (3-4 times a year). Use only bottled water. Feed the fish only a small pinch of food once daily or every other day through the hole in the top using the tip of a toothpick.'

The fish supplied may be Guppies, Swordtails, White cloud mountain minnows or Barbs. In one photograph there are two Rosy barbs. 'Most of the fish we use have a one- to two-year life span and will not get any larger than 1"-4" long'.

Examine the facts

With a 4"x4" aquarium, there is a surface area of 16sq.in – just enough for 1.25" of fish. Yet even one Guppy grows larger than this. White cloud mountain minnows come from fast flowing waters and need more oxygen than many other fish, so they would be in even more difficulty.

Assuming the fish are small enough and sufficiently hardy to survive the low oxygen levels, these baby aquaria have no heating so fish have to cope with normal room temperature, unsuitable for most of them.

As for the 'perfect ecosystem', there is a wonderful diagram showing fish waste being produced, uneaten food and ammonia all passing into the substrate. Here nitrifying bacteria turn them into nitrates that the plant uses to grow. This would work if oxygenated water was cycled through gravel, as it does in an aquarium filtered by a sub gravel filter. But there is no water movement here, so bacterial action will be limited and ammonia and nitrite will build up.

UK ban possible

Many people have signed petitions, both via the Internet and in reputable aquarium shops across the USA. So far, however, a complete ban on their sale has not been achieved.

Sadly, what starts as a fad in the USA often crosses the Atlantic and gains a toehold in the UK – a member of Robin Hood Aquarist Society has seen these on sale in Nottingham. After several complaints to the RSPCA, little had been done to stop their sale. *A&P* then contacted the RSPCA to be told that they required reputable people willing to testify to the cruelty involved. We quickly lined up several experts (including public aquarium curators, vets and long-standing aquarists) who were prepared to give evidence in court. With luck, these devices will be banned before they are widely on sale in the UK. ■

You can help

Do you know of any shops that are selling these baby aquaria? Keep a lookout for them in aquarium shops, market stalls, gift and novelty shops, newsagents and anywhere that may be selling them as Christmas gifts. Contact the Editorial office on 01673 885352 if you spot one.

Trade Talk

THIS MONTH *A&P* HAS NEWS OF A VALUABLE NEW SPONSORSHIP DEAL, A COUPLE OF NEW PRODUCTS – AND WHY AQUAZOO IS ON TENTERHOOKS ABOUT ITS NEW WEBSITE!

TAP on wood

BEAUTIFUL AND UNIQUE pieces of tropical hardwood are the highlight of a new range of aquarium decorations from Technical Aquatic Products (TAP). Each piece is an individual work of art by nature and is so attractive that it could also be used as an ornament for the home or garden.

Sinking readily even when dry, the wood comes from two sources: the African Savannah and Indian mangrove swamps. The Savannah wood comes from fallen Mopani trees and has been sculpted by the natural action of wind and termites. The Indian wood has been submerged under water for years and has been shaped by the tides. Both types of wood are gathered without harming the local environment.

All the pieces of wood are free from bark and insects and have been de-tanned to prevent discoloration of aquarium water.

Recommended retail prices range from £2.99 for a 6" piece to £9.99 for a 24" variety.

For your local stockist, call Technical Aquatic Products on 01275 810522.

Qualified success

The Tropical Marine Centre (TMC) is sponsoring a Visiting Lectureship in Aquarium Sciences and Conservation at the University of Plymouth. The new part-time lectureship will contribute to a postgraduate (MRes) degree in Applied Fish Biology. The new degree represents a development of the internationally acclaimed MSc in Applied Fish Biology which the University has been successfully running for some 25 years.

'As a world leader in ornamental aquatics we recognise the importance of supporting teaching and research in this rapidly developing field,' said Paul West, Managing Director of the Tropical Marine Centre.

Dr Peter Burgess, an ornamental fish consultant and editor of the international science journal Aquarium Sciences and Conservation, will take up the lectureship. Peter is looking forward to meeting the first cohort of MRes students. 'The aquarium sciences and technology module is unique in Britain and is formal recognition of the importance of the ornamental fish and public aquarium industries,' he said.

For further details about course content and suitability of applicants, please contact Dr David J Price, Dept of Biological Sciences, University of Plymouth, Plymouth PL4 8AA. Tel: +44 (0)1752 232947; Fax: +44 (0)1752 232970; email: d.j.price@plymouth.ac.u

Better by design

THE AQUAZOO WEBSITE has reached the final three in *Computer Weekly Magazine*'s E-Business Excellence Awards. The awards are aimed at companies that have used Information Technology to transform their business and are held in conjunction with Reed Exhibitions which runs the UK's biggest e-commerce show, E-Business Expo.

The awards involve every sector of business from finance, manufacturing and retail through to local Government. The Aquazoo site has reached the finals in the Design Section and a representative from the company's IT department is now due to meet the judges for the next stage of the assessment process. Aquazoo will then have to wait for the award presentation on November 7 at the Intercontinental Hotel in London's Park Lane to hear the final results.

Tony Verrinder, who heads both Aquazoo and sister company Sera Partners, was totally blown away by the news. "I know our website has broken new ground and that the look and contents are second to none. But to reach the finals in such a prestigious competition is an achievement beyond my wildest dreams," he said.

Check out the Aquazoo site at www.aquazoo.co.uk.

The right treatment

The diversity of the aquarium biotope calls for flexible matching of the filter technology, irrespective of fresh water or salt water. Tunze Aquarientechnik offers two compact solutions for indoor operation: the water treatment plant Tunze system and Comline.

Featuring modular design, the two versions may be extended in functions and performance to meet requirements, and it makes no difference if a user starts with the basic system and extends it later. To facilitate the choice of each tailor-made system, Tunze Aquarientechnik supplies various versions of the two systems as compact and inexpensive kits.

More information about these kits may be obtained through the website at www.tunze.com.

Club News

A&P'S MONTHLY ROUND-UP OF CLUB NEWS.

Success of NGPS

THE NORTHERN GOLDFISH & Pondkeepers Society was formed in 1959 and has always held an annual Open Show for pedigree Goldfish. For the last 15 years this has been shown at The United Reformed Church on Delamer Road in Altrincham. This year's show, held on Saturday September 30, was the best ever with 342 entries. To win 'Best in Show' from so many entries required a very special fish. This was a London Shubunkin by Brian Parkin of NGPS and the fish also won 'Best London Shubunkin' and the new 'Bill Cumbernauld Memorial Trophy'. This award, a special category in memory of member Bill Cumbernauld who died recently, is a carving of a Shubunkin by Brian Walsh of the FNAS.

● Above: Best in Show' winner Brian Parkin of NGPS.
● Left: The Bill Cumbernauld Memorial Trophy.

New *Aquarist & Pondkeeper* Show League for 2001

Aquarist & Pondkeeper is pleased to announce a new competition for the aquatic show scene. Several Federations already run show leagues in various forms, either for individual exhibitors or for clubs. These, however, are limited to just the shows held under each Federation's rules. With exhibitors travelling further afield and supporting several different Federation's shows, we felt it was time to launch a National Aquatic Show League where prizes gained at any open show throughout the UK would count towards the competition.

For any show's results to count towards the show league it must have its date, contact address and venue published in *Aquarist & Pondkeeper* prior to the show. This information must be with the editor two months before the sho Hopefully clubs will send this information in themselves, but an exhibitor who wants a show to b included can send the details in.

Monthly updates will be publis in *A&P* so we can all keep up to date with who is in the lead. Any exhibitor interested in taking part in the National Aquatic Sho League should send a S.A.E. to *A&P* National Aquatic Show Lea *Aquarist & Pondkeeper*, TRMG Winchester Court, 1 Forum Pla Hatfield, Herts AL10 0RN.

Diary dates

DECEMBER'S SHOW, AUCTION AND CLUB MEETING DATES.

Fri 1st	
Sat 2nd	
Sun 3rd	
Mon 4th	
Tues 5th	**Gloucester F.C. Club meeting** Contact 01453 824810 **Southend & Leigh Club meeting** Contact 01702 305740
Wed 6th	**Corby & D.A.S. Club meeting** Contact 01536 761736 **Oasis Fish Club (Sunderland)** Contact 0191 384 1433 **Hounslow Club meeting** Contact 01784 259230 **Merseyside Aquarist Society** Contact 0151 201 6085
Thurs 7th	
Fri 8th	
Sat 9th	**Koi Auction at Discount Koi Supplies,** Crofton Drive, Allenby Industrial Estate, Lincoln, LN3 4NR. Ron Sharp from Koi Ichi Ban is the auctioneer with viewing from 9am. Contact 01522 569941 for more details.
Sun 10th	
Mon 11th	**Ilford & D A&P Society meeting.** Contact 020 8550 7329
Tues 12th	
Wed 13th	
Thurs 14th	**Telford & DAS Club meeting** Contact 01902 372945
Fri 15th	
Sat 16th	
Sun 17th	
Mon 18th	**Thorpe & D.A.S. Club meeting** Contact 01953 605394
Tues 19th	**Southend & Leigh Club meeting** Contact 01702 305740
Wed 20th	**Merseyside Aquarist Society** Contact 0151 201 6085
Thurs 21st	**Bristol Tropical Fish Club meeting** Contact 0117 973 2145
Fri 22nd	
Sat 23rd	
Sun 24th	
Mon 25th	
Tues 26th	**Southend & Leigh Club meeting** Contact 01702 305740
Wed 27th	
Thurs 28th	
Fri 29th	
Sat 30th	
Sun 31st	

Major Dates in 2001

February 18

Catfish Study Group Convention at Lowton Civic Hall.

Federation Contacts

AofA	Ian & Rhona Walker	01252 668747
FBAS	Paul Corbett	01983 721246
FNAS	Amy Chadwick	0161 652 6207
FSAS	James Sheekey	01475 704219
USA	John Reid	01738 634689
YAAS	Terry Nelson	01724 289736

Copy for *A&P*'s Diary Dates

Copy for Diary Dates should be sent to: *Aquarist & Pondkeeper*, Winchester Court, 1 Forum Place, Hatfield, Herts AL10 0RN. Tel: 01673 885352 or fax 01707 276555. Copy deadline four weeks before publication date.

A&P POSTBAG

Share your news, views and experiences through the A&P Postbag. Have you built a new pond, installed a new aquarium or revamped an existing set-up? Then send us the photographs and tell us how you did it. Every month the star letter wins a fantastic prize worth £25 – all for the price of a 27p stamp...

star letter

An apple a day...

I found your letter from Pete Liptrot in the November issue of *A&P* about using apple snails to combat the scourge of Hydra very interesting. Several members of our club have tried this in our tanks and it works. Hydra have been the bane of many an aquarist's tanks and who would have thought that the well-loved apple snail would have rid us of it! It is great that the much maligned snail has at last come into its own. It would be interesting to hear from some of you about how snails have been useful to you.

Some years ago we had a plague of Malayan livebearing snails and had a terrible problem ridding ourselves of them. They were unseen during the day when the lights were on but first thing in the morning when the lights were turned on there were masses of them crawling up the sides. We dismantled this tank, washed all the gravel in hot water and left it to dry out for about six months. After this time we set the tank up again, carefully washing the bucket of gravel. I thought all the snails would be dead and gone but one reappeared much to our disgust. Does anyone know the answer to this problem?

One final point. Apple snails are often offered in auctions – if Hydra are a problem try them and see for yourself.

P. Bond, Blackburn, Lancs

J. WARD

Apple Snails have been found to eat Hydra.

Biopiracy

Recently, several foreign aquarists/researchers were detained for illegally collecting fishes in Brazil. Some of these persons have described new species of fishes in aquarium magazines and broke Brazilian law by depositing the holotypes in foreign institutions. These persons were detained in Mato Grosso and Amazonas and deported to their countries by the Brazilian Environmental Agency (Ibama). The newspaper reports classified the episodes as 'biopiracy'. This topic has been increasingly discussed in the Brazilian public press in recent years and at least six such cases were reported last year. The Sociedade Brasileira de Ictiologia (Brazilian Society of Ichthyology) promotes the concept that such activities must be prevented to the full extent of Brazilian law so that it can continue to endorse international cooperation in ichthyological scientific research, as is exemplified by the Calhamazon Project recently developed by several scientists and students from South and North America.

The inhibition of these undesired illegal activities should be undertaken by Brazilian and foreign institutions and individuals. This can be done by refusing to catalogue fish specimens illegally collected in Brazil (Brazilian curators can be prosecuted for cataloging illegally collected specimens), and by a refusal to catalogue holotypes into non-Brazilian collections based on fish specimens collected in Brazil. Finally, editors should refuse to publish papers based on illegal field work.

Sociedade Brasileira de Ictiologia

Editor's note: This subject is particularly pertinent at the moment, since a team of aquarists (plus television production crew) is leaving for Brazil in a few days time. They include Dr David Sands who may have had to withdraw because Biopiracy has become such a hot topic at the moment. Fortunately those problems have been resolved and David, Kathy Jinkings and myself can spend a month legally catching fish in the Rio's Negro and Branco. The voyage and all our antics will be broadcast next year in Fish People Go Amazon *– hopefully without the "bonus" of a stay in a Brazilian jail!*

Those eagle-eyed enough to read the fine print in last month's magazine will have already spotted that A&P *will no longer be publishing scientific descriptions or other papers that affect nomenclature. This policy has been introduced to support Brazil and other countries in this matter.*

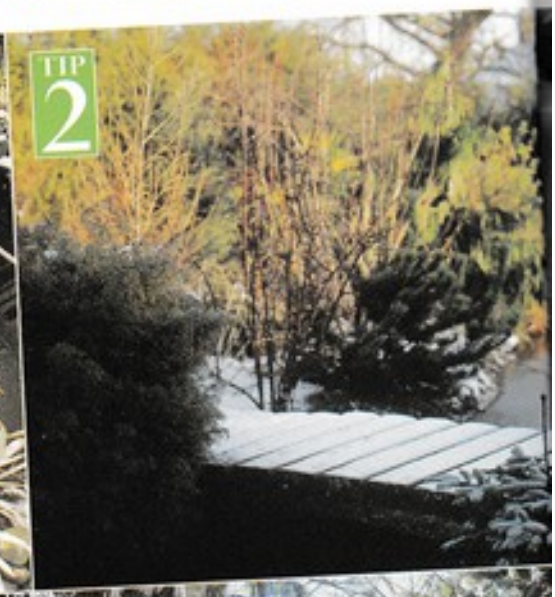
Fishrooms galore

In their efforts to keep and breed fish and not make their hobby too obtrusive into family life I have seen many fishrooms in the most unusual places. It is expensive to construct a purpose-built fishhouse so lofts, basements, spare room (this was a disaster to my friend who came home from work to find his fish tanks had migrated through the floor after he became too enthusiastic about the number of tanks the floor would support), disused coal cellars, larders and understairs cupboards have all been modified and utilised by my determined friends. I have visited people who keep their fish on a houseboat and others wh have a caravan lined with fish tanks. Another couple I know have a large lounge partitioned off with sliding doors behind which are their fish tanks. Someone I know who lives in a high ris block of flats built a lean-to extension o his balcony! It really is amazing to what lengths people will go when they are m about fish.

L. Hartley, London NW1

Pond PER

EIGHT USEFUL TIPS TO MAKE YO



AKE YOUR POND LOOK MORE ATTRACTIVE...

ECTION

Tip 1
Use a pond heater to keep part of your pond's surface clear of ice. This allows free exchange of waste gases from the pond and oxygen to enter.

Tip 2
Wooden bridges and decking are all the rage at the moment but wood and ice spell danger! Make sure all surfaces are cleared of snow before people walk on them and never use salt on a bridge over a pond. Salt levels can build up in your pond and cause health problems for both fish and plants.

Tip 3
Never use a hammer to break the ice on a pond. If fish are present then the vibrations caused may harm them.

Tip 4
Concrete ponds often develop cracks at this time of year. Make sure you check your pond regularly and, should the worst happen, make sure there is at least 24" of water depth left below the crack. If it drops below this level then you *must* fix the crack now rather than leave it until better weather comes along. Alternatively remove all the fish to temporary quarters.

Tip 5
Thick snow like this can block out all light to a pond and damage submerged plants. Make sure you sweep your pond's surface off regularly to allow light through.

Tip 6
Ponds can look beautiful in winter if you think carefully about planting. Here Silver Birch trees contrast wonderfully with evergreens.

Tip 7
All Dogwoods make splendid garden plants However, *Cornus alba* "Elegantissima" is beautiful even during the winter. Young stems are bright red and really stand out against a snowy background.

Tip 8
Make sure all foliage which has been killed off by winter frosts is cut back to within a few inches of the plant's crown. This is best done shortly after the first frosts of winter.

Clean m

MARINE EXPERT ANDREW CAINE EXPLAINS HOW PR

Successful marine aquarists may often seem obsessed with the amount of waste their protein skimmer is producing! So, what causes such intense obsession? The constant fear of a protein explosion resulting in a complete wipe-out.

What is protein?

OK, so we know that proteins and organics, in high concentration, kill tanks. So what exactly is a protein and how do they get into our beloved systems? Shrinking ourselves down to molecular size, there are many different classes of molecules and proteins are but one. Each protein is a long chain of amino acids and each protein is a building block used for growth. One piece of lego is a protein, 1000 blocks of lego are a small part of a muscle in a body, the most famous protein being deoxyribose nucleic acid, commonly known as DNA.

The main input to a system is uneaten food and animal waste. The cleanest system always has uneaten food. The pieces are so small that you cannot see them but they are there. As these rot, proteins and organics are released. Over time a build-up occurs and BANG... we have an explosion. We have to get rid of these proteins and organics.

So in our system where do we find our quarry? The answer is all around. However we will always have the highest concentration in the first few micrometers directly under the surface layer. If you think of a protein or organic molecule being a lollipop stick, one end is hydrophobic, meaning it repels water, and the other end is hydrophilic, meaning it is attracted to water. So think of the surface of your aquarium water having millions of lollipop sticks with the hydrophobic ends sticking up to the surface, attracted to the atmosphere, and the hydrophilic ends hanging down into the water. This molecular behaviour allows us to remove these substances from the aquarium. Enter the protein skimmer.

top right: The Beast is a power, or venturi, skimmer.

right: Counter current skimmers like this Reef Master remove a great deal of proteins very efficiently.

far right: Protein skimmers come in various sizes to suit different sized aquaria. Make sure you select one capable of doing the job required.

What is a protein skimmer?

A protein skimmer is basically a tube with a water inlet, an air inlet and a collecting cup at the top. There are two types of protein skimmers: the counter current, where air is injected via an air pump and wooden air diffuser; and the power skimmer, where water is pumped into the skimmer and mixed with air via a venturi inlet. Both types work on the same principal. Millions of tiny air bubbles, the smaller the bubble the better, are produced within the reaction chamber. The hydrophobic end of our molecule is attracted to the surface of the bubble and hangs on for dear life. As the bubble is swirled around within the reaction chamber more and more hydrophobic ends are attracted to it. As the bubble makes its final ascent towards the collection cup, it resembles a spherical pin cushion with all our molecules stuck to it. As the bubble reaches the top of the collection cup, it bursts. The microscopic layer of water surrounding the bubble is thrown into the bottom of the collecting cup and our proteins are thus removed. As thousands of bubbles are burst, a foul smelling, putrid, dark brown coloured waste is accumulated and this is the concentrated proteins that have been removed from the system.

Natural protein skimmers

Every second of every day, bubbles of gas are being released from the ocean sediment. These rise up to the surface, collecting proteins as they go, and burst. When a bubble bursts, the water droplets

W PROTEIN SKIMMERS WORK.

machine

are so small they are carried up into the atmosphere. This was highlighted many years ago in a coastal region of Italy when a prevailing wind carried all these minute droplets of water towards the coast. These highly toxic droplets settled on the leaves of coastal trees and accumulated over a period of time. This natural protein skimming resulted in the deforestation of the coast!

So which is the most efficient protein skimmer – the counter current or the power? The counter current skimmer should take water directly from the surface. As the water flows down the reaction chamber, bubbles from the air stone rise in the opposite direction and are then collected in the cup. Because water is taken from the surface, a great deal of proteins are removed very efficiently. The only drawback with this skimmer is the noise from an air pump which is required to drive it. If you are on a tight budget this skimmer is the best for you. The power skimmer, otherwise known as a venturi, is more efficient at removing waste than the counter current because of the smaller air bubbles produced and longer contact time in the reaction chamber. However, they cost a lot more and water is rarely taken from the surface of the aquarium.

There is much discussion at this present time as to the effects of over skimming. That is, not only do all protein skimmers remove waste, they also remove a great deal of trace elements required by our beloved animals. Whereas protein skimming is important for 95 per cent of all marine aquariums, a more powerful skimmer is needed in a fish-only system than in a reef due to the concentration of fish biomass in the fish-only system.

So going back to the obsessive nature that surrounds the accumulation of scum in the protein cup, as long as you are collecting a degree of waste weekly, then your protein skimmer is working OK. You do not have to collect cups upon cups to allow your system to function healthily, as you will also be removing a great deal of required compounds as well. A good tip to help the skimmer and your system is to scoop the surface water out with a pint glass when performing a water change instead of syphoning from midway down. Doing this, you become a human protein skimmer and remove many, many toxins. ■

Keeping and breeding Pyrrhulina and Copella Tetras

MOST CHARACINS ARE TYPICAL EGG SCATTERERS BUT SOME TAKE MORE CARE OF THEIR OFFSPRING. PYRRHULINA AND COPELLA TETRAS ARE ONE OF THESE GROUPS – AREND VAN DEN NIEUWENHUIZEN HAS THE FULL STORY.

There are many species of tetra available to aquarists and it is easy to overlook species that are not as brightly coloured as some. This is a shame since many species make wonderful aquarium subjects and have interesting breeding habits. Pyrrhulina and Copella Tetras fall into this category.

Species of *Pyrrhulina* and *Copella* feel most at ease in an aquarium with a somewhat darker bottom, plants along the sides and also a bottom growth, with open spaces here and there. Coarse-leafed plants should be included because both the smaller and the larger species of *Pyrrhulina* or *Copella* love to lay their eggs on these kind of leaves, the exception being *Copella arnoldi*, Splashing tetra, which spawns on the underside of plant leaves above water!

Keeping calm

Preferably, these tetras will spawn in aquariums that have a calm population. What could be nicer than fishes who lay their eggs spontaneously in the aquarium in the living room? These fishes eat – depending on their size – small and larger live foods, white and black mosquito-larvae as well as dry food, and deep frozen food is accepted in most cases. *Artemia salina* and vegetable matter are a welcome addition to the menu.

The young fry in the breeding tank will appreciate an extra feeding of half decayed leaf of lettuce with algae upon it. In the aquarium you can watch them busily feeding on fine algae covered leaves where they are probably looking for micro-organisms. The temperature of the water can fluctuate between 24-26°C. They prefer water which is not too alkaline and have more attractive colours in soft, neutral to slightly acid water. The larger species in these genera need a roomy aquarium with larger open swimming areas. Both the smaller and larger species are shoaling fishes and will show more of their 'natural' behaviour if kept in this way.

Displaying males of the species *Copella arnoldi*, 'filamentosus', 'laeta', 'brevis', or 'metae' show a deep dark longitudinal line, sometimes becoming almost black. They all spread their fins and open their mouths when displaying aggressively. Injuries rarely occur but, when the aquarium is too small or there are too few hiding places, fins can become severely damaged. They also show their bold pattern when courting. At a later stage he'll keep watch above the future spawning spot and will keep species of a similar kind at a distance.

Long-lined Pyrrhulina

The behaviour and mating progress of *Pyrrhulina laeta* (Long-lined Pyrrhulina) can stand as a model for the other species from the named genera. Avoid using a bare breeding tank with a sandy bottom because *Pyrrhulina laeta* sometimes fan the sand away to lay the eggs on the glass bottom. Curiously, though, they will not spawn on a piece of slate lying on the bottom. They also do not spawn on a drooping plant leaf, such as for example *Nymphaea* lotus. They clearly prefer firmer leaves and sturdy leaves of species of *Echinodorus* or *Anubias*.

The male shows a somewhat darker pattern than the female, but is more easily recognised by the much larger dorsal fin and a dark round patch on the larger upper tailfin lobe. The beginning of spawning is clearly recognisable from the male's colour change. Outside the spawning season male and female have a dark line that goes from the tip of the snout via the eye to half way along the middle of the body and ends in a number of dark dots. At the start of spawning the male shows an intense dark band in which a double row of orange-red dots appear from in front of the eye as far as the caudal peduncle. The dark band follows exactly the pattern of the scales, which become darkly pigmented.The fins coloration is somewhat intensified, especially the pelvic fin becomes a bright orange-red with a very thin glowing blue margin, there is also a blue margin along the tail fin.

Aquarium size

To breed these fish I always use an aquarium of 50x30x30cm and place one or more leaves of a smaller or larger species of *Anubias* as a spawning spot. This set-up I found produced the most satisfactory results. Three days after I ⇨

main picture left: Especially with *Pyrrhulina vittata* the fry stay together in a shoal in the first phase of their lives. They have two white spots on their caudal peduncle. Most probably this is a signal to help keep the shoal together.

below left: Male Long-lined Pyrrhulina in his normal garb. This is how they look in an aquarium shop.

below right: The female shows during spawning sequences a light body-colour. The male, intensively black coloured with red spots, displays a small distance above the leaf.

⇨ released the male into the breeding tank, I introduced the female. The next morning he formed a territory within the centre of his chosen spawning spot and guarded it. The female was not allowed near this spot.

Next, the spawning spot was cleaned intermittently. Like *Copella metae*, the small *Pyrrhulina vittata* and other species, he swam with contracted pectoral fins and vibrating body just over the leaf and sometimes pushed himself completely against it to remove any debris. During the morning the female tried to approach the leaf but the male chased her away. That behaviour changed gradually and at about eleven o'clock the male allowed her into the territory and stayed above the leaf with a slightly vibrating body. When the female was very close he pushed himself close to the leaf and sometimes swam over it with a trailing pelvic fin.

At first the female disappeared fast but returned just as fast. Now and then she was still chased away. What happened next can best be described as 'some fooling around'. From examples of my series I established that approximately 30 pictures were needed to record as completely as possible the spawning behaviour. In any case, the female approached the male from all sides, sometimes circling around her, but she came in from all directions – left, right, in front of, behind, above or beneath, then she 'tackled' him on the leaf. In between she also stood quietly underneath the leaf and the male looked for her and then pushed her a little.

Towards the end of the spawning this pushing became more severe and changed into chasing her away. During this preliminary behaviour no eggs were deposited. It takes from half an hour to one hour for spawning to start. I am strongly under the impression that this could depend on the quietness around the breeding tank because these fishes are fairly sensitive to disturbances. At a disturbance they can suddenly stop and with the male even the spawning dress disappears – apparently he does not care any more about the spawning spot and the eggs. However I saw at such a disturbance that the spawning was resumed after one hour. As spawning goes fast, with this species of *Pyrrhulina* the male folds his pelvic fin underneath her oviduct opening, forming a pocket in which the eggs will fall. Just before this moment the fishes lay very close to one another, but just afterwards the female curves her body in an s-shape and the tail and caudal peduncle touch each other. At the height of the spawning, when the male slips his pelvic fin underneath the female, only these parts of the bodies touch each other. This takes less than one second, sometimes a little longer. Directly afterwards they part with a jerk. Moreover the male slides away from the female, the pelvic fin is stretched out and the small eggs, clear as glass, drop upon the leaf and stick. They are less than one millimetre in size and hardly differ in size from the eggs of the much smaller species of *Pyrrhulina*. The number of eggs deposited per spawning is about five to ten, but it is hard to see. However spawning elapses more in the way of *Pyrrhulina metae* than of *Pyrrhulina vittata*. The latter turns in a circle at the spot.

So many eggs

Like all related species that I have seen spawning so far, the male lies a little on his side during spawning. Spawning can – with interruptions – take from two to four hours. In all cases the fishes were very productive and more than 500 eggs were deposited. In the end the leaf was sometimes completely covered with eggs. As a rule approximately 10% of the total go mouldy. Breeding took place in water of 4.5°DH with a pH of 6.6 to 7.0 and a temperature of 24°C.

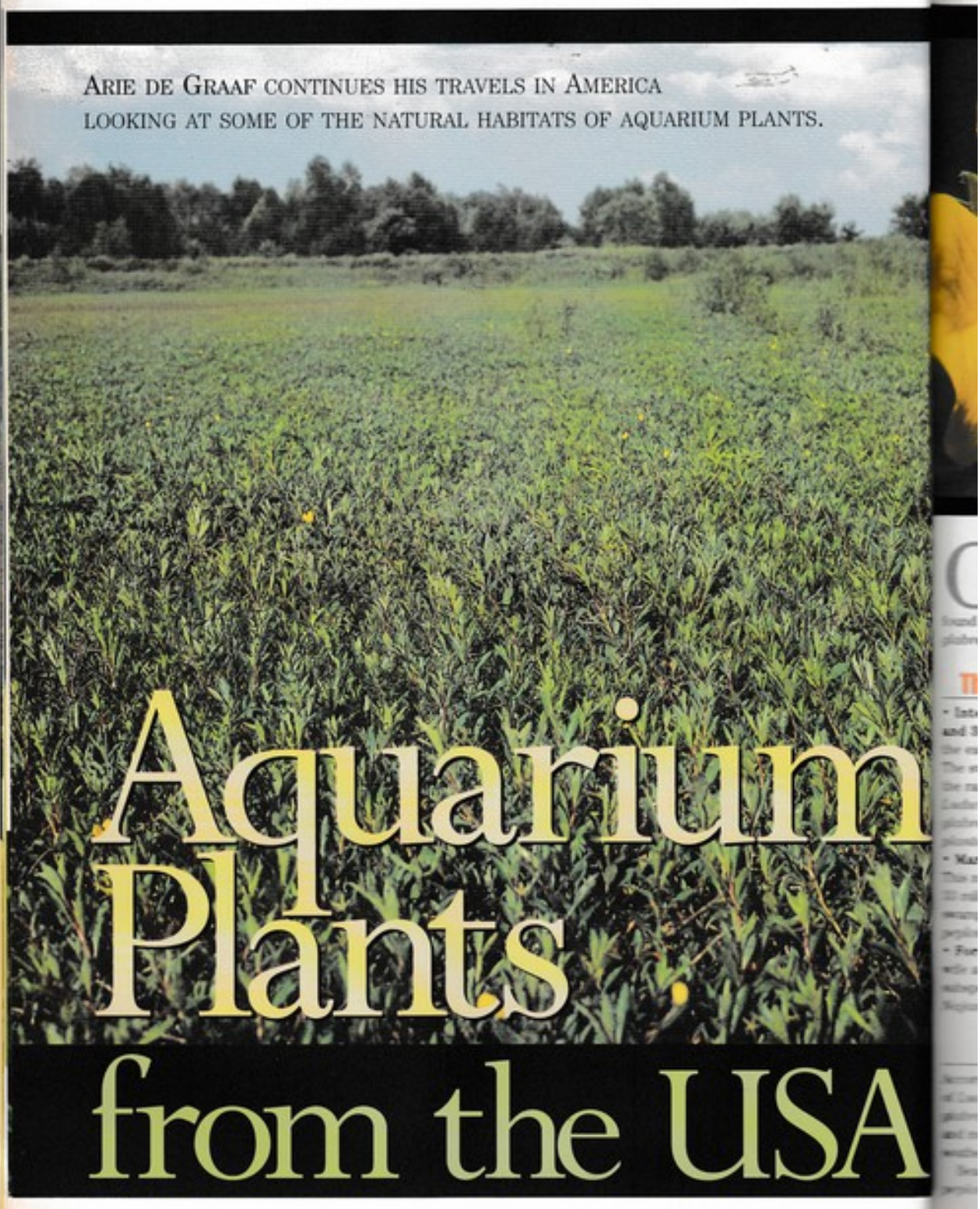
At the named temperature the fry swam free after four days. The fry swim in a close group together, sometimes near the surface of the water. We prefer to give the fry ditch infusoria or *Euglena*. For the first two days, when we do not have these at our disposal, we can give Liquifry red or another specially suited dust food that can be obtained in the shops. Then the growth will be a little slower at this stage. It is also possible to feed raw mussel meat, which is pushed through a cloth or through a sieve with very narrow holes, to divide the food. The young like to eat this and afterwards they have nice round bellies. A disadvantage, however, is the fouling of the water, which will clear after some time. Altogether the raising of the fry is generally trouble free and the young of species of *Pyrrhulina* grow relatively fast.

As with species of *Nannostomus* the young have a urostyl (a lengthened upper tail fin ray which resembles a streamer) for the first few weeks of life. This disappears after approximately 35 days. ■

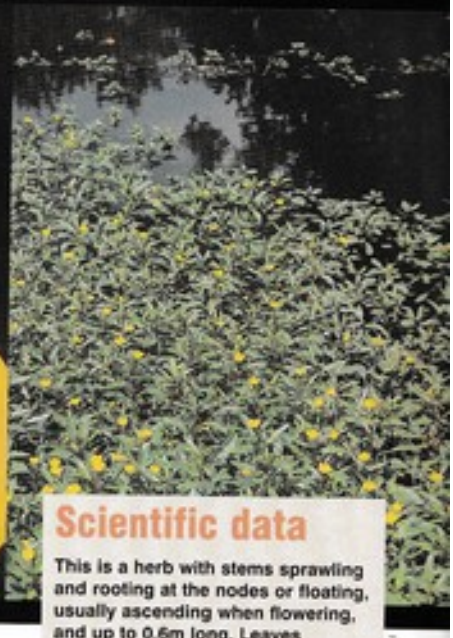
below left: Next the female curves her body in and s-shape and spawning takes place.

below right: The male guards the eggs losing the dark pattern in the process. He does not remove any mouldy eggs.

ARIE DE GRAAF CONTINUES HIS TRAVELS IN AMERICA LOOKING AT SOME OF THE NATURAL HABITATS OF AQUARIUM PLANTS.



Aquarium Plants from the USA



On July 23, Allen Brand, Richard Carter and I made a trip into the swamps between Mississippi and Missouri. There we found *Ludwigia peploides* subspecies *glabrescens* (0. Kuntze) Raven.

Three biotopes visited

- **Intersection of St. Clair Avenue and 37th Street:** This site is situated in the eastern part of St. Louis in Missouri. The swamp was to be found between the railway and Interstate 64. Besides *Ludwigia peploides* subspecies *glabrescens* we also found *Alisma plantago-aquatica*.
- **Marais Temps Clair Wildlife Area:** This nature conservation area is situated 21 miles north-east of the Orchard Farm. The swamp is fully overgrown with *Ludwigian peploides* subspecies *glabrescens*.
- **Forest Park (St. Louis):** Here, my wife and I collected *Ludwigia peploides* subspecies *glabrescens* and *Sagittaria*, *Typha*, *Polygonum* and *Bacopa*.

Distribution area

According to Raven (1963), the distribution of *Ludwigia peploides* subspecies *glabrescens* is restricted to the New World and most common in the eastern and southern parts of the United States.

Seal (1985) mentions that *Ludwigia peploides* var *glabrescens* (Kunbre) Skinners is very rare in low ground, ditches, lakes, and ponds in Mecklenburg, New Hanover and Wilson counties of North Carolina. It extends from Indiana to Kansas and southwest into Louisiana and Texas, with widely scattered (probably introduced) locations in New Jersey, Pennsylvania and Maryland. ■

Scientific data

This is a herb with stems sprawling and rooting at the nodes or floating, usually ascending when flowering, and up to 0.6m long. Leaves elliptical, 1-9.5 cm by 0.4-3cm, narrowly wedge-shaped at the base, the apex acute or obtuse; main veins 7-11 on each side of midrib; submarginal vein not prominent; petioles 0.2-3cm long. Flowers borne singly in upper leaf axils. Five Sepals, 4-12mm long, 1.5-2.5mm wide. Petals bright golden-yellow with a darker spot at the base, obovate, sometimes slightly emarginate at the apex, 7-17mm long, 4-13mm wide. Ten Stamens, filaments bright yellow, 2.5-5mm long; anthers pale yellow, 1-1.8mm long, outward facing but often twisting and shedding pollen directly on the stigma. Pollen grains shed singly. Disc slightly elevated; with a depressed white-hairy nectary surrounding the base of each stamen. Style yellow, 2.5-5mm long, densely long-hairy in lower half or higher; stigma lemon yellow, 1.2-2mm across, about 1mm deep, deeply five-lobed, usually surrounded by, or elevated slightly above, the anthers.

PHOTOS: ARIE DE GRAAF

main picture left: Marais Temps Clair Wildlife Area. This swamp is fully overgrown with *Ludwigia peploides* subspecies *glabrescens*.

top left: Close-up of the beautiful flower of this species.

top right: A large clump of *Ludwigia peploides* subspecies *glabrescens* growing at Forest Park.

left: Fruits of *Ludwigia peploides* subspecies *glabrescens*.

M.P.& C. PIPONIER

Keep Marines, WHO ME?

THIS MONTH, ANDREW CAINE SHOWS YOU HOW TO SET UP YOUR AQUARIUM.

With wife, kids and dog duly banished from the house for the day, in a good mood and with plenty of time, you can now set up the aquarium. It really is easy to do. Install the external filter, position the heater next to the filter intake, and place the return at just under the proposed water surface directly across the tank. This ensures good surface movement so allowing oxygen to enter the water. Clamp on the protein skimmer. Install the UV on the opposite side to the filter with the return directly opposite the filter return, creating a little turbulence in the water.

Now the job I really hate: washing the sand. But really wash it – and then wash it again. Now create your aquascape, taking time to think about each piece. Build a cave, create a ledge not a bland wall. With a five gallon brewing bucket full of water, weigh out the required amount of salt for a specific gravity of 1.024 at 79°F. Mix vigorously then pour in over the top of your rock work so the sand remains in place.

Wow! Your tank is full. Now add the filter activator, turn on the filter only, and sit back. Don't turn on the skimmer or UV until you have introduced your first stock. Your skimmer will only skim out goodness from the water and the UV will inhibit the bacterial colonisation of your aquarium. Also, don't turn on the lights as this causes an algal bloom. To reduce this effect, leave the lights off until you are ready to stock.

Guess what? You have an aquarium that will be ready to stock marine fish in about one month.

Now create your aquarium log, recording every detail, installation date and all test readings which you will carry out twice weekly. When your readings are correct give me a ring and we will turn o

your lights and go to choose your first stock. Congratulations – you have taken the plunge. Easy wasn't it?

I'm getting there

So, my good friend, your aquarium has been running for 30 days now, totally empty of life with just the filter and heater turned on.

Tell me what has happened.

"Well, to be honest, not a lot. In fact I am quite worried about the lack of activity in the tank. Let me get my aquarium log so I can go through it with you. Not a bad idea this – all my mates can't be bothered keeping one. However, I can now refer to the pages and tell you exactly what has happened and on what date. Without this I would just be guessing, and it only takes a few minutes to complete."

You said that you were worried about the lack of activity in the aquarium.

"Yes that's right. All the books say to expect a high ammonia reading, and as that falls off to expect a high nitrite reading, followed by a high nitrate reading, all falling to zero, ready for stocking. Just look at the log. You will find only small readings for all three with zero for two weeks now. I am telling you, Mr Advisor, if we are in trouble already I will be more than annoyed after you made me spend all that cash on equipment."

Don't worry, all is fine. Yes, the books say expect high readings but the books did not use purified water to set up the aquarium as you did. This has reduced the toxin peaks. I also notice that you have been adding biological cultures every week, so your filter is now mature enough to cope with your first fish.

"Great! What are we waiting for – to the fish shop we go."

Which water?

Let's just rewind for a moment. Last month we sorted out all the equipment you need but there is one thing that's missing and it is just as important as any of the equipment that you have just laid out a small fortune for. The water. No, we do not use tap water for marines as to do so will only cause problems in the future. You have a friend with a water purification system and she has agreed to supply you with water for your marine aquarium – all you have to do is share the cost of the replacement cartridges, a very good deal indeed.

Calm down, there are a few things to address first. Remember I asked you to supply a stocking list, and we need to set the lights. We will get a fish today but let's just look at a few areas first. The lights. You bought a 10,000k rated tube and an actinic tube, so pass me your timers and we shall set up the lighting.

First we set the actinic to come on. This blue light simulates dawn and wakes up the fish nice and slowly. Remember fish can be just like you and me. I'm not the nicest of people if woken up with a start, so we will just eliminate a degree of stress on the fish with this. After about one hour on comes the main tube for 11 hours, then it switches off. The actinic has remained on all day and turns off at your average bed time. This gives you a nice night time view and calms the fish down ready for bed.

It's like starting Blackpool illuminations, so turn them on. Oh what a lovely sight, your aquarium shining, lighting up all around. You did a good job with the rock work, a nice cave and ledges. Notice the lack of algae? If you had used your lights before today, all your sand, rock and glass would be covered with brown algae by now. So with your lights on, let's turn on your UV. This will reduce and even stop an algal bloom. Also if there are any nasties in the water they will be zapped before any fish are introduced.

Note in your log the start dates for the lights and replacement date in a year's time and six months for your UV tube. ■

Next month Andrew moves on to stocking your first marine aquarium.

left: Some marine fish are absolutely stunning.

below left: An old-style fish-only aquarium set-up. Although this sort of design is out of favour with many marinists today it was the staple of the marine world for many years. Dead bleached corals like these have been replaced with artificial copies now.

below right: A beautiful marine set-up can easily be yours.

Koi World

BERNICE BREWSTER TAKES OVER OUR REGULAR LOOK AT WHAT'S HAPPENING IN THE KOI WORLD.

Winter is a quiet time for koi but this is the ideal time to prepare everything for spring and the new season.

It's a great pleasure and honour to have been asked to take over *A&P*'s regular Koi feature, although it will be a hard task to follow in the footsteps of David Twigg and Liz Donlan! Most Koi Keepers are probably like me in that the summer is the best part of the year and, just like koi and their wild cousins, carp, there is nothing I enjoy more than the feel of the sun on my back. It is quite noticeable that as soon as the sun starts to get any warmth in the spring, koi and carp can be seen at the water surface, literally basking in the solar heat! Well, as we've all noticed, it certainly isn't summer anymore, the nights are long and the weather is cold, miserable and the koi are basically inactive. For me, this is a very important time of the year at Finspiration as it enables me to undertake maintenance work on the re-circulating systems and filters where necessary and get them up and running again in time for the spring. We operate with large settlement tanks, using filter screens, and the wooden frames can become damaged through constant use so these must be repaired or replaced. The holding tanks are individually checked to make sure that neither they, or the associated pipe work is leaking. A very slow leak can become a burst pipe very quickly – and I'm not that keen on playing around with cold water in the middle of winter, so prevention is better than cure!

The various Koi Societies and Clubs around the country have meetings and events taking place throughout the year. In the winter time most of the Societies and Clubs have a programme of speakers covering a host of koi-related matters as well as social events. If you are a keen Koi Keeper it is certainly worthwhile to join one of the local Societies or Clubs. If you are a Secretary of one of the Clubs or Societies and would like to list any forthcoming events, please forward them to me and I will be pleased to give them a mention.

In the meantime, it's back to work on the filters and tanks and putting a lick of paint on the walls, in anticipation of the forthcoming summer! ■

Koi society meetings & events

There are numerous koi clubs and societies throughout the UK. Here, *A&P* publishes contact details each month.

The British Koi-Keepers' Society

Birmingham and West Midlands: Alan Smith – 01214 223869
Central: Christine Green – 0121 360 6601
Cheshire & District: Keith Grainger – 01782 773592
Chiltern: Bill Hone – 01582 841108
Crouch Valley: Brenda Scott – 01375 642321
East Pennine: Betty Koerner – 0114 234 1151
Essex: Margaret Spurr – 01702 292766
Ireland: Trevor Geary – 01247 466865
Isle of Wight: Mike Giddens – 01983 527520
Kennet Valley: Terry Speight – 01488 686294
Lea Valley & Harlow: Michael Nunn – 0208 524 3681
Leicestershire Koi: Les Hadfield – 0116 223 7670
London: J Carey – 020 8657 9036
Lower Thames Side: Val Radley – 01702 529675
Manchester & District: Sue Ennis – 0161 480 5821
Middlesex & Surrey Border: Jim Freeston – 020 8641 2686
Mid Lincs: Val Gilbert – 01673 858354
Mid Staffs: Val Stokes – 01543 278359
Northants: S Day – 01604 407361
North Herts & District: B Blows – 01767 261135
North Wales: E Parry – 01492 580303
Plymouth & District: Sandra Crocker – 01752 210118
Potteries & District: Tina Burgess – 01782 617526
Scottish: J McCorgray – 01259 750484
South East: Mick Wright – 01634 718943
South Hants: T Clark – 01489 573374
South Wales: Christine Worthcroft – 01443 207279
Suffolk & North Essex: Alan Carter – 01206 866011
West Wales: Basil Evans – 01554 772190
Worthing & District: K Martin – 01273 220818
Yorkshire Section: Andrea Thornton – 01924 275749

Independent Koi Clubs

Birmingham & West Midlands Koi Club: Alan Smith – 0121 422 3896
Black Country Koi Society: Tony Bowcott – 01384 395299
Bristol & West Koi Club: Larry Lerway – 01454 898207
Cambridgeshire Koi Club: Graham Haggar – 01487 711129
Dorset Koi Keepers: Alison Allen – 01202 875437
East Coast Koi Club: Alan Wright – 01502 587116
East Midlands Koi Club: Richard Jones – 01283 224975
Eastbourne & District Pondkeeping Club: Brian Dale – 01323 731369
East Yorkshire Koi Society: Steve Mattinson – 01964 527863 / Chris Hill – 01482 346777
Fylde & District Koi Club: Chris Ingledew – 01772 635581
Heart of England Koi Society: Paul Stacey – 01203 674821
Merseyside: Syl Bennett – 01942 204948
Midland Koi Association: Keith Hanson – 01527 545230
Nishikigoi Association: Neal Kean – 01202 713600
North East Koi Club: Jean Hope – 0191 416 5794
North Lines Koi Club: Ken Bush – 01472 883377
North of England ZNA Chapter: Yvonne Muse – 0114 289 1437
North Wales Koi Society: Keith Parry (Chairman) – 01492 580303 / Rachel Wilkinson (Secretary) – 01407 741846
Northern Koi Club (ZNA Friendship Club): Glynnis Morgan-Davies – 01706 218243
Norwich Koi Club: Jenny Allen – 01603 452932
Nottingham & District Koi Keepers: Shirley Hind – 0115 981 0923
Oxfordshire Koi Club: Kevin Newton – 01865 874008
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PHOTO: GORDON ANSELL

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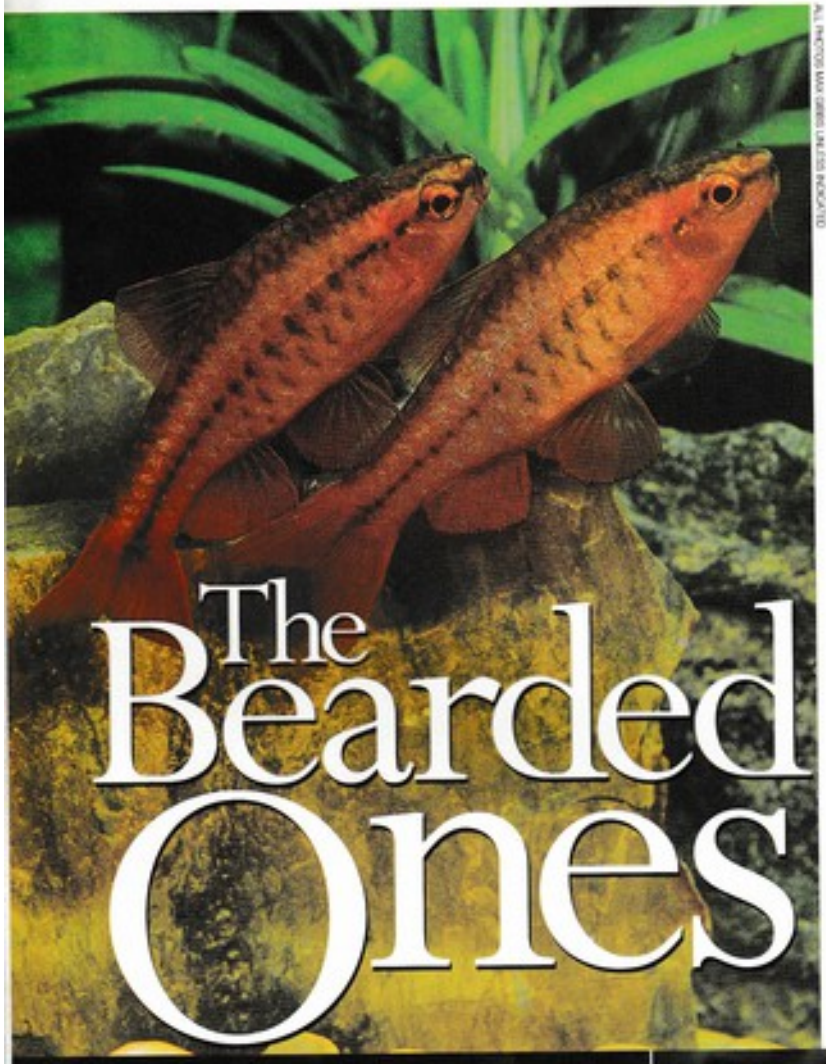


ALL PHOTOS BY DICK MILLS UNLESS INDICATED

The Bearded Ones

DICK MILLS INTRODUCES BARBS FOR BEGINNERS.

We've all got to start off somewhere and making the initial choice when confronted with what's on offer at your dealer's can be a bit daunting. While *A&P* prides itself on covering the widest possible range of aquatic interests, at all levels of expertise, there is something about long-established species. Newcomers will find confidence in them but they may also rekindle fond memories for the more experienced fishkeeper to whom they may represent the 'good old days'. Such a group of fish contains the Barbs.

A species for everyone

Barbs come in all manner of sizes – there's bound to be one for virtually any size of aquarium, from a modest 18" x 10" x 10" right up to the 6' showpiece taking up nearly one wall of the lounge. Most of them are undemanding, yet thoroughly rewarding fishes.

main picture left: Cherry barbs are more slender than most Barb species.

below (from left to right): Tiger Barbs have the reputation for being fin-nippers.

Rosy barbs make perfect community fish.

Tinfoil Barbs are ideal for large aquaria.

A pair of Black ruby barbs; the fish in front is a male.

M.P. & C. PIENOIR

Barbs get their popular name from an abbreviation of their scientific name Barbus, a Latin word meaning 'beard,' a reference to the small barbels found at the corner of the mouth. Forming part of the Cyprinidae Family, tropical species of Barbs have a natural distribution in Africa and Asia but not that other storehouse of aquarium fishes, South America. Like all Cyprinids, there are no teeth in the jaws, but food is ground up by pharyngeal teeth that work against a bony plate at the back of the throat.

Most Barbs are omnivores, happy to eat almost anything that falls their way, although some of the larger species, such as the Tinfoil Barb, *Barbus schwanenfeldi*, have a predilection for green matter, including aquarium plants! Barbs make excellent community fishes as they are constantly active in the mid water and lower levels of the aquarium; it is recommended that several are kept as a shoal both to give a good visual impression and, in some cases, to prevent isolated specimens becoming bored with their solitary representation and developing 'fin-nipping' habits, to the detriment of other tank-mates.

Of the easily-obtainable species, the Rosy Barb, *Barbus conchonius*, is probably the most recommended species of them all. Its dark green dorsal surface shades down through a metallic rosy colour to a silvery belly. The fins are usually reddish with some black in the dorsal fin; a small dark blotch appears on the flanks just ahead of the caudal peduncle. So much for the coloration which, in the case of the male, intensifies dramatically with the onset of breeding 'condition.'

A well-planted aquarium with some open areas of swimming space is all that this modestly-sized fish (around 4") needs to settle down and feel at home; it makes an excellent subject for Furnished Aquarium Classes at Shows. It is a prolific breeder and the spawning action is a typical dash and chase in among the dense plant growths. A long-finned strain has become commonplace in recent years.

A tiger in your tank

The slightly smaller Tiger Barb, *Barbus tetrazona*, is a most recognisable Barb. Its golden brown body is crossed vertically by four dark bands – through the eye, either side of the dorsal fin and on the end of the caudal peduncle. The dorsal fin has a black stripe across its width and is edged with red; the anal and caudal fins are red. The snout is also red. It is usual for the male fish to have the more intense coloration at all times while the female, as is the norm, tends to plump up as she fills with eggs prior to spawning.

The Tiger Barb has a long-standing reputation for 'fin-nipping' but this may be counteracted to some degree by keeping a number of Tiger Barbs together; they will then become very preoccupied with each other's actions so that they will not have time to think about terrorising other fish in the aquarium. Over the years, man has obviously become bored with the normal coloration and there are several other aquarium-developed colour strains including Green, Red and Albino.

If you can imagine a 'sootier' form of the Tiger Barb with only three, less well-defined dark bars across the body then you are most of the way to describing the Black Ruby Barb, *Barbus nigrofasciatus* (today's political correctness means we cannot use the long-standing alternative popular name!). While the female's body colour is golden brown, the male's is a rich red, especially around the head region; the fins are black. During breeding, the male becomes almost purple-black, giving rise to the current common name.

While the genus Barbus is predominantly hardy, the Black Ruby Barb is one of those species that displays the first signs of White Spot Disease before most other fish in the community collection; however, it nevertheless responds to the usual commercially-available remedies without further ado.

Something a little slimmer

Not all Barbs share the same body form, and the Cherry Barb, *Barbus titteya*, has a much slimmer body more resembling a Danio. There is no mistaking the sexes for while both fish have a dark line along the flanks with reticulated scales below, the male is red against the female's brown. These overall colours extend into the fins. Once these fish become established in a well-planted tank, you should be rewarded by the sight of the male 'turning on the colour' into a fiery red as he displays to the female. Being of modest size – 2" is about normal – it would be convenient to set up a small tank just for a few of these superbly coloured fishes.

These are just a few of the species available to aquarists. There are many more out there and most are just as good community fish as these ones are. ■

Room with

Having just moved house, I thought I would share my experiences of constructing a fishhouse with you.

I had two possible sites for my fishhouse: a shed or an outbuilding. Each of these sites had both advantages and disadvantages. The shed is fairly small, and the previous owners had semi-insulated it, which would have allowed me to install my tanks a lot sooner. However, it has a very low ceiling (about 65"/165cm) which would have limited the number of layers of tanks. Lastly there are several windows in the shed which would have given me problems with algae growth in my tanks.

The outbuilding was my chosen site because it is larger and higher (about 8'/240cm) than the shed, which gave me more room for tanks by both an increased floor space and by having three and four layers as opposed to two or three. It also had a tap in, and there is a fuse box outside which was able to supply the fishouse. The only problem? It wasn't insulated and being larger, it would take a while to insulate so lengthening the time before I could install tanks and get back to fishkeeping.

Alternatives could include a spare room, a greenhouse/conservatory or cellar. I'm not going to comment on the suitability of these sites – the best way to decide on your site (if you have more than one option) is to list the merits and problems of each site and then make your decision.

Insulation

Roof Having consulted a 'joiner-friend' about what size timbers to use for the roof, we decided 4"x2" tannalised timber was the best option. Timbers of 4"x2" were fixed along the full length of the 'side' walls, at the desired height. Timbers (of the same size) were then placed on top and screwed down at 16" intervals. Plasterboard was then nailed to the newly created beams so creating a 4" cavity between beams for fibreglass: for optimum insulation use between 6-12" (15-30cm) of fibreglass. Don't assume that because 4"x2" timbers were suitable for my fishhouse, they'll be suitable for yours; consult a joiner/builder with your requirements.

Walls I used 2" (50mm) of insulation on each wall, as I was using a fairly small room and couldn't afford to lose too much space. Ideally, if you have the space, use 4"-6" (100-150mm) of insulation. Batons of 2"x1" were fixed horizontally along the wall at 16" intervals and 1" polystyrene was then placed in the cavities. Then more 2"x1" batons were fixed, vertically, to the others (again at 16" intervals) which created a 'grid'. Again 1" polystyrene was placed in the cavities and plasterboard was used to cover. The advantage of this method is that the whole wall is insulated: if just one layer of 2"x2" batons was used, there would be no insulation at the batons.

Door

The door is often forgotten when insulating a fishhouse. I created a second door-frame inside the room where another door was then hung. The air space between the two doors will help to reduce heat loss. The original, outer door also had some batons fixed to it and (like the walls), the cavity was filled with polystyrene. This was then covered with a piece of plywood.

Electricity

As I use individually heated tanks I needed a power supply at each aquarium. Firstly I decided that as some of my stands would have four layers, I would need four separate circuits. Then I calculated the power supply I would need. I did this by deciding where all my tanks were going. Then I calculated what power each tank would need (the

h View

LAST MONTH PAT LAMBERT VISITED ROBIN BARTON. HERE HE TELLS US HOW HE CREATED HIS FISH ROOM

size heater) and calculated the total for each circuit.

The next stage was to consult an electrician as to what size cable to use, which for the size of current I needed was 2.5mm 'twin and earth'. The cable was then placed around the fishhouse (in four separate circuits) and connector strips were 'fitted' wherever I needed a power supply, placed inside 'mini-trunking' to protect the cable from splashes of water.

Water supply and tanks

My fishhouse already had a tap installed. All that had to be done was to install a sink and extend the tap off the wall so that insulation could be fitted behind it.

Before constructing this fishhouse, I had accumulated plenty of tanks so I had to plan around these. I decided where to put them by making a scale diagram of the fishhouse on graph paper. Then I could see which layout offered the greatest number of tanks. I used the remaining space for (planned) tank sizes that I didn't have – I had plenty of small tanks for breeding small fish but very few larger tanks for raising the fry.

Stands

Currently I have a large stand made from welded 1" box steel. The advantage with this is that it takes up less room than a wooden stand (because of comparative strength) and is more durable. However it is much more expensive than a wooden stand especially as most people can't construct such a stand themselves!

Filtration and heating

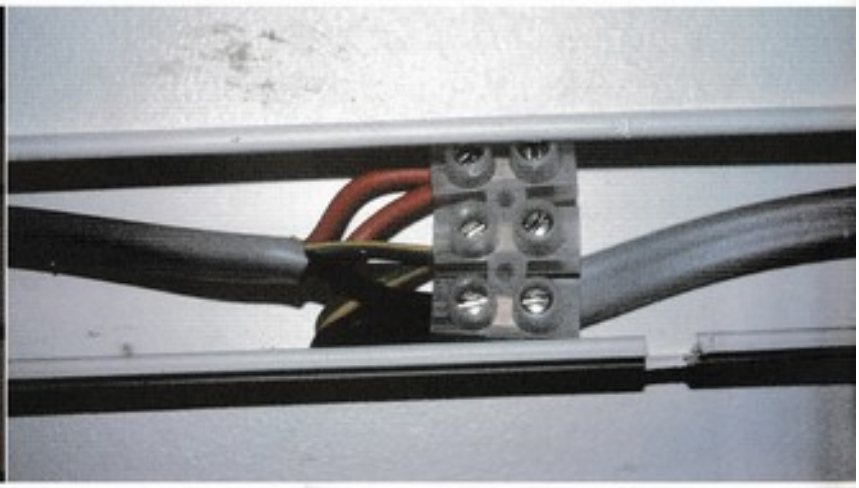
As I have already mentioned I use (mainly) air operated filters and for most of the tanks I use undergravel and sponge filters. The advantage of this system is that when I have young fry the sponge filter is turned up, and the undergravel is left on just a trickle. As the fry grow, however, the undergravel is turned up and because of the large surface area (of gravel), the filter is able to cope with the heavy feeding regimes.

I supply the air to each tank by means of 0.75" overflow pipe. I installed a ringmain of this around the ceiling of the fishouse, and ran a loop to each row of tanks. This was then drilled and in-line valves fitted. I ran this by several small airpumps – if one fails, the system keeps operating.

Individual heaters give me more control over the temperature of each tank. Also if one heater fails, the other heaters keep operating.

Final word

While this is how I constructed my fishhouse, there are plenty of alternatives. However no matter how you construct your's, there is one universal rule – PLANNING. If you don't plan you *will* make mistakes and have regrets afterwards; but if you do plan then you should be rewarded with a fishhouse which will serve you for many years. ■



below (from left to right): 4"x2" tannalised timber was used to create the beams.

Using a double layer of batons and polystyrene like this means the whole wall is insulated.

Water and electricity can be a lethal combination – always consult an electrician before undertaking this sort of installation.

Royal Gramma
(*Gramma loreto*)

PHOTO: M.P. & C. PIENAAR

By Dave Garratt

At first glance it is easy to see the apparent similarity between this fish and its look-a-like the False Gramma. However, on closer inspection the colours of the Royal Gramma, while having a subtle beauty of their own, are not as bright as seen with the False Gramma. The Royal Gramma has a finer display of finnage and a blending of colour as opposed to the abrupt colour change of its cousin. Despite the superficial likeness and other shared characteristics, such as temperament, the two fish do not even belong to the same Family. There are also geographical differences in so far as the very small Grammidae Family, to which the Royal Gramma belongs, is restricted to the Caribbean.

The Grammidae are also known as the Fairy Basslets or the Pygmy Basslets. Only two species are seen within the hobby, the Black Cap Gramma (*G.melacara*) being the other one. I believe the entire Family is restricted to just three members, with the rare *G.linki* being the third species.

In its Caribbean habitat the fish feeds on plankton but when settled into the aquarium it will take a wide variety of meat-based marine foods and may even accept flake food.

It is a secretive fish, spending much of its time in the network of crevices within the coral reef. Despite this secretive nature the species is aggressively territorial and will not tolerate encroachment upon its own particular hide-away. Therefore although it can be considered a community fish it cannot be kept in with similar or related species. The fish is safe with invertebrates and makes an excellent addition to a reef tank where it will be at home among the many nooks and crannies created in such an aquarium.

A pair of Royal Grammas will begin preparation for spawning by bringing algae into their cave as a nest for the eggs. They will then fortify the cave and protect the site very aggressively. The fish represent a good challenge for the advanced aquarist as they have been spawned regularly and raised in captivity, albeit usually by commercial concerns. Sexual differences are not obvious and it may well be necessary to begin with a small group of young fish.

CV

Family:	**Grammidae**
Species:	***Gramma loreto***
Origins:	**Exclusively Caribbean**
Aquarium type:	**Community, but not with similar fish. Ideal with invertebrates.**
Feeding:	**Plankton feeder in the wild but will accept a wide variety of meat-based marine fare**
Size:	**10cm in wild but restricted to 6cm in captivity.**
Difficulty:	**Suitable for beginner plus a breeding challenge for experienced aquarists.**

Excellent water quality and a suitably aqua-scaped tank are essential for success with this relatively hardy species, and such success is well within the capability of a beginner. ■

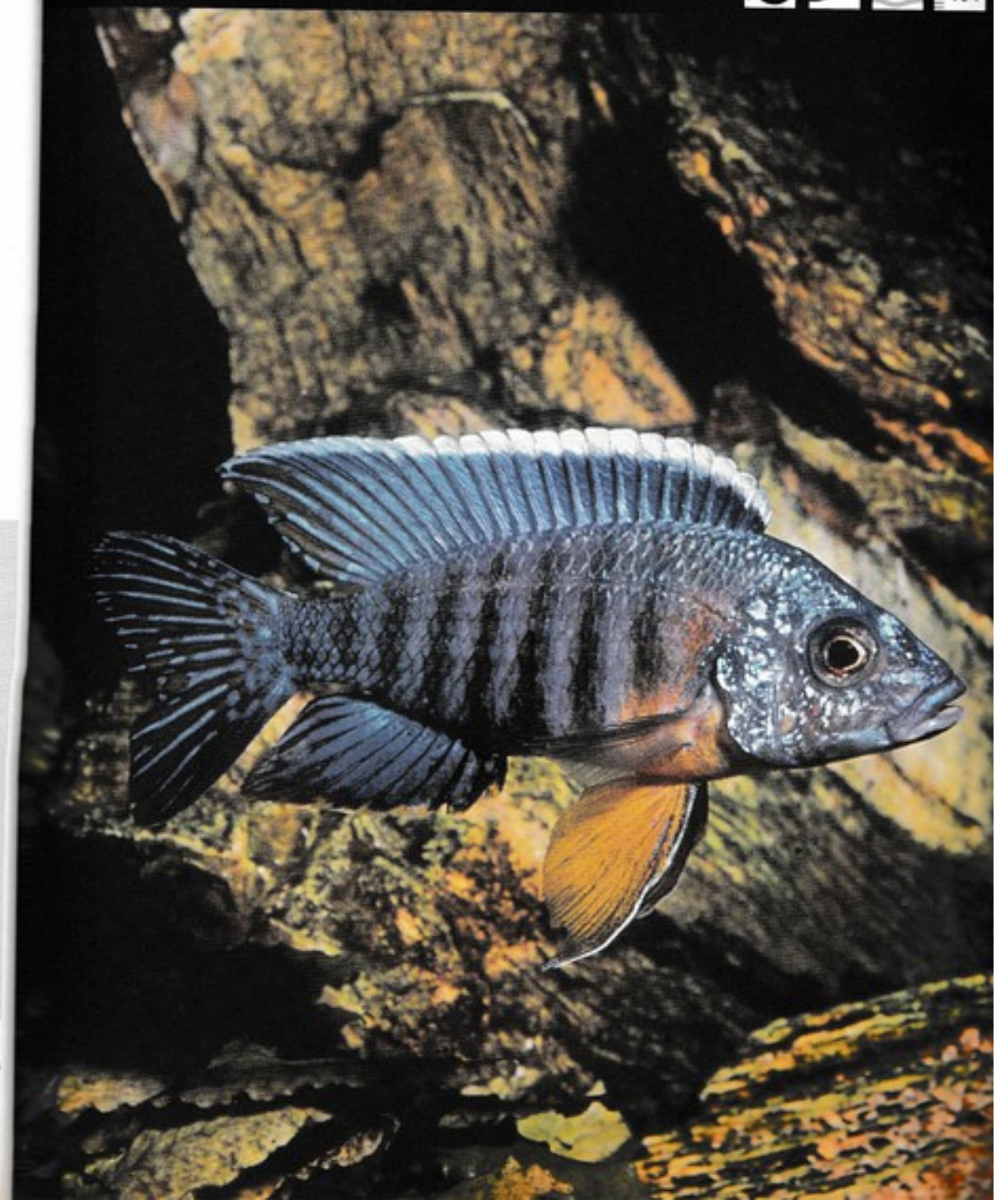
African Peacock Cichlid

Aulonocara hansbaenschi SIZE 6"

AQUARIST AND PONDKEEPER GALLERY

PHOTO: M.P. & C. PIEDNOIR

79°F
76°F



Discus P

TONY SAULT TAKES US THROUGH THE FIRST THREE MONTHS OF LIFE.

I am often asked a variety of questions by potential breeders such as:

- "When do I take the fry away from the parents?"
- "What do I feed them on when I have taken them away?"
- "How often do I feed them?"
- "How often should I do a water change?"
- "Do I leave a light on at night?"

So in this article we will look at the most critical period of time for the young Discus – the first three months of their lives. We will follow their progress week by week, showing how the feeding regime alters to cater for the growing fry in conditions with minimum biological filtration. We will see how the maintenance routine alters to take into account the amount of waste produced and hopefully answer as many of the questions as possible.

Post spawning

The prospective parents fan their batch of eggs 48 hours after spawning. Normal feeding and maintenance is still carried out during this period – a small partial water change every day, the pH of the tank is 5.7, temperature 86°F, hardness GH 6°, KH 0°. A small night light is always left on at such critical times after the fish have spawned.

Forty-eight hours after the fry are free swimming, the conditions of the tank water are slowly altered with the daily water change, approximately five per cent to lift the pH and hardness nearer to the conditions of the tank that the fry will eventually be transferred to.

The parents with the batch of fry at seven days old should now be in water conditions as follows: pH 6.8, GH 13°, KH 4°, temperature 86°F. We must now begin contemplating removing the fry to their own tank. Providing the parents are not showing any signs of stress or "wear and tear" the fry can be left a little while longer. At this time you should start hatching Brine shrimp in preparation for feeding the fry.

At 10 days old, the fry will be "introduced" to live Brine shrimp and will take it greedily. They migrate from their parents on short journeys "snapping" up the Brine shrimp in the water. The Brine shrimp is fed in large quantities four times a day and this necessitates larger water changes in the parent's tank approximately 10 per cent, siphoning out the debris so that the water does not become foul. There is no set time for taking the young away from the parents – you must simply play it by ear. Your object is to get the fry away from the parents before any damage is done to them by the savage hoard of young feeding off their bodies.

At 14 days old, the Brine shrimp can be clearly seen in the stomachs of the fry which have turned pink. They have also begun to grow much more rapidly. The fry should now be removed from the parents by using a very small net and just netting a few at a time off the parent's body and placing them in their own 50-gallon tank. The conditions of the fry tank must be checked so that they match exactly the conditions of the parent's tank, which should be pH 6.8, GH 13°, KH 4° and temperature of 86°F. The parent's tank is then given a good water change, approximately 25 per cent, and the filter cleaned out. The parents are then left alone to rest.

At four weeks the fry begin to take on the shape of Discus. A few losses may be expected as the young develop but these are usually the runts of the litter. As long as the losses are limited to these and the rest of the brood are growing well and looking healthy there is nothing to worry about. =>

M. ROSE

MAX GREIG

top right: Babies feeding from adult. Providing there is no sign of "wear and tear" they can be left with the adults for 14 days or more.

right: A group of Turquoise Discus.

sPool

DISCUS DIRECTORY

left: Group of youngsters now 11 weeks old and all about 2½ in size.

⇒ In the seventh week the fry should be approaching 1" in body length. You must now estimate how many there are. If it is estimated that there are 100 of them, you may be overstocked, so 50 of them need to be transferred to a new 50-gallon tank. The water again has to have exactly the same conditions as their original tank.

The feeding of Brine shrimp will be discontinued altogether at the end of the tenth week as they are all now taking solid food. Twenty of the fry need to be removed to another tank as, once again, the original tank is becoming overstocked. One or two slight defects are noticed, so it is now time to cull any weak and deformed ones.

During the eleventh week, Brine shrimp and Blood worm are discontinued as a part of the daily feed. The increased use of the beef heart as their staple diet now puts considerably more load on the filtration so the filters have to be cleaned out every other day. If the outflow of the filter decreases this is a good indicator that it will want cleaning shortly. All the fry are now approaching 2" in body size – and some are actually over 2".

At three months old, the majority have grown well. With simple sponge filtration there is a little more work involved than with, say, a large trickle filter or external cannister but there is also much more fun involved. The maintenance on each tank of fry takes approximately 10-15 minutes and the actual work involved, with the aid of a 0.5" syphon tube and a pond pump to pump the water back is minimal. ■

Tony's feeding regime

Age	Feeds per day	Water changes (daily)	Filter maintenance
7 days old	Set up B/S	None	None
10 days old	B/S x 4	10%	None but syphon debris
14 days old	B/S x 5 G x 2	50%	Clean filter out at end of week
5th week	B/S x 5 G x 2 B/H x 1	50%	Clean filter out at end of week
6th week	B/S x 4 G x 2 B/H x 2	50%	Clean filter out at end of week
7th week	B/S x 3 G x 1 B/H x 2 B/W x 1	50%	Clean filter out at end of week
8th week	B/S x 2 B/H x 3 B/W x 2	33%	Clean filter out at end of week
9th week	B/S x 2 B/H x 4 B/W x 2	33%	Clean filter out twice this week
10th week	B/S x 1 B/H x 5 B/W x 2	33%	Clean filter out twice this week
11th week	B/H x 6 B/W twice weekly	33%	Clean filter out twice this week
12th week	B/H x 6	33%	Clean filter out every other day.

Key: B/S = Brine shrimp; G = High protein powdered granular food; B/H = very finely grated Beef heart mix; B/W = Chopped frozen Blood worm.

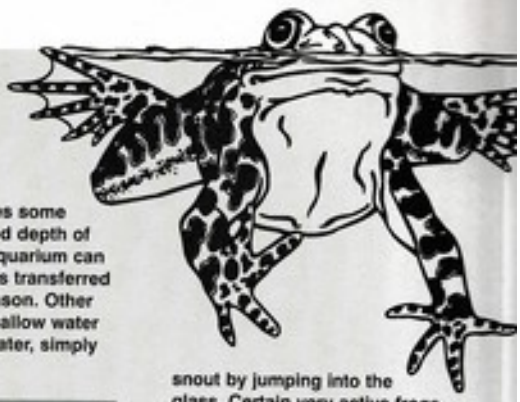
Fire in their bellies

BOB AND VAL DAVIES REACH THE LETTER O IN THEIR A-Z ON AMPHIBIANS AND OFFER SOME MORE USEFUL ADVICE FOR BEGINNERS.

Oriental Firebellied Toads (*Bombina orientalis*) from North Korea and North China have been popular among hobbyists for many years on account of their coloration. The bright green and black dorsum is extremely warty and contains glands that give off a white secretion if they are attacked. The degree of toxicity is not known but there are no records of keepers being harmed. The belly is a bright orange with black markings. These are warning colours which the toads reveal by curling up their limbs and sides of the body when disturbed in an 'unken reflex' – a phenomenon well-known in some other frogs and salamanders. This behaviour usually ceases in captive specimens once they have got used to their keeper. The genus belongs to the family Discoglossidae so named for their round tongues. The tongue cannot be flicked out as in some other frogs and toads – prey is seized in the jaws.

Oriental firebellies make interesting subjects in the vivarium. A 60x30x30cm (24"x12"x12") vivarium will house two or three specimens. They require no additional heat and can be hibernated in suitable conditions. They are frequently bred in captivity requiring only a small, shallow pool (approx 30x30x5cm/ 12"x12"x2"). The species is also hardy enough to keep outside with suitable provision for winter. Elaborate furnishing is not necessary – a moisture-retentive substrate with a covering of sphagnum moss and a few pieces of cork bark for shelter. Two clutches of up to 100 eggs may be produced. Eggs and adults should be separated – cannibalism of tadpoles can occur and adults have been observed ducking into the water and eating their own tadpoles. ■

Amphibians for beginners



Our alternative to using an aquarium as mentioned last month is to use a front-opening vivarium. The sliding doors allow easier furnishing and servicing. An aquarium is more difficult to clean out. Ventilation is necessary even though a degree of humidity is needed – more for some species than others. The front-opener usually has a ventilation mesh, often at the back. If having a vivarium made ask for the ventilation panel to be placed in the top towards the front. This will help to reduce condensation on the front of the vivarium. If using an aquarium then it will be necessary to make a close fitting lid which is part mesh and part glass. A framework of 2.5x2.5cm (1"x1") timber with mesh at each end and a glass panel placed on it is suitable.

Some amphibians will require a pool. This can be a plastic bowl or can be made by fixing a piece of glass across the base of the vivarium using silicone sealer. The exposed top edge of this glass must be smoothed off – but use only aquarium sealer which does not contain a fungicide.

If the pool is built-in it will be more difficult to clean out but a plastic bowl can be lifted out and rinsed. Clean water is essential – dirty water is one of the main sources of disease. Where a pool is used the inhabitants must have some means of leaving the water such as stones or a log.

For breeding purposes some species will need a good depth of water; in this case an aquarium can be used and the animals transferred to it in the breeding season. Other species will breed in shallow water and some don't need water, simply a damp substrate.

Make sure it is escape-proof

The vivarium must be escape-proof; amphibians are mostly good climbers and can squeeze through small gaps. If overlapping sliding doors are used, a piece of plastic file binder fitted on the edge of the door will close the gap and will retain small creatures and live foods.

Since frogs do not actually drink, a drinking bowl is not needed but a small bowl of water is useful in case the vivarium becomes too dry – the inhabitants can soak up moisture from the bowl. Amphibians actually absorb water through the skin. In some frogs and toads the belly is highly permeable and moisture can be absorbed from the substrate even if it is only slightly damp. Provision of one or more damp hiding places is essential for amphibians – they can quickly become dessicated.

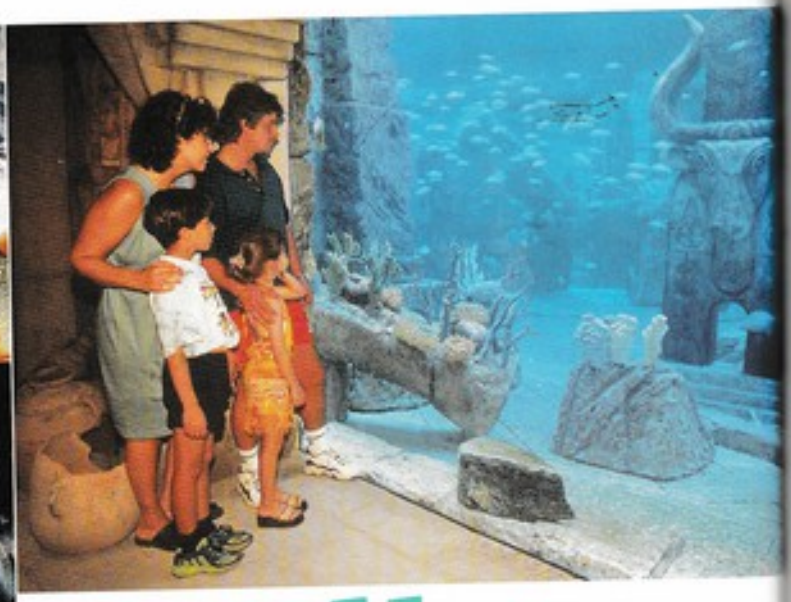
The height of the vivarium should suit the inhabitants – a tall vivarium for arboreal species but length is important for terrestrial species. If the quarters are too small then frogs may injure the snout by jumping into the glass. Certain very active frogs should not be kept in a vivarium for this reason. Wild-caught species sometimes find it difficult to adapt to glass and will make continual attempts to jump through it or scrabble against it. If this occurs it is useful to tape some kind of opaque material around the glass. Injured snouts should be treated with antibiotic powder (obtainable from a vet). Antiseptics are mostly dangerous to amphibians and should not be used.

If the vivarium is situated in a light spot (not in sunlight or near a radiator!) extra light will not be needed. If it is in a darker area an overhead light can be used to make viewing easier. Planted vivaria will also need good light if the plants are to thrive. Should it be decided to plant the vivarium then hardy ferns and other plants that will survive at room temperatures in humid surroundings should be used. Generally speaking frogs need wetter conditions than toads – some toads experience quite hot, dry conditions in the wild but in the confines of a vivarium extremes should be avoided.

left: A pair of oriental firebellied toads. They may turn dark according to mood or environmental factors.

right: A front-opening vivarium for small, arboreal frogs. The glass doors meet in the centre so live foods cannot escape.

far right: Bufo garmani showing damaged snout resulting from rubbing against glass.



Walking in Paradise

BRIAN BEGG REPORTS ON THE WORLD'S LARGEST PUBLIC AQUARIUM WHERE EVEN THE SHARKS HAVE A CHEF!

A special kind of hypnotic torpor overtakes me whenever I set foot in an aquarium. Call it mesmeric, whatever, there is a fascination that has been with me since childhood, when I used to stand for hours and watch the aimless circulating of a few exotic types of fish behind glass in not-very-capacious illuminated tanks. That was in a small aquarium opposite the pier on wet days in Bognor Regis, of all places. Today, the effect is just the same, and the mesmerisation was all there again when the opportunity arose to visit the world's largest aquarium, housed in the newly-opened 'Atlantis' complex at Paradise Island off Nassau, in the Bahamas.

top left: Wall to wall Piranha.

top right: Fifty thousand fish are on show behind 40ft picture windows made of specially toughened acrylic.

Stunning it was, with a mind-bending list of facts and figures to confirm the point. There, in more than 20 major displays set in 11 million gallons of water, no less than 50,000 thousand fish are on show behind 40ft picture windows made of specially toughened acrylic.

Piranha and giant cats

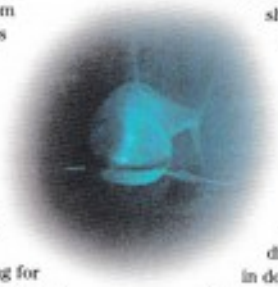
Most captivating for me among the 200 different species to be seen was a tank filled wall-to-wall with deadly Red-bellied Piranha fish from Amazonian waters, along with other freshwater species such as Black Pacu in the same tank. Nearby on display were Redtail, Tiger Shovelnose and Zebra catfish, Longnose Gar and Peacock Bass, all of the fish looking decidedly peaceful and more than a little well-fed. A further glance at a fact sheet would tell you why. Regular daily feedings get through some 800lb of top-quality seafood prepared solely for the fish by a full-time Bahamian chef! The tempting list of ingredients for these banquets features squid, shrimp, sardines, jacks, smelt, krill, glass minnows, flake food, pellet food, brine shrimp, lettuce, gelatine diet and, less tempting perhaps, dental plaster food blocks.

Fifty-five full-time staff are employed to maintain the aquarium and work on the marine life. Among them are four marine biologists, two of whom act as fish curators, and the crew of a 45ft twin jet-drive research boat 'Seakeeper' which collects and transports many of the exotic fish to Atlantis. On board the vessel are two live wells of 300 gallon capacity and one well of 1200 gallon capacity in

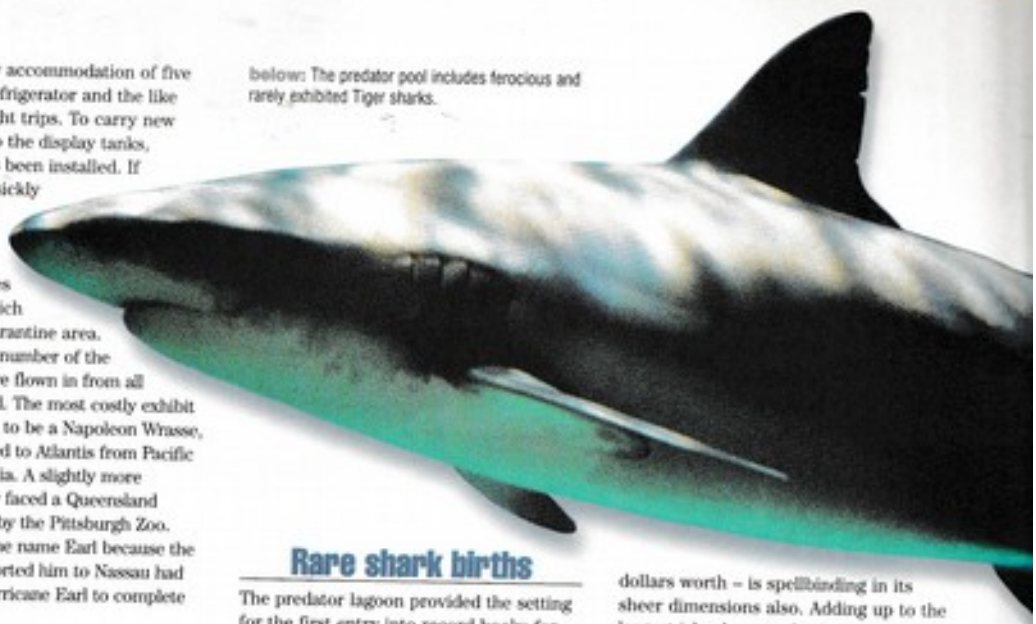
addition to crew accommodation of five bunks, galley, refrigerator and the like for long overnight trips. To carry new arrivals direct to the display tanks, a special lift has been installed. If warranted, any sickly newcomers can be diverted to a unique behind-the-scenes fish hospital, which doubles as a quarantine area.

Visitors, and a number of the fish on display, are flown in from all parts of the world. The most costly exhibit so far has proved to be a Napoleon Wrasse, which was shipped to Atlantis from Pacific waters off Australia. A slightly more traumatic journey faced a Queensland grouper donated by the Pittsburgh Zoo. The fish carries the name Earl because the plane that transported him to Nassau had to fly through Hurricane Earl to complete its journey.

Among other rarities on display are Saw fish from the more shallow waters off the Bahamas. This quite awesome species starts off looking like a shark, but at the sharp end the snout is elongated into a broad, flat rostrum with opposing rows of large lethal-looking teeth, resembling for all the world the sort of saw that lumberjacks use for felling trees. Rarely seen by divers or fishermen, the Saw fish feeds by thrashing his saw from side to side, wounding and killing all smaller fish within range, rather as though he was studying to become some sort of undersea Grim Reaper. Actually, he belongs to the Ray family.



It is the sharks of Atlantis that provide the most exciting exhibits, however. High spot for any fearless adults, and almost all children, could be a water slide from a towering five storey make-believe Mayan Temple. This propels fearless adults and all young riders at speeds of up to 35mph down a near vertical drop that culminates in a pass through a clear acrylic tunnel submerged in a shark-filled predator lagoon. Timid elders can take photographs of their offspring flashing past the formidable predators (which include ferocious and rarely exhibited Tiger sharks) from a special underwater vantage point.



below: The predator pool includes ferocious and rarely exhibited Tiger sharks.

Rare shark births

The predator lagoon provided the setting for the first entry into record books for Atlantis, when a Caribbean Reef shark with the descriptive but unbecoming name of 'Scarface' became pregnant and gave birth to six pups in June 1998. Births in captivity are rare enough, and for Caribbean Reef sharks in particular such births are extremely rare.

As if to confound any disbelievers who might be left in doubt, however, 'Scarface' went on to deliver three more pups last year, before being released back into the open sea. A romantic lagoon, if ever there was.

The aquarium apart, the rest of the Atlantis development – all 800 million dollars worth – is spellbinding in its sheer dimensions also. Adding up to the largest island resort destination in the world, it dwarfs the sort of theme parks we have grown accustomed to hearing about and visiting from time to time. Rather, it is a kind of myth park of almost legendary proportions, which include Beach, Coral and Royal hotels, 38 restaurants, a 63-slip world class marina, the largest gaming casino in the Atlantic/Caribbean region, a spa and fitness centre, 10 tennis courts, an 18-hole golf course, basketball and volleyball courts, 11 freshwater swimming areas, and a whole raft of watersport facilities.

Back in the aquarium is a unique specimen fish, not exhibited anywhere else in the world, which goes under the name 'Goggle-eyes'. Come to think of it, not a bad name for the impact of Atlantis itself! ■

ALL PHOTOS BRIAN BEGG

ight: Hypnotic, mesmeric – and stunning!

A Goldfi

The Common Goldfish is the most popular pet in the world and make the ideal first pet because they are so undemanding, hardy, colourful and gentle. They introduce their owners to the responsibilities of caring for a living creature. They are also educational since this is a pet that lives in a totally different world to our own. People can relate to their Goldfish too. Often 'Goldie' becomes one of the family... and can live to see a future generation of that family because with proper care the fish will live for 30 years.

Every Goldfish is an individual with its own characteristics. The fish can recognise its owner and will rise to be hand-fed. It is also the one pet that can be safely left when you go on holiday. It makes no noise, no mess, no smell and with a few simple rules will brighten any home as a living ornament.

Goldfish Husbandry

Always remember that Goldfish have to swim in their own loo! So flush that loo – regular (partial) water changes are essential to keep Goldfish happy, healthy and long-lived. Note the stress on 'partial' – the traditional Goldfish bowl is usually left until the water is so dirty the Goldfish cannot be seen and is then given a clear-out, with everything scrubbed clean and the water changed completely. This is traumatic for the fish and the new water gives a chemical shock to the fish – in fact, if untreated tapwater is used it is actually poisonous.

Knowledge of basic fish biology is needed to explain these facts. Goldfish (in fact, practically all fish) digest food in the same way we do. Just like us they excrete the waste, both solids and liquid. The solid excreta makes the water dirty and yet this is not a danger to the fish, so murky waters are not really 'dirty' water that has to be changed. In the wild, Carp fishes often live in water so muddy they cannot see or be seen.

The liquid excreta is the danger. Equivalent to our urine, the fish excretes ammonia (as a soluble compound called ammonium) which is invisible. It is also deadly and can poison the fish at only a few parts per million concentration. Even traces will irritate the fish, making it scratch (called 'flashing' and often mistaken for a parasite problem). The chemical also irritates the gills (where the fish breathes) and a protective mucous forms. This reduces the uptake of oxygen and so the fish is seen gasping at the surface trying to get extra air. Yet the tank water may look perfectly clean and clear.

The ammonia produced by the fish is acted upon in mature water by the bacteria which converts it to another compound called nitrite. This is equally poisonous and also invisible. The level of nitrite can be easily measured with a test kit from the aquarium shop and since this also reflects the presence of ammonia, the 'nitrite test' is a good indication of water quality. The ideal is a zero rating at all times.

Other bacteria in a mature aquarium convert the nitrite to nitrate. This compound is less harmful (except at high levels) and is actually used by the plants as a fertiliser. These so called nitrifying bacteria live on surfaces so passing the water over some filter medium is the way to make the reaction occur. This is the basis of 'biological filtration' where a filter pump of some kind continuously flows the tank water through a filtering material.

Water maintenance

If you have a simple Goldfish bowl with just one Goldfish as a pet, then there may not be room for a filter system, in which case rely on the flushing method to remove the ammonia and dirt. Preferably daily, but at least three times a week, ladle out half the water and replace it with tapwater. Mix hot and cold tapwater so it feels the same temperature as the Goldfish bowl water to your finger tip.

left: River sand makes a better substrate than normal aquarium gravel for Goldfish.

right: Fancy Goldfish like this Lionhead are not suitable for ponds.

fish is for life

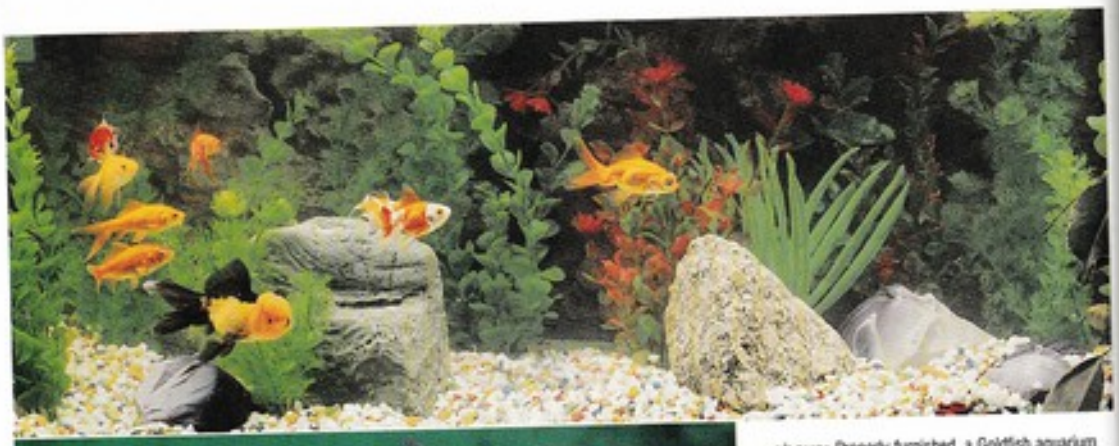
DR DAVID FORD EXPLAINS THE BASICS OF CARING FOR A GOLDFISH.

Never leave the bowl until filthy and then pour all the water away (with its valuable nitrifying bacteria culture). If more than half of the water is ever changed the chlorine in the tap water will harm the fish, so use a Dechlorinator (available at all aquatic shops). If the bowl needs a scrub out, tip the fish and its water into another container, returning all after cleaning. With care, only clean water can be tipped out. Only use a net as a last resort because the fish is naturally terrified by the device – it must look like a shark to it!

The ideal Goldfish aquarium is a standard silicone-sealed, all-glass tank, as large as possible, but at least 24"x12"x12" (60x30x30cm). This holds 10 gallons or nearly 50 litres of water, which helps dilute the ammonia the fish produces, as well as giving more swimming space than a bowl. Of course, the stocking level is important to water quality too. Only keep one large Goldfish per 20 litres of water. This means the 24" tank can house two large or three medium Goldfish. Do not think that this means four or more baby Goldfish because they soon grow! If you want four or five Goldfish as pets then plan at least a 36"x12"x15" tank (90x30x38cm).

If you own one Goldfish in a bowl do not decide it must be lonely and buy a second fish. The water will then be overloaded with ammonia and nitrite and one (or both) of the fish will die. ⇨

ALL PHOTOS: DAVID FORD



above: Properly furnished, a Goldfish aquarium can become a room's focal point. Here plastic plants have been used rather than real ones.

left: This Comet shows the classic shape of a single-tailed Goldfish. They are hardy enough to keep outdoors all year round.

Accessories

The advantage of the large aquarium is that many accessories can be obtained. A stand can be used to place the aquarium at viewing level. This can have a shelf or even a cupboard to house a power filter. A lid may be fitted with fluorescent lighting for attractive viewing – and it will lighten a dark corner of any room. An aquascene can be designed with plants, rocks, caves or ornaments. The aquascene can also be brought to life with a stream of bubbles from an airpump.

Note that the airpump is decorative. It is often claimed to be essential for the fish's health but the filter is the life saver, not aeration. If the tank is so crowded that extra air is needed to supply oxygen, there will be many other problems that the airpump cannot cure.

The most important accessory is the filter system. There are many types on the market and all work well, so the choice is yours. The cheapest system, however, is the air operated undergravel unit but this is not suitable for Goldfish. This filter works best at tropical temperatures and so is more suitable for tropical or marine aquaria.

The best base for Goldfish is river sand rather than the traditional aquarium gravel. A 10kg bag is enough for a 36" aquarium (rinse well before use to remove fine dust – best done by stirring hands-full in a bucket of water under a running tap). If traditional aquarium gravel is preferred, choose a small grain variety (under 4mm) because 5mm and over gives a stone that may get stuck in the complicated mouthparts of Goldfish.

Feeding

Most commercial fish foods have all the nutrients and trace elements petfish require. Choose a good quality one, however, because the makers will be carrying out research to find the ideal level of vitamins that fish need for a long and healthy life. Follow the instructions on the pot of flakes or granules, which usually recommends two small feeds per day, and always remove any leftovers.

If scrap food is tried, choose fishy items (fishmeat, prawns, crab, shrimp) and vegetables (peas, lettuce, spinach) and even grain (brown bread) but do not feed meats. Mammalian meats (especially red meat, but even white meat such as chicken) contain hard fats and the fish's digestive system cannot cope with it – it's positively harmful. The same applies to processed foods containing meat – burgers, hams, sausages and so on.

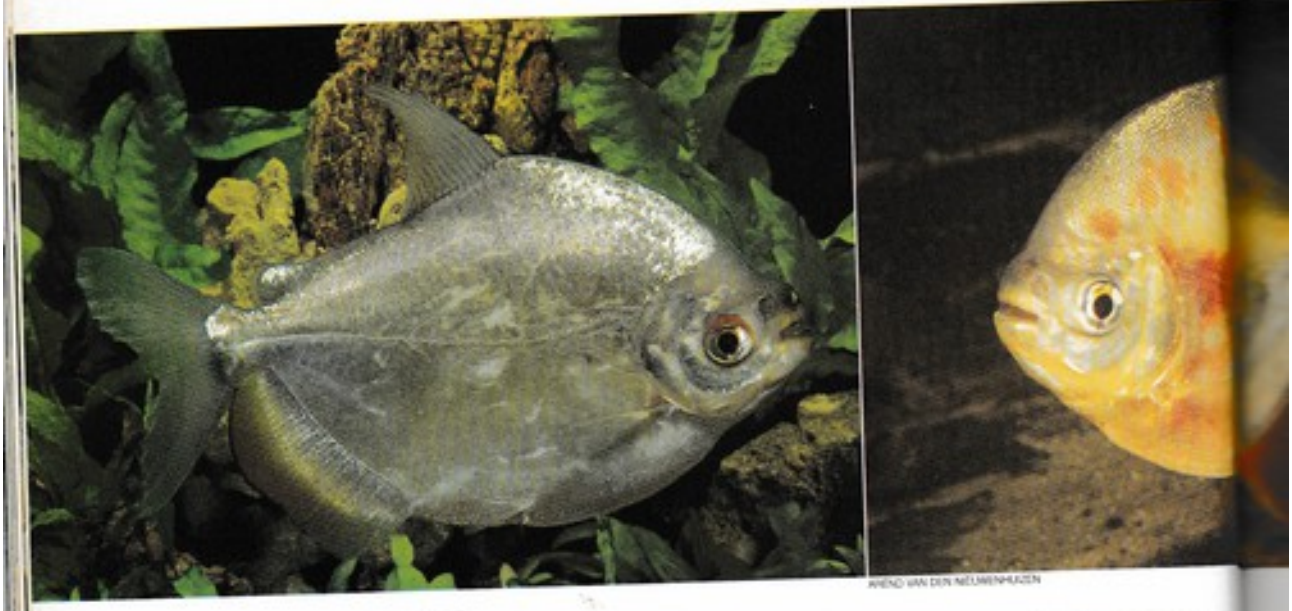
Remember too that scrap foods may not contain the right balance of vitamins and minerals so do include a prepared fish food at least twice a week.

Live foods such as Daphnia, Tubifex, Bloodworms, Mosquito larvae and the like are the natural diet of most fish but they can contain live parasites that may infest the fish and cause problems in the small confines of the home aquarium. Only if these natural foods have been treated (irradiated, frozen, freeze dried) are they safe and can be used as a 'treat'.

Keeping a pet Goldfish can be a very rewarding experience and may lead to a lifetime's interest in the fascinating hobby of fishkeeping. Ask any dedicated aquarist how they started in the hobby and nearly everyone will say "with a Goldfish". ■

Holiday care

When going away on holiday, do the usual partial water change but do not feed any extra foods. The fish will live off its stored reserves (fish oils) for at least three weeks and so can be left unattended. If a friend or relative is left to look after the Goldfish, leave portions of food (a tablet form is good for this) ready weighed out. If the fish food container is just left with the guardian – inexperienced people usually over-feed (because the Goldfish does its hungry dance) and so pollute the water and kill the fish.



AREND VAN DEN NIEUWENHUIZEN

Silver D

SILVER DOLLARS ARE VERY POPULAR AQUARIUM FISH IN THE U.S.A. WHERE PIRANHA HAVE BEEN BANNED IN MANY STATES. ANTON CASS EXAMINES THIS OFTEN OVERLOOKED GROUP OF CHARACINS

Myleus is one of those genera of fishes that is quite often overlooked in its own right and is therefore not very well documented in aquarium literature. Together with *Metynnis* and *Mylossoma*, *Myleus* are classed as Silver Dollars and as a result many interesting 'contaminants' in shipments of mixed disc Characins are overlooked. Above all they are not just another disc shaped silver Characin as their coloration is quite varied.

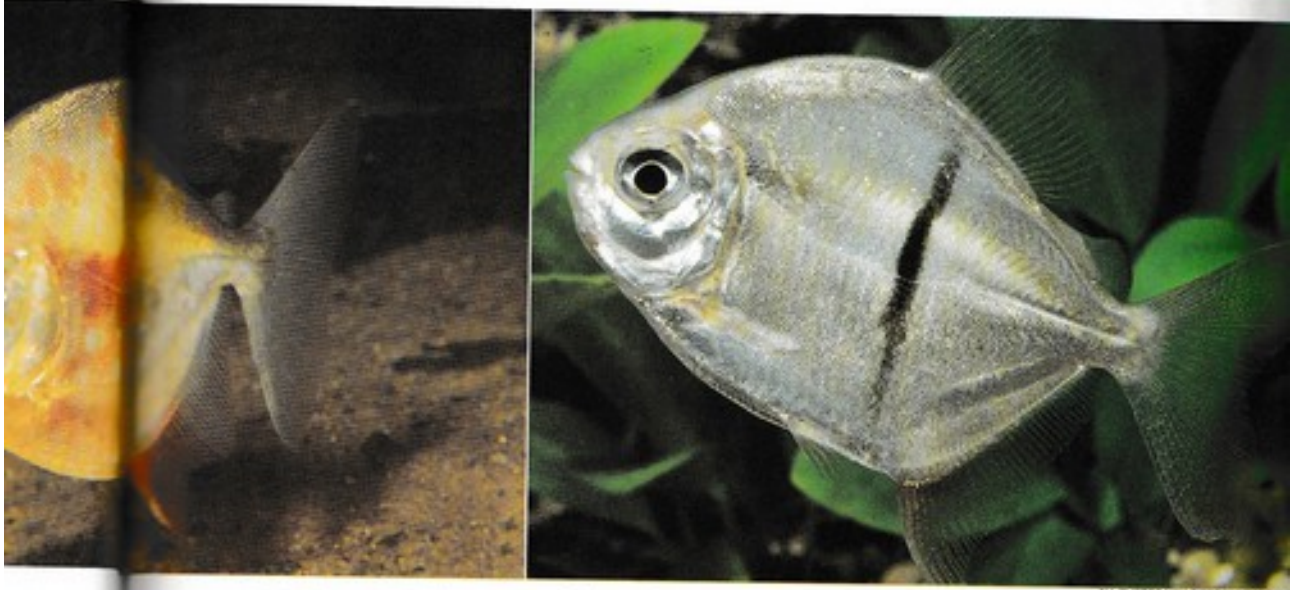
They make ideal shoaling fishes for larger aquariums and are easy to maintain providing an eye catching display. One of the major problems with the genus, and indeed with other disc characins, is the radical change from juvenile to adult, a situation which has caused considerable confusion in specific identification. Furthermore, it is not known exactly how many species have been correctly assigned to the genus, many books showing the same photograph with different names.

Confusing common names

As stated the species count is somewhat vague, the best known being the Red Hook Metynnis (*Myleus rubripinnis*). This common name typifies the confusion that exists, as *Metynnis* are a separate genus of fishes one of whose characteristic features is an angular or rectangular adipose fin. That of the *Myleus*, or those that are currently known, is a rounded or teardrop shape.

In the aquarium, despite the confusion over their actual names, *Myleus* are quite undemanding. These fish can attain a reasonable size i.e. a minimum of 15cm (6") and a 1.2m (4') aquarium, with a capacity of at least fifty gallons is essential. If 15cm does not seem too large, remember that *Myleus* are as deep as they are long so they are similar in shape to a saucer. Two other factors also dictate the necessity for a large tank. Firstly, these are active and powerful swimmers utilising the dimensions of the aquarium to the fullest extent. Secondly, they are, like most Characins, shoaling fishes that benefit from being kept in groups. In the case of the larger fishes a minimum of four is required. One *Myleus* on its own is likely to be extremely nervous. They are nervous fishes even in groups but this is reduced the more of them there are. Beware of buying just two as one could bully the other causing injury and in extreme cases death.

It is important to ensure that the aquarium is well covered as these fish can leap like Olympians. Many aquarists,



ALL PHOTOS MAX GIBBS UNLESS IND

Dollars and friends

top left: *Mylossoma duriventre* is sometimes called the Silver Mylossoma, although its correct common name is Hard-bellied Characin. These fish can reach 25cm (10") in the wild.

top centre: *Myleus gurupyensis* is another species that has been bred in captivity.

top right: *Myleus schomburgki* has a very distinctive black vertical bar on its flanks.

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myself included, have found bodies on the floor, the fish have panicked suddenly and certain individuals have leaped to their doom through the smallest gap.

Filtration needs to be more than just adequate as these fishes like clean well oxygenated water and welcome strong currents. They behave like trout or salmon often remaining, or appearing to be, motionless in the current as their powerful physique counteracts the fast flow.

Tough as old boots!

Myleus, especially larger specimens, are very strong and physically tough. In one incident in my own aquarium the filter system broke down biologically and the nitrites went well beyond the toleration limits of most aquarium fishes. The *Myleus rubripinnis* quite calmly carried on feeding showing no ill effects. It was only when their eyes began to cloud over that it became apparent that something was wrong and the problem was rectified. The fish healed up and carried on as if nothing had happened.

I do not suggest anyone attempts this and would suggest that it is a good policy to check water chemistry on a regular basis.

Aquarium conditions

Myleus do not seem to be concerned too greatly with pH, hardness or temperature provided extremes are avoided. Ideal conditions do seem to be in the softer acidic region with a pH of between 6.5 and 7.0, a hardness of below 10 and a temperature of approximately 27°C (80°F).

Do not put living plants in the aquarium. *Myleus* are avid plant eaters and will consume anything of the leafy variety even the bitter tasting Java Fern. This plant is tough and actually does have a bitter taste (yours truly tasted it). It was on this basis that a magnificent Dutch grown specimen some 18"tall was placed in the aquarium at approximately 3pm. By 9am next morning, all that was left was two to three inches of stalk.

Myleus are far from fussy feeders. Large Shrimps, (Prawns, Krill and the like), pieces of ox heart (not recommended too often), cubes (yes whole cubes) of freeze dried Tubifex and various varieties of pellets are all consumed with equal relish. In fact, if these fishes do not eat it then it must be a very poor food. It is a good idea, essential according to some sources, to include some vegetable matter in their diet. At least once a week either Cos lettuce or Chinese leaves are weighted and then placed in the aquarium. The *Myleus* attack these and can be seen chomping off large strips as if they had been cut by shears.

Good community fish

Fast, strong and generally mid to surface water swimmers, *Myleus* can be kept with a variety of other fishes. I have kept them with a variety of Catfishes although I would suggest that the nocturnal brigade with their long barbels and night time forays be avoided as they could cause panic in the aquarium. Larger Corydoras and the Loricariid species, especially the more exotic varieties, make excellent ➡

Catemaco Molly
(*Poecilia catemaconis*)

By Derek Lambert

The Catemaco Molly is only found in Lake Catemaco (Mexico) and the streams which flow into it. This beautiful lake contains many species of Livebearer of which the Catemaco Molly is one of the most attractive. This wild caught male was found as a young, immature, unsexed fish and grew up into a really good specimen of its kind. The fish pictured is the mature, wild caught male some 6.5cm in body length. This is one of the moderately sized mollies and males usually grow to about 7cm and females 8.5cm.

The body is torpedo shaped with a strongly developed caudal peduncle. When in good condition the body is a chocolate brown paling to white on the belly with rows of fine orange spots along the flanks. The dorsal and caudal fins are pale yellow to orange at the extremities becoming dark grey towards the body. These fins have fine black spots on the membranes between the rays. The gonopodium of the male is orange. Females are similarly coloured but much paler.

PHOTO: DEREK LAMBERT

Temperament and care

This is a peaceful, somewhat timid species of molly which Manfred Meyer reports may achieve 8cm for males in the wild and 10.5cm for females. Lake Catemaco is a freshwater lake with relatively little in the way of growing plants and a strong wave motion developing during the day. Early in the morning is the best time to see these fish as many come in close to the beaches to feed.

In the aquarium this species behaves similarly to many of the other mollies, preferring warmer temperatures and a large roomy aquarium. Filtration should be provided in the form of a good internal power filter or better still a large external model. These fish live in clean well oxygenated water in the wild and need those conditions to thrive in captivity.

They can be kept in a community tank with fish of a similar size. Diet presents no problem as they seem to do well on all foods including flake. All live foods are taken greedily. The gestation period is typically four weeks with approximately 20 fry born to young adult females. Larger broods can be expected from large females but the fry are often smaller. A pregnant female should never be put in a breeding trap, Mollies hate being confined in this way as they do like plenty of space. A well-planted tank will provide shelter for the babies. ■

CV

Family:	**Poeciliidae**
Species:	***Poecilia catemaconis***
Origins:	**Lake Catemaco, Veracruz state, Mexico**
Aquarium type:	**Large roomy community aquarium**
Feeding position:	**Surface and mid-water.**
Size:	**Males 7cm; females 8.5cm**
Temperature:	**24-26°C (75-78°F)**
Diet	**Flake, live and frozen foods.**

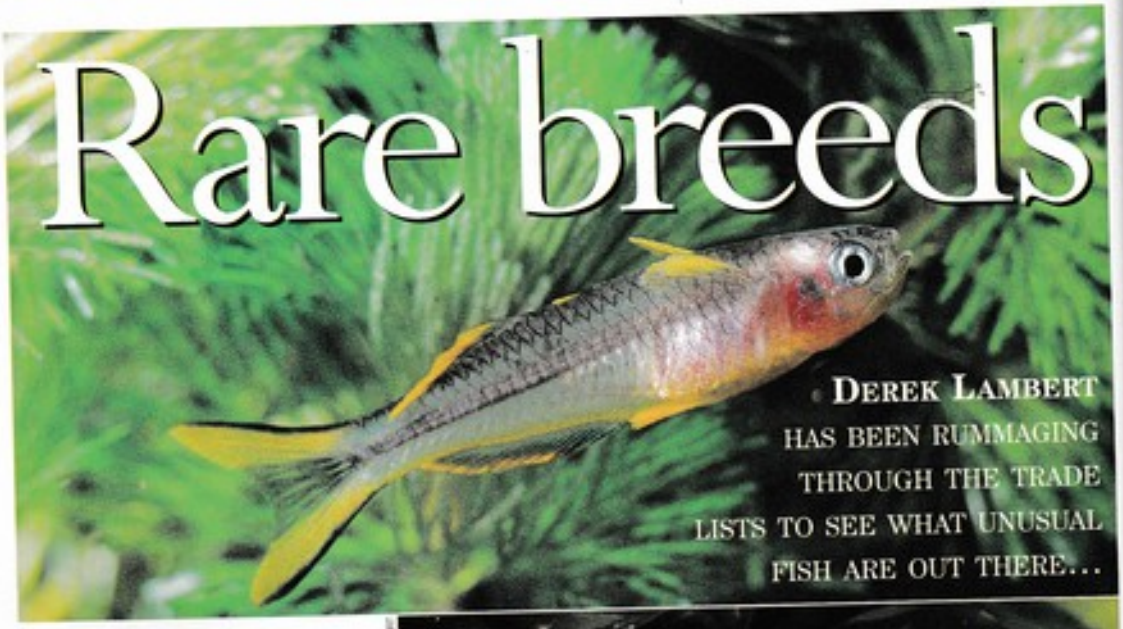
Lemon Tetra

Hyphessobrycon pulchripinnis SIZE 2"

AQUARIST AND PONDKEEPER GALLERY

PHOTO: M.P. & C. PIENOOR

Rare breeds



DEREK LAMBERT HAS BEEN RUMMAGING THROUGH THE TRADE LISTS TO SEE WHAT UNUSUAL FISH ARE OUT THERE...

ALL PHOTOS: DEREK LAMBERT

above: *Pseudomugil furcatus* was still listed under its old name of *Popondetta furcata*.

right: *Procatopus aberrans* have gorgeous shimmering blue bodies and red spots in the fins.

below right: *Botia nigrolineata* is ideal for medium-sized fish communities.

This month I decided to check out a few trade lists to see just what is available at the moment for those people who have a community set-up but want something a little different. First up was *Botia nigrolineata*. This is a larger version of *Botia sidthimunki* (Chain Botia) which makes an ideal community fish. They look best in groups of four to six but the price tag may be prohibitive. At 10cm this fish is ideal for medium-sized fish communities.

Next came *Pseudomugil furcatus* although this was still listed under its old name of *Popondetta furcata*. This pretty little Rainbow deserves to be seen far more often than it does. The price may put people off a little but with its brilliant yellow 'wings' and bright, lively disposition it is well worth the extra money. At 5cm it fits well in to a small fish community.

Few Killifish have caught my attention in the way *Procatopus aberrans* (and its cousins) have. The gorgeous shimmering blue body and red spots in the fins make these fish stand out. More importantly, for those people with a normal community aquarium, it is hardy, peaceful, eats anything and at only 5cm is ideal for small fish communities.

Finally, tucked deep away in a new genus name (at least to me), was one of the very rare cyprinids that I love. Garnet Minnows have been few and far between over the years but here they are, large as life, being offered under the name of *Tanichthys lini*. Their close relationship to White cloud mountain minnows is well known but I had not realised they had been placed in the same genus. So, while every month I have been searching for *Hemigrammocypris lini* I should have been looking further down the lists.

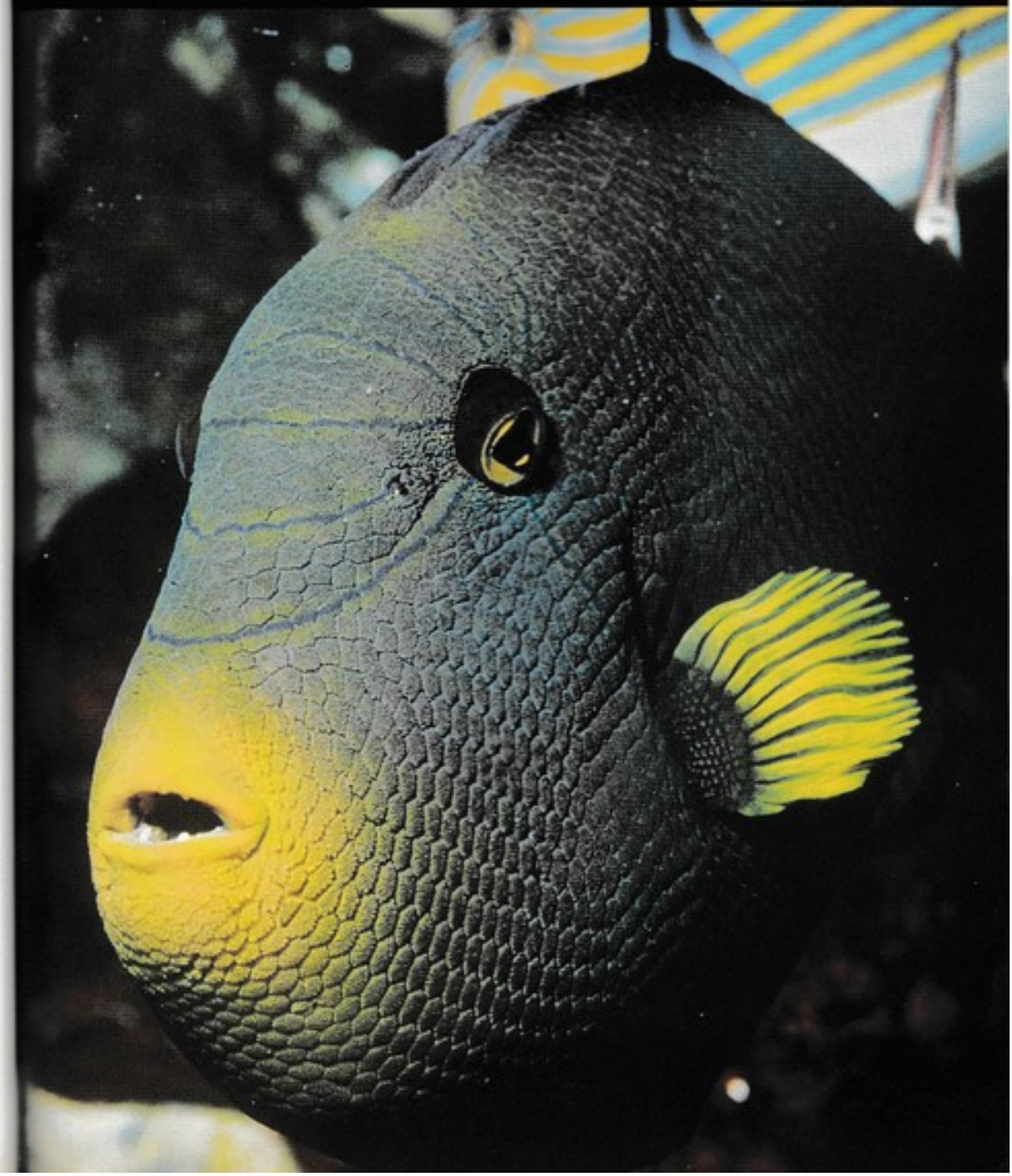
Now I know this one is being imported again I will ask my local shop to obtain some for me. Not that it is a stunningly attractive fish but it does have a charm all of its own and makes a lively fish for a small fish community aquarium. ■

Pink-Tailed Trigger

Melichthys vidua SIZE 13"

AQUARIST AND POND KEEPER GALLERY

PHOTO: M.P. & C. PIEDNOIR



Book reviews

A&P LOOKS AT THE LATEST BOOKS ON THE SHELVES.

Land of Waters – Explorations in the Natural History of Guyana, South America

The tropical rainforests of Guyana are one of the richest ecosystems on the planet. In *Land of Waters*, award-winning scientist Ro McConnell records this lost world of virgin rainforests and lush savannahs before the onslaught of intensive logging and mining began to threaten their existence.

Ro McConnell was a young researcher stationed in then British Guiana in the '50s. One of the first women to make a career as a professional scientist, she investigated the huge diversity of the fish populations in the interior of this remarkable country. Travel then was hazardous, conducted by canoe and amphibious plane. Humorous incidents like chasing Manatees through the centre of town with the help of local school children and the man who thought he was shooting a bird in a tree until a porcupine fell on top of him, add a warmth and humour to this book. This helps make it accessible natural history in the best tradition of the genre.

Land of Waters combines acute scientific observation with a poetic appreciation of the natural world.

Well worth adding to your shelf if you want a good read about the natural world but this is not a pretty picture book full of lavish photographs, although there are enough just to give you a flavour of the place.

Reviewed by Derek Lambert

Price:	£18.50
Author:	Ro McConnell
Publisher:	The Book Guild Ltd
ISBN:	1 85776 458 7

Fish Disease, Diagnosis and Treatment

I have been keeping tropical freshwater fishes in my home for slightly over 34 years and I wish I had a copy of Edward Noga's book in my reference library since the day I set up my first aquarium. The author is professor of aquatic medicine, Department of Clinical Sciences, College of veterinary medicine, North Carolina State University – a job description that makes Dr Noga eminently qualified to bring such a publication to press.

While *Fish Disease, Diagnosis and Treatment* is not written with the casual hobbyist in mind, it is a publication that will provide an excellent source of reference and help for the serious hobbyist, dealers and professionals breeding or cultivating fish on an everyday basis. The photographs and illustrations that are widespread throughout the book are clinically graphic and easy to understand and follow. Photomicrographs feature heavily through all the chapters, discussing the identification of a specific disease and again do much to add to the value of the publication.

Fish Disease, Diagnosis and Treatment is divided into three distinct parts: Methods for Diagnosing Fish Diseases; Problem List covering many environmental stress issues such as incorrect or stratified temperature, ammonia and nitrite poisoning, pH, salinity and hardness in addition to specific disease related problems; and Methods for Treating Fish Diseases. I can see this last section quickly becoming dog-eared and thumb worn as this detail is consulted with regularity in search of a detailed problem solution.

Personally I would venture that most of the diseases I have ever encountered during my years as a tropical fish hobbyist feature within the pages of Dr Noga's publication. I can heartily recommend this volume to any person concerned with the keeping, breeding or cultivation of freshwater tropical or coldwater fishes both inside and outside the United States. While the cost of the book may seem high at $99.95 this is of relative insignificance if the long term use and likely effects of having this publication in one's personal library are taken into account. ■

Reviewed by Dr Peter Lewis

Price:	$99.95 (approx £60)
Author:	Dr Edward J Noga M.S, D.V.M.
Publisher:	Iowa State University Press
ISBN:	0-8138-2558-x

Close encounters *of the fish kind*

JOHN DAWES AND MORE ENCOUNTERS WITH FISH AROUND THE GLOBE.

ALL PHOTOS JOHN DAWES UNLESS INDICATED

above: An adult pair of Piranha Preta. The slimmer fish with more colourful gills and throat and damaged anal/caudal fin is the male.

Catfish are versatile creatures. They are found in a vast range of habitats and exhibit an almost bewildering array of physical permutations based on the basic barbel faced format. Among perhaps the least catfish-like cats are the Whale-like Catfish of the South American family Cetopsidae. These incredible cats have (mostly) very small eyes (they are microphthalmic), are scale-less, have three pairs of barbels (no nasal ones), a highly reduced swim bladder and no adipose ('second' dorsal) fin. There are four genera in the family, containing only 12 species.

What really makes Whale-like Catfish unusual is their predatory habits. Strong teeth and streamlined, smooth skin allow them to open up large holes in the bodies of their prey. Indeed, it's quite common for large fish of other species that are caught by fishermen to contain one or more Cetopsids lodged inside the body cavity still voraciously feeding!

I have collected Cetopsids, including the specimen of *Cetopsis coecutiens* shown in the accompanying photograph, in the lower reaches of the Rio Solimoes near Manaus, Brazil. They all have been fished by dragging a net along the sandy/muddy bottom of the river, whose sediment-laden water make it impossible to see further than a few centimetres at a time.

Under such conditions, of course, eyesight is quite unimportant, so the fact that these fish are microphthalmic does not place them at any sort of disadvantage to the other river inhabitants when it comes to searching out food.

Further, once they find an adequate food source, the nourishment they obtain from

Which name?

The Brazilian name 'Piranha Preta' translates as 'Black Piranha'. However, the fish more usually referred to as the 'Black Piranha' is generally known as *Serrasalmus niger* and is not found in the Rio Negro at all, but in the Guyanas. Some authorities, though, believe both fish to be one and the same species . If this eventually proves to be the case then both fish would be referred to as *Serrasalmus rhombeus*, which is the older of the two scientific names.

one large protein-rich meal will sustain them for considerable periods of time, particularly since Cetopsids appear not to burn up a great deal of energy in either 'aimless' swimming about or (as a result of their bottom-hugging habits) in having to fight constantly against the current.

Sexing Piranha

Piranha are notoriously difficult fish to sex. true or false? Well, a bit of both.

Check any aquarium book and the chances are that you will read comments like: "No external differences between the sexes" or "Males may be slightly slimmer" or "Males may be a little more colourful than females"... and so on.

The fact is that, where aquarium specimens are concerned, the sex of an individual Piranha can, indeed, be very difficult or even impossible to determine. The reason is quite simple: we tend to overfeed our fish to the extent that they very quickly begin to lay down layers of fat reserves, often within days of arriving in our aquaria. Once this happens, any slight differences between individuals tend to disappear under the layers of fat.

However, in the wild, conditions are, of course, very different. There, most animals (not just fish) go through an annual cycle of 'feast and famine'. During the periods of 'feast', when food is readily available, they put on weight and store 'fuel' reserves to take them through the leaner periods of 'famine' that invariably follow.

In addition, wild fish swim more energetically, and over longer distances, than their aquarium cousins. Therefore, they burn more 'fuel' and are consequently slimmer than aquarium specimens of the same species.

During my last visit to the Rio Negro, I was talking to the *cabocios*, whose guests we were, about the difficulty of sexing Piranha. At the time, we were on a fishing trip to catch 'Piranha Preta', 'Black' Piranha (*Serrasalmus rhombeus*) on hook and line for our evening meal. They looked a bit surprised. Sexing Piranha was easy, they said.

upper: Captive Piranha like these Red-bellied Piranha soon put on body weight and become difficult to sex.

lower: It may look quite unremarkable but *Cetopsis coecutiens* – like its relatives – is anything but unremarkable in habits.

So it proved to be. As you can see from the accompanying photograph of two adult 'Piranha Preta' lying side by side on the sand, they look different. One has a flattish belly profile and has more colour around the gills and throat than the other. This slimmer, more colourful, fish (the one with damaged caudal and anal fins – probably obtained as a result of bites from other Piranha) is the male. The female is the much stouter fish. Once you know what to look for, the rest is easy.

All the specimens I have seen since my last visit to the Rio Negro, have been adult aquarium specimens of several years of age whose sex has been next-to-impossible to guess, so – unfortunately – I haven't, as yet, been able to apply the knowledge I gained during my 'sex education' lessons on the Rio Negro. ■

AQUARIST AND POND KEEPER GALLERY

PHOTO: AREND VAN DEN NIEUWENHUIZEN

Golden Wonder Panchax

Aplocheilus lineatus SIZE 4"

78°F ▲ 72°F

ASK A&P

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Every query receives a personal answer and in addition, we will publish a selection of the most interesting questions and responses each month. Please indicate clearly on the top left hand corner of your envelope which department you wish your query to go to. All letters must be accompanied by an S.A.E. and addressed to: Ask A&P, *Aquarist & Pondkeeper*, TRMG Ltd, Winchester Court, 1 Forum Place, Hatfield, Herts AL10 0RN.

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Our other experts

Dave Armitage
Anabantoids

Pete Liptrot
Barbs, Characins, Rasboras and any oddballs

Kathy Jinkings
Catfish

Sonia Guinane & Dave Tourle
Cichlids

Ben Helm
Equipment & Technical advice

Lance Jepson
Health

Andy Gabbutt
Killifish

Derek Lambert
Livebearers, Rainbows & Breeding fish


Ben Helm


Pete Liptrot


David Armitage


Sonia Guinane & Dave Tourle


Derek Lambert

Goldfish

Stephen J Smith will be very well known to long term *A&P* readers. For many years he wrote a column entitled *Coldwater Jottings* in this magazine and it is with great pleasure that we welcome him back as our Goldfish expert. Stephen has a lifetime of fishkeeping experience behind him and has been a prolific aquatic writer as well as an active speaker and a Goldfish competition judge in the UK, Singapore and in the USA where he now resides.

Marines

Andrew Caine has had a life-long interest in marine life and has been keeping marine aquariums for 15 years. He attained an honours degree in marine biology from Bangor University and wrote and taught his own night school course in the same subject. He started Aqua-World installing reef aquariums throughout the UK and now has a little corner aquarist shop in Warrington where he can be found hiding behind the plastic plants!

Koi & Ponds

Bernice Brewster is very well qualified to answer your questions on Koi and Ponds. She has a B.Sc (Hons) London, Biological Sciences – incorporating Marine Biology; Animal Physiology and Vertebrate (back-boned animals) Anatomy. She worked for 10 years as Fish Biologist at the Natural History Museum, London, and spent four years as Fish Biologist with Koi (UK) Ltd, working on pathology and husbandry of ornamental carp (koi). In 1998 she formed Finspiration (Wholesale) Ltd in conjunction with Lorraine Hubbard and Neil Black, specialising in the farming and sale of coldwater ornamental species of fish.

M.P.& C. PIEDNOIR

South American cichlids like this *Satanoperca jurupari* should not be kept with Central American species.

Tropical

Cichlid Communities

Q My American cichlid set-up consists of five Firemouths, five Convicts and three Jaguars in a 4'x12"x15" tank. I have recently seen some attractive cichlids called *Geophagus jurupari* that I would like to add to my cichlid collection. As I am not sure how large all these fish will grow, will my tank be big enough?

Bernie Dale, Kings Lynn.

A At the moment you are housing Central American cichlids: Firemouths (*Thorichthys meeki*), the Convicts, (*Archocentrus nigrofasciatum*) and the Jaguar cichlid, (*Nandopsis managuensis*). Male Firemouths and male Convicts may reach 16cm (6") in length, with the females remaining slightly smaller. However, the Jaguars might grow to 40cm, (16"), so your tank will certainly not be big enough for these three species. The *N. managuensis* is a specialised predator and may decide to eat smaller tank-mates. Your tank will be able to accommodate the young Firemouths and Convicts until pairs are formed but then the surplus fish should be rehoused for their own safety. It might just be possible to house one pair of Jaguars in the tank, but it will be necessary to provide adequate hiding places for the smaller female. The former suggestion is probably the best option and to find new homes for the spare fish.

Satanoperca jurupari, which is a peaceful South American cichlid species, as are the majority of cichlids from there, should never be housed with their far more aggressive Central American cousins. Many South American cichlids must be kept in soft water, while those from Central America need alkaline water. If you are that taken with the *S. jurupari* why not set up another tank for their exclusive use?

Sonia & Dave.

Marine

A Tang too many

Q I have just set up a 48"x18"x18" marine fish-only system. The filtration is an external filter with 20kg of live rock. I also have a protein skimmer and a UV. The aquarium was set up five days ago with R.O. water and in about three weeks I would like to stock the following: a Flame angle, Pyjama wrasse, Emperor tang, two Yellow tangs and a Zebra moray eel. Is the stocking compatible and will I be at my stocking limits?

Pete Brown, Huddersfield.

A You will have about 45 gallons of water within your aquarium. Your filtration is good and I am pleased that you are using live rock as well. You can safely stock 1" of fish (excluding the tail) per two gallons of aquarium water, giving a total of 22" of fish. Your total fish stock when adult will be 56" because the zebra moray will grow to about 36" long if not bigger so go for a smaller eel. Your Emperor tang and Yellow tangs are incompatible unless in a much larger aquarium, so you will have to lose the eel and a tang species. Replace these with peaceful fish. Also, the Flame angel and Pyjama wrasse should be added last as they are very territorial species.

Andrew Caine.

Coldwater

Green water problems

Q Why does my pond turn green every spring and summer and what can I do to stop this happening?

Jane Smith, Glasgow.

A Green water is a very common problem in the garden pond. It is caused by billions of microscopic algal cells which are in suspension in the water column. On a very sunny day, you can actually see the algae swirling through the water to reach the sunlight at the water surface. The algae thrive on nutrients in the water that originate from the fish and wildlife in the pond. Fish produce waste in the form of ammonia which in an established pond is either used directly by the aquatic plants or is broken down to nitrite and then nitrate –

Emperor Tang – a beautiful species but incompatible with Yellow Tangs unless in a very large aquarium (photo: M.P. & C. Piednoir).

Boseman's Rainbowfish

Melanotaenia boesemani SIZE 4.5"

AQUARIST AND PONDKEEPER GALLERY

PHOTO: M.P. & C. PIEDNOIR

79°F
75°F

BERNICE BREWSTER

Green water like this can be cleared in several different ways but using a UV Clarifier guarantees success.

through the activity of bacteria and other micro-organisms.

Nuisance algae such as green water and blanket weed begin to grow very early in the year, which allows them to out-compete established aquatic plants. Once the water turns green, it prevents the sunlight from reaching the submergent and oxygenating species of plant, which then die and this further promotes the algae bloom.

There are a number of ways of controlling green water. Adding more aquatic plants to the pond is beneficial but once the water is green, any submergent species cannot grow. Some plants such as Watercress, *Rorippa* species also grow very early in the year and can be planted in waterfalls or even in baskets around the margins of the pond. These plants can prove very effective at controlling green water.

Green water may be controlled by using one of the many proprietary brands of algae controlling chemicals that are on the market. It is important to realise the algae is controlled for as long as the chemical is effective in the water and, unfortunately, in many instances this may be just a period of days or weeks in the summer time and this will not be sufficient time to allow any plants to become established. Many people prefer not to use algae treatments because of concern for the welfare of pets and other wildlife that drink from the pond.

In recent years there has been a great deal of interest in the use of barley straw as an effective algicide. As the barley straw decays through the activity of aquatic bacteria and fungi, a chemical is liberated which is very effective in controlling the growth of these nuisance algae. It takes several weeks for the bacteria and fungi to release the substance that controls the algae and so it is not an immediate remedy but it is available in pouches or as algae pads.

The guaranteed way of controlling green water is by adding an ultraviolet clarifier to the pond system. Certainly on filtered systems, such as koi ponds, ultraviolet clarifiers tend to be added as a standard fitting to prevent the water from turning green. The ultraviolet light damages the green pigment in the algae cells, preventing them from producing nutrients from sunlight and so will not only eradicate green water but will prevent its recurrence. Water needs to be pumped through the ultraviolet unit and, depending on the make, the bulb needs to be replaced every six months to annually.

Bernice Brewster.

Tropical

No babies

Q I have a small group (2 males and 4 females) of Black speckled *Gambusia holbrooki* which I keep in an 18"x12"x12" aquarium. They are fed on a good quality flake food and the tank is well planted. My Guppies, Platies, Mollies and Swordtails have all produced lots of babies in similar conditions which I am raising without any problems. The Gambusia, however, don't seem to be breeding as I never see any fry. What am I doing wrong?

Ron Greenwood, Chelmsford.

A Your Gambusia are probably producing babies every month. The problem is they are being eaten by the other Gambusia in the tank. This is one species of livebearer which must have its female isolated if any babies are going to be saved. In fact, although I don't like trapping female livebearers, this is one species I do trap just to be sure of having some fry survive.

Derek Lambert.

Marine

Live Rock

Q I am very confused. I think I would like to buy some live rock to set up my aquarium but what are the benefits of this rock and why is there such a price difference between places for the same weight of rock "all of the highest quality" and why is it so expensive?

Pat Smith, Milton Keynes

A Live rock is one of the best things to have in your system. When mature and looked after correctly not only will it provide the best looking aquascape but wonderful calcareous algae, loads of little life appearing and, as if this isn't enough, it is the best nitrate filter money can buy. While it is expensive, it is money well spent. It has to arrive via air freight and then be cured, which is time consuming, so a small piece of rock costs a lot of money.

How can you tell the difference between good and bad rock? Cheap live rock has a very poor calcareous algal covering, while the best jumps out of the tank and hits you in the face – when you see the good you will know the poor! The only advice I can give to people when buying live rock is to treat it the same as when you buy a car. Don't buy any unless you can examine it and do a little shopping around. Once you have seen a good piece, snap it up – it's a great addition to any marine aquarium.

Andrew Caine. ■

Gambusia holbrooki will eat their own fry (photo: Derek Lambert).

M.P. & C. PIEDADE

Under pressure

DR PETER BURGESS EXPLAINS WHY STRESS IS AS HARMFUL TO FISH AS IT IS TO HUMANS.

We humans live increasingly stressful lives, or so we are led to believe. For us, stress comes in many shapes and forms: stress at work, the stress of commuting on crowded undergrounds, or the stress of being chased by a bull across a field. But what about our fish – do they get stressed? And can stress be harmful to them? In this article we'll take a look at stress in fish: the causes, consequences and cures.

Natural stress

It is perfectly normal for fish and other animals to occasionally experience stress. Stress can even have a beneficial purpose in certain circumstances. For example, the stress response may actually help a fish to escape from an aggressor, and this is achieved through a sequence of events, as follows: when a fish perceives a threat, electrical signals from its brain are sent via nerves to its kidney (fish possess two sorts of kidney, the one involved in stress being situated near the head). Special glands within the head-kidney, known as interrenal glands, are then triggered into producing a variety of 'messenger' chemicals, known as hormones. These hormones travel via the blood until they reach their target organs where they 'deliver the message'. Some of these so-called stress hormones function by instructing the tissues to release reserves of energy, enabling the fish to put on a spurt of speed and hence have a better chance of escaping from the aggressor. So without stress, the victim might be rather 'laid-back' about being chased, and finish up with a few fins torn, or much worse!

Stress hormones

Of all the stress hormones, adrenaline is perhaps the best known. Humans, fish and other animals are capable of producing adrenaline in response to stress. We know its effects only too well – a sudden fright triggers the production of adrenaline in our body which in turn causes our heart to thump faster! The fast heart beat is priming us to face the threat (to fight it) or run away (take flight). Hence our reaction is sometimes known as the 'fight or flight' response, and it happens in fish also.

Acute and chronic stress

The chase scenario described above is an example of acute stress. Acute stressors are, by definition, brief, since the ➡

left: Here a group of Uaru are covered in White Spot. This disease is most common among fish that have recently been imported but may surface any time in an aquarium where stressful conditions prevail.

below: Chronically stressed fish are more prone to skin fungus like this poor *Corydoras rabauti* is suffering from.

Causes of stress

Being constantly chased is just one cause of chronic stress. Below are some of the other causes of stress in an aquarium:

Stressful fish interactions

- **Chased or bullied by territorial fish.**
- **Chased by a spawning partner (usually a male chasing an unwilling female).**
- **Chased by a potential or perceived predator.**

These aggressive interactions are often worse when fish are kept in crowded conditions.

Environmental stressors: water conditions

- **Incorrect temperature.**
- **Incorrect pH.**
- **High level of nitrate, nitrite, ammonia or other toxins.**

Water chemistry stressors are often the worst kind for the fish may be constantly exposed to these stressors for 24 hours a day. In addition to causing stress, adverse water conditions may directly harm the fish (for example, ammonia will harm the gills).

Environmental stressors: decor

- **Lack of appropriate decor.**
- **Lack of shelter for species that like to hide (for example, some catfish and loaches).**
- **Incorrect lighting (too bright or too dark).**
- **Frequent changes to the environment (some aquarists constantly fiddle with the aquarium decor – don't!)**

External stressors

- **Frequent sudden vibrations (children banging on glass, doors slamming)**
- **Frequent switching on and off of room lights (especially when the tank lights are off).**

above: Some viral diseases, such as Lymphocystis, may be triggered by stress. Despite the chronic condition this Queen angel fish is in, it may recover once moved to a stress-free environment.

⇒ chased fish will quickly recover from its ordeal once safely away from the aggressor.

In a lake or pond it is fairly easy for a fish to flee far enough to safety, but things can be quite different within the confines of a small glass box – the aquarium. Let's consider an aquarium that houses a pair of cichlids and other fish. We know that cichlids are especially territorial at spawning time, so let's assume that the cichlid's spawning territory in nature is 6' diameter (the actual size will depend on the species), however their aquarium is only 3' long. Clearly, any other fish sharing the cichlid's small home will constantly be within the defended territory and hence constantly at risk of being chased: these harassed fish are likely to suffer from chronic stress, assuming they don't get torn to shreds.

Effects of chronic stress

Chronic stress is much more likely to occur under captive conditions, and it is this form of stress that can have the greatest detrimental effects on the fish's well being. Chronic stress can harm a fish by the following:

REDUCING GROWTH

Stress hormones divert energy away from growth and into 'fight or flight'. Chronically stressed fish may remain stunted or take longer to reach adult size. Stress can also inhibit growth by interfering with growth hormones and by suppressing the fish's appetite (subordinate fish may be reluctant to feed at mealtimes).

Signs of chronic stress in fish

These can be quite vague, but here a few symptoms to watch out for:

- **A fish that normally is seen out in the aquarium begins to hide.**
- **Fish appears very dark or very pale (stress can affect the hormones that alter skin pigmentation).**
- **Fish hides near top of water with head-down posture (may indicate a defence position resulting from aggression by another fish).**
- **Fish goes off its food.**

Obviously, some of the above symptoms can also arise from disease, or even from spawning activity (some cichlids and catfish hide away when brooding eggs and fry).

REDUCING DISEASE RESISTANCE

Stress directly interferes with the fish's immune system. Chronically stressed fish are therefore more prone to bacterial problems, skin fungus and parasites. Also, some viral diseases, such as lymphocystis, may be triggered by stress.

INHIBIT REPRODUCTION

This can arise from behavioural changes and/or physiological changes caused by stress. Certain stress hormones may interfere with other hormones involved in reproduction.

As far as fish are concerned a threat doesn't have to be real in order to be stressful. For example, children who bang on the aquarium glass pose no direct threat to the fish, but the fish *feels* threatened nevertheless and can suffer from chronic stress as a result. This is why public aquariums place warning signs about not tapping on the viewing panels. Also note that what is stressful to one species of fish may be non-stressful (or even beneficial) to another. For example, a powerful filter can provide ideal riverine conditions for an agile Rasbora but can cause stress to a slow-moving gourami that constantly has to struggle in the water current.

Avoiding aquarium stress

Unfortunately, hypnotherapy and stress counselling doesn't work too well on fish! The responsible aquarist must try and minimise possible causes of stress in the aquarium. It is, of course, impossible to achieve zero stress.

Basically, this means paying special attention to the fish's environmental needs and by monitoring the fish's interactions with each other (that is, to avoid pecking orders or the emergence of aggressors).

Stress prevention is better than cure and so these considerations are very important when choosing fish for the aquarium. Before buying a fish, always consider whether it will be compatible with the aquarium and its existing fish community. For example, ask yourself: does it require any special decor, such as rock caves or bushy plants? Are the water conditions suitable? Will the fish be harassed by the existing fish, or conversely could it grow into an aggressor? Will adding another fish overcrowd the tank when all the inhabitants are fully grown? A few moments' thought could save a lot of misery for the fish and their owner.

The ability to minimise stress in the aquarium is a hallmark of an experienced aquarist, and that's what it takes to achieve an harmonious and healthy community of fish. ■

Miss Piggy

GRANT WEIR HAS A STRANGE TALE TO TELL ABOUT A SPOTTED LUNG FISH.

It was not long after we started exporting live tropical aquarium fish from Agbaje Waterside, in the rain forest region of Nigeria, that we received a large order from the USA. Among the items required were 24 Spotted lung fish (*Protopterus dolloi*). We despatched the initial order and then, thinking that they should be among the fish always kept in stock, sent for further supplies from a place, 200 miles (320km) north of us, on the River Niger.

The African lung fish can be traced back nearly 350 million years to the Devonian period in history. It inhabits the Niger and Benue rivers and especially their northern reaches. There are two varieties available in Nigeria: *Protopterus dolloi* and *P. annectens*, which is plainer. Neither variety inhabits the southern rivers and, especially, our local river, the Oluwa.

Sleeping through the dry season

As the lung fish's river home recedes towards the end of the rainy season, it builds itself a cocoon out of saliva and mud. It then aestivates inside its cocoon until the following rainy season when the rising river water liberates it. However it can survive up to three years inside its cocoon if there is a prolonged drought. The lung fish has been known to move quite appreciable distances over land and can breathe quite happily, out of the water. During the dry season, it is quite common for northern-based farmers to dig them up when ploughing or hoeing land that is adjacent to a river.

Unfortunately, although we advertised our lung fish considerably and even made them the subject of 'special offers', the replacements were slow to sell. Due to the aggressive, territorial nature of lung fish this meant that a considerable number of our conditioning tanks were permanently occupied with one fish only. Eventually, the only one we had left was one that had been 'in hospital' since it had arrived with some particularly nasty sores, which we had found very tough to heal. These sores had prevented its sale and unwittingly made it the source of many 'healing' experiments.

A new home

The fish was about 10" (25cm) long and despite our most concentrated efforts maintained one lasting wound which we deduced had been made by a farmer's hoe. Finally, we made the decision to liberate the fish and with due ceremony gently launched it from the bottom of our boat ramp into the fast flowing river.

A year later, almost to the day, a fisherman was casting his net near the base of the boat ramp and caught our lung fish, now 14" long (35cm) and in pristine condition. Knowing it was not a 'local' fish and fearing, perhaps, any spiritual rebuffs that eating or keeping the unusual specimen might incur, he offered it back to us and we duly bought it again.

Disgusting table manners

The Managing Director of Nigeria's premier air charter company lived next door to our Lagos base and both Andrew and his wife, Tileke, were keen amateur aquarists. Always on the look-out for the unexpected and unusual for their many tanks, they agreed to look after our lung fish. Although we have never been able to differentiate between the lung fish sexes, Tileke decided to name her new pet Miss Piggy, not only in deference to her appetite but also due to her decidedly distasteful dinner habits.

After eating, lung fish regurgitate their meal through their gill openings, eat it again, regurgitate and continue this filtering process until, in Tileke's opinion, the tank is a complete mess. Unless the debris is quickly removed, this filtering activity quickly fouls the tank and Tileke endured many hours of her own filtering activity with a fine mesh net while trying to keep Miss Piggy's tank clean.

Despite this obvious drawback, it soon became obvious that her favourite food was raw hamburger. Immediately the hamburger entered her tank, she would freeze, size up her 'prey' and then devour it with the speed and motion of a striking snake. This exceptional and entertaining eating pattern, coupled with her willingness to devour all Tileke's recipes, led to one very satisfied chef and a rapidly growing, very well fed Miss Piggy.

An unusually close relationship

The routine of hand feeding and then cleaning, although gruelling, proved rewarding and soon developed into an unusually close relationship between Miss Piggy and Tileke. With visible teeth and snake-like striking action, only one man, Monday, back at our Fish Centre at Agbaje had been courageous enough to routinely feed our lung fish and nobody would dare to try to touch them. Tileke, remarkably, actually petted Miss Piggy and handled her regularly.

M. P. & C. FRENCH

above: This Lungfish (*Protopterus annectens*) looks like Miss Piggy without the spotted pattern.

The relationship flourished to such a degree that Miss Piggy would audibly tap on her glass tank with her head whenever she wanted feeding or attention. Tileke, ever ready to please, would immediately respond with either hamburger or a cuddle. In view of the lung fish's reputation, which our own experience bellied, we found it impossible to accept Tileke's teasing invitations to cuddle Miss Piggy ourselves and wouldn't recommend anybody attempting Tileke's heroics *before* establishing a very close relationship with their lung fish.

Sadly, after nearly 18 months, the now 20" (50cm) long Miss Piggy and her demanding routine got to be too much for even Tileke and she asked to be relieved of her duties. Fortunately, shortly after we had taken Miss Piggy back to Agbaje and reintroduced her to a more mundane life style and a diet of earth worms and crushed water snails, we had an order for a large lung fish from an importer near Miami, Florida. We were so relieved to find her a good home that we didn't charge for her.

When we visited this customer four months later, Miss Piggy was firmly ensconced in her new home, a 200-gallon (880-litre) tank. She had become so much of a local celebrity, with her penchant for hamburgers and her very friendly manner, that our customer had decided to keep her and for all we know she is there to this day, totally adapted to, and thoroughly approving of, the American fast food tradition. ■